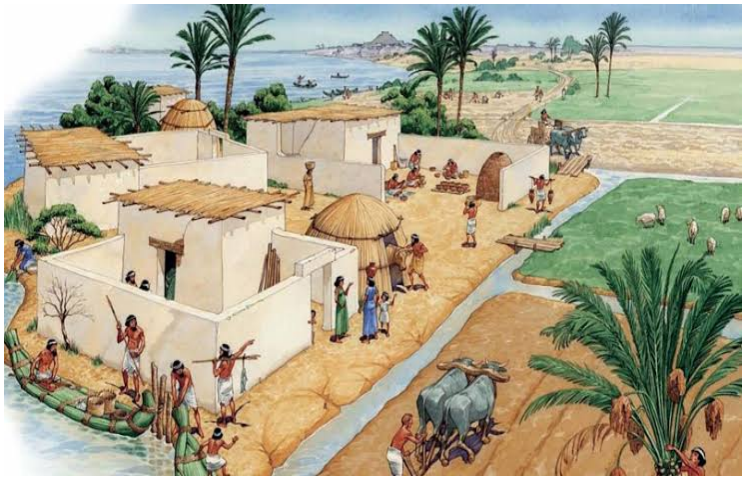
CRITICAL AND CREATIVE THINKING TEST ITEMS
CLASS: VIII
SUBJECT: SCIENCE
CHAPTER_1_ CROP PRODUCTION AND MANAGEMENT
INDEX

TOPIC: Crop Production and Management

TEST ITEM 1: History of agriculture:-

Humans were hunter gatherers in the beginning of human history. People lived a nomadic lifestyle. Soon they began to learn about crops. The origin of farming dates to around 10,000 years ago somewhere in the Indus valley. During early civilization around 5000 B.C. irrigation technology developed in Middle East. In Egypt, the Nile River relied on seasons. Innovations took place like cross breeding, crop rotation, mixed cropping, genetically modified crops, composite farming, etc. Finally modern agriculture practices began in America with the arrival of European colonists.



1.1) Name the place where origin of farming is supposed to be started-

a) Brahmaputra valley
b) Indus valley
c) Bhakhra Nangal valley
d) Lug valley

Template

Domain :Scientific Literacy		Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items		Learning Outcome (as per NCERT)- Student learns about the history of agriculture.	
Yes	Text		
Yes	Image		
-	Table		
-	Graph		
-	Map		
-	poem		

Scientific Literacy

1.1 FRAMEWORK	CHARACTERISTICS
Competency	Identify scientific oriented issues and evidences
Knowledge system	Knowledge of science-Living system
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	1 (a)

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT (b)Indus valley NO CREDIT any other answer

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1.2) Most of Egypt is desert, but along the Nile River the soil is rich and good for growing crops.

Yes/No

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student learns about the history of agriculture.	

Scientific Literacy

1.2 FRAMEWORK	CHARACTERISTICS
Competency	Identify scientific oriented issues and evidences
Knowledge system	Knowledge of science-Living system
Context	Global

Cognitive Demand	Medium
Item format	Close constructed response (reasoning)
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT (b)NO NO CREDIT any other answer

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1.3) The practice of growing a cereal crop and the pulse crop alternately in the same field in successive season is called _____.

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- To learn different cropping pattern.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Scientific oriented issues and evidences
Knowledge system	Knowledge of science-Living system
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response (reasoning)
Proficiency Level	2

Credit Pattern:
Full credit: 2
Partial Credit: N.A.
Nil Credit: 0
Description of answer key and Credits:

FULL CREDIT :Crop rotation NO CREDIT :any other answer

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1.4) A farmer grows different crops in a succession. Do you think what he is following, is correct? Justify your answer.

Template

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To learn utility of different cropping pattern.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the phenomenon scientifically.
Knowledge system	Knowledge of science-Living system
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response (reasoning)
Proficiency Level	3

Credit Pattern:
Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT to maintain soil fertility, to replenish soil, to produce better yield (any two point) PARTIAL CREDIT any one correct point NO CREDIT any other answer

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1.5) Choose the method to replenish nutrients in the soil

a) Provide manure
b) Provide fertilizers
c) Sowing of such kind of crops which can be mulched
d) All of the above

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Student learns about the agriculture practices.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify scientific oriented issues and evidences
Knowledge system	Knowledge of science-Living system
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: d) all of the above NO CREDIT: any other answer

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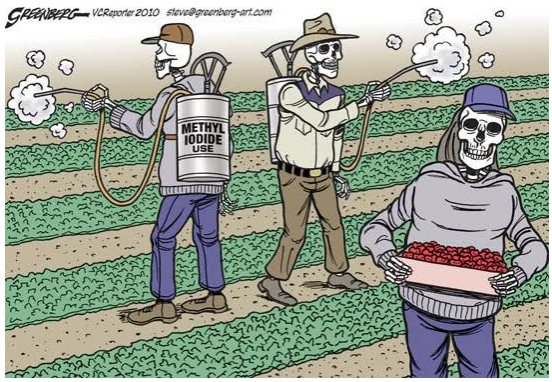
TEST ITEM 2: MODERN AGRICULTURAL CHALLENGES

A pest is any organism that causes an economic loss or damage to the physical well-being of human beings. It may destroy crops, cause diseases in them or in human beings. Chemicals used to eradicate or worn-out the unwanted pest's population from agriculture or experimental field are called as pesticides. Some pesticides are organism-specific and have particular mode of action to remove the pests.

Pesticides used in modern agriculture and bio-farming, and its interaction in environmental processes which is about 4,000 years old. Ancient literature mentions the use of poisonous plants for pest control. Modern agriculture employs a number of chemicals for enhancing crop yield and protecting the same. Synthetic fertilizers are added to replenish the various nutrients and maintain the soil fertility. These chemical fertilizers are added to the soils in order to overcome the deficiency of minerals and to provide extra chemicals required for proper growth of high yielding varieties. Plant development pattern is highly modified by additionof plant growth regulators (PGR) during agricultural practices and plant tissue culture experiments.



2.1) What is the full form PGR?

a) Physical growth revivers
b) Plant growth regulators
c) Plant germination regulators
d) Plant germination revivers

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min

		Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student learns about the modern agricultural challenges.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify scientific oriented issues and evidences
Knowledge system	Knowledge of science-Living system
Context	Global
Cognitive Demand	Low
Item format	Simple MCQ
Proficiency Level	1 (a)

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT b)Plant growth regulators NO CREDIT any other answer

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2.2) Why a farmer uses pesticides in field during agricultural practices?

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph	Learning Outcome(as per NCERT)- Student learns about the modern agricultural challenges.	

-	Map
-	Poem

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify scientific oriented issues and evidences
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT :to kill pests , to get higher yield
Partial credit: any one response
Nil credit: Any other response

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2.3) Whether use of pesticides is the application of modern science only? (Yes/No)

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student learns about the modern techniques of agriculture.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to draw conclusion
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Close constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT :no NO CREDIT :any other answer

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2.4) Name any two chemicals which are used to increase crop yield.

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student will be able to apply knowledge	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Knowledge -use scientific evidence to draw conclusion
Knowledge system	Knowledge of science
Context	Global

Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Urea, di ammonium phosphate PARTIAL CREDIT :Any 1 name NO CREDIT :Any other answer

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2.5) 'Pesticides/weedicides has increased the crop yield but caused other damages to the environment including human life'. Justify the statement by giving two points.

Template

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Student analyze the phenomenon critically.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to draw conclusion
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	High
Item format	Open constructed response
Proficiency Level	4

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT i)Excess use of chemicals make soil infertile in long run ii)chemicals cause several diseases to human Partial Credit for incomplete answer. No credit: Any other response

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TEST ITEM 3: IMPACT OF GERMICIDES

PGR are required in low concentrations in plant growth studies. Many growth regulators like malic hydrazide, methyl ester of naphthalene acetic acid (NAA) prolong storage. Still others like 2, 4-D and 2, 4, 5-T prevent premature fruit drop and are widely used as weedicides. Ethylene induces early ripening of fruits. Some other physiological effects of growth regulators are rooting of stem cuttings, enhanced vegetative growth, and prevention of
flowering etc. Agricultural crops are mainly destroyed by insects. Various types of fungi and bacteria cause diseases in plants. According to an estimate, there is an annual loss of up to 30% in agricultural production due to insect pests and plant diseases. If only 50% of this loss could be saved from pests, the food problem of our country can be solved to a great extent.

3.1) Name the chemical which induces early ripening of fruits

a) 2 4-D
b) 2,4,5,T
c) Ethylene
d) Abscisic acid

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes / Text	Learning Outcome(as per NCERT)- Student will be able to:	

Yes	Image
-	Table
-	Graph
-	Map
-	Poem

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify scientifically oriented issues
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	1

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT c)
NO CREDIT any other answer

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3.2) What are the main causative agents of plant diseases?

Template

Domain :Scientific Literacy	Theme: Modern Agriculture practices	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph	Learning Outcome(as per NCERT)- Student can enlist the pests	

-	Map
-	Poem

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use evidences to draw conclusion
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Close constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT virus, bacteria, protozoa, fungi Partial credit any one answer

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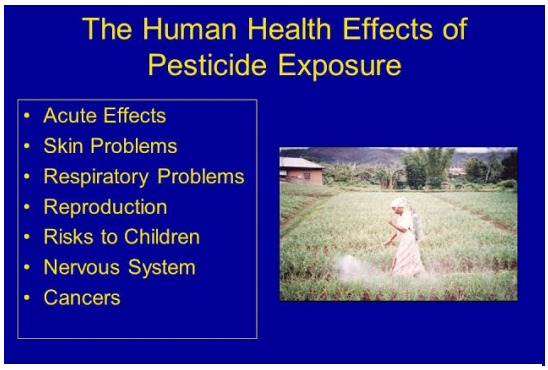

Pesticides can cause short term adverse health effects called acute effects as well as chronic health effects which includes stinging eyes, rashes, blisters and blindness to farmers and nausea, diarrhea, and death to consumers.

3.3) Do weedicides has any impact on main crop plant? (Yes/No)

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student analyzes the phenomenon critically.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to conclude
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: no impact on main crop plant NO CREDIT :any other answer

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3.4) Use the information to develop an argument in support of reducing use of chemicals to enhance plant growth.

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII

		Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student analyze the phenomenon critically.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to conclude
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT :i) They deteriorate the quality of soil in a long run
ii) They cause many diseases to the farmers and consumers.
PARTIAL CREDIT: any one point
NO CREDIT :any other answer

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3.5) Which is true for DDT? It is

a) Not a pollutant
b) An antibiotic
c) An antiseptic agent
d) A non degradable pollutant.

Template

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</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the phenomenon scientifically
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT d) NO CREDIT any other answer

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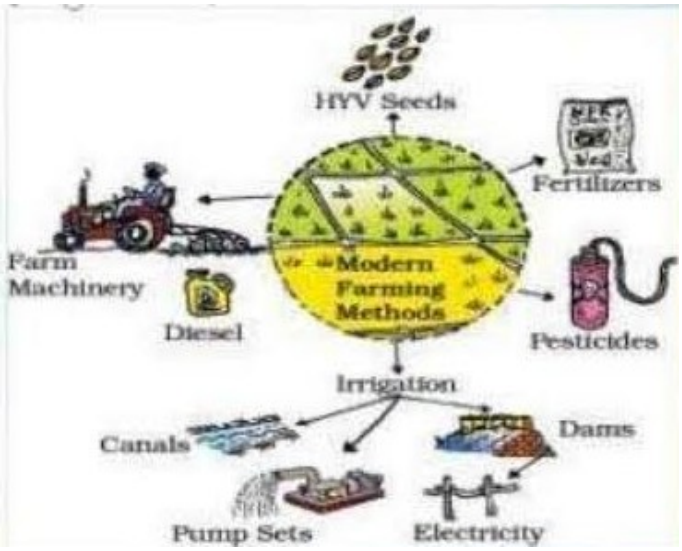
TEST ITEM 4: AGRICULTURAL PRACTICES:-

India is a vast country. The climatic conditions like temperature, humidity and rainfall vary from one region to another. Accordingly, there is a rich variety of crops grown in different parts of the country. A village Palmapur in India has farming as its main product activity. This village resembles a village of the western part of the state of Uttar Pradesh. During rainy season (Kharif) farmers grow jowar and bajra. It is followed by cultivation of potato between October and December. In the Winter season (Rabi) fields are sown with Wheat. Sugarcane is also harvested once every year. This village has a well-developed system of irrigation. Crops require water for growth and production. Crops like boropaddy and potato are grown in irrigated condition. The level to which the soil can hold on water

depends on the physical property of the soil like particle size, composition of soil i.e. % of clay etc. Some oilseed crops and vegetables in rabi season are also grown with irrigation. Farmers use cow-dung and other natural manure as fertilizers. From preparation of soil to storage of grains, Modern farming methods are using for higher yield.



Crops	Water requirement(ha.cm)
Autumn(Aus) paddy	88
Winter (Aman) paddy	200
Summer (Boro) paddy	175
Wheat	35
Potato	50
Mustard	32
Lentil	24
Green gram	24
Tomato	40
Brinjal	65
Okra	60
Beans	45
Beets	38
Cabbage	40
Cauliflower	46
Onion	36
Sugarcane	120

Source: i) Principles of Crop Production by Chakraborty and Mondal(4)
ii) Agriculture Research Data Book, Watershed Management of India, JVS Murthy, 1995

Table showing water requirement of different crops.

4.1Which crop needs minimum irrigation?

a) Onion
b) Pulses

c) Paddy
d) Wheat

Template

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Student interprets the data accurately.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Data interpretation-Use scientific evidence to draw conclusion
Knowledge system	Knowledge about science
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT :b) Pulses NO CREDIT : any other answer

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4.2) The field capacity of soil depends upon

a) capillary tension in soil
b) porosity of soil
c) both a and b
d) none of the above

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Student analyze the phenomenon critically.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the phenomenon scientifically
Knowledge system	Application-Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT c) NO CREDIT any other answer

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4.3) Why paddy crop cannot be grown in winter season?

Template

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Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to draw conclusion
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Because its water requirement is high at the time of sowing.
It cannot withstand very low temperature. Or any other correct
reason.
PARTIAL CREDIT: for any one correct reason
NO CREDIT :any other answer

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4.4) Give examples of crops grown in:

Winter season_____

Summer season _____

Template

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Expected time:2 min
Total Credit: 2</td></tr>
<tr><td>Description of items<table><tr><td>Yes</td><td>Text</td></tr><tr><td>Yes</td><td>Image</td></tr><tr><td>-</td><td>Table</td></tr><tr><td>-</td><td>Graph</td></tr><tr><td>-</td><td>Map</td></tr><tr><td>-</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome(as per NCERT)-
Students will be able to recollect and tell the crops they have seen in relation to the season</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify the science-oriented phenomenon
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Close constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT:Rabi crop- Wheat or any correct one
Kharif crop -Rice or any other correct one
PARTIAL CREDIT: if any one response is correct
NO CREDIT :any other answer

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KVS REGION: Gurugram__

4.5) What role is played by Irrigation in raising crops? Mention any two points.

Template

<table>
<tr><td>Domain :Scientific Literacy</td><td>Theme: Agriculture</td><td>Classes: VII-VIII
Expected time:2 min</td></tr>
</table>

		Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Will be able to explain the role of water for crops.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the phenomenon scientifically
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Irrigation helps to supply water as per need of the plants grown. Irrigation water improves water conditions in the soil, increases the water content of plant fibers, dissolves nutrient and makes them available to plants.
PARTIAL CREDIT: if response is correct but not covering all points.
NO CREDIT :any other answer

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KVS REGION: Gurugram

4.6) With the help of picture shown, make out the steps of growing crop in field.

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student will be able to explain and write the steps in correct sequence.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Interpret the data scientifically
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Close constructed response
Proficiency Level	4

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

: Ploughing of the field,sowing of seeds, addition of manure or fertilizers, Irrigation, use of weedicides, pesticides.
PARTIAL CREDIT: if response is correct but not covering all points.
NO CREDIT: any other answer

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TEST ITEM 5: GRANARIES

Granaries

Buffer stock is the stock of food grains, namely wheat and rice, procured by the government through the Food Corporation of India (FCI). Large scale storage of grains in silos and granaries is done for proper distribution. Proper steps should be followed to protect them from pests like rats and insects.

The first step for quality grain is to make sure your storage facilities are prepared for the grain going in. Clean out your bins properly disinfectant and get rid of any grain left that might have insects in it. Also, check under floor areas. “These can be a real nice spot for insects to go from one season to the next,” advises Ken Hellevang, North Dakota State University Extension engineer. “If you had an insect infestation at the end of last year, make sure you fumigate or thoroughly clean the bin.”

For long-term storage, farmer will need to dry grain to a lower moisture level. It depends on the crop how much moisture should be left for long term storage.

At 13% moisture, mould growth is prevented in corn, keeping grain in better condition. For soybeans, famer will need to dry down a little bit more. “13% is what is typically done for storage in cooler months,” says Hellevang. “If you are going into summer temperatures, the moisture content of soybeans should really be closer to 11%.”

Properly distributing fines with a grain spreader or by practicing repetitive coring will help improve aeration. A grain spreader can be used on bins smaller than 48 feet to spread out fines.

The ability to control the temperature of grain during storage is critical, says Hellevang. “You should be putting grain into a storage system that has a good aeration system so you can control the grain temperature,” he says.

Recommendations for the exact temperature to store differ by region and season.

The long-recommended practice is to check your grain weekly during the summer. Another reason to check grain frequently during the summer is to watch for insects.

5.1) Name one government agency which is involved in procuring food grains from farmers and storing them properly?

Template

<table>
<tr><td>Domain :Scientific Literacy</td><td>Theme: Agriculture: Storage</td><td>Classes: VII-VIII
Expected time:2 min
Total Credit: 2</td></tr>
<tr><td>Description of items<table><tr><td>Yes</td><td>Text</td></tr><tr><td>Yes</td><td>Image</td></tr><tr><td>-</td><td>Table</td></tr><tr><td>-</td><td>Graph</td></tr><tr><td>-</td><td>Map</td></tr><tr><td>-</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome(as per NCERT)-
Student knows about food storage techniques.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the phenomenon
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Short answer
Proficiency Level	1

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT Food corporation of India (FCI) NO CREDIT any other answer

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KVS REGION: Gurugram

5.2) Why is it necessary to dry the harvested food grain before storage? Comment.

Template

<table>
<tr><td>Domain :Scientific Literacy</td><td>Theme: Agriculture</td><td>Classes: VII-VIII
Expected time:2 min
Total Credit: 2</td></tr>
<tr><td>Description of items<table><tr><td>Yes</td><td>Text</td></tr><tr><td>Yes</td><td>Image</td></tr><tr><td>-</td><td>Table</td></tr><tr><td>-</td><td>Graph</td></tr><tr><td>-</td><td>Map</td></tr><tr><td>-</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome(as per NCERT)-
Student analyze the phenomenon critically.</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific information to draw conclusion
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

Because high moisture content promotes growth of fungus or microbes which damages grains.
Partial credit: Any one point
NO CREDIT: any other answer

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5.3) What are the ways in which food grains can be stored on large scale?

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - Table - Graph - Map - Poem	Learning Outcome(as per NCERT)- Students will be able to enlist different ways of storage of food grains.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific information to draw conclusion
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Close constructed response
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT Large scale storage is done in Granaries (in gunny bags) and Grain Silos. NO CREDIT any other answer

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5.4) Farmer should check the stored grains regularly:

a) Once in a Month
b) Once in six months
c) Daily
d) Once in a week.

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min

		Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student analyze the phenomenon critically.	

Scientific Literacy

Framework	Characteristics
Competency	Use scientific information to draw conclusion
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit:

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT d) once in a week NO CREDIT any other answer

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5.5) Write the factors one should keep in view while storing grains for long term.

_____

_____

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items	Learning Outcome(as per NCERT)-	

Yes	Text	Student will be able to enlist the factors essential for storage.
Yes	Image	
-	Table	
-	Graph	
-	Map	
-	Poem	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to draw conclusion
Knowledge system	Knowledge about science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Moisture, Temperature, Pests and microbes free storage house, good quality grains. PARTIAL CREDIT: for partial correct response NO CREDIT :any other answer

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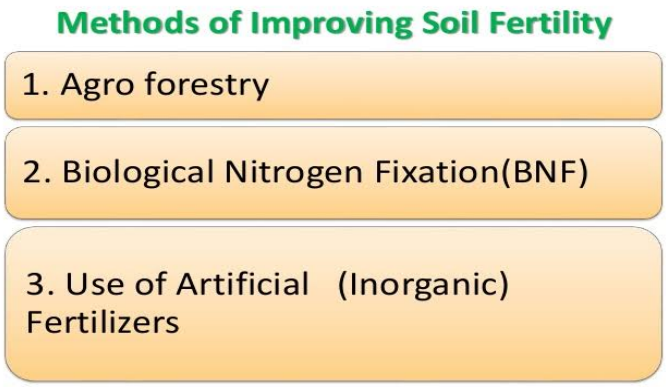
TEST ITEM 6: IMPROVEMENT IN SOIL FERTILITY

Healthier soils improve crop yields and reduce soil loss from both wind and water erosion, and protect water quality by reducing contaminated runoff. Land managers can increase soil organic matter by applying raw manure or a manure product like compost, pellets or biochar; a product of manure combustion. These days more natural way of keeping up the soil has been adopted where some earthworms are used to consume garden wastes and thereby convert organic matter into compost formed by worms. It is considered better than normal compost. Other methods of improving soil fertility have been depicted here. Chemical fertilizers being pure salts made in factories, so they are devoid of any organic matter. They are being readily soluble in water form solutions and if field is excessively irrigated, the excess water either flows off or get into ground table along with its solutes. Leaching of minerals from fields may damage the water quality also. Their over presence may add to toxicity.



6.1) fertilizers are _____ in nature.

a) Organic
b) Inorganic
c) Both of these
d) None of these

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Students will be able to enlist the factors of soil fertility The essentiality of fertilizers/ manures	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explain the scientific issues
Knowledge system	Knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Simple MCQ
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: NA

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Inorganic NO CREDIT :any other answer

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6.2) It is age old saying 'Earthworms are the friends of farmer'. What justification can you suggest for the same?

i) _____
ii) _____

Template

<table>
<tr><td>Domain :Scientific Literacy</td><td>Theme: Agriculture</td><td>Classes: VII-VIII
Expected time:2 min
Total Credit: 2</td></tr>
<tr><td>Description of items<table><tr><td>Yes</td><td>Text</td></tr><tr><td>Yes</td><td>Image</td></tr><tr><td>-</td><td>Table</td></tr><tr><td>-</td><td>Graph</td></tr><tr><td>-</td><td>Map</td></tr><tr><td>-</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome(as per NCERT)-
Students will be able to know the natural way of soil rejuvenation</td></tr>
</table>

Scientific Literacy

Framework	Characteristics
Competency	Explain the phenomenon scientifically
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:
Full credit: 2
Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Increase pores in the soil.Vermi-compost and green manure Partial CREDIT any other answer

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Name of the Vidyalaya: K V No. 3 Faridabad

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6.3) Suggest which is better-manure or fertilizers? Give reasons.

_____

_____

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student think critically and are able to: Differentiate between manure and fertilizers	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use scientific evidence to draw conclusion
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Open constructed response
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT: Manure is better because it adds organic matter to the soil, increase porosity, water holding by soil and controls mineral balance. PARTIAL CREDIT: manure is better than fertilizer. NO CREDIT :any other answer

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6.4) Select the appropriate response of the following:

i) Red worms can be used to make compost faster. Yes/no
ii) Humus can be added to soil by fertilizers. Yes/no

Template

<table>
<tr><td>Domain :Scientific Literacy</td><td>Theme: Agriculture</td><td>Classes: VII-VIII
Expected time:2 min
Total Credit: 2</td></tr>
<tr><td>Description of items<table><tr><td>Yes</td><td>Text</td></tr><tr><td>Yes</td><td>Image</td></tr><tr><td>-</td><td>Table</td></tr><tr><td>-</td><td>Graph</td></tr><tr><td>-</td><td>Map</td></tr><tr><td>-</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome(as per NCERT)-
Student will be able to:
enlist the usefulness of red worms</td></tr>
</table>

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Use data scientifically to draw conclusions
Knowledge system	knowledge of science
Context	Global
Cognitive Demand	Medium
Item format	Complex reasoning
Proficiency Level	2

Credit Pattern:

Full credit: 2

Partial Credit: 1

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT 1. yes, 2. NO Partial credit any correct answer

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6.5) Which of the following microorganisms are engaged in nitrogen fixation?

a) blue-green algae

b) *penicillium notatum*

c) rhizobium

d) both a and c

Template

Domain :Scientific Literacy	Theme: Agriculture	Classes: VII-VIII Expected time:2 min Total Credit: 2
Description of items Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome(as per NCERT)- Student will be able to enlist the names of some microbes that enhance soil fertility.	

Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Identify based on scientific evidences
Knowledge system	Content of science
Context	Global
Cognitive Demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Credit Pattern:

Full credit: 2

Partial Credit: N.A.

Nil Credit: 0

Description of answer key and Credits:

FULL CREDIT d) both a and c NO CREDIT any other answer

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Test Item 7 CROP ROTATION AND USE OF COVER CROPS

Crop rotation is one of the most powerful cultural management techniques available to farmers for reducing weed seed and seedling densities. When rotation sequences include crops that differ in planting and maturation dates, competitive and allelopathic characteristics, and associated management practices (e.g., tillage, cultivation, mowing, and grazing), weeds can be confronted with an unstable and frequently inhospitable environment that prevents their proliferation. Studies reveal marked reductions in weed seed and seedling densities when corn was grown in rotation with winter wheat compared with corn grown as a continuous monoculture. Crop rotation is responsible for increase in soil physical properties and increases yield also.

Q1.1 What is the effect of Crop Rotation on soil properties?

a) Reduce soil fertility
b) Reduce yield
c) Improve soil physical properties
d) Increases cost of crop

Domain: scientific literacy	Theme: crop rotation	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text Image	NCERT learning outcome: benefits of crop rotation	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use scientific evidence to draw conclusion	

Knowledge system	Knowledge of science
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency level	Level 2
Credit pattern:	
Full credit:	2
Partial credit:	No
No credit:	0
Description of answer key and credits:	
1.1)Full credit: Improve soil physical properties	
Name of the teacher: Dinesh Kumar	
Designation: PGT Physics	
Email: dinesh.atithi@gmail.com	
Name of Vidyalaya: Rewari Region Gurugram	

Q1.2In terms of agricultural practices, what tillage denotes?

Domain: Scientific literacy	Theme: Crop rotation	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: Text Image	NCERT learning outcome: Benefits of crop rotation	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Interpretation	
Knowledge system	Understanding	
Context	Global	
Cognitive demand	Medium	
Item format	Open constructed type	
Proficiency level	Level 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1	
No credit:	O	
Description of answer key and credits:		
1.2)Full credit: Tillage is the agricultural preparation of soil by mechanical agitation		
Name of the teacher: Dinesh Kumar		
Designation: PGT physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q1.3 The most powerful culture management technique for reducing weed seed is Crop rotation (YES/NO)

Domain: Scientific literacy	Theme: crop rotation	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: Text Image	NCERT learning outcome: benefits of crop rotation	
FRAMEWORK	Characteristics	
Competency	Scientific attitude	
Knowledge system	Understanding	
Context	Global	
Cognitive demand	Medium	
Item format	Reasoning type	
Proficiency level	Level 1	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	No	
No credit:	O	
Description of answer key and credits:		
1.3)Full credit: Yes		
Name of the teacher: Dinesh Kumar		
Designation: PGT physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q1.4 The main advantage of crop rotation over continuous monoculture is

---

Domain: Scientific literacy	Theme: Crop rotation	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: Text Image	NCERT learning outcome: benefits of crop rotation	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain phenomena scientifically	
Knowledge system	Understanding	
Context	Global	
Cognitive demand	Medium	

Item format	Closed constructed type
Proficiency level	Level 2
CREDIT PATTERN:	
Full credit:	2
Partial credit:	1
No credit:	O
DESCRIPTION OF ANSWER KEY AND CREDITS:	
1.4) Full credit: Helps in reducing soil erosion, Increases soil fertility Partial credit: Any one point Nil credit: Any other response	
Name of the teacher: Dinesh Kumar	
Designation: PGT physics	
Email: dinesh.atithi@gmail.com	
Name of Vidyalaya: Rewari Region Gurugram	

Q1.5 While following crop rotation the major things to keep in mind are.

Domain: Scientific literacy	Theme: Crop rotation	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: Text Image	NCERT learning outcome: benefits of crop rotation	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Interpretation	
Knowledge system	Scientific attitude	
Context	Global	
Cognitive demand	Medium	
Item format	Closed constructed type	
Proficiency level	Level 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
1.5) Full credit: crops that differ in planting and maturation dates, competitive and allelopathic characteristics, and associated management practices Partial credit: Any two or three No credit: Any other response		
Name of the teacher: Dinesh Kumar		
Designation: PGT physics		
Email: dinesh.atithi@gmail.com		

Name of Vidyalaya: Rewari Region Gurugram

Test Item 8 . ORGANIC FARMING

Organic farming system in India is not new and is being followed from ancient time. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (bio fertilizers) to release nutrients to crops for increased sustainable production in an eco-friendly pollution free environment. As per the definition of the United States Department of Agriculture (USDA) study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".

Q2.1 In Organic farming the thing that is excluded:

a) Manure
b) Biofertilizers
c) Fertilizers
d) Aquatic wastes

Domain: Scientific literacy	Theme: Organic farming	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of organic farming	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	Global	
Cognitive demand	Medium	
Item format	Simple MCQ	
Proficiency level	Level 1	
Credit pattern:		
Full credit:	2	
Partial credit:	NO	
No credit:	0	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
2.1)C) FERTILIZERS		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		

Email: dinesh.atithi@gmail.com
Name of Vidyalaya: Rewari Region Gurugram

Q2.2. Organic farming is not eco-friendly and pollutes the environment. (Yes/No)

Domain: Scientific literacy	Theme: organic farming	Class: viii
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of organic farming	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use scientific evidence to draw conclusion	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	REASONING TYPE	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
NO		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q2.3. How minerals grade rock additives form a part of organic farming?

Domain: Scientific literacy	Theme: organic farming	Class: viii
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Knowledge and benefits of organic farming	
FRAMEWORK	**CHARACTERISTICS**	

Competency	Explain the phenomenon scientifically
Knowledge system	Knowledge of science
Context	GLOBAL
Cognitive demand	MEDIUM
Item format	Closed constructed type
Proficiency level	LEVEL 2
CREDIT PATTERN:	
Full credit:	2
Partial credit:	1
No credit:	No response
DESCRIPTION OF ANSWER KEY AND CREDITS:	
1.3) Full credit: Mineral grade rock powder is natural equivalent to mineral rich soil. So no need to add chemical fertilizers	
Name of the teacher: Dinesh Kumar	
Designation: PGT Physics	
Email: dinesh.atithi@gmail.com	
Name of Vidyalaya: Rewari Region Gurugram	

Q2.4 Why is organic farming profitable?

Domain: Scientific literacy	THEME: ORGANIC FARMING	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT learning outcome: knowledge and benefits of organic farming	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Open constructed type	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1	
No credit:	No response	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
*Farmers can reduce their production **costs** because they do not need to buy		

expensive chemicals and fertilizers. *Healthier farm workers. *In the long term, organic farms save energy and protect the environment.
Name of the teacher: Dinesh Kumar
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Name of Vidyalaya: Rewari Region Gurugram

Q2.5 Organic farming may be adopted, to:

a). increase genetic diversity.

b). promote more usage of natural pesticides.

c). increase the uses of fertilizers and insecticides etc.

d). a and b both

Domain: Scientific literacy	Theme: organic farming	Class: viii
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of organic farming	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use the information to draw conclusion	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Complex MCQ	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	0	
No credit:	No response	
Description of answer key and credits:		
D) both a and b		
Name of the teacher: Dinesh Kumar		
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Name of Vidyalaya: Rewari Region Gurugram		

Q9. MULTIPLE CROPPING

In agriculture, multiple cropping is the practice of growing two or more crops in the same piece of land in same growing seasons instead of one crop. It is a form of polyculture. It can take the form of double cropping, in which a second crop is planted after the first has been harvested, or relay cropping, in which the second crop is started amidst the first crop before it has been harvested. A related practice, companion planting, is sometimes used in gardening and intensive cultivation of vegetables and fruits. One example of multi-cropping is tomatoes + onions + marigold; the marigolds repel some tomato pests. Mixed cropping is found in many agricultural traditions. In the Garhwal Himalaya of India, a practice called baranaja involves sowing 12 or more crops on the same plot, including various types of beans, grains, and millets, and harvesting them at different times.

Q3.1 Mixed cropping means

a) Growing of Two or more crops in same season
b) Growing of two or more crops one after the other
c) Growing of marigold two times a year
d) Growing of crops by using fertilizers

Domain: Scientific literacy	Theme: mixed cropping	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of mixed cropping	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	MCQ SIMPLE	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
FULL CREDIT:	2	
PARTIAL CREDIT:	NO	
NO CREDIT:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
3.1)Full credit: Growing of Two or more crops in same season No credit: Any other response		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q3.2 What is the other name of mixed cropping?

Domain: Scientific literacy	Theme: mixed cropping	Class: viii
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of mixed cropping	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	Global	
Cognitive demand	Low	
Item format	Closed constructed type	
Proficiency level	Level 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	No	
No credit:	No response	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
3.2)Full credit: POLYCULTURE		
Name of the teacher: Dinesh Kumar		
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Name of Vidyalaya: Rewari Region Gurugram		

Q3.3 Why marigold is grown with tomato crop?

a) It increases the yield of tomato
b) It increases the cost of cropping
c) It repel the pests of tomato
d) To obtain marigold flower

Domain: Scientific literacy	Theme: mixed cropping	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of mixed cropping	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	

Knowledge system	Knowledge of science
Context	Global
Cognitive demand	Medium
Item format	Simple MCQ
Proficiency level	Level 2
CREDIT PATTERN:	
Full credit:	2
Partial credit:	No
No credit:	No response
DESCRIPTION OF ANSWER KEY AND CREDITS:	
3.3)Full credit: It repel the pests of tomato	
Name of the teacher: Dinesh Kumar	
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Name of Vidyalaya: Rewari Region Gurugram	

Q3.4 What are the main objectives of mixed cropping?

Domain: Scientific literacy	Theme: mixed cropping	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of mixed cropping	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science-Living system	
Context	Global	
Cognitive demand	High	
Item format	Open constructed type	
Proficiency level	Level 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1 Reasonable answer	
No credit:	NO RESPONSE	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
t: Basic objective in mixed cropping is to make profit by growing various types of crops as their rates are different. It increases yield and improves variety of produce It prevents crop failure Partial credit: Any one or two responses		

No credit: Any other response
Name of the teacher: Dinesh Kumar
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Q3.Which of the following crops can be used for multiple cropping in a season?

a. Maize
b. Marigold
c. Millets
d. Wheat

i) a,b,c
ii) a,c,d
iii) b,c,d
iv) a,b,d

Domain: Scientific literacy	Theme: mixed cropping	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: knowledge and benefits of mixed cropping	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use scientific data to draw conclusion	
Knowledge system	Knowledge of science-Living system	
Context	GLOBAL	
Cognitive demand	HIGH	
Item format	Complex MCQ	
Proficiency level	LEVEL4	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	No	
No credit:	No response	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
Full credit: (iv) No credit: Any other response		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Test Item 10 .DESERTIFICATION

One day mother earth was showing a picture to the Son Newton, she said, "Look at the picture what do you see?

Newton: "Mom, in this picture, no greenery is there but only dry land. What is this?

Mother Earth: "This is the picture of desertification. When there is loss of water bodies as well as vegetation and wildlife, a land converts into desert.

Newton: "Mom! What are the causes of this?

Mother Earth: "There are many causes such as climate changes, over exploitation of soil through various activities like deforestation, loss of soil cover due to rainfall. Surface run off is one of the biggest reasons for desertification.

Newton: "What are the effects of desertification?"

Mother Earth: "if an area becomes a desert, then it is almost impossible to grow substantial crop without the crops there will be the shortage of food. Without the plant cover, rainfall pattern may change bringing floods or droughts depending upon the geography. This will further affect food and water supply, there will be poverty also.

Q4.1. About which problem Newton and his mother were discussing in the context?

Domain: Scientific literacy	Theme: Desertification	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Students will be able to define desert, enlist the factors that cause it.	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	CLOSED CONSTRUCTED TYPE	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		

4.1)Full credit: Desertification
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Q4.2. Write any two causes of the desertification in Africa?

Domain: Scientific literacy	Theme: Desertification	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Students will be able to define desert, enlist the factors that cause it.	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	OPEN CONSTRUCTED TYPE	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1 ONE REASON	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
4.2) Full credit: ANY TWO REASON		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
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Name of Vidyalaya: Rewari Region Gurugram		

Q4.3. What is effect of desertification?

(a) Almost impossible to grow substantial crop
(b) Shortage of food
(c) Poverty
(d) All of the above

Domain: Scientific literacy	Theme: Desertification	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Students will be able to define desert, enlist the factors that cause it.	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	MCQ	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	0	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
4.3)Full credit:**(d) All of the above**		
Name of the teacher: Dinesh Kumar		
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Name of Vidyalaya: Rewari Region Gurugram		

Q4.4.According to you, why is the need to solve the problem, felt today?

Domain: Scientific literacy	Theme: Desertification	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Students will be able to define desert, enlist the factors that cause it.	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use the scientific data to draw conclusion	
Knowledge system	Knowledge about science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	OPEN CONSTRUCTED TYPE	
Proficiency level	LEVEL 2	

CREDIT PATTERN:	
Full credit:	2
Partial credit:	1
No credit:	O
DESCRIPTION OF ANSWER KEY AND CREDITS:	
4.4) Full credit: Any correct reason : To save topsoil, To maintain soil fertility, To increase water holding capacity Partial credit : Any one or two points	
Name of the teacher: Dinesh Kumar	
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Name of Vidyalaya: Rewari Region Gurugram	

Q4.5. Topsoil erosion is a major problem in the global context. It can be caused by two natural forces on which we humans have no direct control. This is the reason why desertification has increased in the past century. Can you make out what the two forces are?

Domain: Scientific literacy	Theme: Desertification	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT learning outcome: Students will be able to define desert, enlist the factors that cause it.	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	REASONING TYPE	
Proficiency level	LEVEL 2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	0	
No credit:	0	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
~~NO~~ 4.5) Full credit: Wind & water forces. Only green cover is the answer to it.		
Name of the teacher: Dinesh Kumar		
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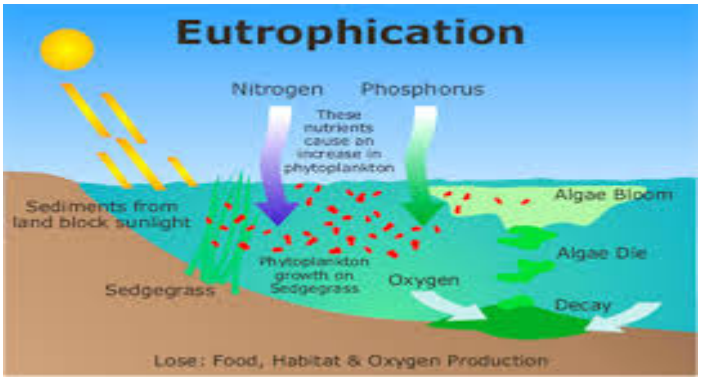
Name of Vidyalaya: Rewari Region Gurugram

Test Item 11. EUTROPHICATION:-



The enrichment of a terrestrial or aquatic ecosystem by the addition of nutrients, especially Nitrogen and phosphorous, that results in the superabundant growth of plants, algae or other primary producers. It can be a natural process or results from human activities such as agriculture runoff or sewage pollution. In aquatic ecosystem an increase in the algal population is terms as Algal bloom.

Eutrophication has become a major cause of concern over the world. Do you know the percentage of waters (lakes, rivers etc.) affected by eutrophication. "A recent survey showed that Asia pacific region 54% of lakes are eutrophic. In India alone 69% lakes, 87 % rivers are eutrophic. Increased algal bloom causes the disappearance of indigenous aquatic life and high BOD levels.

Q5.1.In the passage, what is the cause of Algal bloom?

a) Increase in silt level of water bodies
b) Increase in the water level of water bodies
c) Increase in the algal population
d) Addition of nutrient, especially nitrogen and phosphorous.

Domain: Scientific literacy	Theme: **Eutrophication**	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT LEARNING OUTCOME: Students will be able to define **EUTROPHICATION** **& enlist the factors for its increase**	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Understanding scientific enquiry	
Knowledge system	Knowledge of science-Environment	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Simple MCQ	
Proficiency level	LEVEL ~~3~~2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
5.1) Full credit: Addition of nutrient, especially nitrogen and phosphorous.		

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Q5.2-What could be the reason for the increase of nitrates and phosphates in the water bodies:

a. Addition of more fertilizers by the farmers
b. Surface run off from the field
c. Addition of sewage water into water bodies
d. Leaching of minerals due to excessive irrigation in fields

i) Only a,b,c
ii) Only a,c,d
iii) Only a & c
iv) All of the above

Domain: Scientific literacy	Theme: **Eutrophication**	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT LEARNING OUTCOME: Students will be able to define **EUTROPHICATION** **& enlist the factors for its increase**	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Use scientific data to draw conclusion	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	Complex MCQ	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
5.2) Full credit: (iv)		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
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Name of Vidyalaya: Rewari Region Gurugram		

Q3.How does eutrophication effects climate change?

Domain: Scientific literacy	Theme: **Eutrophication**	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT LEARNING OUTCOME: Students will be able to define **EUTROPHICATION** **& enlist the factors for its increase**	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	MEDIUM	
Item format	OPEN CONSTRUCTED TYPE	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
5.3) Full credit: Increased algal bloom causes the disappearance of indigenous aquatic life and high BOD levels. Disappearance of water bodies with aquatic ecosystem will disturb the fragile ecological balance Partial credit: Any one or two of the above points No credit: Any other response		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q5.4. Do you think agricultural activities can also promote eutrophication? YES or NO
If yes then how?

Domain: Scientific literacy	Theme: **Eutrophication**	Class: VIII
		Expected time: 2 min
		Credit:2
Description of item: text	NCERT LEARNING OUTCOME: Students will be able to define **EUTROPHICATION** **& enlist the factors for its increase**	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	

Cognitive demand	MEDIUM
Item format	REASONING TYPE
Proficiency level	LEVEL 3
CREDIT PATTERN:	
Full credit:	2
Partial credit:	1
No credit:	O
DESCRIPTION OF ANSWER KEY AND CREDITS:	
5.4) Full credit: Yes. Use of chemical fertilizer like NPK, Super phosphates, even weedicides and pesticides can increase the nutrient level of aquatic ecosystem.	
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Test Item 12 . CHANGING TRENDS OF MONSOON: SCIENCE TOPIC

'' The drastic change in the monsoon pattern in recent years calls for holistic and quick policy response.''

The Monsoon, which, since the Indian Metrological Department started recording it, has been arriving in India by June 1 and departing by September 30, like clock- work is no longer behaving. While the pattern itself has been changing for past several years, this year perhaps saw the most severe deviation from 'normal'. Large part of the country particularly in the North are in deficit of rainfall, while there has been late and massively excessive rainfall in the other areas, triggering floods and loss of human life as well as property.

Q5. What is the active period of Monsoon rainfall in India?

a) 1 April to 30 June

b) I June to 15 July
c) 1august to 30 September
d) 1 June to 30 September

Domain: Scientific literacy	THEME: **CHANGING TRENDS OF MONSOON**	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT LEARNING OUTCOME: KNOWLEDGE ABOUT CHANGING TRENDS OF MONSOON	
FRAMEWORK	CHARACTERISTICS	
Competency	KNOWLEDGE BASED SCIENTIFIC ENQUIRY	
Knowledge system	UNDERSTANDING	
Context	LOCAL	
Cognitive demand	MEDIUM	
Item format	MCQ	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
1 June to 30 September		
Name of the teacher: Dinesh Kumar		
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Name of Vidyalaya: Rewari Region Gurugram		

Test Item 13. GLOBAL WARMING

The future level of global warming is uncertain, but a wide range of estimates have been made scientists predicts an increase in sea levels world-wide due to melting of two massive ice sheets in Antarctica and Green land. Many nations around the world will experience the effect of rising in sea level, which could displace millions of people. One nation, the Maldives, is already looking for a new home, thanks to rising sea level. The severity of storms such as hurricanes and cyclones is increasing.

According to recent research, there is 90% chances that three billion people world-wide will have to choose between moving their families to milder climates and go hungry due to climate change within 100 years.

Question 6.1: What may happen to the Maldives in the near future?

(i) Maldives may face the drought situation
(ii) It may get engulfed by the sea
(iii) It may face heavy rain
(iv) It is more prone to frequent earthquakes

Domain: Scientific literacy	THEME: Global Warming	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT LEARNING OUTCOME: Role of global warming on living being	
FRAMEWORK	CHARACTERISTICS	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Simple MCQ	
Proficiency level	LEVEL 42	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	NO	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
6.1) Full credit: It may get engulfed by the sea		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q6.2: How will the Global warming effect the occurrence of the storms world-wide? Explain your answer.

Domain: Scientific literacy	THEME: Global Warming	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT LEARNING OUTCOME: Role of global warming on living being	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	HIGH	
Item format	OPEN CONSTRUCTED TYPE	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1 PARTIAL EXPLANATION	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
6.2) Full credit: Full Credit: Global warming will lead to an increase in the intensity of extreme storms across the world. The speed of the tropical cyclones will increase with the increase in the temperature		
Name of the teacher: Dinesh Kumar		
Designation: PGT Physics		
Email: dinesh.atithi@gmail.com		
Name of Vidyalaya: Rewari Region Gurugram		

Q6.3: What are the findings of the latest research?

(i) Ice bergs will melt very fast.
(ii) Antarctica and Green land will get submerge in sea
(iii) About 90% chances that three billion people will migrate due to climate change
(iv) All the nation will experience the effect of rise in water level

DOMAIN: SCIENTIFIC LITERACY	THEME: Global Warming	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Domain: Scientific literacy	NCERT LEARNING OUTCOME: Role of global warming on living being	
FRAMEWORK	CHARACTERISTICS	
Competency	Use scientific data to draw conclusion	
Knowledge system	Knowledge of science	
Context	GLOBAL	

Cognitive demand	HIGH
Item format	Simple MCQ
Proficiency level	LEVEL 2
CREDIT PATTERN:	
Full credit:	2
Partial credit:	0
No credit:	O
DESCRIPTION OF ANSWER KEY AND CREDITS:	
6.3)Full credit:(About 90% chances that three billion people will migrate due to climate change)	
Name of the teacher: Dinesh Kumar	
Designation: PGT Physics	
Email: dinesh.atithi@gmail.com	
Name of Vidyalaya: Rewari Region Gurugram	

Q6.4: The survival of human becomes very difficult if some species becomes extinct. (Yes/NO)

Domain: Scientific literacy	THEME: Global Warming	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT LEARNING OUTCOME: Role of global warming on living being	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Explain the phenomenon scientifically	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Reasoning type	
Proficiency level	LEVEL ~~3~~2	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	0	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
6.4) Full credit: Yes		
Name of the teacher: Dinesh Kumar		
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Q6.5 Global warming is responsible for extreme whether condition change. Comment on it.

Domain: Scientific literacy	THEME: Global Warming	CLASS: VIII
		EXPECTED TIME: 2 MIN
		CREDIT:2
Description of item: text	NCERT LEARNING OUTCOME: Role of global warming on living being	
FRAMEWORK	**CHARACTERISTICS**	
Competency	Understanding scientific facts- Identify the phenomenon based on scientific evidences	
Knowledge system	Knowledge of science	
Context	GLOBAL	
Cognitive demand	Medium	
Item format	Open constructed	
Proficiency level	LEVEL 3	
CREDIT PATTERN:		
Full credit:	2	
Partial credit:	1	
No credit:	O	
DESCRIPTION OF ANSWER KEY AND CREDITS:		
6.5) Full credit: Any two effects : green house effects, Excess combustion of fuels, Deforestation		
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CRITICAL AND CREATIVE THINKING TEST ITEMS
CLASS: VIII
SUBJECT: SCIENCE
CHAPTER_2_ MICROORGANISMS: FRIENDS AND FOE
INDEX

“Fermentation”

The word “fermentation” has undergone many changes in meaning during the past hundred years. According to the derivation of the term, it signifies merely a gentle bubbling or boiling condition. The term was first applied when the only known reaction of this kind was the production of wine, the bubbling, of course, being caused by the production of carbon dioxide.

It was not until Gay-Lussac studied the chemical aspects of the process that the meaning was changed to signify the breakdown of sugar into ethanol and carbon dioxide. It was Pasteur, however, who marked the birth of chemical microbiology with his association of microbes with fermentation in 1857. He used the terms “cell” and “ferment” interchangeably in referring to the microbe. The term “fermentation” thus became associated with the idea of cells, gas production, and the production of organic byproducts.

The evolution of gas and the presence of whole cells were invalidated as criteria for defining fermentation when it was discovered that in some fermentations, such as the production of lactic acid, no gas is liberated. Moreover, other fermentation processes could be obtained with cell-free extracts indicating that the whole cell may not be necessary.

The position was further complicated by the discovery that the ancient process of vinegar production, generally referred to as acetic acid fermentation, which yielded considerable quantities of organic byproducts, was a strictly aerobic process. Fermentation clearly needed to be redefined.

Although carbohydrates are often regarded as essential materials for fermentations, organic acids (including amino acids) and proteins, fats, and other organic compounds are fermentable substrates for selected microorganisms.

Annexure 4

Template for preparation Items for Scientific Literacy

Domain: Scientific Literacy	Theme:Fermentation	Class(es): VIII - X Expected time: 15mins Total Credit: 12
Description of Item: YES – Text NO – Image NO – Table NO – Graph NO – Map NO – Poem	Learning Outcome: (As per NCERT)) Explains processes and phenomenon i) Relates processes and phenomenon with causes ii) Applies learning of scientific concepts in day-to-day life	

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Health/local
Cognitive demand	Low
Item format	Simple M.C.Q
Proficiency Level	Level 1

Q1 :What is fermentation?

A. A process where a sugar is broken down into ethanol and carbon dioxide
B. A process where a sugar is broken down into yeast and carbon dioxide
C. A process where a yeast is broken down into ethanol and carbon dioxide
D. A process where a sugar is broken down into ethanol and oxygen

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q1.Explain expected answer and the respective credits
Full Credit: A. A process where a sugar is broken down into ethanol and carbon dioxide
Nil Credit: Other responses &Missing

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Knowledge of science
Context	Healthlocal
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 2

Q2 What is anaerobic respiration?

A. Respiration in an oxygen free environment

B. Respiration in an oxygen rich environment

C. Respiration in a carbon dioxide free environment

D. Respiration in a carbon dioxide rich environment

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q2.Explain expected answer and the respective credits

Full Credit: A. Respiration in an oxygen free environment

Nil Credit: Other responses &Missing

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	HIGH
Item format	SIMPLE M.C.Q
Proficiency Level	LEVEL 5

Q3.Which of the following medicine is produced using fermentation?

A. Morphine

B. Penicillin

C. Cough Mixture

D. Paracetamol

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q3.Explain expected answer and the respective credits **Full Credit:** B. Penicillin **Nil Credit:** Other responses &Missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	EVALUATE AND DESIGN SCIENTIFIC ENQUIRY
Knowledge-system	EPISTEMIC
Context	HEALTH
Cognitive demand	HIGH
Item format	Close constructed response
Proficiency Level	LEVEL 4

Q4: Why is fermentation important in bread making? Give reason.

Scientific Literacy

Credit Pattern:

Full Credit: 02
Partial Credit: 01
Nil Credit: 00

Description of Answer Key and Credits:

Q4. Explain expected answer and the respective credits **Full Credit:** With **bread**, this refers to the process where yeast converts sugar to carbon dioxide and alcohol in the absence of oxygen, causing **dough** to rise. A shorter **fermentation** process leads to less taste, texture and quality. ... On the other hand, longer **fermentation** times will improve flavor and texture **Partial Credit: fermentation** causing **dough** to rise but with no reason **Nil Credit:** Other responses &Missing

Q5.

FRAMEWORK	CHARACTERISTICS
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health
Cognitive demand	Medium
Item format	Complex M.C.Q

Proficiency Level	Level 4

Q5 What are the advantages of the fermented food? Encircle "Yes" or "No" for each statement

Is this an advantage of the fermented food?	Yes or No
A. Makes the food more digestible	Yes or No
B. Increase storage life	Yes or No
C. Synthesize vitamins	Yes or No
D. Decrease intestinal microflora	Yes or No

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits **Full Credit:** YES , NO, YES , No **Nil Credit:** Other responses &Missing

Q6.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	HIGH
Item format	CLOSE constructed response
Proficiency Level	LEVEL 5

Q6:Why Fermentation is considered as a healthy process?

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: 01

Nil Credit: 00

Description of Answer Key and Credits:

Q6. Explain expected answer and the respective credits **Full Credit: (a) Fermentation** makes the foods easier to digest and the nutrients easier to

assimilate. In effect, much of the work of digestion is done for you.
(b) Since it doesn't use heat, **fermentation** also retains enzymes, vitamins, and other nutrients that are usually destroyed by food processing
Partial Credit: Write any one of (a) or (b)
Nil Credit: Other responses &Missing

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https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/fermentation

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KVS Region: DEHRADUN

People with a Higher Risk of Food Poisoning

Anyone can get food poisoning, but certain groups of people are more likely to get sick and to have a more serious illness. Their bodies' ability to fight germs and sickness is not as effective for a variety of reasons. These groups of people are:

Older adult have a higher risk because as people age, their immune systems and organs don't recognize and get rid of harmful germs as well as they once did. Nearly half of people aged 65 and older who have a lab-confirmed foodborne illness from Salmonella, Campylobacter, Listeria or E. coli are hospitalized.

Adults Aged 65 and Older

Young children have immune systems that are still developing, so their body's ability to fight germs and sickness isn't as strong. Food poisoning can be particularly dangerous for them because illness can lead to diarrhea and dehydration. Children younger than 5 are three times more likely to be hospitalized if they get a Salmonella infection. And kidney failure strikes 1 out of 7 children under age 5 who are diagnosed with E. coli O157 infection.

Children Younger Than 5 Years

People with weakened immune system due to diabetes, liver or kidney Weakened disease, alcoholism, and HIV/AIDS; or receiving

People with Immune Systems

chemotherapy or radiation therapy cannot fight germs and sickness as effectively. For example, people on dialysis are 50 times more likely to get a Listeria infection.

Pregnant women are more likely than other people to get sick from certain germs. For example, pregnant women are 10 times more likely to get a Listeria infection.

Pregnant Women

Annexure 4

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme: FOOD POISONING</td><td>Class(es): VIII - X
Expected time: 15mins
Total Credit: 8</td></tr>
<tr><td>Description of Item:
<table><tr><td>YES</td><td>Text</td></tr><tr><td>YES</td><td>Image</td></tr><tr><td>NO</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr><tr><td>NO</td><td>Map</td></tr><tr><td>NO</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome:
(As per NCERT)
Explains processes and phenomenon
Relates processes and phenomenon with causes
Applies learning of scientific concepts in day-to-day life</td></tr>
</table>

Q1.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Health
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 4

Q1 Possible treatments for food poisoning may include which of the following -

a) Antidiarrheal drugs
b) Antibiotics
c) Taking lots of Fluids
d) All of the above

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits **Full Credit: (d) All of the above** **Nil Credit:** Other responses &Missing

Q2.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	MEDIUM
Item format	SIMPLE M.C.Q
Proficiency Level	LEVEL 3

Q2Food poisoning is mainly caused by -

a) Viruses and bacteria
b) Parasites
c) Fungi
d) Toxins

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q2.Explain expected answer and the respective credits **Full Credit: (a)** Viruses and bacteria **Nil Credit:** Other responses &Missing

Q3.

Q3

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	MEDIUM
Item format	Open constructed response
Proficiency Level	LEVEL 3

What are the symptoms of food poisoning?

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: 01

Nil Credit: 00

Description of Answer Key and Credits:

Q3.Explain expected answer and the respective credits

Full Credit: The most common symptoms of food poisoning include: (**any four**)

- Nausea
- Diarrhea
- Vomiting
- Abdominal Cramping

Severe symptoms that indicate a "heavy" food poisoning include:

- Fever
- Renal or liver problems
- Severe dehydration

Partial Credit: write any two of the following:

Nausea, Diarrhea ,Vomiting, Abdominal Cramping

Nil Credit: Other responses &Missing

Q4.

Q4

FRAMEWORK	**CHARACTERISTICS**
Competency	EVALUATE AND DESIGN SCIENTIFIC ENQUIRY
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	HIGH
Item format	COMPLEX M.C.Q
Proficiency Level	LEVEL 4

Food poisoning can be

prevented by Circle "Yes" or "No" for each statement

Statements	Yes or No
A. Not wash your hands	Yes or No
B. Wash and clean your food	Yes or No
C. Cook around bugs	Yes or No
D. Leave food out in the heat	Yes or No

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q4. Explain expected answer and the respective credits
Full Credit: NO, YES , NO ,NO
Nil Credit: Other responses &Missing

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https://www.cdc.gov/foodsafety/people-at-risk-food-poisoning.html

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FOOD PROCESSING

Microorganism are used in fermentation to
make yoghurt, cheese, curd, kefir, ayran, xynogala, and other types of food. Bacteria play an essential role in recycling nutrients, for example fixing nitrogen from the atmosphere into the soil. The human body contains vast numbers of bacteria, most of which are harmless or

rendered so by the immune system, and some are vital in processes such as digestion. Bacteria are used to make a wide range of food products. The most important bacteria in food manufacturing are Lactobacillus species, also referred to as lactic bacteria. Lactic bacteria are used in many different tablets and capsules sold as supplements in the health food industry. Our hectic modern lifestyles often lead to an imbalance in the intestinal flora; travel and medical treatment are two of the major culprits. By taking supplements containing lactic bacteria, this balance can be restored, improving the quality of life.

Yeasts have two main uses in food production: baking and making alcoholic beverages. They have been used in this way since ancient times – there is evidence that ancient Egyptians used yeast in breadmaking, and we have been making fermented drinks like beer and wine for millennia.

Fermentation microbial cultures provide flavor and aroma, and inhibit undesirable organisms They are used to leaven bread, and to convert sugars to alcohol in wine and beer. Microorganisms are used in brewing, wine making, baking, pickling and other food-making processes.

Some industrial uses of Microorganisms:

Product	**Contribution of Microorganisms**
Cheese	Growth of microorganisms contributes to ripening and flavor. The flavor and appearance of a particular cheese is due in large part to the microorganisms associated with it.
Alcoholic beverages	Yeast is used to convert sugar, grape juice,or malt-treated grain into alcohol. other microorganisms may also be used; a mould converts starch into sugar to make the Japanese rice wine, sake.
Vinegar	Certain bacteria are used to convert alcohol into acetic acid, which gives vinegar its acid taste.
Citric acid	Certain fungi are used to make citric acid, a common ingredient of soft drinks and other foods.
Vitamins	Microorganisms are used to make vitamins, including C, B_2, B_{12}.
Antibiotics	With only a few exceptions, microorganisms are used to make antibiotics.

Template for preparation Items for Scientific Literacy

<table>
<tr><td colspan="2">Domain: Scientific Literacy</td><td>Theme: FOOD PROCESSING</td><td>Class(es):VI-VIII
Expected time:15 min
Total Credit:10</td></tr>
<tr><td colspan="2">Description of Item:<table><tr><td>YES</td><td>Text</td></tr><tr><td>NO</td><td>Image</td></tr><tr><td>YES</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr><tr><td>NO</td><td>Map</td></tr><tr><td>NO</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome:
(As per NCERT)
(i) Explains processes and phenomenon
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</table>

Q1. Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Health/ local
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	Level1

Q1: Which of the following is/are produced by using bacteria?

a) Antibiotic b) Cheese c) Yoghurt d) All of these

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

FULL CREDIT: d) all of these NO CREDIT any other option and missing

Q2.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Health/ local
Cognitive demand	Medium
Item format	Simple MCQ
Proficiency Level	Level 3

Q2: A microorganism X is used in the making of bread. It is also used in making which of the following substances?

a) Cheese b) Vinegar c) Wine d) Yoghurt

Credit Pattern:

Full Credit: 02

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Full credit: c) all of these No credit any other option and missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Health/ local
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	Level 4

Q3: The moist bread becomes mouldy after a few days when it is left in a container with a cover. Which of the following conditions requiredfor the growth of the fungus?

1	Absence of light	Yes/no
2	Presence of sunlight	Yes/no
3	presence of water/moisture	Yes/no
4	Presence of carbon dioxide	Yes/no

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Full credit: yes,no,yes,no Partial credit: any one option correct No credit any other option and missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Health/ local
Cognitive demand	Medium

Item format	Closed constructed response
Proficiency Level	Level 4

Q4: What causes the dough to rise when yeast is added to it?

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

release of carbon dioxide gas causes dough to rise when yeast is added to it. (Fermentation)
Partial credit: if a student writes: production of CO_2 only
No credit : any other option and missing

Q5.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	CONTENT
Context	HEALTH/ LOCAL
Cognitive demand	HIGH
Item format	Closed Constructed Response
Proficiency Level	LEVEL 5

Q5: Explain the role of bacteria in the digestive system of humans.

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Gut bacteria have several roles in the body. For example, intestinal bacteria:

- Produce **vitamin B_{12}** and **vitamin K**.
- Control the growth of harmful bacteria.
- Break down poisons in the large intestine.
- Break down some substances in food that cannot be digested, such as fiber and some starches and sugars. Bacteria produce enzymes that

digest carbohydrates in plant cell walls.
Partial credit: if student writes: two or three points.
No credit : any other option and missing

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FUNGI FACTS

Fungi are living organisms that are found all over the earth and can range in size from being microscopic to as large as many square miles. More than 100,000 species of fungi have been identified, but it is estimated that there are at least 1.5 million species on earth. Although once thought to be a plant, scientists have since come to distinguish them as their own group of living organisms. Unlike plants, whose cell walls are made up of cellulose, fungi cell walls are made up of chitin. Unlike plants, fungi are not able to make their own food and must get food by eating off their hosts or from decomposing matter. Fungi reproduce by spores while plants reproduce through seeds, fruit, or pollen.

INTERESTING FUNGI FACTS:

- The word 'fungus' is Latin for the word 'mushrooms.
- Fungi are much closer to animals than plants because of their biology. Animals and fungi are both part of the super-kingdom referred to as Opisthokonta.
- Fungi are eukaryotic. This means that the cells contain organelles and a membrane boundgenetic zone called as nucleus.
- Fungi are sometimes used for food. Mushrooms and truffles are fungi.
- Yeast is a type of fungi used in baking, which helps to make bread rise.
- Fungi are used to create important medicine for people, including antibiotics such as penicillin.
- Fungi can be divided into four groups. These groups include club fungi, moulds, sac fungi, and imperfect fungi.

- The club fungi group includes mushrooms. These can be edible or deadly poisonous, so it is important not to eat mushrooms that are found growing in the wild. The Destroying Angel mushroom is an example of a deadly poisonous mushroom.
- Mould fungi are the types that usually grow on cheese, bread, and old fruit. These fungi can look furry and release spores into the air.
- Cheeses are made with the help of different fungi species.
- A scientist that studies fungi is called a mycologist.
- Fungi consume a variety of decomposing matter including fruit, trees, plants, dead and living animals, manure, and bird droppings, among many other things.
- Athlete's foot is a common fungal disease that causes someone's feet to become red and itchy.
- Fungi can grow in areas where other organisms cannot survive such as in deserts, high salt environments, the deep sea, in high UV and cosmic radiation regions of the atmosphere and space, and in other living creaturestoo.
- Until the invention of the microscope, in the 1500s,it was difficult to study fungi fully. The first fungalspores seen by a human were in 1588, by Giambattistadella Porta, an Italian scholar living in Naples during the Scientific Revolution.

Template for preparation Items for Scientific Literacy

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme:FUNGI FACTS</td><td>Class(es):VI-VIII
Expected time: 20 MIN
Total Credit:10</td></tr>
<tr><td>Description of Item:<table><tr><td>YES</td><td>Text</td></tr><tr><td>YES</td><td>Image</td></tr><tr><td>NO</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr></table></td><td colspan="2">Learning Outcome:
(As per NCERT)
(i) Explains processes and phenomenon
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</table>

Q1.Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Natural resource/ local
Cognitive demand	Medium
Item format	Simple MCQ
Proficiency Level	Level 3

Q1: Fungi obtain energy____.

a) Directly from the sun.
b) From inorganic material in their environment.
c) By absorbing organic molecules
d) From nuclear fusion.

Credit Pattern:

Full Credit: 02
Partial Credit: NA
Nil Credit: 00

Description of Answer Key and Credits:

FULL CREDIT: c) By absorbing organic molecules NO CREDIT any other option and missing

Q2.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Natural resource/ local
Cognitive demand	Medium
Item format	Simple MCQ
Proficiency Level	Level 2

Q2: Fungi are important to an ecosystem as _____.

a. Producers
b. Controllers
c. Decomposers
d. Regulators

Credit Pattern:

Full Credit: 02
Partial Credit: NA
Nil Credit: 00

Description of Answer Key and Credits:

FULL CREDIT: c) decomposers NO CREDIT any other option and missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content

Context	Natural resource/ local
Cognitive demand	High
Item format	SimpleMCQ
Proficiency Level	Level 4

Q3: Write whether the statement is true or false.

1	Chitin is found in fungi and in snail shells.	T/F
2	The individual filaments that make up the body of a fungus are called hyphae	T/F
3	Fungi are considered to have eukaryotic type of cells	T/F
4	Fungi reproduce both sexually and asexually	T/F

Description of Answer Key and Credits:

FULL CREDIT: if student response is: FALSE, TRUE, TRUE, TRUE
PARTIAL CREDIT: if student give two or more response correct
NO CREDIT any other option and missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Natural resource/ local
Cognitive demand	Medium
Item format	Open constructed response
Proficiency Level	Level 3

Q4: Write any two uses of fungi in different industries.

Description of Answer Key and Credits:

IT: if student response is: Drug production, food processing, bio-control agents, enzyme biotechnology or research and development.
PARTIAL CREDIT: if student give one or more response correct
NO CREDIT any incorrect option and missing

Q5.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon

Knowledge-system	Content
Context	Natural resource/ local
Cognitive demand	Medium
Item format	Open constructed response
Proficiency Level	Level 3

Q5: Write the basic differences between bacteria and fungi, any two.

Description of Answer Key and Credits:

BASIS FOR COMPARISION	BACTERIA	FUNGI
Meaning	Bacteria are the most ancient organisms present till date. They are unicellular, prokaryotic, having simple cell structure.	Fungi are the multicellular, eukaryotic organisms with complex cell structure.
Characteristics	Prokaryotes.	Eukaryotes.
	Single-celled.	Single cell toMulti-celled.
	Cell lacks organelles.	Organelles present.
	They lack the membrane boundnucleus.	Nucleus presentmembrane bound.
	The cell wall is made up of peptidoglycan.	The cell wall is made up of chitin.
Cell Membrane	Present inner tothe cell wall.	Present.
Shapes	Have fourdistinct shapes (spiral, round, and rod shape). Rounded - Cocci. Rod - Bacilli. Spiral - Spirilla. Comma - Vibrio	Vary in shapes, but most of them are in the form of the thread-like structure called hyphae.
Mode of reproduction	Sexual as well asAsexual.	Can be either sexually or asexually.
Motility	Move through flagellum.	They are non-motile.
Mode of nutrition	Can be autotrophs, but usually heterotrophs.	Heterotrophs, usually feed on the dead and decayed matter.

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Q5. FULL CREDIT: if student gives any two or more correct differences
PARTIAL CREDIT: if student give one or more response correct
NO CREDIT any incorrect option and missing

Selecting Legumes as Green Manure

As legume plants grow, nitrogen accumulates in the vines and roots (biomass). With much of their nitrogen derived from the air, through biological nitrogen fixation, tropical legumes are capable of accumulating substantial amounts of nitrogen. In ECHO trials in South Africa, over 100 kg of nitrogen per hectare were accumulated in above-ground biomass of legumes such as **cowpea** (*Vigna unguiculata*), **horse gram** (*Macrotylomauniflorum*),**sunn hemp** (*Crotalaria juncea*), and **velvet bean** (*Mucunapruriens*).

Many tropical legumes have root systems that effectively draw nutrients from a large volume of soil. Thus, the biomass they contain is not only rich in nitrogen but also in other nutrients such as phosphorus and potassium. When legume residues are left on the field, after microbial decomposition the nutrients they have accumulated are returned to the soil. Particularly when legume mulch is combined with practices that prevent soil erosion, the added organic material helps maintain and even improve soil fertility. Figure 2 shows the effect that legumes had on soil nitrogen in a South African soil four months after they were planted. Note that nitrogen mineralization (conversion by microbes of organic nitrogen in the soil to inorganic nitrogen) rates were fastest in soil just underneath the legume residue.

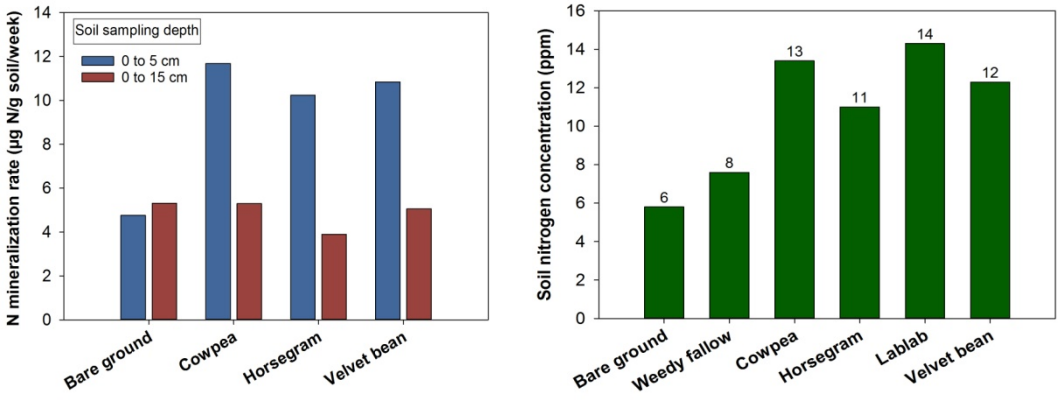

Figure 2. Soil nitrogen mineralization (left) and concentration (right) in bare ground versus under legumes in an ECHO trial in South Africa.

Template for preparation Items for Scientific Literacy

Domain: Scientific Literacy	**Theme:**Selecting Legumes as Green Manure	**Class(es):VI-VIII** **Expected time:20 min** **Total Credit:10**
Description of Item: YES Text NO Image NO Table YES Graph	**Learning Outcome:** **(As per NCERT)** (i) Explains processes and phenomenon (ii) Relates processes and phenomenon with causes (iii) Applies learning of scientific concepts in day-to-day life	

Q1.Scientific Literacy

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Environment quality/global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	Level 2

Q1: Legumes host nitrogen fixing bacteria, and thus are good crops to plant to replenish the soil. a)true b)false

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Q1.FULL CREDIT: a) true
NO CREDIT :any other option and missing.

Q2.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Closed constructed response

Proficiency Level	Level 3

Q2: Which of the two legumes have highest nitrogen fixing ability out of the different crop shown above?

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Q2.FULL CREDIT:	Lablab and Cowpea
PARTIAL CREDIT:	If student write any one correct or only one correct option
NO CREDIT:	Any other option and missing.

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	Level 4

Q3:W~~w~~rite whether the statement is true or false.

1	In case of bare ground, the mineralization rate of nitrogen is maximum at 0-5 cm below ground surface.	T/F
2	When legumes are grown in the field, mineralization rate of nitrogen is maximum at ground surface and decreases as depth increases.	T/F
3	When horse gram is grown, mineralization rate decreases at depth 5-15cm	T/F
4	Weedy fallow has better nitrogen fixing ability compared to velvet bean	T/F

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

dent write : FALSE, TRUE, TRUE, FALSE
PARTIAL CREDIT: if student write two or more correct option
NO CREDIT: any other option and missing.

Q4.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Open constructed response
Proficiency Level	Level 2

Q4: Name any two microorganisms which fix atmospheric nitrogen to soil.

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

If student write: Bacteria like Rhizobium, Azotobacter or Blue green algae.
PARTIAL CREDIT: if student write any one correct or only one correct option
NO CREDIT: any other option and missing.

Q5.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	High
Item format	Open constructed response
Proficiency Level	Level 5

Q5: Ammonium (NH_4) stays in soil, while nitrate (NO_3) is easily leached out. Why do they behave so differently?

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

NH_4 has a positive charge and sticks to soil particles and NO_3 has negative charge so leached out.	
PARTIAL CREDIT:	if student write electrical attraction only.
NO CREDIT:	any other option and missing

Name of the Teacher/Item Writer: DEEPAK THAPLIYAL
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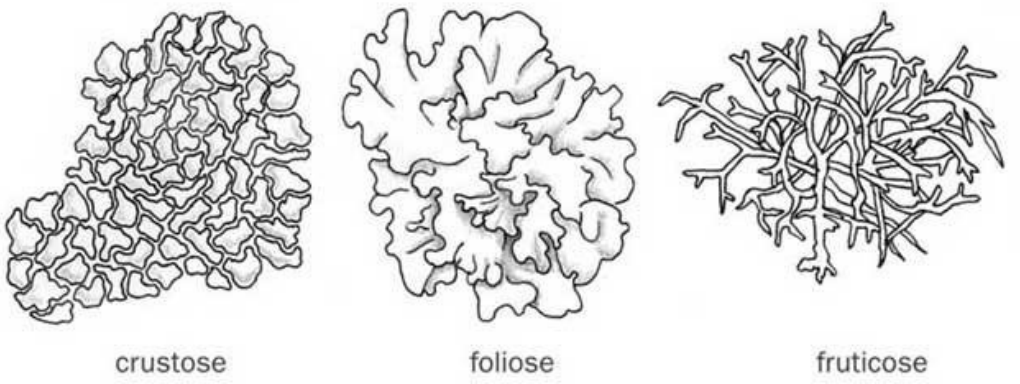
http://www.air-quality.org.uk/19.php

LICHENS

Lichens are mutualistic associations of a fungus and an alga or cyanobacterium and occur as crusty patches or bushy growths on trees, rocks, and bare ground. The names given to lichens strictly refer to the fungal partner; the algae have separate names. Lichens are very sensitive to sulphur dioxide pollution in the air. Since industrialization, many lichen species have become extinct in large areas of lowland Britain, one example being the beard moss *Usneaarticulata*.

This is mainly due to sulphur dioxide pollution, but the loss of habitat, particularly ancient woodland, has also led to reductions in some species. Lichens are sensitive to sulphur dioxide because their efficient absorption systems result in rapid accumulation of sulphur when exposed to high levels of sulphur dioxide pollution. The algal partner seems to be most affected by the sulphur dioxide; chlorophyll is destroyed, and photosynthesis is inhibited. Lichens also absorb sulphur dioxide dissolved in water.



Lichens are widely used as environmental indicators or bio-indicators. If air is very badly polluted with sulphur dioxide there may be no lichens present, just green algae may be found. If the air is clean, shrubby, hairy, and leafy lichens become abundant. A few lichen species can tolerate quite high levels of pollution and are commonly found on pavements, walls, and tree bark in urban areas. The most sensitive lichens are shrubby and leafy while the most tolerant lichens are all crusty in appearance. Since industrialisation many of the shrubby and leafy lichens such as Ramalina, Usnea and Lobaria species have very limited ranges,often being confined to the parts of Britain with the purest air such as northern and western Scotland and Devon and Cornwall.

Annexure 4

<table>
<tr><td>Domain: Scientific Lit</td><td>Theme: LICHENS</td><td>Class(es): VIII - X
Expected time: 15mins
Total Credit: 10</td></tr>
<tr><td>Description of Item:
<table><tr><td>YES</td><td>Text</td></tr><tr><td>YES</td><td>Image</td></tr><tr><td>NO</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr><tr><td>NO</td><td>Map</td></tr><tr><td>NO</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome:
(As per NCERT)

Explains processes and phenomenon
Relates processes and phenomenon with causes
Applies learning of scientific concepts in day-to-day life</td></tr>
</table>

Template for preparation Items for Scientific Literacy

Q1.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Environment quality/global
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 3

Q1 Lichen are important in studies of atmosphere pollution because they

A. can also grow in highly polluted atmosphere
B. very sensitive to pollutants
C. can readily multiply in polluted atmosphere
D. efficiently purify the atmosphere

Scientific Literacy

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Q1. Explain expected answer and the respective credits

Full Credit: B. very sensitive to pollutants
Nil Credit: Other responses &Missing

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Environment quality/global
Cognitive demand	Medium

Q2.

Item format	Simple M.C.Q
Proficiency Level	Level 2

Q2 The major group of algae involved in lichen formation is

A. Red algae
B. brown algae
C. Blue green algae
D. Red brown algae

Scientific Literacy

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Q2.Explain expected answer and the respective credits
Full Credit: C. Blue green algae
Nil Credit: Other responses &Missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Environment quality/local
Cognitive demand	High
Item format	Complex M.C.Q
Proficiency Level	Level 4

Q3 The town center of a city experiences very high levels of Sulphur dioxide pollution from vehicles during the rush hours.

Encircle 'yes' or 'no' to the statements in the table below.

Types of lichens that will be found in any town center	Yes or No?

Crustose (crusty) lichens	Yes / No
Foliose (leafy) lichens	Yes / No
Fruticose (shrubby) lichens	Yes / No
No lichens present at all	Yes / No

Scientific Literacy

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Q3.Explain expected answer and the respective credits
Full Credit: No, No, No, Yes in that order
Nil Credit: Other responses &Missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpret data and evidence scientifically
Knowledge-system	Content
Context	Environment quality/global
Cognitive demand	High
Item format	Simple MCQ
Proficiency Level	Level 6

Q4 Students from a school have been asked to investigate the link between lichen growth and air pollution. They decide to survey the types of lichens growing in their town. Which method will give them the best results?

A. survey the types of lichens found in the town center, and in the countryside 5km outside the town
B. Survey the types of lichens found in the town center, and 1km, 2km, 3km, 4km and 5km from the town center.
C. Survey the types of lichens in the town center only
D. Survey the types of lichens found in the countryside only

Scientific Literacy

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Q4.Explain expected answer and the respective credits

Full Credit: B Survey the types of lichens found in the town center and 1km, 2km, 3km, 4km, and 5km from the town center

Nil Credit: Other responses &Missing

Q5.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Environment quality/global
Cognitive demand	High
Item format	Short response item
Proficiency Level	Level 5

Q5 There is a large industrial estate on the edge of a town. What pattern of lichens do you think the students will see in the results of their survey?

Pattern

_____

_____

Scientific Literacy
Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Q5.Explain expected answer and the respective credits

Full Credit: PATTERN - Few or no lichens in town center, then see crusty lichens, then leafy lichens and then shrubby lichens as you go out from the town center, see crusty or no lichens again around the industrial area.

Partial Credit: No lichens in the town center, more lichens as you go further out of the town center,

Nil Credit: Other responses &Missing

https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/fermentation

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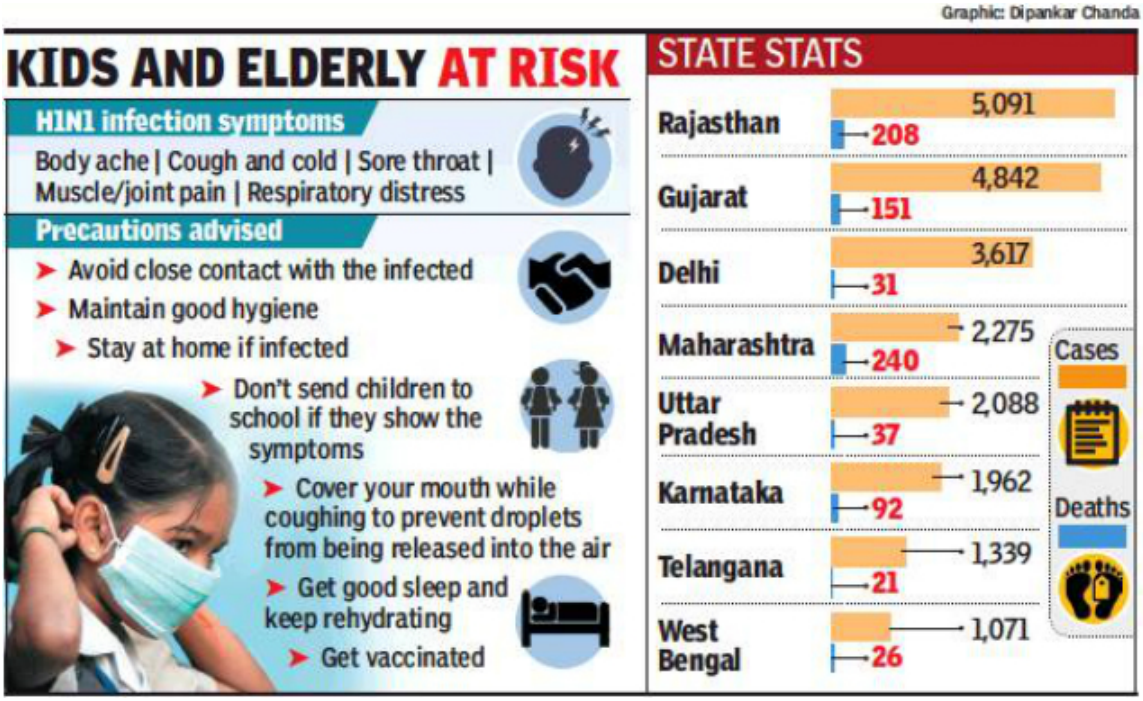
West Bengal: 2019 records highest number of H1N1 cases in 5 years

KOLKATA: Bengal recorded the highest number of seasonal influenza (H1N1) cases in 2019 compared to the past five years. Though seven other states rank higher in the list of H1N1 cases, health experts in the city said that the rising number in Bengal is a cause of concern.



According to the latest data available with National Vector Borne Disease Control Programme, West Bengal had recorded 1,071 HIN1 cases till September. The number of deaths was recorded at 26.

Though swine flu outbreak is more common during monsoons, the virus can wreak havoc even during winters. In fact, the city recorded the first swine flu death this year in January. And with winter around the corner, doctors attached with Pediatric Infectious Diseases Academy (PIDA), Kolkata chapter, stressed on awareness and prevention.

“Even as the influenza virus is known to be more active before and during monsoon, it strikes in winters, too, because of certain factors, including atmospheric pollution,” Dr. Jaydeep Choudhury from PIDA said.

Children whose immunity is weak and elderly people with co-morbid conditions are the most vulnerable. ICH that specializes in pediatric health care gets a large number of H1N1 cases.

“This year, we have had around 20 cases of seasonal influenza, out of which 14 were severe. Going by our hospital statistics, of those affected by the H1N1 virus, 50% needed treatment in the ICU. A 10% mortality rate has been recorded,” said Dr.PrabhasPrasunGiri, pediatric intensivist who is also part of PIDA. During the major outbreak in 2015, the state recorded 544 cases and 30 deaths. The following year recorded only seven cases with two deaths. The number rose in 2017 when 716 cases and 26 deaths were reported. Last year, there were 295 cases and 10 deaths.

One of the two types of seasonal influenza, H1N1 — commonly known as swine flu — could prove difficult to treat if detected late. It is highly contagious and transmitted through droplets.

“Influenza infection could lead to pneumonia, particularly in the risk group. Good hygiene and vaccination can go a long way in resisting the infection,” said Dr. Kundu, professor of pediatrics at ICH.

Doctors advise the affected take care to cover their mouth while coughing to prevent spreading the infection.

Annexure 4

Template for preparation Items for Scientific Literacy

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme: Influenza (H1N1)</td><td>Class(es): VIII - X
Expected time: 15mins
Total Credit: 10</td></tr>
<tr><td>Description of Item:

<table><tr><td>YES</td><td>Text</td></tr><tr><td>YES</td><td>Image</td></tr><tr><td>NO</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr><tr><td>NO</td><td>Map</td></tr><tr><td>NO</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome: (As per NCERT)

Explains processes and phenomenon
Relates processes and phenomenon with causes
Applies learning of scientific concepts in day-to-day life</td></tr>
</table>

Q1.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Health/global
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 3

Q1 Which of the following are general symptoms of Swine flu?

(a) Vomit, cough, fever
(b) Shortness of breath, cough , fever
(c) Shortness of breath diarrhea, cough
(d) Cough, fever , rash

Scientific Literacy

Credit Pattern:

Full Credit: 02
Partial Credit: NA
Nil Credit: 00

Description of Answer Key and Credits:

Q1.Explain expected answer and the respective credits **Full Credit: (b) Shortness of breath, cough , fever** **Nil Credit:** Other responses &Missing

Q2.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Health
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 4

Q2 What according to you will be the most appropriateslogan you need to remember to avoid swine flu?

(a) Catch it , wipe it, kill it
(b) Kill it , chase it, bin it
(c) Catch it , bin it, kill it

(d) Clean it, bin it, kill it

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q2.Explain expected answer and the respective credits **Full Credit: (c)** Catch it , bin it, kill it **Nil Credit:** Other responses &Missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Health
Cognitive demand	High
Item format	Open constructed ITEM
Proficiency Level	Level5

Q3 In a study it was found that 60% of total **swine-origin influenza A** patients during 2009 pandemic (as declared by WHO on June 11, 2009) were 18 years of age or younger. What might be possible reason for this observation?

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q3.Explain expected answer and the respective credits **Full Credit: [ANY TWO] (a)** Because of differences in social networks, transmission to older persons has been delayed. (b) It is also possible that elderly persons may have some level of cross-protection against swine-origin influenza A infection from preexisting antibodies against other influenza A (H1N1) viruses, (c)A potential case-ascertainment bias may also exist, with more young people being tested as part of outbreaks of swine-origin influenza A infection in schools and fewer older persons being tested for influenza. **Partial Credit: any ONE of the above reasons** **Nil Credit:** Other responses &Missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	CONTENT
Context	HEALTH
Cognitive demand	MEDIUM
Item format	SIMPLE MCQ
Proficiency Level	LEVEL 4

Q4 What can you do to avoid catching Swine Flu?

(a) Stay indoors, wash your hands or use gel, cover your mouth with clean tissues when you cough or sneeze, bin the tissues after one use
(b) Wash your hands or use gel, wear a face mask, bin the tissues after one use, always carry tissues
(c) Wash your hands or use gel, bin tissues after one use, always carry tissues, use clean tissues to cover your mouth and nose if you cough or sneeze
(d) Avoid people who have been on holiday abroad, wash your hands or use gel, bin tissues after one use, always carry tissues.

Scientific Literacy

Credit Pattern:

Full Credit: 02
Partial Credit: NA
Nil Credit: 00

Description of Answer Key and Credits:

Q4.Explain expected answer and the respective credits
Full Credit: (c) Wash your hands or use gel, bin tissues after one use, always carry tissues, use clean tissues to cover your mouth and nose if you cough or sneeze
Nil Credit: Other responses &Missing

Q5.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health
Cognitive demand	Medium
Item format	Complex M.C.Q
Proficiency Level	Level 4

Q5 If one thinks he/she has swine flu symptoms then he/she should-

Encircle “Yes” or “No” for each statement

During swine flu symptoms	Yes or No
A. Go to school as usual so that studies did not get hamper	Yes or No
B. Go to some doctor and ask his/her friend to come meet at doctor place	Yes or No
C. Go to the emergency department of local hospital	Yes or No
D. Take medicines by own knowledge and stay at home	Yes or No

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits
Full Credit: NO , NO, YES , NO
Nil Credit: Other responses &Missing

Name of the Teacher/Item Writer: AJAY GHILDIYAL/
https://timesofindia.indiatimes.com/city/kolkata/1071-patients-26-deaths-2019-records-highest-number-of-h1n1-cases-in-5-years/articleshowprint/72391613.cms

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Name of the Vidyalaya: K.V ITBP II SHIFT DEHRADUN
KVS Region: DEHRADUN

Vaccines

The body’s immune system helps protect against pathogens that cause infection. Most of the time, it’s an efficient system. It either keeps microorganisms out or tracks them down and gets rid of them.However, some pathogens can overwhelm the immune system. When this happens, it can cause serious illness.The pathogens most likely to cause problems are the

ones the body does not recognize. Vaccination is a way to “teach” the immune system how to recognize and eliminate an organism. That way, your body is prepared if you’re ever exposed.Vaccinations are an important form of primary prevention. That means they can protect people from getting sick. Vaccinations have allowed us to control diseases that once threatened many lives, such as:measles, polio, tetanus, whooping cough. It is important that as many people as possible get vaccinated. Vaccinations don’t just protect individuals. When enough people are vaccinated, it helps protect society.This occurs through herd immunity. Widespread vaccinations make it less likely that a susceptible person will come into contact with someone who has a particular disease.

A healthy immune system defends against invaders. The immune system is composed of several types of cells. These cells defend against and remove harmful pathogens. However, they have to recognize that an invader is dangerous.Vaccination teaches the body to recognize new diseases. It stimulates the body to make antibodies against antigens of pathogens. It also primes immune cells to remember the types of antigens that cause infection. That allows for a faster response to the disease in the future.

Vaccines work by exposing you to a safe version of a disease. This can take the form of:

- a protein or sugar from the makeup of a pathogen
- a dead or inactivated form of a pathogen
- a toxoid containing toxin made by a pathogen
- a weakened pathogen

When the body responds to the vaccine, it builds an adaptive immune response. This helps equip the body to fight off an actual infection.Vaccines are usually given by injection. Most vaccines contain two parts. The first is the antigen. This is the piece of the disease your body must learn to recognize. The second is the adjuvant.

The adjuvant sends a danger signal to your body. It helps your immune system to respond more strongly against the antigen as an infection. This helps you develop immunity.Vaccines are very important for infants, but they’re not all given immediately after birth. Each vaccine is given on a timeline, and some require multiple doses. This table can help you understand the timeline of each vaccine:

Name of Vaccine	Age	How many shots?
Hepatitis B	Birth	A second at 1–2 months, a third at 6–18 months
Rotavirus (RV)	2 months	A second at 4 months, a third at 6 months
Diphtheria, tetanus, and whooping cough (DTaP)	2 months	A second at 4 months, a third at 6 months, a fourth at 16–18 months; then every 10 years
Haemophilus influenzae type b (Hib)	2 months	A second at 4 months, a third at 6 months, a fourth at 12–15 months
Pneumococcal conjugate vaccine PCV13	2 months	A second at 4 months, a third at 6 months, a fourth between months 12 and 15
Inactivated Polio Vaccine (IPV)	2 months	A second at 4 months, a third at 6–18 months, a fourth at 4 to 6 years
Influenza	6 months	Repeat yearly
Measles, mumps, and rubella (MMR)	12–15 months	A second at 4–6 years
Varicella	12–15 months	A second at 4–6 years
Hepatitis A	12–23 months	A second at 6 months after the first
Human papillomavirus (HPV)	11–12 years old	2-shot series 6 months apart
Meningococcal conjugate (MenACWY)	11–12 years old	Booster at 16 years old
serogroup B meningococcal (MenB)	16–18 years old	
Pneumococcal (PPSV23)	19–65+ years old	
Herpes zoster (Shingles—RZV formulation)	two doses at 50 years old	

Annexure 4

Domain: Scientific Litera	**Theme: VACCINE**	**Class(es): VIII - X** **Expected time: 15mins** **Total Credit: 12**
Description of Item: YES Text NO Image YES Table NO Graph NO Map NO Poem	**Learning Outcome: (As per NCERT)** Explains processes and phenomenon Relates processes and phenomenon with causes Applies learning of scientific concepts in day-to-day life	

Template for preparation Items for Scientific Literacy

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Epistemic
Context	Health
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 2

Q1 Which of the following is NOT a vaccine-preventable disease?
A)Cervical cancer
B) Polio
C)Hepatitis B
D) Asthma

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q1.Explain expected answer and the respective credits
Full Credit: (D) Asthma
Nil Credit: Other responses & Missing

FRAMEWORK	**CHARACTERISTICS**

Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	National -Health
Cognitive demand	Low
Item format	Simple M.C.Q
Proficiency Level	Level 1

Q2.

Q2 Which vaccine is given soon after birth?
A. Polio
B. Hepatitis B
C. Measles, mumps, and rubella (MMR)
D. Varicella

Scientific Literacy

Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Description of Answer Key and Credits:

Q2.Explain expected answer and the respective credits
Full Credit: (B) Hepatitis B
Nil Credit: Other responses & Missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health
Cognitive demand	High
Item format	Simple M.C.Q
Proficiency Level	LEVEL 5

Q3. If animal or humansbecome sick with an infection and then recover, they generally do not contract the disease again. The reason is.

A)The body has killed all bacteria that may cause the same kind of disease

B) The body has made antibodies that kill the disease-causing bacteria.
C) The body has prevented the entry of the bacteria which caused the disease.

D) None of the above.

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q3.Explain expected answer and the respective credits
Full Credit: B. The body has made antibodies that kill the disease-causing bacteria.
Nil Credit: Other responses & Missing

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	PROCEDURAL
Context	HEALTH
Cognitive demand	MEDIUM
Item format	CLOSE ENDED
Proficiency Level	LEVEL 4

Q4.

Q4How does vaccine work in our body? Explain.

Scientific Literacy

Credit

Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q4.Explain expected answer and the respective credits
Full Credit: Vaccines produce their protective effect by inducing active immunity and providing immunological memory. This memory enables the immune system to recognize and respond rapidly to exposure to natural infection at later date and thus prevent the disease.
Partial credit:vaccines make our body immune to the disease.
Nil Credit: Other responses & Missing

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health
Cognitive demand	High
Item format	SimpleM.C.Q
Proficiency Level	Level 5

Q5 The target groups for seasonal influenza vaccination should include which one of the following? Encircle "Yes" or "No" for each statement:

Target group for seasonal influenza vaccination	Yes or No
A. Persons aged 50 or older.	Yes or No
B. Pregnant women	Yes or No
C. Anyone 6 months or older with chronic diseases e.g. asthma	Yes or No
D. Healthcare workers, workers at long term care facilities and household contacts of persons in high risk group	Yes or No

Scientific Literacy

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Description of Answer Key and Credits:

Q5.Explain expected answer and the respective credits
Full Credit: YES, YES, YES, YES
Nil Credit: Other responses & Missing

Q6.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health/global
Cognitive demand	High
Item format	Simple M.C.Q
Proficiency Level	Level 3

Q6 The biggest challenges to improving global vaccine coverage are:

(A)Limited resources

(B) Competing health priorities

(C) Poor management of health systems

(D) All of the above

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q6.Explain expected answer and the respective credits **Full Credit:** (D) All of the above **Nil Credit:** Other responses & Missing

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https://www.healthline.com/health/vaccinations

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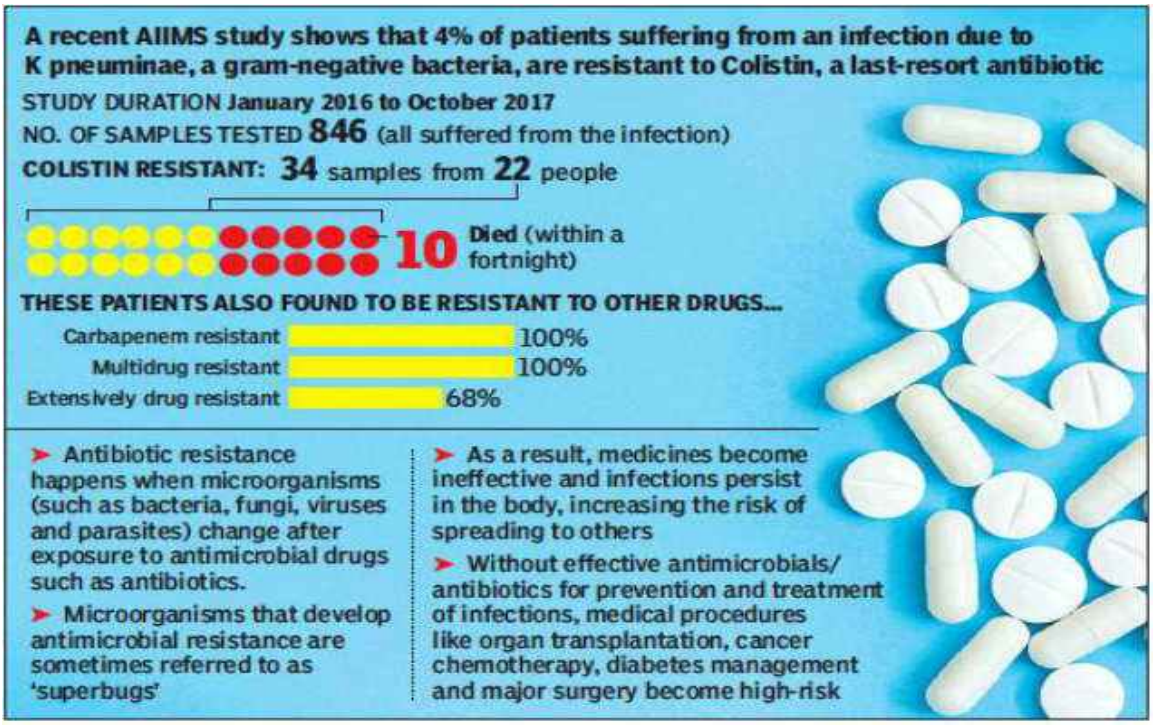
Name of the Vidyalaya: K.V ITBP II SHIFT DEHRADUN
KVS Region: DEHRADUN

`Last-resort antibiotics fail'

NEW DELHI: Between January 2016 and October 2017, AIIMS Trauma Center had 22 patients who didn't even respond to colistin-a last-resort antibiotic. The patients were suffering from multi-drug survived but required 23 days of admission and administration of a combination of high-end drugs resistant infection caused by gram-negative bacteria *K.pneumoniae*. Research conducted by a group of scientists from AIIMS, CMC Vellore and US' Center for Disease Control and Prevention found that of the 22 patients, 10 (45%) died within a fortnight of admission. The rest.



Colistin, discovered in 1959, was one of the first antibiotics with significant activity against gram-negative bacteria. But it caused side effects such as damage to the kidneys due to which the drug was discontinued from regular usage as safer antibiotics came up. However, it had to be reintroduced recently to treat infections that couldn't be treated with any of the new antibiotics, for example Carbepenems.

Dr. Sumit Ray, an expert in critical care, said 22 cases of colistin resistance from a single institution in two years is a matter of concern. "Stray cases of colistin resistance have been reported from ICU settings in the past, but the numbers shown here are significant and raise concern about the rising incidence of multi-drug resistance in India," he said. In the AIIMS study, researchers found that all 22 patients were also resistant to other high-end drugs, including Carbepenems, extended spectrum Cephalosporins, and Penicillin/B-lactamase.

"Action is needed from a broad range of stakeholders, including clinicians, microbiologists and public health officials, to limit the spread of this critically-important multi-drug resistant organism," the scientists warned in the research, published in 'Infection Control and Hospital Epidemiology'.

They said widespread use of antibiotics in humans and animals, insufficient infection control in healthcare facilities and limited availability of safe water and sanitation facilities are the possible causes of emerging pattern.

Antimicrobial Resistance (AMR) has been identified as one of the 10 threats to global health in 2019 by World Health Organisation. WHO has warned that if action is not taken to prevent overuse of all forms of antibiotics, we could go back to the time when it was hard to treat infections such as pneumonia, tuberculosis, gonorrhea and salmonellosis.

While the Indian government has taken steps to create awareness about the misuse of antibiotics, self-medication of the drug is rampant in the country. Doctors, too, overprescribe

them. For example, antibiotic is often prescribed to patients suffering from seasonal cough and cold that are mostly caused by viruses.

Annexure 4

Domain: Scientific Literacy	**Theme: ANTIBIOTIC-RESISTANT**	**Class(es): VIII - X** **Expected time: 10mins** **Total Credit: 08**
Description of Item: YES – Text YES – Image NO – Table NO – Graph NO – Map NO – Poem	**Learning Outcome:** **(As per NCERT)**) Explains processes and phenomenon) Relates processes and phenomenon with causes Applies learning of scientific concepts in day-to-day life	

Q1

Q1

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Knowledge of science
Context	Health/global
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 2

Antibiotics are powerful medicines that help to fight:

(a) Viruses
(b) Bacteria
(c) Algae
(d) Toxins

Scientific Literacy

Credit Pattern:

Full Credit: 02
Partial Credit: NA
Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits
Full Credit: (b) Bacteria

Nil Credit: Other responses &Missing

Q2.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Epistemic
Context	Health/personal
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 4

Q2 What can happen if I get an antibiotic-resistant infection?

(a) I may be sick for longer
(b) I may have to visit my doctor more or be treated in hospital
(c) I may need more expensive medicine that may cause side effects
(d) All of the above

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits
Full Credit: (d) All of the above
Nil Credit: Other responses &Missing

3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluate and design scientific enquiry
Knowledge-system	Content
Context	Health/personal
Cognitive demand	High
Item format	Complex M.C.Q

Q3 I can help tackle antibiotic resistance if I:

Encircle "Yes" or "No" for each statement

Ways to tackle antibiotic resistance	Yes or No
A. Share my antibiotics with my family when they are sick	Yes or No

B. Keep my vaccinations up to date	Yes or No
C. Get antibiotics as soon as I feel sick - either directly from the pharmacy or a friend	Yes or No
D. washing your hands regularly	Yes or No

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits
Full Credit: NO, YES, NO , YES
Nil Credit: Other responses &Missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Procedural
Context	Health- global
Cognitive demand	High
Item format	Closeconstructed response
Proficiency Level	Level 4

Q4 How Antibiotic-resistant bacteria can spread to humans?

Scientific Literacy

Credit Pattern:

Full Credit: 02

Partial Credit: 01

Nil Credit: 00

Description of Answer Key and Credits:

Explain expected answer and the respective credits
Full Credit: (a) Contact with a person who has an antibiotic-resistant infection
(b) Contact with something that has been touched by a person who has an antibiotic-resistant infection (e.g. a health-workers' hands or instruments in a health facility with poor hygiene)
(c) Contact with a live animal, food or water carrying antibiotic-resistant bacteria.

Partial Credit: Any of the two points from (a), (b) and (c)

Nil Credit: Other responses &Missing

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https://timesofindia.indiatimes.com/city/delhi/last-resort-antibiotics-fail-10-die-in-22-mths-in-aiims/articleshow/71696171.cms

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PASTEURIZATION

Pasteurization is a process, named after scientist Louis Pasteur that applies heat to destroy pathogens in foods. For the dairy industry, the terms "pasteurization," "pasteurized" and similar terms mean the process of heating every particle of milk or milk product, in properly designed and operated equipment, to one of the temperatures given in the following chart and held continuously at or above that temperature for at least the corresponding specified time:

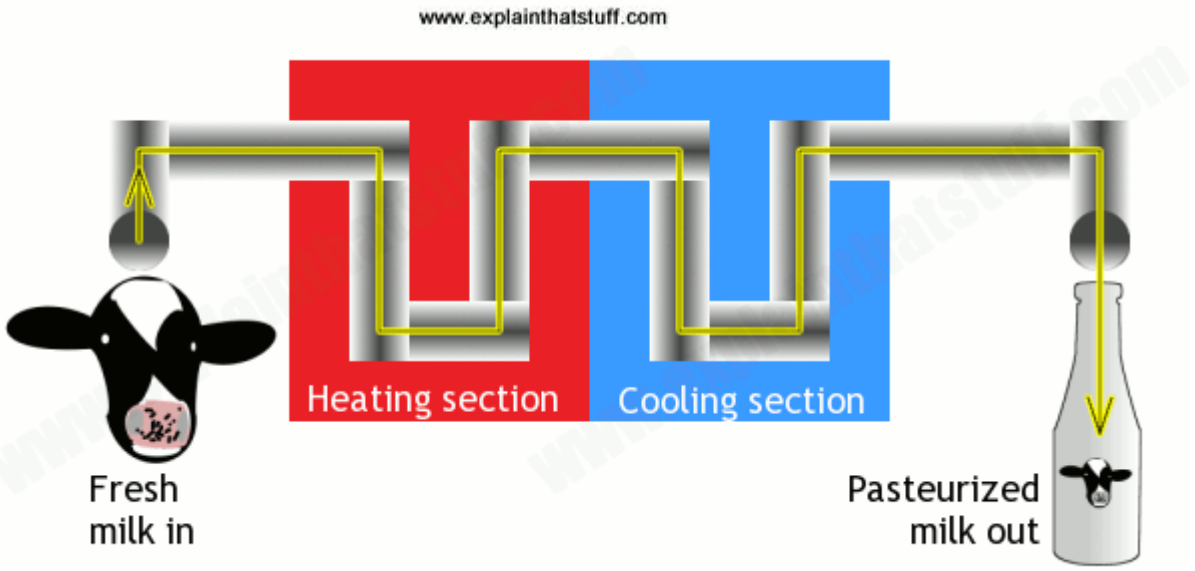
Temperature	Time	Pasteurization Type
63ºC (145ºF)*	30 minutes	Vat Pasteurization
72ºC (161ºF)*	15 seconds	High temperature short time Pasteurization (HTST)
89ºC (191ºF)	1.0 second	Higher-Heat Shorter Time (HHST)
90ºC (194ºF)	0.5 seconds	Higher-Heat Shorter Time (HHST)
94ºC (201ºF)	0.1 seconds	Higher-Heat Shorter Time (HHST)
96ºC (204ºF)	0.05seconds	Higher-Heat Shorter Time (HHST)
100ºC (212ºF)	0.01seconds	Higher-Heat Shorter Time (HHST)
138ºC (280ºF)	2.0 seconds	Ultra Pasteurization (UP)

*If the fat content of the milk product is 10percent or more, or if it contains added sweeteners, or if it is concentrated (condensed), the specified temperature shall be increased by 3^0C(5^0F). This process that is existing, is known as sterilization that also is based on the use of high temperature for a specific time but is different from pasteurization in the sense that it completely kills all the germs and their spores.

The original method of pasteurization was vat pasteurization, which heats milk or other liquid ingredients in a large tank for at least 30 minutes. It is now used primarily in the dairy industry for preparing milk for making starter cultures in the processing of cheese, yogurt, buttermilk and for pasteurizing some ice cream mixes.

The most common method of pasteurization in the United States today is High Temperature Short Time (HTST) pasteurization, which uses metal plates and hot water to raise milk temperatures to at least 161° F for not less than 15 seconds, followed by rapid cooling. Higher Heat Shorter Time (HHST) is a process similar to HTST pasteurization, but it uses slightly different equipment and higher temperatures for a shorter time. For a product to be considered Ultra Pasteurized (UP), it must be heated to not less than 280° for two seconds. UP pasteurization results in a product with longer shelf life but still requiring refrigeration.

Another method, aseptic processing, which is also known as Ultra High Temperature (UHT), involves heating the milk using commercially sterile equipment and filling it under aseptic conditions into hermetically sealed packaging. The product is termed "shelf stable" and does not need refrigeration until opened. All aseptic operations are required to file their processes with the Food and Drug Administration's "Process Authority." There is no set time or temperature for aseptic processing; the Process Authority establishes and validates the proper time and temperature based on the equipment used and the products being processed.



Template for preparation Items for Scientific Literacy

Domain: Scientific Literacy	**Theme: Pasteurization**	**Class(es):VI-VIII** **Expected time: 10MIN** **Total Credit:12**
Description of Item: YES — Text YES — Image Table NO — Graph	**Learning Outcome:** **(As per NCERT)** (i) Explains processes and phenomenon (ii) Relates processes and phenomenon with causes (iii) Applies learning of scientific concepts in day-to-day	

	life

Q1.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Short response item
Proficiency Level	Level 2

Q1: What is the difference between pasteurization and sterilization?

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q1.FULL CREDIT: **Sterilization**: Sterilization is a destruction of all microorganisms and their spores.

Pasteurization: Pasteurization is a process that kills the pathogenic bacteria by heating to a certain temperature for a set period of time.

NO CREDIT : any other option and missing

Q2.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Short response item
Proficiency Level	Level 4 2

Q2: Is boiling milk the same as pasteurization?Justify your response.

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: **00**

FULL CREDIT - In **boiling** process, there is no cooling involved hence the growth of those microorganisms which survive heat treatment is not retarded and, therefore, **boiled milk** has lower keeping qualityshelf lifethan the properly **pasteurized milk**
PARTIAL CREDIT: pasteurized milk can be stored safely for longer period of time as compared of boiled milk with no reason
NO CREDIT : any other option and missing

Q4.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	High
Item format	Simple MCQ
Proficiency Level	Level 5

Q4: State whether the following statement are true or false regarding Pasteurization:

1	Is not a useful method of preventing food-borne illness	T/F
2	Is able to kill all bacteria	T/F
3	Gets rid of most microorganisms, but not spores	T/F
4	Gets rid of all microorganisms	T/F

Description of Answer Key and Credits:
Credit Pattern:
Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Q4.FULL CREDIT: If student gives the following response in order: false, true, true, false
PARTIAL CREDIT: if student gives two or more correct responses.
NO CREDIT : any other option and missing

Q5.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content

Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	Level 2

Q5 : After milk is heated during the process of pasteurization, it must then be:

a) Thrown away b) Fed back to the cow that produced it

c) Have some penicillin added to it d) Rapidly cooled

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q5.FULL CREDIT: d) Rapidly cooled
PARTIAL CREDIT: NA
NO CREDIT : any other option and missing

Q6.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	Level 1

Q6: During 'pasteurization' the milk is heated for 30 minutes attemperature of

a)67°C b)63°C

c)62°C d)61°C

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q6.FULL CREDIT: b)63°C
PARTIAL CREDIT: NA
NO CREDIT : any other option and missing

Q7.

FRAMEWORK	CHARACTERISTICS
Competency	Explains processes and phenomenon
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Open constructed
Proficiency Level	Level 3

Q7: What is the purpose of pasteurization of milk or milk products?

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

FULL CREDIT: (A) to protect the health of the public by destroying organisms harmful to human beings; (B) to improve the keeping quality of the product

PARTIAL CREDIT: Any one of the reasons (a) or (b)

NO CREDIT : any other option and missing

https://www.idfa.org/news-views/media-kits/milk/pasteurization

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Role of Microorganisms Used in Wastewater Treatment

Wastewater can be detrimental to the environment if left untreated. That's because waste from humans and pets are a source of several *types of waterborne diseases* and bacterial contamination. The role of microorganisms in wastewater treatment helps to treat and purify wastewater and make it less harmful to the environment.

While there are different microbes used in sewage treatment, there are three well-known microbes that play an instrumental role in keeping sewage clean. Each of these types of bacteria help the treatment process in a unique way to ensure there is little to no impact on the surrounding environment.

COMMON MICROORGANISMS USED IN WASTEWATER TREATMENT

AEROBIC BACTERIA

Aerobic bacteria are mostly used in new treatment plants in what is known as an aerated environment. This bacterium uses the free oxygen within the water to degrade the pollutants in the wastewater and then converts it into energy that it can use to grow and reproduce.

For this type of bacteria to be used correctly, it must have oxygen added mechanically. This will ensure the bacteria are able to do their job correctly and continue to grow and reproduce on its food source.

ANAEROBIC BACTERIA

Anaerobic bacteria are used in wastewater treatment on a normal basis. The main role of these bacteria in sewage treatment is to reduce the volume of sludge and produce methane gas from it.

The great thing about this type of bacteria and why it isused more frequently than aerobic bacteria is that the methane gas, if cleaned and handled properly, can be used as an alternative energy source. This is a huge benefit considering the already high wastewater treatment energy consumption levels.

Unlike aerobic bacteria, this type of bacteria is able to get more than enough oxygen from its food source and will not require adding oxygen to help do its job. *Phosphorus removal from wastewater* is another benefit of anaerobic microbes used in sewage treatment.

FACULTATIVE MICRO-ORGANISMS

Facultative microorganisms in sewage treatment are bacteria that can change between aerobic and anaerobic depending on the environment they are in. Note that these bacteria normally prefer to be in an aerobic condition.

FINAL THOUGHTS ON THE ROLE OF MICROORGANISMS IN WASTEWATER TREATMENT

Many industrial and municipal wastewater treatment plants use bacteria and other microorganisms to help with the process of cleaning sewage. Picking the right bacteria can be tricky since your selection depends on the condition of your area for effective use. Wastewater treatment can also provide a great source for alternative energy if the anaerobic bacteria are handled correctly.

Template for preparation Items for Scientific Literacy

<table>
<tr><td>Domain:
Scientific Literacy</td><td>Theme: Role of Microorganisms Used in Wastewater Treatment</td><td>Class(es):VI-VIII
Expected time: 15 MIN
Total Credit: 10</td></tr>
<tr><td>Description of Item:<table><tr><td>YES</td><td>Text</td></tr><tr><td>NO</td><td>Image</td></tr><tr><td>NO</td><td>Table</td></tr><tr><td>NO</td><td>Graph</td></tr><tr><td>NO</td><td>Map</td></tr><tr><td>NO</td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome:
(As per NCERT)
(i) Explains processes and phenomenon
(ii) Relates processes and phenomenon with causes
(iii) Applies learning of scientific concepts in day-to-day life</td></tr>
</table>

Q1.

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 3

Q1: Wastewater can be made non-toxic for environment with the help of.

a)worms b)viruses c)bacteria d)all of these

Credit Pattern:

Full Credit: 02

Partial Credit: 01

Nil Credit: 00

Description of Answer Key and Credits:

Full credit: option : c) bacteria
Partial Credit: NA
Nil Credit: any other option and missing

Q2.

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Low
Item format	Simple M.C.Q
Proficiency Level	Level 1

Q2: Wastewater treatment is important for society because:

a) It checks water pollution

b)can be helpful to conserve nonrenewable resources

c) health benefits

d) all of the above

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q2.Full credit: option : d) all of the above

Partial Credit: NA Nil Credit: any other option and missing

Q3.

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	High
Item format	Simple M.C.Q
Proficiency Level	Level 5

Q3:A scientist finds a bacterium and studies it in the lab. She finds that the bacteria produce a lot of lactic acid. What type of bacteria is she looking at? a) Anaerobic bacteria b) Aerobic bacteria c) Facultative bacteria d) Acid fast bacteria

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q3.Full credit: option : a) Anaerobic bacteria Partial Credit: NA Nil Credit: any other option and missing

Q4.

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Short response items
Proficiency Level	Level 2

Q4: Name two organic impurities present in sewage.

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q4.Full credit: option : if student write any two out of Animal waste, oil, urea, vegetable peels etc. Partial Credit: one correct answer Nil Credit: any other option

Q5.

FRAMEWORK	CHARACTERISTICS
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	High
Item format	Short response items
Proficiency Level	Level 3

Q5: What does the presence of Coliform bacteria in water indicates?

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q4.Full credit: option : presence of human faeces Partial Credit: NA Nil Credit: any other option and missing

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Basic TB Facts

Tuberculosis (TB) is caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. If not treated properly, TB disease can be fatal.

How TB Spreads

TB bacteria are spread through the air from one person to another. The TB bacteria are put into the air when a person with TB disease of the lungs or throat coughs, speaks, or sings. People nearby may breathe in these bacteria and become infected.

TB is NOT spread by

- shaking someone's hand
- sharing food or drink
- touching bed linens or toilet seats
- sharing toothbrushes
- kissing

When a person breathes in TB bacteria, the bacteria can settle in the lungs and begin to grow. From there, they can move through the blood to other parts of the body, such as the kidney, spine, and brain.TB disease in the lungs or throat can be infectious. This means that the bacteria can spread to other people. TB in other parts of the body, such as the kidney or spine, is usually not infectious.People with TB disease are most likely to spread it to people they spend time with every day. This includes family members, friends, and coworkers or schoolmates.

Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: **latent TB infection and TB disease.**

The Difference between Latent TB Infection (LTBI) and TB Disease

Latent TB Infection (LTBI)	TB Disease
• Has no symptoms	Has symptoms that may include: • a bad cough that lasts 3 weeks or longer • pain in the chest • coughing up blood or sputum • weakness or fatigue • weight loss • no appetite • chills • fever • sweating at night
• Does not feel sick	• Usually feels sick
• Cannot spread TB bacteria to others	• May spread TB bacteria to others
• Usually has a skin test or blood test result indicating TB infection	• Usually has a skin test or blood test result indicating TB infection
• Has a normal chest x-ray and a negative sputum smear	• May have an abnormal chest x-ray, or positive sputum smear or culture
• Needs treatment for latent TB infection to prevent TB disease	• Needs treatment to treat TB disease

Vaccines

TB Vaccine (BCG)

Bacille Calmette-Guérin (BCG) is a vaccine for tuberculosis (TB) disease. This vaccine is not widely used in the United States, but it is often given to infants and small children in other countries where TB is common. BCG does not always protect people from getting TB.

Testing for TB in BCG-Vaccinated People

Many people born outside of the United States have been BCG-vaccinated.

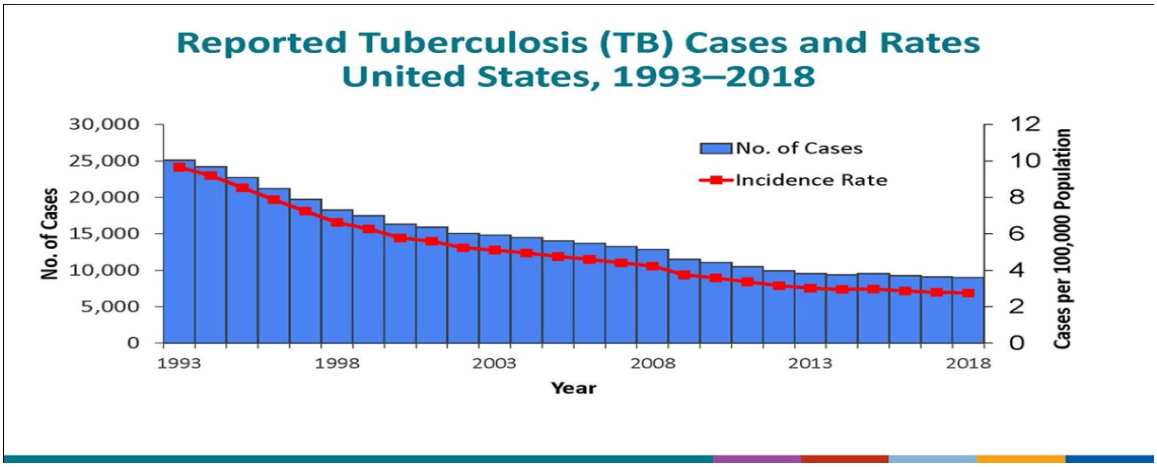
People who were previously vaccinated with BCG may receive a TB skin test to test for TB infection. Vaccination with BCG may cause a positive reaction to a TB skin test. A positive reaction to a TB skin test may be due to the BCG vaccine itself or due to infection with TB bacteria.

TB blood tests (IGRAs), unlike the TB skin test, are not affected by prior BCG vaccination and are not expected to give a false-positive result in people who have received BCG.

For children under the age of five, the TB skin test is preferred over TB blood tests.

A positive TB skin test or TB blood test only tells that a person has been infected with TB bacteria. It does not tell whether the person has latent TB infection or has progressed to TB disease. Other tests, such as a chest x-ray and a sample of sputum, are needed to see whether the person has TB disease.

Trends in Tuberculosis, 2018



Template for preparation Items for Scientific Literacy

Domain: Scientific Literacy	**Theme:Basic TB Facts**	**Class(es):VI-VIII** **Expected time: 20 MIN** **Total Credit: 10**
Description of Item: YES – Text NO – Image YES – Table YES – Graph NO – Map NO – Poem	**Learning Outcome:** **(As per NCERT)** (i) Explains processes and phenomenon (ii) Relates processes and phenomenon with causes (iii) Applies learning of scientific concepts in day-to-day life	

Q1.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Medium

Item format	Simple M.C.Q
Proficiency Level	Level-2

Q1: How is TB diagnosed?

a) Chest X-ray b) Sample of sputum

c)Skin test d)All of the above

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Description of Answer Key and Credits:

Q1.Full credit: option : d)All of the above **Partial Credit**: NA **Nil Credit:** any other option and missing

Q2.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Low
Item format	Simple M.C.Q.
Proficiency Level	Level 1

Q2: According to the graph the rate of decrement cases in TB disease in USA is minimum in the year.

a)1993-94 b)1999-2000

c)2008-2009 d)2017-18

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: 02

Partial Credit: NA

Nil Credit: 00

Q2.Full credit: option : d)2017-18 **Partial Credit:** NA **Nil Credit:** any other option and missing

Q3.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically

Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Simple M.C.Q
Proficiency Level	Level 3

Q3:What makes TB hard to diagnose?

a) Symptoms aren't always obvious
b) Symptoms come and go
c) The disease may take years to become active
d) A and B

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Q3.Full credit: option : c)The disease may take years to become active
Partial Credit: NA
Nil Credit: any other option and missing

Q4.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Medium
Item format	Open constructed
Proficiency Level	Level 3

Q4: What is latent TBinfection?

Description of Answer Key and Credits:

Credit Pattern:

Full Credit: **02**

Partial Credit: **NA**

Nil Credit: **00**

Q4.Full credit: option : if student write
In most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain

alive in the body and can become active later. This is called latent TB infection. People with latent TB infection:

Have no symptoms
Don't feel sick
Can't spread TB bacteria to others
Usually have a positive skin test reaction or positive TB blood test
May develop TB disease if they do not receive treatment for latent TB infection

Partial Credit: if student give any two symptoms of the disease.
Nil Credit: any other option and missing

Q5.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain Phenomena scientifically
Knowledge-system	Content
Context	Global
Cognitive demand	Low
Item format	Open constructed
Proficiency Level	Level 2

Q5: What are the main symptoms of TB disease?

Description of Answer Key and Credits:
Credit Pattern:

Full Credit: **02**
Partial Credit: **NA**
Nil Credit: **00**

Q5.Full credit: option : If student gives all correct symptoms given below:
- persistent cough for > 2-3 weeks
- weight loss
- fever
- night sweats
- coughing up blood

Partial Credit: If student gives two or more correct symptoms.
Nil Credit: any other option and missing

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CRITICAL AND CREATIVE THINKING TEST ITEMS
CLASS: VIII
SUBJECT: SCIENCE
CHAPTER_3_ SYNTHETIC FIBRES AND PLASTIC
INDEX

DOMAIN:SCIENTIFICLITERACY TOPIC/CHAPTER: SYNTHETIC FIBRES ANDPLASTICS
CLASS: VIII THEME: MATERIALS EXPECTED TIME: 10 MIN TOTALCREDIT:8

DESCRIPTIONOFITEM: LEARNING OUTCOMES:
1. TEXT 1. To enable to differentiate materials-Natural and human madefibres
2. Sensitising towards environmentalissues
.

UNIT-11 : THE DANGERS OF SYNTHETIC FIBERS AND FABRICS ON THE ENVIRONMENT

With the unending discussion about renewable energy and fossil fuel, and the harm it is causing to our environment, the unhealthy carbon emission, depleting the ozone layer and ultimately bringing about the impending catastrophic global warming environmental scientists warn us about, it is important we decide if we all want this planet to survive our excesses.

Carbon emission must be minimized to keep our environment and ecosystem sustainable; the oil rigs must be stopped, and the world should move to the more environmentally sustainable source of energy, right? But we all forget the industry that is primarily fed by this oil rigs, the textile industry.

The textile industry contributes more to environmental degradation than any other industry, according to research; the textile industry is responsible for over 10% of global carbon emissions. That's scarily huge. All these statistics are damaging the ecosystem and destroying our environment.

Production of clothing should be a risk free industry, that was true some 50-60 years ago, but with the change in materials used by manufacturers and designers in the production of apparels, and the shift in the demand of more organic clothing material by consumers to synthetic fibres, the natural fibres which dominated clothing production materials may soon be a thing of the past. This new textile industry is dominated by polyester, nylon, rayon, and acrylic. Another reason behind this change in materials is because synthetic and microfibers are cheaper to produce.

This may be good for profit and the economy in general, but it is confirmed that it is also damaging the environment on a massive scale. The dangers of these synthetic fibres and fabrics are dire to the environment.

Q 11.1: Which harmful part of sunlight is absorbed by the atmosphere?

FRAMEWORK	**CHARACTERISTICS**
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low

Item format	Short Response
Proficiency Level	2

Q 11.2: The new textile industry is not dominated by

1. Polyester
2. Nylon
3. Cotton
4. Rayon

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	1b

Q 11.3: In spite of being hazardous, why synthetic clothes are being increasingly used now a days? Give two reasons

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating data and scientific enquiry
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Open constructed
Proficiency Level	3

Q.11.4: Name any two natural fibres that should be used in the Textile industry to avoid the dangers of synthetic fibres.

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Closed Constructed
Proficiency Level	2

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Answer 11.1- **Full credit**: Ultraviolet rays

No credit: for wrong response and missing

Answer11. 2 **Full credit:** 3.Cotton.

No credit: For wrong response and missing

Answer11. 3- **Full credit:** (For any two correct responses)

(i) Synthetic fibres are cheaper

(ii) More durable

(iii) Can be dyed in brilliant colours, or any other two reasons.

Partial credit: any one correct response

No credit: Wrong response or missing

Answer11. 4- **Full credit**: (For any two correct responses)

(i) Cotton (ii) wool (iii) Silk (iv)Jute

Partial credit: any one correct response

No credit: Wrong response or missing

SOURCES: https://superegoworld.com/blogs/the-world/the-dangers-of-synthetic-fibers-and-fabrics-on-the-environment

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DOMAIN: SCIENTIFICLITERACY TOPIC/CHAPTER: SYNTHETIC FIBRES AND PLASTICS
CLASS: VIII THEME: MATERIALS EXPECTED TIME: 10MIN
TOTAL CREDIT: 8

DESCRIPTIONOFITEM: LEARNING OUTCOMES:
1. TEXT 1. To enable to differentiate materials-Natural and human made fibres
2. Identifies properties of materials

UNIT-12: A COMPARATIVE STUDY OF CHARACTERISTICS OF SYNTHETIC FIBRES

Synthetic fibres are more durable than most natural fibres and readily pick-up different dyes. In addition, many synthetic fibres offer consumer-friendly functions such as stretching, waterproofing and stain resistance. Sunlight, moisture, and oils from human skin cause all fibres to break down and wear away. Natural fibres are susceptible to larval insect infestation; synthetic fibres are not a good food source for fabric-damaging insects. Compared to natural fibres, many synthetic fibres are more water resistant and stain resistant. Some are even specially enhanced to withstand damage from water or stains

Most of synthetic fibers' disadvantages are related to their low melting temperature: The mono-fibres do not trap air pockets like cotton and provide poor insulation. Synthetic fibres burn more rapidly than natural fibres. Synthetic fibres are prone to heat damage and damage by hot washing and melt relatively easily. More electrostatic charge is generated by rubbing them with natural fibres and is not skin friendly, so it is uncomfortable for long wearing. They are non-biodegradable in comparison to natural fibres. Most of the synthetic fibres absorb very little moisture so become sticky when the body sweats.

Q 12.1: Name the synthetic fibre which is processed from a natural substance.

FRAMEWORK	**CHARACTERISTICS**
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Short Response

Proficiency Level	3

Q 12.2: Which of the following is not a characteristic of synthetic fibres?

1. Most of the synthetic fibres absorb very little moisture.
2. Synthetic fibres are not skin friendly.
3. Synthetic fibres do not trap air pockets.
4. Synthetic fibres are biodegradable.

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q 12.3: Write answer is Yes/No as per given passage:

- Raincoats are made from synthetic fibres.
- One should wear synthetic fibre clothes while working in the kitchen.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating data and scientific enquiry
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Q 12.4: Rayon takes relatively less time to decompose. Yes or No. Explain

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining phenomena scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	High

Item format	Closed Constructed
Proficiency Level	5

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Answer 12.1-**Full credit:** Rayon

No credit: No response or missing

Answer 12.2- **Full credit:** (iv) Synthetic Fibres are biodegradable.

No credit: No response or missing

Answer12. 3- **Full credit:** (i) Yes, as Synthetic fibres are waterproof.

(ii) No, Synthetic fibres catch fire and stick to the body.

Partial credit: any one correct response

No credit: No response or missing

Answer 12.4**- Full credit: Yes**. As it is processed from natural substance i.e. wood?

No credit: Wrong response or missing

SOURCES: https://en.wikipedia.org/wiki/Synthetic_fiber

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CLASS: VIII THEME: MATERIALS EXPECTED TIME: 10MIN

TOTAL CREDIT: 8

DESCRIPTIONOFITEM:

1. TEXT

LEARNINGOUTCOMES:

1. Identifies and classifies materials based on their properties.
2. Applies scientific concepts in day to day life.

UNIT 13: POLYMERS THAT WILL SHAPE THE FUTURE

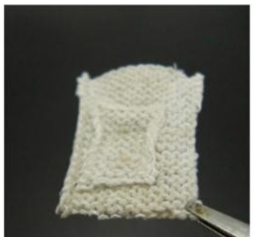
1. SELF HEALINGPOLYMERS

Forty years ago, plastic surpassed steel as the most widely used material in the world. There's a catch, however: Unlike many of the metals it replaces, plastic is really hard to fix; even invisible fractures can compromise its strength. A new class of smart plastics can heal breaches all on their own, to mend cracked phone screens or stitch up airplane wings.

The material opens the door to new self-healing wound dressings for use in medicine. The new material, a supramolecular polyurethane, 'flows' like a liquid when cut or scraped, filling in the damage in a couple of hours before its molecules bind together to become solid again.

It is safe to humans and works at temperatures as low as 37 degrees Celsius, making it ideal for use in healthcare.

Anyone who has had to replace an old bandage knows it can be very painful and can easily damage healing skin. This new material not only repairs itself at body temperature, but is non-toxic, so is an ideal material for use in healthcare settings. This material could maintain a sterile barrier as part of a wound dressing while constantly repairing and renewing itself, reducing the need for replacement. It could even be adapted to naturally break down over time, similar to dissolvable stitches, making it suitable for internal use in surgery as well as for dressing wounds.

2. KEVLAR

Kevlar is a plastic strong enough to stop bullets and knives—often described as being "five times stronger than steel on an equal weight basis." It has many other uses too, from making boats and bowstrings to reinforcing tires and brake pads.

Kevlar is an excellent antiballistic (bullet and knife resistant) material because it takes a great deal of energy to make a knife or a bullet pass through it. The tightly woven fibres of highly oriented (lined-up) polymer molecules are extremely hard to move apart: it takes energy to separate them. A bullet (or a knife pushed hard by an attacked) has its energy "stolen" from it as it tries to fight its way through. If it does manage to penetrate the material, it's considerably slowed down and does far less damage. It's worth noting that Kevlar also has its drawbacks. Inparticular, although it has very high tensile (pulling) strength, it has very poor compressive strength (resistance to squashing or squeezing).



Q13.1 .Kevlar is 5 times stronger than steel. Even then it is not used in buildings and bridges instead of steel. Why?

FRAMEWORK	CHARACTERISTICS
Competency	Explaining phenomena scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Short Response
Proficiency Level	3

Q13.2 .Which of the following is not a use of Kevlar?
(a)Kevlar is used to heal bullet and knife wounds.
(b)Kevlar is used for making car tyres.
(a) Kevlar is used to make bulletproof vests.
(d)Kevlar is used for making bowstrings.

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q13.3. Write answers in Yes/No as per given passage:
(a) Self-healing plastics can work at normal human body temperature. (b)Self-healing plastics are toxic and cannot be used in healthcare products

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating data and scientific enquiry
Knowledge-system	Physical Systems
Context	Global

Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Q13.4 .Self-healing plastics are used in wound dressings and are considered better than old traditional bandages. Yes or No? Explain.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	High
Item format	Closed Constructed
Proficiency Level	5

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Answer 13.1- **Full Credit:** Kevlar has very poor compressive strength. So, it is not used instead of steel as a primary building material.
No Credit: Wrong response or missing

Answer 13.2- **Full Credit:** (a) Kevlar is used to heal bullet and knife wounds
No Credit: Wrong response or missing

Answer 13.3-**FullCredit :**(a) Yes (b) No
Partial Credit: Any one correct response
No Credit: Wrong response or missing

Answer 13.4-**Full Credit:** 1)Self-healing plastics used in wound dressings can renew and repair Itself at body temperature whereas traditional bandages stick to the wound and can easily damage the healing skin.
2) They are nontoxic and maintain a sterile environment.
Partial Credit: Any one correct response
No Credit: Wrong response or missing

SOURCES:
https://www.explainthatstuff.com/kevlar.htmlhttps://sewguide.com/synthetic-fabrics-fibers/

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CLASS: VIII THEME: MATERIALS EXPECTED TIME: 10MIN

TOTAL CREDIT: 8

DESCRIPTIONOFITEM: LEARNING OUTCOMES:
1. TEXT 1. Identifies and classifies materials based on their properties.
2. Applies scientific concepts in day to day life.

UNIT-14: TYPES OF SYNTHETIC FIBRES

Synthetic fibres are of four types, namely:
1. Rayon 2.Nylon
3. Polyester 4.Acrylic

Rayon

Rayon has properties similar to those of silk.
It is a man-made fibre and cheaper than silk.
It is obtained from wood pulp.
It is infused with cotton or wool to prepare bed sheets and carpets respectively.
It is also known as artificial silk and can be dyed in a wide variety of colours.

Nylon

These are strong elastic and light, lustrous and easy to wash fibres made from water, coal, and air initially.
The fibre is completely synthetic and stronger than steel wire.
It is used to make socks, ropes, toothbrushes, tents, seat belts, curtains, etc.
Used to make ropes for rock climbing and parachutes.

Polyester

Polyester is made up of many units of an ester.
It is suitable for making dress material because it is easy to wash and stays crisp and wrinkle-free.
Terylene is a known polyester.
PET (Polyethylene terephthalate) is used to make many useful products like bottles, utensils, films, wires.

Acrylic

Many sweaters and blankets are not created from natural wool but from a kind of synthetic fibre known as acrylic.
The clothes prepared from acrylic are cheaper and more durable.
Acrylic is more prevalent than natural wool.

However, synthetic fibres melt on heating. If they catch fire, it could be really dangerous. The fabric sticks to the body of the person wearing it. Therefore, one should avoid acrylic clothes while working in the kitchen or a laboratory.

Q 14.1: Name the synthetic fibre which is made up from a chemical having fruity smell.

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Short Response
Proficiency Level	3

Q 14.2: Which characteristic of nylon ropes makes them the most favourable choice for mountain climbing?

(i) Nylon fibres are very brittle.
(ii) Nylon fibres are soft and fine so they do not cut into the skin.
(iii) Nylon fibres have high tensile strength
(iv) Nylon fibres do not catch fire easily.

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q 14.3: Write answer in Yes/No as per given passage:

(i) Some of the synthetic fibres are stronger than steel wire.
(ii) Cotton apron can be replaced by synthetic apron while working in laboratory.

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating data and scientific enquiry
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium

Item format	Complex MCQ
Proficiency Level	3

Q 14.4: Why PET is used for making useful products like bottles, utensils etc. Explain.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining phenomena scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Closed Constructed
Proficiency Level	4

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Answer14.1- **Full Credit:** Polyester
No Credit: Wrong Response or missing

Answer 14.2-**Full Credit:** iii) Nylon has very high tensile strength.
No Credit: Wrong Response or missing

Answer 14.3- **Full Credit:** (i) YES, Nylon fibre is stronger than steel wire
(ii) NO, as synthetic fibres catches fire very quickly and sticks to the skin.
Partial Credit: Any one correct response
No Credit: Wrong response or missing

Answer 14.4 – **Full Credit:** (For any two correct response)
Light in weight, durable non-reactive and non-corrosive.
Partial Credit: Any one correct response
No Credit: Wrong response or missing

SOURCES:https://byjus.com/biology/types-of-synthetic-fibers/?utm_source=Google&utm_medium=cpc&utm_campaign=K12-Traffic-DynamicSearch-India&utm_term=&gclid=Cj0KCQiA04XxBRD5ARIsAGFygj9G3un8TTpLJ

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DOMAIN: SCIENTIFIC LITERACY TOPIC/CHAPTER: SYNTHETIC FIBRES AND PLASTICS]
CLASS: VIII THEME: MATERIALS EXPECTED TIME: 10MIN

TOTAL CREDIT: 8

DESCRIPTIONOFITEM: LEARNING OUTCOMES: LEARNING OUTCOMES:
1. TEXT 1.Applies scientific concepts in day to day life
2.Sensitising towards health and environment.

UNIT-15 (SYNTHETIC FIBRES AND HUMAN HEALTH)

Not that long ago, people wore natural fibers like wool, cashmere, cotton, silk, linen, and hemp. Now, with the help of technology synthetic fabrics like rayon, polyester, acrylic, acetate and nylon are worn by many of us as they seem to make our lives simpler, like wrinkle-free or stain resistant, but at what cost? Fabric may not be the first thing that comes to mind when we think about living a healthier lifestyle, but it definitely should be considered. We must keep in mind that most of the dresses we wear made of synthetic fabric, like polyester. Polyester fabric is made from chemically produced fibers. The chemicals used to make the fibers are sodium hydroxide and carbon disulphide, which are derived from coal, oil, or natural gas. Polyester factories are responsible for massive amounts of air pollution and water pollution and may cause human health problems. Polyester doesn't breathe like natural textiles. This is the worst choice if we live in warm climates. The heaviest weaves are extremely dense. Without the inclusions of natural threads, there's literally no ventilation in the garments. Chemically treated fabrics are a source of toxins that adversely affect our health and the planet. They commonly contain toxins like formaldehyde, brominated flame-retardants, and perfluorinated chemicals like Teflon fibers to make the apparel wrinkle free. In simple words perfluorinated compounds are classified as cancer-causing agents under Protection Agency Synthetic fabrics are often non-biodegradable, meaning that when discarded, they do not break down in the soil, and the chemicals used in their manufacture can leach out into the environment. "Killer Clothes! How Seemingly Innocent Clothing Choices Endanger our Health and How to Protect our self" reveals in unprecedented detail the surprising number of harmful effects on health caused by garments once considered safe.

To avoid any such dangers of synthetic fabric effects on our self:

- In future buy natural fibre clothing, especially for our children and babies. Good options are cotton, flax, hemp, silk, wool and linen; Less common natural fibre options include alpaca, angora, camel, cashmere, mohair, and ramie.
- Try and buy only organic clothing when possible.

Now answer the following questions

Q 15.1: Give the name of the two chemicals used to make apparels wrinkle free.

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Short Response
Proficiency Level	3

Q 15.2: Which of the following statement about synthetic fibres is correct?

(i) All Synthetic fibres are obtained from natural substances.

(ii) Synthetic fibres are biodegradable.

(iii) Synthetic fibres are durable and cheaper.

(iv) Synthetic fibres are skin friendly and don't easily catch fire.

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q 15.3: Give the answer in YES/NO for the statements given below.

(i) Synthetic fibre clothes should be preferred for wearing in hot and humid weather.(YES/NO)

(ii) Synthetic fabrics are environment friendly .(YES/NO)

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating data and scientific enquiry
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Q15.4: Now a day's people are using quilts made of synthetic fibres. Is this good for our health? Explain.

FRAMEWORK	CHARACTERISTICS
Competency	Explaining phenomena scientifically
Knowledge-system	Physical Systems
Context	Global
Cognitive demand	High
Item format	Closed Constructed
Proficiency Level	5

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITHCREDITS

Answer 15.1-**Full Credit:** Perfluorinated chemicals like Teflon fibres to make the apparel wrinkle free.

No Credit: Wrong response or missing

Answer 15.2- **Full Credit**: iii) Synthetic fibres are durable and cheaper.

No Credit: Wrong response or missing

Answer 15.3 –**Full Credit :(** i) NO,As synthetic fibres are not a good absorber of sweat.

(ii) No, As Synthetic fibres are non-biodegradable.

Partial Credit: Any one correct response

No Credit: Wrong response or missing

Answer 15.4 – Full **Credit:** NO.As synthetic fibres are not skin friendly and causes allergy. They are not breathable.

No Credit: Wrong response or missing

SOURCES: https://www.ifdcouncil.org/the-dangers-of-synthetic-fabric/

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DOMAIN: SCIENTIFIC LITERACY CLASS: VIII

TOPIC: SYNTHETIC FIBRE AND PLASTIC

EXPECTED TIME: 10MIN. TOTAL CREDIT: 8

LEARNING OUTCOME:

1. To make students aware about use of plastic in medical industries.
2. Impact of plastic on environment.

Unit -16 (PLASTIC IN MEDICAL INDUSTRY)

The use of plastics revolutionized the field of medicine making patients safer, and procedures simpler. For example, doctors experienced difficulties when the MRI machine was first introduced. An MRI is basically a giant magnet with the ability to attract any metal object within range. Metal objects situated too close to the MRI machine could become airborne and dangerous if they should fly towards the magnetized unit. Today, all of the equipment that surrounds an MRI is created out of plastic to guard against this. Even tools utilized to install the MRI are fabricated out of plastic

Patients directly benefit from the use of plastic with more lives being saved, improved and prolonged due to its use.

High tech polymers are used to create new and improved artificial limbs and plastic disposable delivery devices have succeeded in reducing the risk of infection to patients.

Plastics in medicine have improved the quality of life for seniors and for those injured in accidents. Today's artificial knees and hips rely on plastics to provide people with pain free movement and trouble-

free joints. The gloves that surgeons wear use soft and pliable plastics that help maintain the sterile atmosphere of hospitals' operating rooms.

Lately, in the media, plastics have been getting a bad reputation. Due in part to the fact that plastic is not biodegradable. But it is not likely that anything can replace plastic in the field of medicine, or that its use will be reduced in the very near future. The medical industry has been greatly improved due to the incorporation of plastics across a whole range of uses in all fields of medicine. Ultimately the patients, and that's you and me, benefit the most from the use of plastics in medicine.

QUESTION 16.1. Artificial knees and hips are made of plastic nowadays. Give two reasons in support of this.

FRAMEWORK	**CHARACTERISTICS**
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Close construct
Proficiency Level	3

Question16.2: Equipments surrounding MRI is made out of plastics instead of metal mainly because

(a) Plastics are light in weight.

(b) Plastics are economical.

(c) MRI has not ability to attract metal object.

(d) Metal objects may fly towards the magnetized unit.

FRAMEWORK	**CHARACTERISTICS**
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Question 16.3: Write answer in Yes/No as per given passage:

(i) Introduction of plastics in medicine has reduced costs of medicine(YES/NO)

(ii) Risk of infections to patient have been increased due to plastic disposable delivery devices (Yes/NO)

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Question16.4: The medical industry has become safer as a result of introduction of plastic. (YES/NO), Justify.

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	High
Item format	Open constructed
Proficiency Level	5

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Q16.1 **Full Credit**: durable and better pain management
Partial Credit: For one reason.
No Credit: Any other response or missing response

Q16.2 **Full Credit:** d
No Credit: Wrong response or missing response.

Q16.3 **Full Credit YES, NO**
Partial Credits: For one correct response.
No Credit: Any other response or missing response

Q16.4 **Full Credit** for yes and correct Justification
use of plastic in different field of medicine
Full Credit : for no and correct Justification, if any
No Credit: for yes/no without justification or missing
SOURCES http://www.pepctplastics.com/resources/connecticut-plastics-learning-center/plastics-in-medicine/

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DOMAIN :SCIENTIFICLITERACY CLASS:VIII

TOPIC: SYNTHETIC FIBRE AND PLASTIC

EXPECTED TIME: 15MIN. TOTAL CREDIT:8

LEARNING OUTCOME:

1. To make students aware about properties of plastics to make it material of choice.
2. Importance of plastic in outlives.

Unit 17 (HOW PLASTIC IMPROVES OUR LIVES)

Nowadays plastics are used in thousands of products that add comfort, convenience, and safety to our everyday lives.

it makes an ideal material for manufacturing cars, trucks, and other vehicles. Plastics make up ten percent of new vehicle's total weight, and over 50 percent of their volume.

Plastics are not corroded easily. This makes it suitable to store various kinds of material, including many chemicals. On the other hand, metal like iron get rusted in moisture and air.

Plastics can be given to different shapes and variety of household articles like buckets, mugs, container; ropes are made out of it.

Plastics are also used in handles of kitchen utensils and electrical appliances.

So, if we summaries, followings are the properties of plastic, making it suitable for variety of useful objects.

5. Response with heat
6. Non-reactive nature
7. Light weight and durability and

8. Bad conductor of heat and Electricity.

QUESTION 17.1: Plastic is a material of choice because:

(a) It can be easily decomposed
(b) It reacts with water and air.
(c) It is durable
(d) It allows heat to pass through hit.

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

QUESTION 17.2: Write your answer in Yes or No

(a) Plastic resists electricity through it.(Yes/NO)
(b) Plastic is used in car and aircrafts mainly due to its non-reactive nature.(Yes/No)

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

QUESTION 17.3: Why is PVC pipes preferred over metallic pipes nowadays?

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	high
Item format	Close construct
Proficiency Level	5

QUESTION 17.4: Handles of many cookware are made of plastic, why?

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Close construct
Proficiency Level	3

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Q17.1. Full Credit: C

No Credit: Wrong response or missing response.

Q17.2. **Full Credit YES, NO**

Partial Credits: For one correct response.

No Credit: Any other response or missing response

Q17.3 Full credit : Plastics are non reactive with water and air, on the other hand metals like iron get rusted.

Partial credit: for partial answer.

No credit: for wrong response and missing

Q17.4 Full Credit: As plastic is bad conductor of heat so it doesn't allow heat to pass and remain at normal temperature on the other hand metallic part of cookware become hot.

Partial credit: for partial answer.

No credit: for wrong response and missing

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TOPIC: SYNTHETIC FIBRE AND PLASTIC

EXPECTED TIME: 15MIN. TOTAL CREDIT: 8

LEARNING OUTCOME:

1. To make students aware about advantages and harm of plastic in our kitchen.

Unit 18 (TEFLON AND MELAMINE IN OUR KITCHEN)

Materials like Teflon and Melamine are commonly plastics found in everyday kitchenware products.

Teflon is a type of plastic which is often used to coat frying pans.

Generally speaking, Teflon is a safe and stable compound. But above 570°F (300°C), Teflon coatings may begin to break down, releasing toxic fumes into the air. These fumes can cause temporary, flu-like symptoms known as polymer fume fever.

Cast-iron, when seasoned properly, is naturally nonstick. It also lasts a long time and can withstand temperatures well above those considered safe for nonstick pots and pans.

Melamine is used to manufacture cooking utensils, plates, plastic products, Melamine tableware is generally considered safe for use but there are a few guidelines that you need to know and follow in order to remain safe.

Most melamine tableware is not microwave-safe and should not be used for heating food. However, you can serve hot food in melamine tableware. The primary concern with melamine is that it can leech into acidic foods if heated at very high temperatures.

Make sure that you look at the condition of your melamine cookware before using it. Do not use chipped, broken or scratched melamine tableware

There have been melamine-related scares in the past. In 2007, melamine found its way into Chinese infant

formula and pet food. Unscrupulous manufacturers saw melamine as a substitute to increase the protein content of the food that were manufacturing. This led to thousands of pet deaths across the US. It has also been reported

that close to 54,000 infants fell ill due to melamine exposure and had to suffer from renal and kidney-related problems. Addition of melamine to food or food substitutes is illegal and not approved by the World Health Organization

Q 18.1: (a) Name the plastic which is more flame resistant.

(b) What is the role of coating Teflon in frying pans?

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Close construct
Proficiency Level	3

Q 18.2: What are the risks behind using nonstick frying pans?

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Close construct
Proficiency Level	4

Q 18.3: Write cheap and best alternative of Teflon coated frying pans in your opinion and Justify it.

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	high
Item format	Close construct
Proficiency Level	5

Q 18.4: Write your answer in Yes/No

(a) Melamine is good substitute of protein in our diet(YES/NO)

(b) It is safe to serve no acidic food at normal temperature in melamine plate.(YES/NO)

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

CREDIT PATTERN:

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Q18.1 Full Credit: (a) Melamine, (b) making it smooth and non-stick

Partial credit: for partial answer.

No credit: for wrong response and missing

Q18.2. Full **credit**attemperature above300-degreeCelsius breakdown occurs releasingtoxic fumes can cause flu like symptom.

Partial credit: for partial answer.

No credit: for wrong response and missing

Q18.3 Full credit Cast iron or Stainless-Steel Pan or any other with correct Justification

Partial credit: for partial answer.

No credit: for wrong response and missing

Q18.4: Full Credit: NO, YES

Partial Credits: For one correct response.

No Credit: Any other response or missing response

SOURCES. ** (http://www.kplintl.com/blog/is-melamine-safe-for-everyday-use/)

*(https://www.healthline.com/nutrition/nonstick-cookware-safety#section3)

NAME OF THE TEACHER: NIRAJ KUMAR SHUKLA
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NAME OF THE VIDYALAYA: K V NO. 3 AGRA CANTT
KVS REGION: AGRA

DOMAIN : SCIENTIFICLITERACY CLASS:VIII

TOPIC: SYNTHETIC FIBRE AND PLASTIC

EXPECTED TIME: 15MIN. TOTAL CREDIT:8

LEARNING OUTCOME:

Sensitizing students about response of different plastics with heat and make them able to identify plastics which can be recycled.

UNIT 19 (THERMOPLASTIC VS THERMOSETTING PLASTIC)

Thermoplastics and thermosetting plastics are two separate classes of polymers, which are differentiated based on their behaviour in the presence of heat. The material difference between the two is that **thermoplastics can be remelted**, while **thermoset plastics remain in a permanent solid state once hardened**. As a result of these physical qualities, thermoplastic materials have low melting points while thermoset plastic products can withstand high temperatures without losing austerity.

THERMOPLASTICS

The curing process of Thermoplastics is 100% reversible as no chemical bonding takes place. This characteristic allows thermoplastics to be remolded and recycled without negatively affecting the material's physical properties. There are a variety of thermoplastic resins that offer various performance benefits, but the majority of materials commonly offer high strength, shrink-resistance and easy flexibility. Examples of thermoplastic polymers include polyethylene, PVC, and nylon.

Thermoplastic Advantages:

Highly recyclable, High-Impact resistance, Reshaping capabilities, Chemical resistant, Aesthetically superior finishes

Thermoplastic Disadvantages:

Expensive, can melt if heated

(THERMOSETTING PLASTIC)

Thermoset plastics greatly improve the material's mechanical properties, providing enhanced chemical resistance, heat resistance and structural integrity. Thermoset plastics are frequently used for sealed products due to their resistance to deformation and are also among some of the resistant plastics available. Examples of thermoset plastic polymers include epoxies, phenolics, silicones, and polyesters.

Q 19.1: Which of the following cannot be recycled?

a) Plastic Toys b) Cooker handles c) Carry bags d) Plastic chair

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system

Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q 19.2: Rahul got surprised that Electric Plugs are made up of thermosetting plastics? The reason behind this is-

a) they can be remolded(yes/no)

b) Poor conductor of Electricity(yes/no)

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Personal
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Q 19.3: Rajesh observed that some plastic becomes hard on heating while some becomes soft. Write two examples of each type used as household articles.

FRAMEWORK	**CHARACTERISTICS**
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Personal
Cognitive demand	high
Item format	Close construct
Proficiency Level	5

Q 19.4: Today's is the world of plastic. We can't think of life without plastic. Use of plastics and other synthetic fibres is helping in conservation of forest (YES/NO), Justify

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	High
Item format	Open constructed
Proficiency Level	5

CREDIT PATTERN:

1.FULL CREDIT:02
2.PARTIAL CREDIT:01
3.NO CREDIT:00

ANSWER KEY WITH CREDITS:

Q19.1. Full Credit: b
No Credit: Wrong response or missing response.

Q19.2. **Full Credit NO, YES**
Partial Credits: For one correct response.
No Credit: Any other response or missing response
Q19.3 Full credit : hard on heating: cooker handle and electric plug or any two
Soft on heating: plastic toys and Plastic water bottles or any two
Partial credit: at least one example of both.
No credit: for wrong response and missing
Q17.4 Full Credit: yes, we don't depend on forest for many daily use items which can be made by plastics. Like furniture, construction, etc. . .
Full Credit:2 No, if student justifies logically. .
Partial credit: for partial answer.
No credit: yes/no with wrong justification.

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DOMAIN : SCIENTIFICLITERACY CLASS:VIII

TOPIC: SYNTHETIC FIBRE AND PLASTIC

EXPECTED TIME: 15MIN. TOTAL CREDIT:8

LEARNING OUTCOME: Sensitizing students towards plastic waste management.

UNIT :20

These Buddhist Monks are Recycling Thousands of Plastic Bottles into Robes in Thailand

'If you don't collect these plastics, where do they end up? In the stomachs of dugongs, dolphins, whales, and many other sea animals. Then they die.'

At a Buddhist temple in south of Bangkok, a monk watches as a machine presses down on thousands of water bottles, before a giant bale of crushed plastic rolls out with a thud.

The plastic is destined to be recycled into polyester fibres, which will be made into fabric for saffron-coloured robes for monks.

The recycling temple of WatChakaDaeng is one bright example of recycling for Thailand, one of five countries that account for more than half of plastic in the world's oceans.

The monks have crushed 40 tonnes (88,185 lb.) of plastic over two years since starting the programme, aiming to curb plastic waste entering the Chao Phraya River, which flows south to the Gulf of Thailand in the western Pacific Ocean.

“I’m practicing the Buddha’s teachings, which also align with solving the global environmental crisis,” says PhraMahaPranomDhammalangkaro, 54, abbot of the temple in SamutPrakan province, just south of Bangkok.

Unlike most temples where people give monks alms like food and clothes, devotees ride bicycles here to offer plastic bags and bottles in exchange for PhraMahaPranom’s blessings.

“Donating one kilogram (2.2 lb) of plastic bottles can help make a full set of monk robes, which has a high return value, both in terms of money and merits,” the monk says.

The temple has produced at least 800 sets of robes, with more in production stages.

Each set sells for between 2,000 baht ($65.79) and 5,000 baht ($164.47), to keep funding the project and pay waste-sorting volunteers, many of whom are local housewives, retirees and disabled persons.

Thailand is the fifth highest contributor of plastic to the world’s oceans, according to a report by the U.S.-based group Ocean Conservancy. The list includes three other Southeast Asian countries and China, the top plastics polluter.

“Not only are the monks making a concrete contribution to recycling, but they are raising awareness in their communities,” said CheverVoltmer, Director for Plastics Initiatives at Ocean Conservancy.

When PhraMahaPranom ventures into the community, villagers, both young and old, come out to contribute plastics.

“If you don’t collect these plastics, where do they end up? In the stomachs of dugongs, dolphins, whales, and many other sea animals. Then they die,” he tells them.

Q.No. 20.1 Process to change waste materials into new products to prevent waste of potentially useful materials is called-

(a) Reduce (b) Recycle (c) Reuse (d) Repurpose

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Global
Cognitive demand	Low
Item format	Simple MCQ
Proficiency Level	2

Q 20.2 Write answer is YES /NO

(a) Reuse is -to take something and use it for something else. (YES/NO).

(b) Plastic is non-biodegradable and takes approximately 50 years to be decomposed completely. (YES/NO)

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Q 20.3: How can you minimize use of single use plastic with your own effort/habit? Write 4 habits.

FRAMEWORK	CHARACTERISTICS
Competency	Demonstrating knowledge and understanding
Knowledge-system	Physical system
Context	Personal
Cognitive demand	high
Item format	Open construct
Proficiency Level	5

Q 20.4: What happens to animals eating garbage?

FRAMEWORK	CHARACTERISTICS
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical system
Context	Global
Cognitive demand	High
Item format	Open constructed
Proficiency Level	5

CREDIT PATTERN:	

1. FULLCREDIT:02
2. PARTIALCREDIT:01
3. NOCREDIT:00

ANSWER KEY WITH CREDITS

Q20.1. Full Credit: b

No Credit: Wrong response or missing response.

Q20.2. **Full Credit NO, NO**

Partial Credits: For one correct response.

No Credit: Any other response or missing response

Q20.3 Full credit : Any four habits like

1. Using cotton carry bag
2. Say no to plastic straws

3. Stop using Saran wrap
4. Get a reusable water bottle.

Partial credit: at least two habits.

No credit: for wrong response and missing

Q20.4 Full Credit: The plastic material chokes the respiratory system of these animals, or forms a lining in their stomachs and can be cause of their death.

Partial credit: for partial answer.

No credit: for wrong response and missing.

SOURCE: https://www.news18.com/news/buzz/these-buddhist-monks-are-recycling-thousands-of-plastic-bottles-into-robes-in-thailand-2491231.html

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CRITICAL AND CREATIVE THINKING TEST ITEMS
CLASS: VIII
SUBJECT: SCIENCE
CHAPTER_4_ MATERIALS: METALS AND NON-METALS
INDEX

11.CORROSION RESISTANT COATINGS

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme:
Metals and Non-metals
(reaction of metals with surroundings)</td><td>Class(es): VIII

Expected time:10 MIN
Total Credit: 8</td></tr>
<tr><td>Description of Item:

<table><tr><td>✓</td><td>Text</td></tr><tr><td></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td></td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome: (As per NCERT)
✓ Understands chemical properties of metals
✓ Linking scientific concepts to everyday life
✓ Compares the properties of different metals</td></tr>
</table>

Krishna and Gargi went for a summer camp in a remote village.There they visited many ancient temples. One day they noticed that a lady is cleaning old vessels that became dull in colour. They had a discussion with that lady and Gargi noticed that the lady uses tamarind solution to clean the tarnished copper vessels. While moving to store room for old utensils they noticed many rusted iron vessels and utensils dumped here and there.Then they had a mutual discussion over a related article, they read in a Science Magazine

'Corrosion resistant coatings protect metal components against degradation due to moisture, salt spray, oxidation or exposure to a variety of environmental or industrial chemicals. Anti-corrosion coatings allow for added protection of metal surfaces and acts as a barrier to inhibit the contact between chemical compounds or corrosive materials. In addition to corrosion prevention, many of the coatings also provide a bonus of abrasion resistance, non-stick performance and chemical protection.

11.1 Gargi noticed green patches over the tarnished copper vessels that are kept in store room. What are these green patches?

(a)Mixture of copper hydroxide and copper carbonate
(b)Mixture of copper sulphate and copper carbonate
(c) Copper hydroxide

(d)None of the above

FRAMEWORK	CHARACTERISTICS
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Simple multiple choice
Proficiency Level	2

Description of Answer Key and Credits:

Full credit: Mixture of copper hydroxide and copper carbonate

No credit: No response or Any other response

11.2 Is it advisable to use sour substances in cleaning tarnished copper vessels? What is your answer? Explain your answer.

……

……

……

……

FRAMEWORK	CHARACTERISTICS
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Closed constructed

Proficiency Level	4

Description of Answer Key and Credits:

Full credit: Yes, sour substances contain acids. The green substance on tarnished copper vessels (mixture of copper hydroxide and copper carbonate) is basic in nature. When acid react with base neutralisation reaction occurs.

Partial Credit: Yes. Sour substances contain acids, which react with green patches in copper vessels,

No credit: No response or Any other response

11.3 In one of the store rooms of the temple, Krishna noticed many Aluminium vessels kept aside that are not polished or painted. Why aluminium objects do not require painting or polishing even though it is very reactive?

……
……
……

FRAMEWORK	CHARACTERISTICS
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Closed constructed response**
Proficiency Level	**4**

Description of Answer Key and Credits:

Full credit: Aluminium react with oxygen to form an inert layer of aluminium oxides, The inert layer protect metal from further corrosion

Partial credit: Aluminium vessels develop a coating that protects it from corrosion.

No credit: No response orAny other response

11.4 Bath taps, car parts, kitchen gas burners, bicycle handle bars etc. remain shiny, rust free and scratch resistant for long time. Which method of metal protection is adopted here?

……
……

FRAMEWORK	CHARACTERISTICS
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Low**
Item format	**Closed constructed response**
Proficiency Level	**2**

Description of Answer Key and Credits:

Full credit: Nichrome plating

Partial credit: Electroplating

No credit:No response or Any other response

12.Eiffel Tower

Domain: Scientific Literacy	**Theme:** Metals and Non-metals (Physical properties of Metals and Non-metals)	**Class(es):** VIII **Expected time:12 MIN** **Total Credit: 8**

Description of Item:

✓	Text
✓	Image
	Table
	Graph

Learning Outcome: (As per NCERT)

- ✓ Understands the physical properties of metals and Non-metals
- ✓ Compares physical properties of different metals
- ✓ Correlates the properties of metals with their applications in daily life.
- ✓ Explores uses of metals in daily life
- ✓ Distinguish metals from Non- metals based on observations, followed by experiment.

During the World's Fair in 1889, Contractor Gustave Eiffel introduced the Eiffel Tower. An engineer by training, Eiffel founded and developed a company specializing in metal structural work. He devoted the last thirty years of his life to his experimental research. His most popular achievement was the Eiffel Tower. Towering nearly 320 meters tall, and weighing 10,100 tons, the Eiffel tower stands both as a landmark, recognizable throughout the world as the icon of the city of Paris, and as a monumental example of materials' structure, properties and performance. The tower is composed of puddling iron, not steel as many of today's buildings. Total 7,000 metric tons of puddling iron, which were the precursor to construction steel, was used. Like most materials, the tower undergoes thermal expansion. Thermal expansion is when a material changes dimensions while it undergoes temperature changes. The tower expands and contracts 15 cm from the hottest to the coldest day."

12.1 You are given with pieces of iron, copper, aluminium, magnesium and sodium and directed to perform an activity to verify the hardness of different metals. Pick out the correct observation(s).

(a) All metals are very hard
(b) Iron and Magnesium are hard, other metals are soft
(c) Only iron is the hard metal among them
(d) All given metals except sodium is hard.

FRAMEWORK	CHARACTERISTICS
Competency	Interpret data and evidence scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Simple multiple choice
Proficiency Level	3

Description of Answer Key and Credits: **Full credit: All given metals except sodium is hard.** **No credit: No response or Any other response**

12.2 An incandescent bulb works on the principle of incandescence, a general term meaning light produced by heat. An electric current is passed through a thin metal filament, heating the filament until it glows and produces light. Which pair of characters makes tungsten as a suitable element for incandescent bulb?

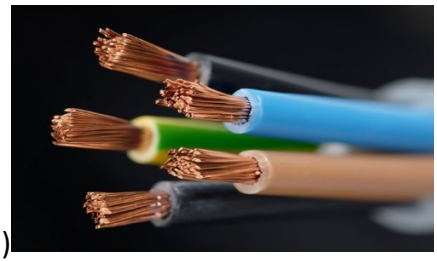
(a)High melting point and Malleability
(b)High melting point and ductility
(c)Low melting point and ductility
(d)Low melting point and malleability

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Simple multiple choice
Proficiency Level	3

Description of Answer Key and Credits: **Full credit: High melting point and ductility** **No credit: No response or Any other response**

12.3 The following pictures (a) and (b), explains two different properties of metals. Identify and differentiate those properties.

(a) 

(b) 

FRAMEWORK	CHARACTERISTICS
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	**Closed constructed response**
Proficiency Level	2

Description of Answer Key and Credits:

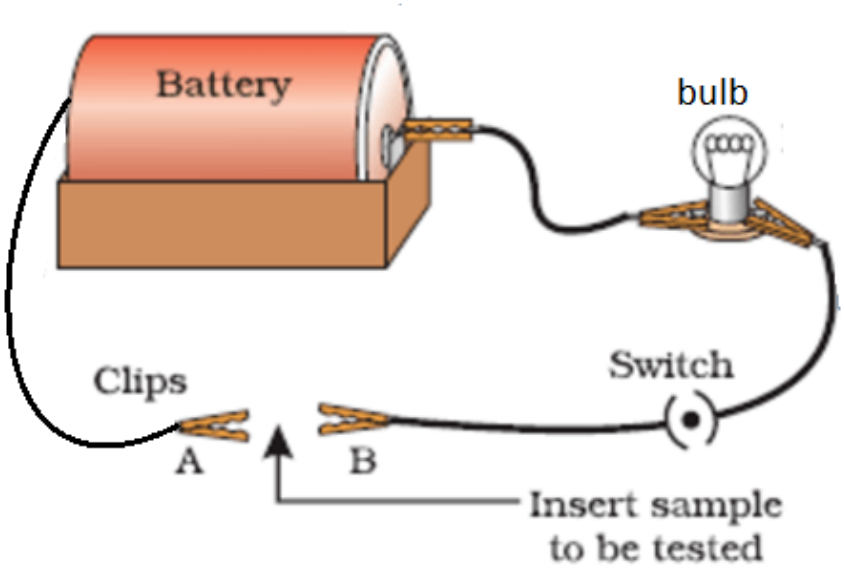
Full credit: (a) Malleability: Metals can be hammered into thin sheets

(b) Ductility: Metals can be drawn into thin wires.

Partial credit: (a) Malleability (b) Ductility ; without explanation

No credit: No response or any other response.

12.4 Rohit performed an experiment to check the conductivity of different objects. Complete the observation table in his practical diary



SAMPLE	OBSERVATION
(i) Copper wire	Bulb glows
(ii) Plastic straw	----------
(iii) Silver Spoon	----------
(iv) Pencil lead	----------
(v) Iron Nail	----------

FRAMEWORK	**CHARACTERISTICS**
Competency	Design and evaluate an experiment.
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Short Closed constructed response
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: (ii) do not glow,(iii) bulb glows,(iv) do not glow, (v) bulb glows

Partial credit: Any two correct responses

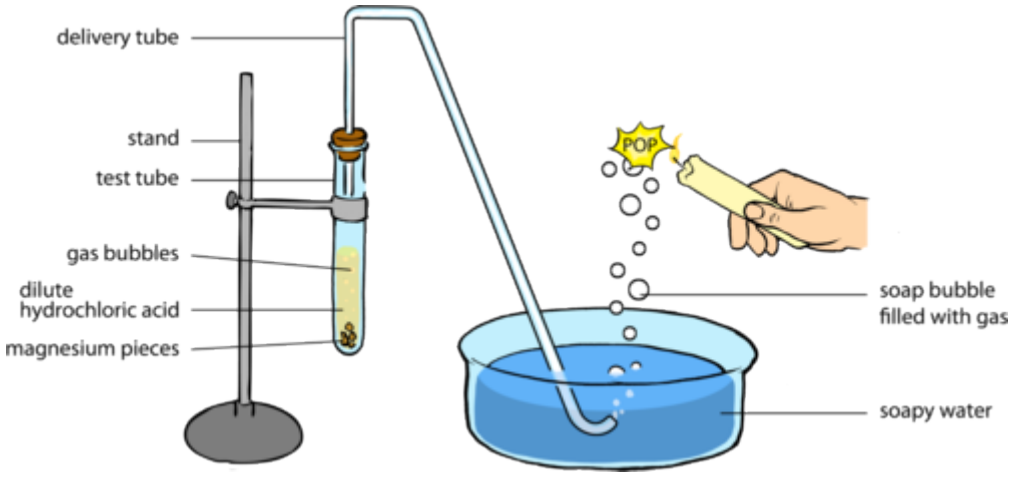
No credit: No response or Any other response

13. DEALING WITH METAL REACTIONS

Domain: Scientific Literacy	Theme: Metals and Non-metals (Chemical reactions of Metals)	Class(es): VIII Expected time:10 MIN Total Credit: 8
Description of Item: ☐ Text ✓ Image ✓ Table ☐ Graph ☐ Map ☐ Poem	Learning Outcome: (As per NCERT) ✓ Understands the chemical reactions of metals with other substances. ✓ Applies scientific knowledge in explaining real life situations ✓ Compares the reactivity of different metals.	

Metal	Reaction with cold water	Reaction with dilute acids	Reactivity
Potassium	Violent	Violent	Most reactive
Sodium			
Lithium			
Calcium	Fast	Rapid	
Magnesium	Very slow		
(Carbon)			
Zinc	Usually no reaction	Slow	
Iron	Rusts slowly		
(Hydrogen)			
Copper	No reaction	No reaction	
Gold			Least reactive

While discussing chemical reactions of metals with other substances, Class VIII students performed an experiment in chemistry lab .



13.1 Which gas gets filled in soap bubbles

(a)Carbon dioxide
(b)Oxygen
(c)Hydrogen
(d)Nitrogen

FRAMEWORK	CHARACTERISTICS
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Low
Item format	Simple multiple choice
Proficiency Level	2

Description of Answer Key and Credits:

Full credit: Hydrogen

No credit: No response or Any other response

13.2 Aparna was given Mg(Magnesium), Zn(Zinc), Fe (Iron), and Cu(Copper) metals. She put each of them in dilute HCl contained in different test tubes. Identify which of them

- Will not displace H_2 from dilute HCl.
- Forms a pale green substance
- Will be displaced from its salt solution by all other metals.

Select the correct combination.

(i) Fe, Cu , Mg
(ii) Cu, Fe, Cu
(iii) Mg, Fe, Cu
(iv) Fe, Mg, Cu

FRAMEWORK	CHARACTERISTICS
Competency	**Interpret data and evidence scientifically**
Knowledge-system	Physical
Context	Social
Cognitive demand	High
Item format	Complex multiple choice
Proficiency Level	5

(v)

Description of Answer Key and Credits:
Full credit: Cu, Fe ,Cu
No credit: No response or Any other response

13.3 A solution of copper sulphate was kept in an iron vessel, after a few days large number of holes were observed in the pot. What will be the reason?

…….

……
……

FRAMEWORK	**CHARACTERISTICS**
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Closed constructed response**
Proficiency Level	**4**

Description of Answer Key and Credits:

Full credit: When copper sulphate solution is kept in iron vessel, iron get dissolved to displace copper from the solution. It is because iron is more reactive than copper. Holes appear due to dissolution of iron particles

Partial credit: Iron is more reactive than copper/ because Iron get dissolved /because iron displaces copper

No credit: No response or any other response

13. 4 Aditya, a class VIII student was preparing for an experiment in chemistry lab. While collecting samples for experiment it came to his notice that phosphorous is stored in water. He was curious to know the reason. But only lab attendant was there. He answered that, it is stored in water, because of its high reactivity. But Aditya became confused because lab attendant pointed out that sodium metal is also very reactive but it cannot be stored in water.

Can you help Aditya, to clarify the doubts? Explain your answer

…….

……

……

FRAMEWORK	CHARACTERISTICS
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Closed constructed**
Proficiency Level	**4**

Description of Answer Key and Credits:

Full credit: Sodium reacts vigorously with water. Phosphorous, a reactive Non-metal, catches fire if exposed to air. To prevent the contact of phosphorous with atmospheric oxygen, it is stored in water. Phosphorous do not react with water

Partial credit: Sodium react with water vigorously but phosphorus does not.

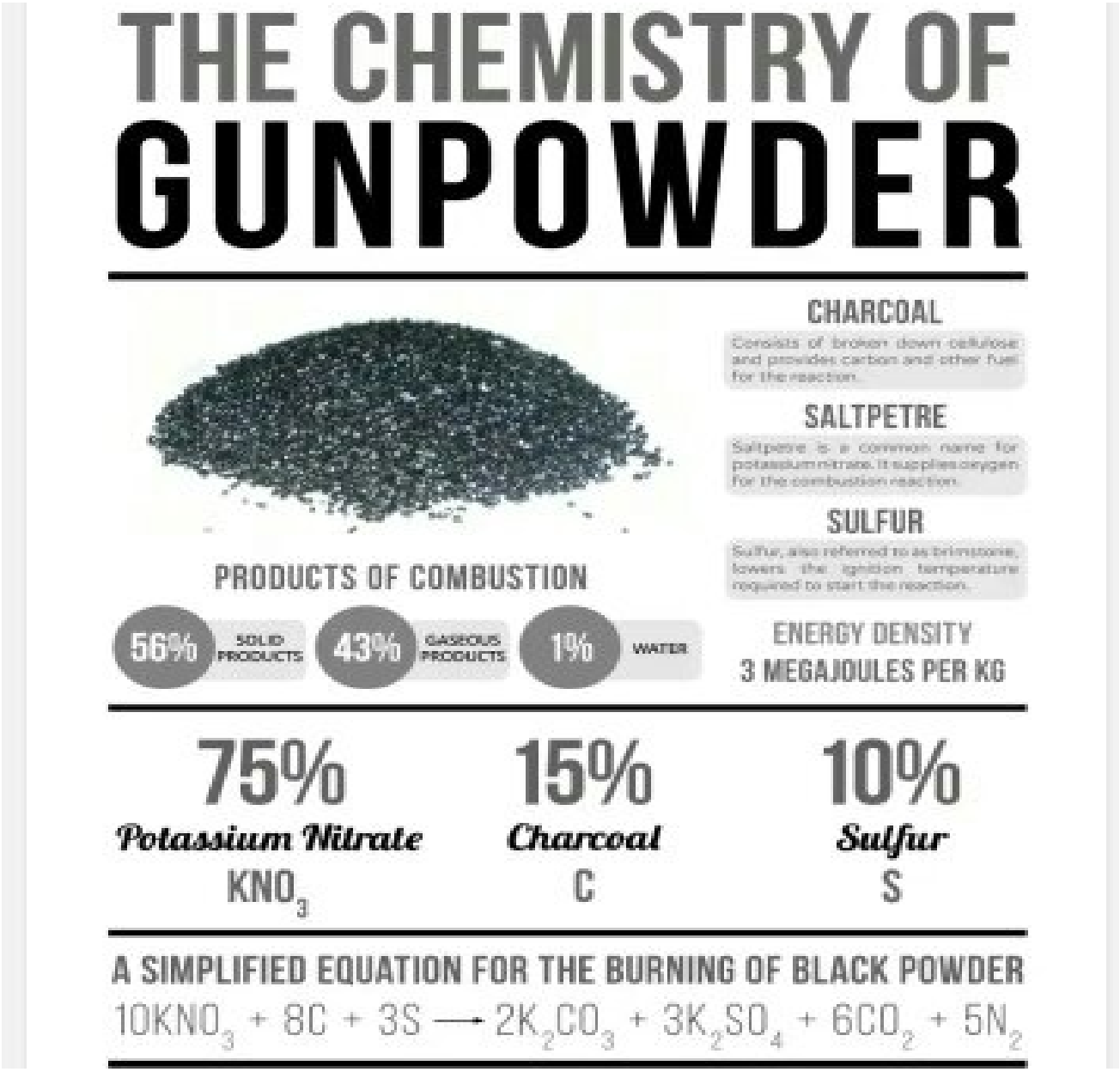
No credit: No response or any other response

14.CHEMISTRY OF GUNPOWDER

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme:
Metals and Non-metals</td><td>Class(es): VIII

Expected time:12 MIN
Total Credit: 8</td></tr>
<tr><td>Description of Item:

<table><tr><td>✓</td><td>Text</td></tr><tr><td>✓</td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td>✓</td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome: (As per NCERT)
✓ Understands the chemical reactions of Non-metals. (sulphur)
✓ Analyse and Interpret data to reach a conclusion
✓ Use scientific knowledge in assessing a problem in society..
✓ Become aware of importance of Non-metals in daily life</td></tr>
</table>



Gunpowder is a mixture of potassium nitrate, carbon, and Sulphur. Since it is a mixture, it does not, strictly speaking, have a formula. The standard composition for black powder (i.e., Proportions by weight) is **75%** potassium nitrate, **15%** Carbon, and **10%** Sulphur.Sulphur's main role in gunpowder is to decrease the ignition temperature.

Sulphur (S) is one of those elements you can never forget. It is bright yellow in colour and it has a really bad smell (like rotten eggs). Beyond the obvious physical traits of sulphur, man has been using this element for thousands of years. Sulphur is often found near volcanoes and hot springs. Historically, when man finds pure elements that are readily available, he puts them to use. Sulphur is even mentioned in the Bible, where it is called brimstone.Sulphur is an element that is easy to find on the ground and even easier to find in the table. Naturally occurring sulphur is a yellowish colour and is often found as a crystal. At normal temperatures, sulphur is **non-reactive**.

Fireworks are a good place to find sulphur. Fireworks and firecrackers are filled with gunpowder. One of the main ingredients of gunpowder is sulphur.

14.1 Sulphur powder is taken in a deflagrating spoon and heated it with the help of a burner. The evolved gas is collected inside a jar and water is added. You are provided with litmus papers to check the nature of product formed. Then what will be the correct observation from the following:

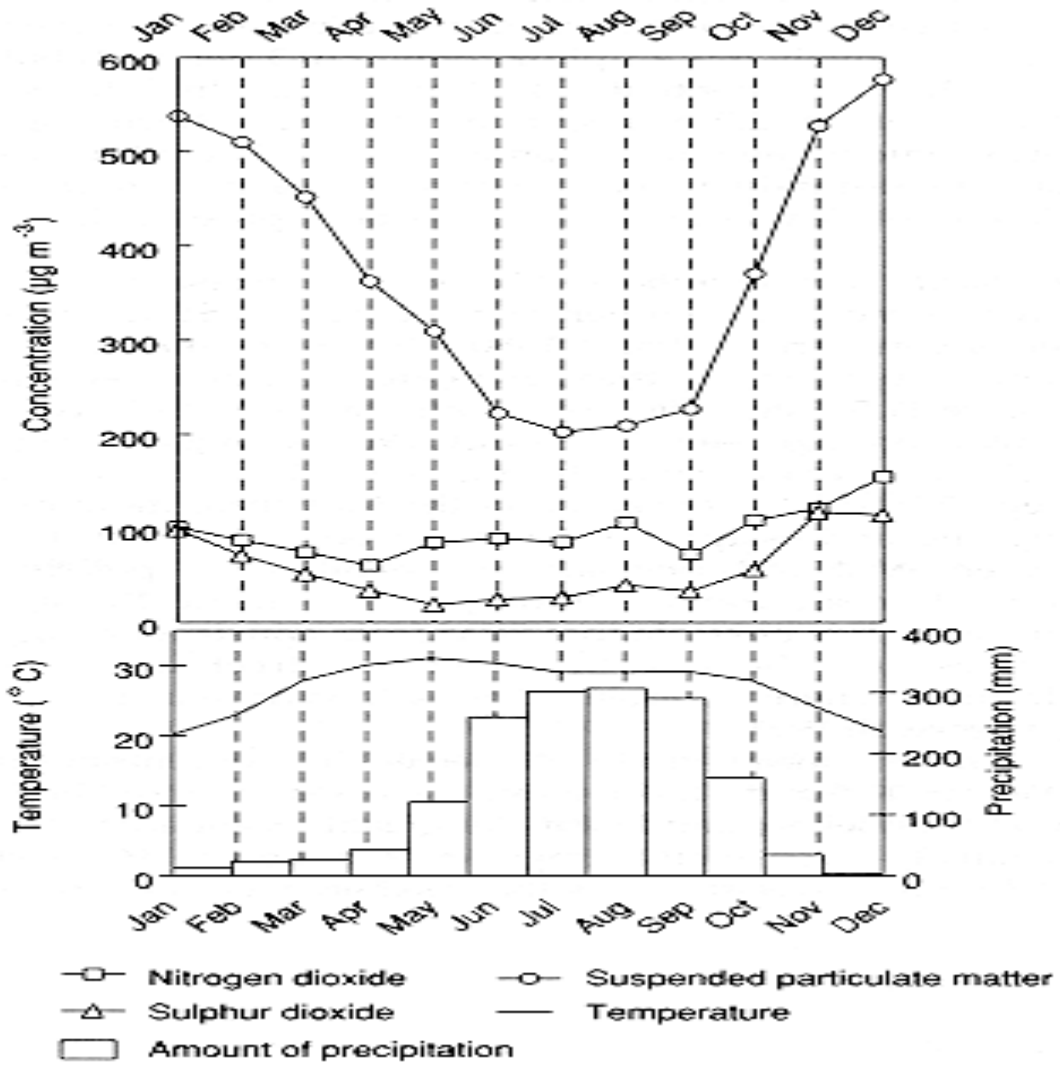
(a) The aqueous solution obtained changes red litmus to blue
(b) The aqueous solution obtained changes blue litmus to red
(c) The aqueous solution does not make change in blue litmus paper
(d) The aqueous solution changes the colour of both red and blue litmus paper

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Simple multiple choice
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: Aqueous solution obtained changes blue litmus to red

No credit: No response or Any other response



(Figure 4)

14.2 With reference to the above graph, the average Sulphur dioxide concentration peak during ----------

(a)July to September

(b)April to June

(c)November to February

(d)June to August

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpret data and evidence scientifically.

Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Complex multiple choice
Proficiency Level	4

Description of Answer Key and Credits: **Full credit: November to February** **No credit: No response or Any other response**

14.3 It rained in cities of Delhi, after Diwali season and people came up with a strange observation that, many statues and monuments getting black spots after continuous exposure to such rain. Can you explain this phenomenon? What is your stand in this regard?

…….

…….

……

FRAMEWORK	**CHARACTERISTICS**
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Open constructed response.**
Proficiency Level	**5**

Description of Answer Key and Credits:
Full credit: Acid rain, Oxides of nitrogen and sulphur, mix with water leads to acid rain. **Use of firecrackers in Diwali season, release of huge amount of sulphur dioxide** **Control of air pollution-use of firecrackers can be avoided. Eco-friendly approach** **Partial credit: Acid rain explanation** **No credit: No response or Any other response**

14.4 TheSchool Science club planned to organize a seminar on the topic" Exploring the world of Non –metals". The teacher suggested the members to add more points from daily experiences. Do you think Non-metals are essential for our daily life? Support your answer.

…….

…….

…….

…….

FRAMEWORK	**CHARACTERISTICS**
Competency	**Explain phenomena scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Closed constructed response**
Proficiency Level	**2**

Description of Answer Key and Credits:
Full credit: 1. Non-metal oxygen, inhale during breathing responsible for cell respiration (breakdown of glucose to release energy) **2. Non-metal used in water purification(Chlorine)**

3. Non-metal used as anti-septic(iodine) **4. Non-metal used in fertilisers(Nitrogen)** **OR**

any four relevant points **Partial credit: Any two relevant points** **No credit: No response or Any other response**

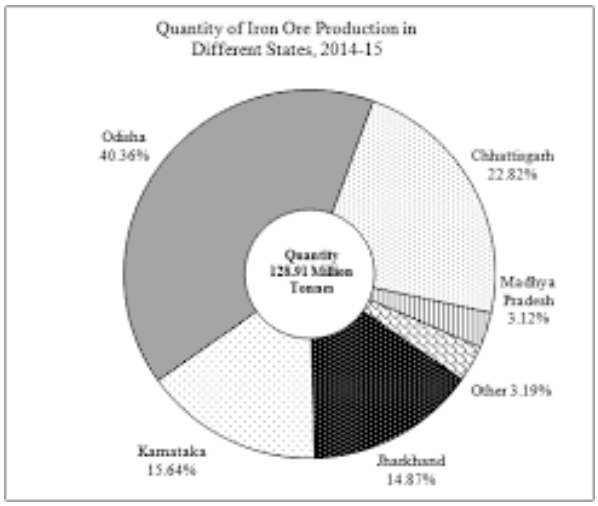
15.MINING :THE BACK BONE OF A NATION

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme:
Metals and Non-metals
(Mining-back bone of a Nation)</td><td>Class(es): VIII

Expected time:10 MIN
Total Credit: 8</td></tr>
<tr><td>Description of Item:

<table><tr><td>✓</td><td>Text</td></tr><tr><td></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td>✓</td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome: (As per NCERT)
✓ Understands the importance of metals in industrial development.
✓ Become aware of environmental impacts of mining.
✓ Applies scientific knowledge in justifying a decision.</td></tr>
</table>

Minerals constitute the backbone of economic growth of any nation and India has been endowed with mineral resources. Mining is the extraction (removal) of minerals and metals from the earth and is considered one of the core sectors that drive growth in every economy, providing raw materials to a host of basic industries such as steel, power, automobiles, construction, etc. The importance of this sector to a country's growth is often underestimated, as without the mining sector, many industries, especially manufacturing can get negatively impacted. At the same time, the environmental and social impact of mining is quite harsh. TheIron& steel is the driving force behind industrial development in any country. The mining of iron ore, an essential raw material for Iron & Steel Industry, is arguably of prime importance among all mining activities undertaken by any country. With the total resources of over 31.32 billion tonnes of haematite ($Fe_2O_{3)}$ and magnetite (Fe_3O_4), India is amongst the leading producers of iron ore in the world. Main deposits of iron ore are located in the states of **Odisha**, Jharkhand, **Chhattisgarh**, **Karnataka** and Goa, with **Odisha** contributing ~50% of India's total production.



15.1 Which of the single state had minimum production of Iron ore in 2014-15?

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpret data and evidence scientifically.
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Short closed constructed
Proficiency Level	2

Description of Answer Key and Credits:
Full credit: Madhya Pradesh
No credit: No response or Any other response

15.2 'Mining is one of the core sectors that drive growth in every economy'. Pick out the statement(s) in support of this.

(a) Mining provides raw materials for industries such as steel, power, automobiles and construction.

(b)Community dislocation and amenity loss are the common impacts of mining

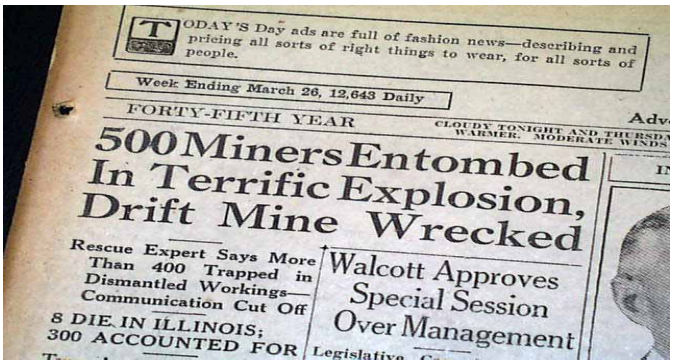
(c)India is among the leading producers of iron ore in the world

(d) Manufacturing industries will not progress, without mining industries

FRAMEWORK	CHARACTERISTICS
Competency	Interpret data and evidence scientifically.
Knowledge-system	Physical
Context	Social
Cognitive demand	Medium
Item format	Complex MCQ
Proficiency Level	3

Description of Answer Key and Credits: **Full credit: Statements (a) and (d)** **No credit: No response or Any other response**

15.3


TODAY'S Day ads are full of fashion news—describing and pricing all sorts of right things to wear, for all sorts of people.

Week Ending March 26, 12,643 Daily

FORTY-FIFTH YEAR

CLOUDY TONIGHT AND THURSDAY WARMER. MODERATE WINDS

500 Miners Entombed In Terrific Explosion, Drift Mine Wrecked

Rescue Expert Says More Than 400 Trapped in Dismantled Workings— Communication Cut Off

8 DIE IN ILLINOIS; 300 ACCOUNTED FOR

Walcott Approves Special Session Over Management

Legislative

Do you think the people working in mines should take precautions for their safety? Comment.

……

……

……

……

FRAMEWORK	CHARACTERISTICS
Competency	**Interpret data and evidence scientifically**
Knowledge-system	**Physical**
Context	**Social**
Cognitive demand	**Medium**
Item format	**Open constructed**
Proficiency Level	**4**

Description of Answer Key and Credits:

Full credit: Yes, chance of accidents

Precautions to be taken buy labourers and rules and regulations to be executed by authorities.

No credit: Other responses

15.4 It is said that minerals constitute the backbone of economic growth of any nation. Will you agree or disagree with the above statement keeping the environmental impacts of mining in areas especially with rich biodiversity? Justify your view in this regard.

……
……

FRAMEWORK	CHARACTERISTICS

Competency	Interpret data and evidence scientifically
Knowledge-system	Physical
Context	Social
Cognitive demand	High
Item format	Open constructed
Proficiency Level	5

Description of Answer Key and Credits:

Full credit: Correct justification of the view,

Emphasis on protection of biodiversity- Ecologically sensitive areas, hot spots etc.

No credit: Statement without justification

16. MERCURY: A WONDER LIQUID

Domain: Scientific Literacy	**Theme: Metals and non-metals(Mercury)**	**Class(es): VIII** **Expected time:12 min** **Total Credit: 8**

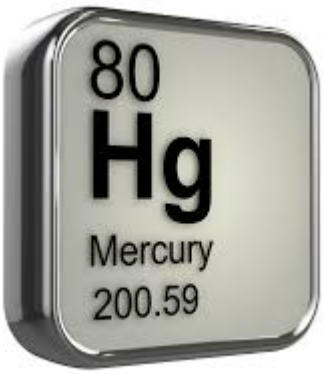
Description of Item:

✓	Text
✓	Image
	Table
	Graph
	Map
	Poem

Learning Outcome: (As per NCERT)

- ✓ Explains physical properties of non-metals
- ✓ Applies learning of scientific principles in day to day life
- ✓ Related processes and phenomenon with cause

.



Named after the fastest-moving planet in the solar system, mercury has been known to humanity for ages. In fact, evidence of its use has been found in China, India and Egypt, and traces of mercury were found in 3,500-year-old Egyptian tombs.
Mercury is a very toxic element. It can enter the body through an open wound or by inhaling or ingesting it. It can then cause damage to nerves, the liver and the kidney, as well as a number of other symptoms.

Despite its toxic qualities, mercury can still be useful to us. The element conducts electricity and is used in electrical switches of thermostats and certain types of doze alarm-type alarm clocks, according to the College of Natural Resources at the University of California, Berkeley (CNR) "The place where people probably see it most commonly is in the new light bulbs — the compact fluorescent light bulbs," where mercury vapour is one of the chemicals used, said Daniel King, an associate professor of chemistry at Drexel University.

16..1 Mercury is found in liquid state in normal room temperature. It is a:

(a)Metal

(b) Non-Metal

(c) Metalloid

(d) Alloy

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	Low

Item format	Simple multiple choice
Proficiency Level	2

Description of Answer Key and Credits: **Full credit: metal** **No credit: No response or Any other response**

16.2 Circle True/False in the following cases

- Mercury is in liquid form, so it cannot conduct electricity.(True/False)
- Mercury will float over water since it is less dense to water.(True/False)
-

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	Medium
Item format	Binary choice type
Proficiency Level	3

Description of Answer Key and Credits: **Full credit: FALSE, FALSE IN ORDER** **Partial credit : any one answer correct** **No credit: No response or Any other response**

16.3 For measuring body temperature, thermometers are placed under arms or under the tongue, normally. Why in your opinion mercuric thermometers are not advised to keep under tongue to measure the body temperature of kids?

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Physical

Context	Global
Cognitive demand	High
Item format	Closed constructive type
Proficiency Level	5

Description of Answer Key and Credits:

Full credit: There chances that kids may bite the thermometer if it is kept under tongue and it can cause injury and may break the thermometer. The mercury inside the bulb of thermometer, which is highly poisonous can mix with the blood and can be fatal

Partial credit: mercury is poisonous

No credit: No response or response like it may not give correct reading, for children also might not like if kept under tongue or any other response.

16.4 There was a project run by Govt to replace all filament type bulbs with CFL, since CFL consumes less energy compared to normal filament type bulbs. Do you think this has adverse effect on environment? Yes/No. List one reason in support of your answer.

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating and designing scientific enquiry
Knowledge-system	Health
Context	Global
Cognitive demand	High
Item format	Closed constructive type
Proficiency Level	4

Description of Answer Key and Credits:

Full credit: YES. CFL s contain mercury .Thus its disposal can cause various type of pollution.

Partial credit: YES or CFL cause pollution .any one answer

No credit: No or no response.

17.STATUE OF LIBERTY

<table>
<tr><td>Domain: Scientific Literacy</td><td>Theme: Metals and non-metals(statue of liberty)</td><td>Class(es): VIII
Expected time:8 min
Total Credit: 8</td></tr>
<tr><td>Description of Item:<table><tr><td>✓</td><td>Text</td></tr><tr><td>✓</td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td>✓</td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table></td><td colspan="2">Learning Outcome: (As per NCERT)
1.Explains physical properties of metals
2. Interpret data (graph)
3. Applies learning of scientific principles in day to day life.
.</td></tr>
</table>

Statue of Liberty: In 1886, the Statue of Liberty represented the largest use of copper in a single structure. To build the statue, about 80 tons of copper sheets was cut and hammered to a thickness of about 2.

millimetres (3/32 inch), or about that of two U.S. pennies placed together.

Photo copyright iStockphoto / A. Harris. Source:https://geology.com/usgs/uses-of-copper/

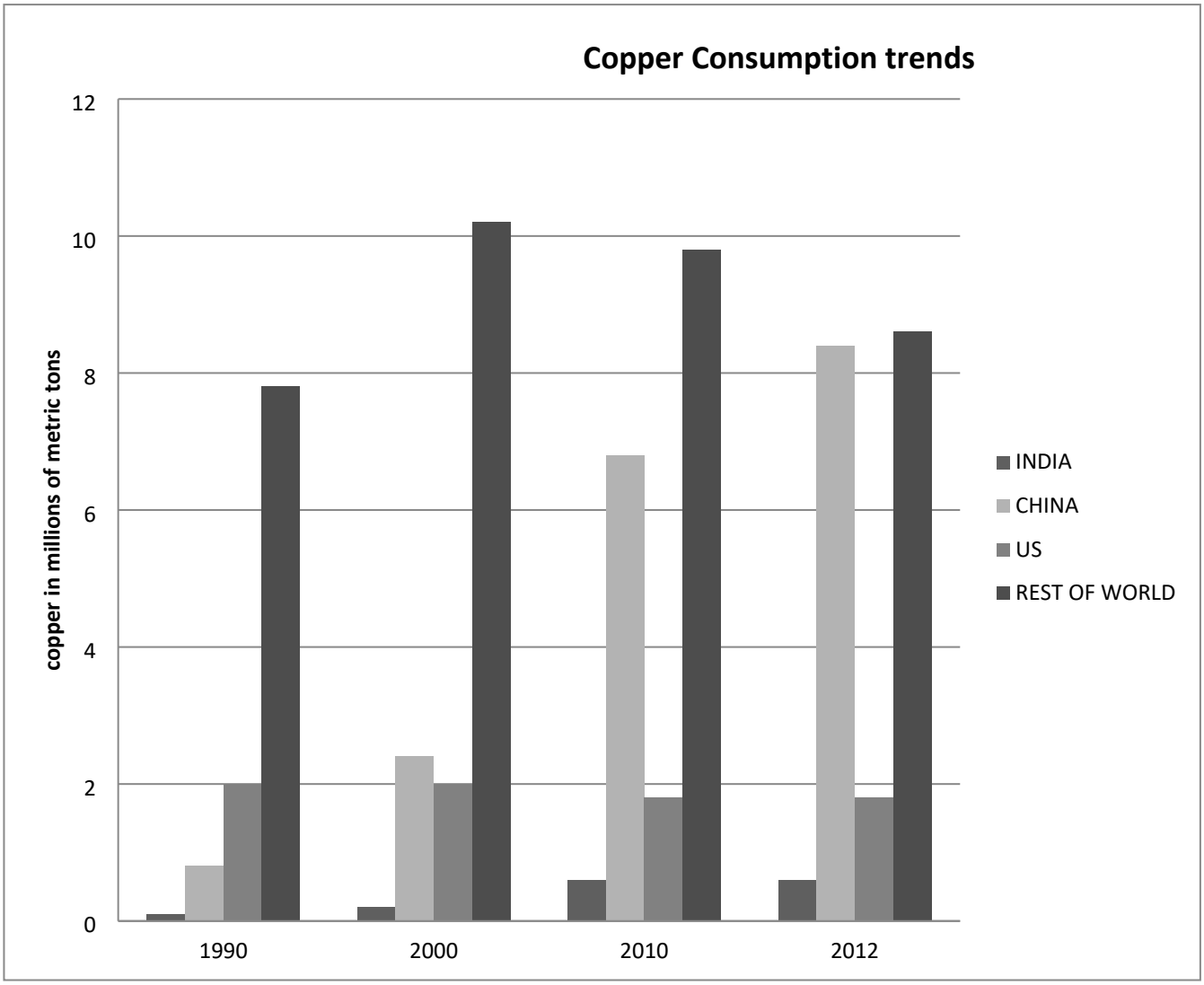
17.1 The property by which metals can be hammered into thin sheets, is termed as

a. Malleability
b. Ductility
c. Sonorous
d. Lustrous

FRAMEWORK	**CHARACTERISTICS**
Competency	Explain phenomena scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	medium
Item format	Simple Multiple choice
Proficiency Level	2

Description of Answer Key and Credits:
Full credit: malleability
No credit: no answer or other responses

17.2



Observe the graph. Among the following which single country's consumption is more in the year 2000?

FRAMEWORK	**CHARACTERISTICS**
Competency	Evaluating and designing Scientific Enquiry
Knowledge-system	physical
Context	Global
Cognitive demand	medium
Item format	Closed constructive type
Proficiency Level	2

Description of Answer Key and Credits:
.Full credit: China.
Partial credit: no partial credit
Zero credit: no answer, or any other answer

17.3 Copper is added to the gold for making jewellery. What do you think the reason is?

……
……
……

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Phenomena Scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	high
Item format	Closed constructive type
Proficiency Level	5

Description of Answer Key and Credits:
Full credit: Gold is very soft(brittle). When it is hammered into thin plates and may break easily while making jewellery. To make it strong enough to mould, little bit of copper is added
Partial credit :Gold is brittle
No credit: Gold is costly, Copper is cheaper than gold, any other response

17.4 “Silver is a better conductor of electricity than copper, still copper is used in most of the electrical wirings”. Give two reasons, in support of this statement

……
……
……

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Phenomena Scientifically

Knowledge-system	physical
Context	Global
Cognitive demand	high
Item format	Closed constructive type
Proficiency Level	5

Description of Answer Key and Credits:

Full credit:

1) **Copper is abundant**
2) **Copper is cheaper than silver**

Partial credit :Any one answer

No credit: No answer, any other answer

18. METALLIC AND NON-METALLIC OXIDES

Domain: Scientific Literacy	**Theme: Metals and non-metals(metallic and non-metallic acids)**	**Class(es): VIII** **Expected time:10 min** **Total Credit: 8**
Description of Item: ✓ Text Image Table Graph Map Poem	**Learning Outcome: (As per NCERT)** 1.Explainschemical properties of metals 2. Observe the phenomena and explain using scientific knowledge 3. Related processes and phenomenon with cause	

Metallic oxides are basic in nature .Their oxides dissolves in water to give alkalis. Non-metallic oxides dissolve in water to give acidic solutions. Metals differ in their reactivity.. It can be identified by the nature of the reaction of metals with atmospheric oxygen, water, acids etc. The arrangement of metals in the decreasing order of their reactivity is known as reactivity series. In the reactivity series, potassium is more reactive than sodium. Some other

metals also can be arranged in the decreasing order of their reactivity such as Calcium>Magnesium>Aluminium>Zinc>Iron>led>copper >mercury>Silver>platinum etc. Though some reactive metals undergo corrosion fast ,they do not get spoiled as the oxide layer that forms on their surface acts as a protective coating that prevent damage. The metal with more reactivity can displace another metal with less reactivity from its salt solution. Both metals and non-metals hold significant role in biological systems. Chlorophyll has magnesium and human blood contain Iron. So many other metals and non-metals also required by the body in trace amount for proper functioning. Both deficiency and surplus of metals and non-metals causes health problems and environmental issues. Disposal of metals like mercury or any heavy metals leads to various types of pollution.

18.1 After adding water to magnesium oxide, it is shaken well for some time. Which of the following statement(s) is (are) correct.

a. The solution Turns blue litmus to red
b. The solution Turns red litmus to blue
c. No colour change with any of the litmus papers.
d. Magnesium oxide reacts with water to form magnesium hydroxide.

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Phenomena Scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	medium
Item format	Complex MCQ
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: choice (b) and (d)

Partial credit :Any one answer

No credit: No answer, any other answer

18.2 Can you store copper sulphate solution in a zinc vessel. Support your answer with proper explanation.

……

……

……

FRAMEWORK	CHARACTERISTICS
Competency	Explaining Phenomena Scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	medium
Item format	Closed constructive type
Proficiency Level	4

Description of Answer Key and Credits:

Full credit: No ,zinc displaces copper from coppersulphate solution .

Partial credit :No or Zinc replaces copper

No credit: No answer, any other answer

18.3 Assertion: Iron undergoes corrosion faster than aluminium.
Reason: Iron is more reactive metal than aluminium.

1. Assertion is not a correct statement, but reason is a correct statement.
2. Both assertion and Reason are correct, and the reason is a perfect answer for the assertion.
3. Both assertion and reason are wrong statements.
4. Assertion is correct but the reason is not a correct statement as well as not an answer for the assertion

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	High
Item format	Complex MCQ
Proficiency Level	5

Description of Answer Key and Credits:

Full credit: (iv)Assertion is correct but the reason is not a correct statement as well as not an answer for the assertion

No credit: No answer, any other answer

18.4 Statement A: Electronic devices or its parts should not be thrown into open places after use.
Statement B: Some of the metals present in the electronic devices may be health hazard.
Statement C: Magnesium is present in human blood and Iron is present in Chlorophyll.

Statement D: Among metals only iron corrodes.

- Except statement B, other statements are correct
- Except Statement C, all the other statements are correct.
- Among the four statements, only Statement A and B are wrong.
- Among the four statements, only C and D are wrong.

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	High
Item format	Complex MCQ
Proficiency Level	5

Description of Answer Key and Credits:

Full credit: (iv) Among the four statements, only C and D are wrong

No credit: No answer, any other answer

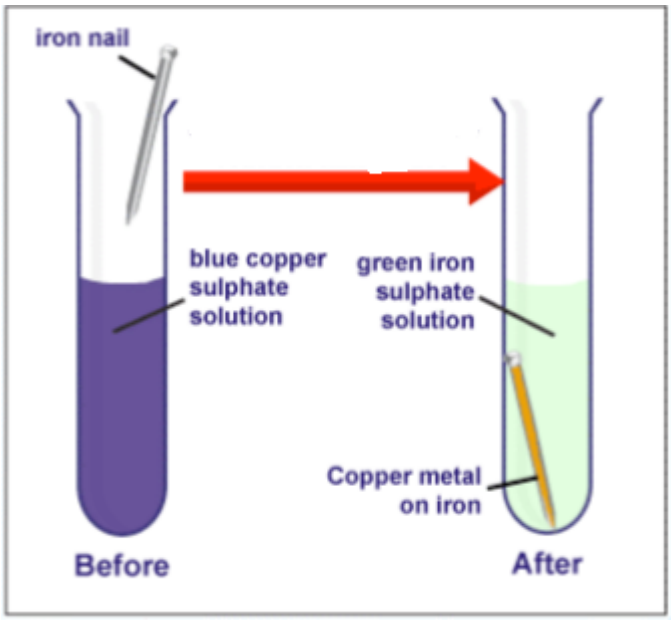
19. IRON replaces COPPER!

Domain: Scientific Literacy	**Theme: Metals and non-metals (copper replaces iron)**	**Class(es): VIII** **Expected time:12 min** **Total Credit: 8**
Description of Item: ✓ Text ✓ Image Table	**Learning Outcome: (As per NCERT)** 1.Explainschemical properties of metals .2. Applies learning of scientific principles in day to day life. 3.Writes equation for chemical reaction	

	Graph		

Metals replace other metals. When an iron nail is placed in a test tube containing copper sulphate. The nail is coated with a layer of copper while the blue copper sulphate solution has turned greenish. The green solution is a solution of iron sulphate.

$Fe + CuSO_4Cu + FeSO_4$ ⟶



19.1 Arjun argued that Zinc could also displace Copper from copper sulphate ($CuSO_4$) solution. Is he right ? YES/NO

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Phenomena Scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	Medium
Item format	Binary choice type
Proficiency Level	3

Description of Answer Key and Credits:

Full credit:YES

No credit: No answer, any other answer

19.2 In another experiment Juhi found that, when iron nail is put in a beaker containing Zn SO_4 solution, there was no change, in the beaker.

Based on the above observations arrange the following metals in the descending order of reactivity

Iron, Zinc, Copper

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	physical
Context	Global
Cognitive demand	Medium
Item format	Binary choice type
Proficiency Level	3

Description of Answer Key and Credits:
Full credit: In the order Zinc, Iron, Copper
No credit: No answer, any other answer

19.3 A piece of Copper was kept in ferrous sulphate (Green in colour) solution and was observed after one week. What change do you observe in the colour of the solution and why?

……
……
……

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical

Context	Global
Cognitive demand	Medium
Item format	Closed constructive type
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: No change in the colour of the solution as copper cannot displace iron from iron sulphate solution.

No credit: No answer, any other answer

19.4 Juhi, while doing her experiment saw something which is stored in Kerosene, identify the metal. What happens if this metal is placed in (1)coconut oil (2) sugar solution (3) Hydrochloric acid

---

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	Medium
Item format	Closed constructive type
Proficiency Level	4

Description of Answer Key and Credits:

Full credit: Sodium.(1) No reaction (2) Sodium will react the water present in the sugar solution and produce hydrogen gas. (3) Sodium react with HCl to produce NaCl and Hydrogen gas

Partial credit: Any two correct responses.

No credit: No answer, any other answer

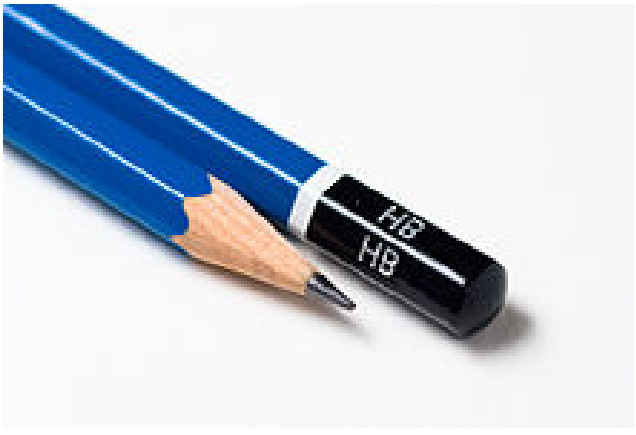
20. Graphite Pencils

Domain: Scientific Literacy	**Theme: Metals and non-metals (graphite pencils)**	**Class(es): VIII** **Expected time:10 min** **Total Credit: 8**
Description of Item: ✓ Text ✓ Image Table ✓ Graph Map Poem	**Learning Outcome: (As per NCERT)** 1.Explains use of non-metals 2.Explain chemical properties of non-metals 3. Interprets graph	

The ability to leave marks on paper and other objects gave graphite its name, given in 1789 by German mineralogist Abraham Gottlob Werner. It stems from *graphein*, meaning *to write* or *draw* in Ancient Greek.

From the 16th century, all pencils were made with leads of English natural graphite, but modern pencil lead is most commonly a mix of powdered graphite and clay; it was invented by Nicolas-Jacques Conté in 1795. It is chemically unrelated to the metal lead, whose ores had a similar appearance, hence the continuation of the name. Plumbago is another older term for natural graphite used for drawing, typically as a lump of the mineral without a wood casing. The term plumbago drawing is normally restricted to 17th and 18th century works, mostly portraits.

Today, pencils are still a small but significant market for natural graphite. Around 7% of the 1.1 million tonnes produced in 2011 was used to make pencils.



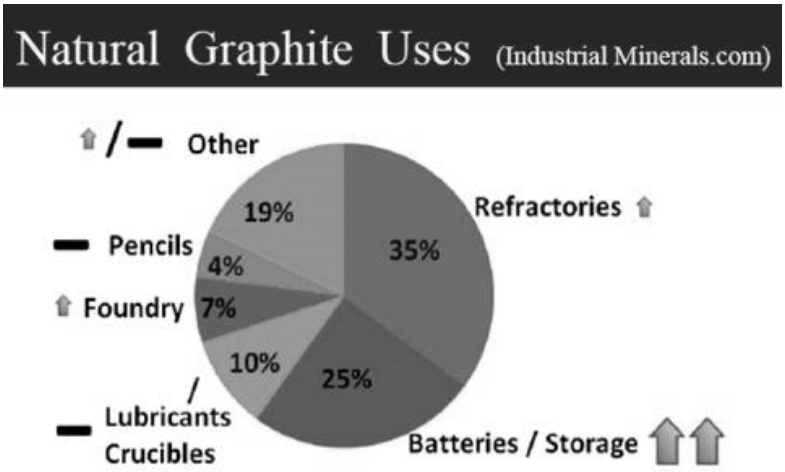
20.1 Diamond and Graphite are different forms of same element. Identify the element

1. Nitrogen
2. Carbon

3. Sulphur
4. Gold

FRAMEWORK	CHARACTERISTICS
Competency	Explaining Phenomena Scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	Medium
Item format	Multiple choice type
Proficiency Level	2
Description of Answer Key and Credits: **Full credit:** Carbon **No credit: No answer, any other answer**	

20.2



Observe the graph .If 200 kg of graphite is used in a year in total, how much would have been used for making pencils?

FRAMEWORK	CHARACTERISTICS
Competency	Interpreting data and evidence scientifically

Knowledge-system	Physical
Context	Global
Cognitive demand	Medium
Item format	Closed constructive
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: 8 kg

No credit: 4% of 200, any other answer

20.3 Surya took some pencil lead and crushed it into powder. She took it in a beaker and added diluted sulphuric acid to it. Describe the observations.

……
……
……

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Phenomena Scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	High
Item format	Closed constructive type
Proficiency Level	5

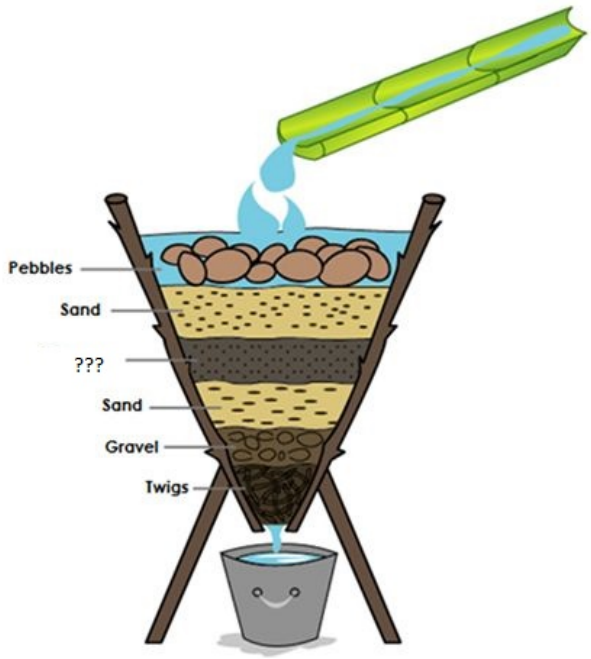
Description of Answer Key and Credits:

Full credit: No reaction thus no special observation.Non-metals generally do not react with acids

Partial credit: no reaction

No credit: No answer, any other answer

20.4



"Non-metals find their use in water purification". Anil forgot to label one component in the simple diagram of water purifier given above. Can you write the missing component?

FRAMEWORK	**CHARACTERISTICS**
Competency	Interpreting data and evidence scientifically
Knowledge-system	Physical
Context	Global
Cognitive demand	medium
Item format	Closed constructive type
Proficiency Level	3

Description of Answer Key and Credits:

Full credit: Charcoal

No credit: No answer, any other answer

Prepared by: Mr Vijayaraj M, VP KV Payyanur
Mr Sibu John, PGT Chem KV Kollam

CRITICAL AND CREATIVE THINKING TEST ITEMS
CLASS: VIII
SUBJECT: SCIENCE
CHAPTER_5_ COAL AND PETROLEUM
INDEX

Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 1

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 10 min Total Credit: 10
Description of Item: Yes – Text Yes – Image -- – Table -- – Graph -- – Map -- – Poem	Learning Outcome : 1. Interpret the data from the text. 2. Explain scientific principles involved. 3. Evaluate the situation and deduct enquiries. 4. Apply previous scientific knowledge to deduct conclusions.	

Scientific Literacy

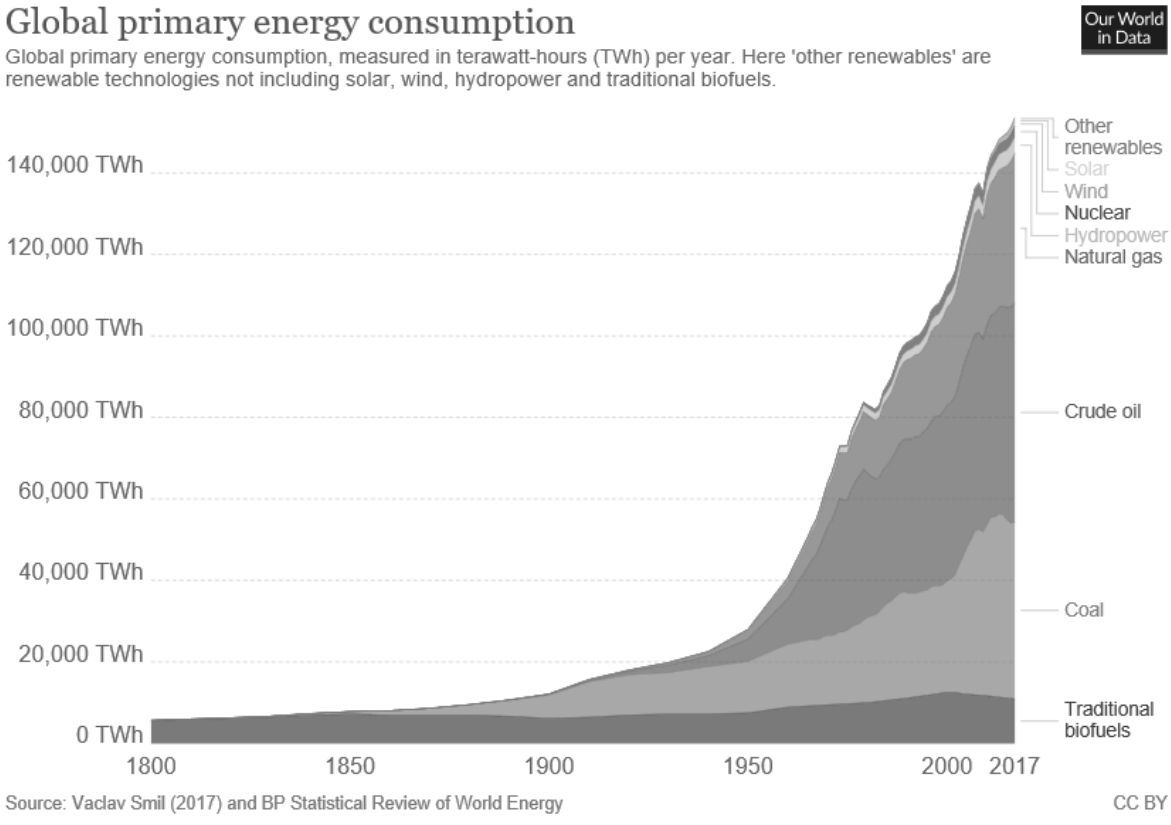
FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ National/Global
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**2-4**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

--	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
Yes	Open Construct response

SLM01	**GLOBAL ENERGY CONSUMPTION**
	Access to energy is a key pillar for human wellbeing, economic development, and poverty alleviation. Ensuring everyone has sufficient access is an on-going and pressing challenge for global development. Our energy consumption is increasing day by day. In

	order to fulfil our energy needs we are increasing the use of different energy sources. But our energy systems have a very bad impact on our environment. Historical and current energy systems are dominated by fossil fuels (coal, oil and gas) which produce carbon dioxide (CO_2) and other greenhouse gases– the fundamental driver of global climate change. If we are to meet our global climate targets and avoid dangerous climate change, the world needs a significant and concerted transition in its energy sources. Harmony between energy consumption and nature can be achieved by following sustainable development and using more and more non- conventional sources of energy. Let us first take a look at how global energy production- both in terms of quantity and source- have changed over the long-term. In the visualisation we have plotted global energy consumption from 1800 through to 2015. Note that you can use the absolute/relative toggle on the chart to view these in absolute numbers or as the percentage of the global total.
	
(1)	**"**Historical and current energy systems are dominated by fossil fuels (coal, oil and gas) which produce carbon dioxide (CO_2) and other greenhouse gases". What do you mean by "other green house gases"? Name any two. ----------

	----------
(2)	Coal, natural gas and petroleum are considered as fossil fuels as – X. They are found inside the earth. Y. They are formed by dead plants and animals. (A) Both X & Y are correct (B) Only Y is correct (C) Only X is correct (D) None of them is correct
(3)	What is the energy usage due to crude oil in 2017 as per the data given? ----------
(4)	What is the change of energy usage from 1950 to 2017 in terawatt hour? ----------
(5)	Our future energy requirements would be totally depended on traditional biogas and non -conventional sources of energy. Comment and justify your answer ----------

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level- 2** **Full credit:** Methane, Water vapor, Nitrous Oxide, Ozone, or any other indirect green house gas. **No Credit:** Any other response or no response
(2)	**Level- 2** **Full Credit:** Option (B) Only Y is correct **No Credit**: Other response or missing response

(3)	**Level- 3** **Full Credit**: ~ 23,000 TWh **Partial Credit:** Data close to above **No Credit :** No response or other response
(4)	**Level- 3** **Full Credit:** 130,000 TWh and complete solution **Partial Credit:** around 120,000 TWh **No Credit :** No response or other response
(5)	**Level- 4** **Full Credit:** Agree: Two Justifications (natural gas, nuclear, wind etc.. gaining momentum in later stages of 2015-17) Disagree: justifications (current data show expansion of coal & oil uses) **No Credit :** No response or other response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 4

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 10 min Total Credit: 10
Description of Item: Yes – Text -- – Image Yes – Table -- – Graph -- – Map -- – Poem	Learning Outcome : 5. Interpret the data from the text. 6. Explain scientific principles involved. 7. Evaluate the situation and deduct enquiries. 8. Apply previous scientific knowledge to deduct conclusions.	

Scientific Literacy

FRAMEWORK	**CHARACTERISTICS**

Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ National/Local
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-5**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

Yes	Simple Multiple Choice
--	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
---	Open Constructed-response

SLM04	**HORRENDOUS AIR POLLUTION IN INDIA**

India is once again heading into the worst time of year for air pollution, a season where the country's notoriously poor quality becomes even more toxic. The main cause of deteriorating quality of air is- petrol and diesel-based vehicle exhaust fumes, coal and petroleum power plants, exhaust from industrial plants and factories and other human activities. Burning of fossil fuels releases carbon dioxide, methane, nitrogen and particulates into the atmosphere. A whopping nine in 10 people on Earth breathe highly polluted air, and more than 80 percent of urban dwellers have to endure outdoor pollution that exceeds health standards, according to the WHO's **World Global Ambient Air Quality Database**. Cities like Kanpur, Faridabad, Delhi, Varanasi and Patna are polluted badly by vehicles and have large number of coal and petroleum-based industries.

Drawing on measurements and calculations as of 2016 from air monitoring stations in 4,300 cities, the WHO **reported** in March that India's cities suffer the most.

Cities with the highest small particulate measurements in the world

Country	**City**	**PM2.5 (µg/m³)**
India	**Kanpur**	**173**
India	**Faridabad**	**172**
India	**Varanasi**	**151**
India	**Gaya**	**149**
India	**Patna**	**144**
India	**Delhi**	**143**
India	**Lucknow**	**138**
Cameroon	**Bamenda**	**132**

	India	**Agra**	**131**
	India	**Muzaffarpur**	**120**
	India	**Srinagar**	**113**
	India	**Gurgaon**	**113**

World Health Organization

Technically, the WHO doesn't treat its data as a ranking but rather a measurement of where risks are higher. But it's clear from the report that India is one of the riskiest countries in the world to breathe, up there with Bangladesh and **Georgia**. When it comes to comparing PM10 measurements of the world's largest cities, India's capital Delhi comes in with an annual average of 292, ahead of Cairo (284), Dhaka (147), Mumbai (104), and Beijing (92), the Washington Post **noted**.

(1)	List any four reasons for poor air quality index in so many cities in India? --- --- --- --- ----
(2)	What do you mean by PM as mentioned above in PM 2.5 and PM 10- A. Pollution Meter B. Particulate Matter C. Performance Monitor D. Particular Material
(3)	The lungs of a person living in Shimla and that living in Delhi were compared by Dr.Vivek Goyal. He noticed that the lungs of person living in Shimla were pinkish red but that of person living in Delhi for last ten years was black. Explain the cause of such difference in your own words? --- --- --- --- ---
(4)	From the data given above, write names of any two cities that have PM 2.5 more than 170? --- - --- -
(5)	Carbon-di-oxide is very important gas for maintaining the temperature of the earth. It is also needed by plants for photosynthesis. Even though it is now being considered as

	a pollutant. Comment --- --- --- --- --- -----

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level- 2** **Full credit:** Increased use of vehicles Burning farm waste. Industrial pollution and smoke. Too much construction. **Partial Credit:** Any three correct responses **No Credit:** Any other response or no response
(2)	**Level- 1** **Full Credit:** Particulate matter **No Credit:** Other response or missing response
(3)	**Level- 4** **Full Credit:** Delhi is a polluted city, so the person's lungs are being badly affected by the pollutants and on the other hand Shimla is a hill station with clean fresh air. So, the lungs of the person living in Shimla are pinkish red. **No Credit:** No response or other response
(4)	**Level- 2** **Full Credit:** Kanpur and Faridabad **No Credit:** No response or other response
(5)	**Level- 5** **Full Credit:** The level of Carbon di oxide in the atmosphere is increasing day by day by different human activities. It traps sun rays when reflected from earth. But more CO 2 is causing global warming and changing earth's climate. **No Credit:** No response or other response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 1

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 12 min Total Credit: 08
Description of Item: Yes – Text Yes – Image -- – Table -- – Graph -- – Map -- – Poem	Learning Outcome : 9. Interpret the data from the text. 10. Explain scientific principles involved. 11. Evaluate the situation and deduct enquiries. 12. Apply previous scientific knowledge to deduct conclusions.	

Scientific Literacy

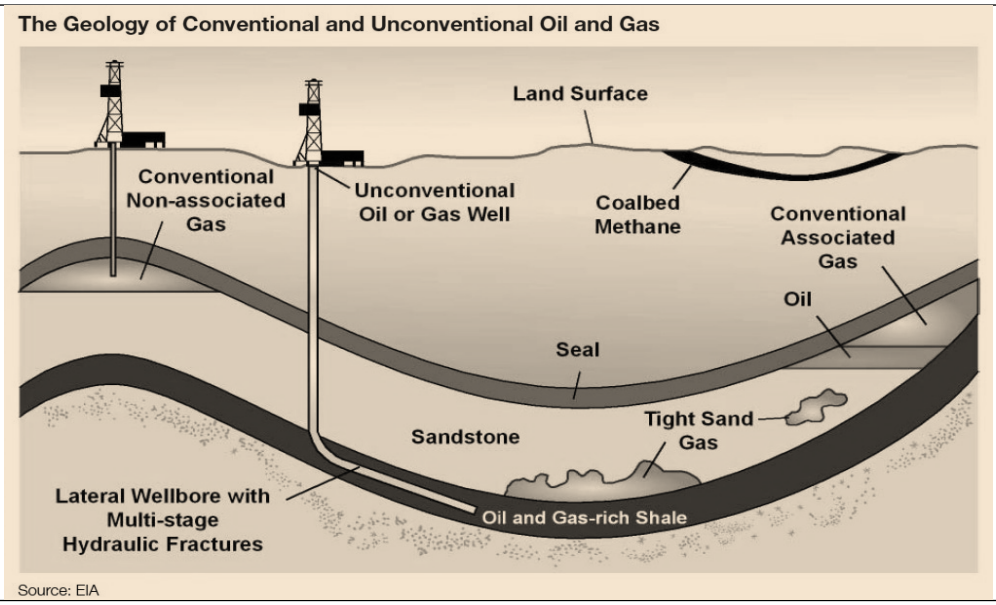
FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ National/Global
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-6**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

--	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
Yes	Open Construct response

SLM01	**The Wonder Liquid: PETROLEUM**

	For Human society, Petroleum is truly a wonder liquid only second to water. Petrol is used as a fuel in light automobiles such as motorcycles/ scooters and cars. Heavy motor vehicles like trucks and tractors run on diesel. Petrol, diesel, and some other important things, are obtained from a natural resource called **petroleum**. Petroleum is formed from dead organisms that lived in the sea and Oceans. As these bodies settled at the bottom of the sea and got covered with layers of sand and clay, extreme heat, pressure, and microbial action in the absence of light transformed the dead organisms into petroleum and natural gas. The world's first oil well was drilled in Pennsylvania, USA, in 1859. Eight years later, oil was stuck at Makum in Assam by Oil India Limited (OIL). In India, oil found in Assam, Gujarat, Mumbai High and in the river basins of Godavari and Krishna. Lighter chain petroleum products are economically of more use and found higher up in the deposits, while heavy chain products (generally present in substratum) are less valuable and have to undergo microbial digestion so as to convert into lighter chain. The figure below shows the deposits of petroleum and natural gas. Conventional non –associated gas and nonconventional gas reserves are separately shown, and hence there method of extraction differs. **(Source: Internet & ONGC)**
	
	Answer the following questions based on the understanding of above paragraphs:
(1)	Name the place where India's First oil well was drilled? ----------
(2)	Dead bodies in sea, after millions of years, convert into Fossil Fuel. Make a list of

	natural phenomena involved in this drastic conversion. ---------- ---------- ---------- ---------- --
(3)	Analyze the below mentioned statements from the text given: (J) Heavy Motor vehicles run on Diesel. (S) In India, Oil is Found only in river basins of Godavari and Krishna. (T) Petroleum Gas is heavier than water. (W) The porous rocks over petroleum are made of sand and clay particles. Choose the option mentioning only correct statements: (A) Only J (B) Only J and W (C) Only S and T (D) Only J, T and W
(4)	Mr. S. K Selvans is a renowned scientist of India. He was working on a chemical equation for producing artificial petroleum. He has successfully formulated the equation. Will he be able to produce petroleum? Justify your answer. ---------- ---------- ---------- ---------- ---

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level-1**: FULL CREDIT: Makum (Assam) NO CREDIT: Any other response or no response.
(2)	**Level -2**: FULL CREDIT: absence of air, high temperature and high pressure PARTIAL CREDIT: at least two points correct NO CREDIT: one correct or no correct or no response
(3)	**Level-3:** FULL CREDIT: (B) Only J and W NO CREDIT: any other response or no response
(4)	**Level-6**: FULL CREDIT: NO. Petroleum being fossil fuel is obtained from organisms. It is prepared

	under very high temperature and pressure which can be maintained in lab but takes Millions of years to be formed. "Time" cannot be reduced in labs. PARTIAL CREDIT: Fossil fuel is obtained from organism/fossil only. OR Takes millions of years to form OR those conditions can't be maintained for too long. NO CREDIT: Just writing "NO" or any other response or no response.

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 2

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 15 min Total Credit: 12
Description of Item: Yes – Text Yes – Image -- – Table -- – Graph -- – Map -- – Poem	Learning Outcome : ➢ Understanding of Process and Deduct scientific statements from the text ➢ Apply the basic knowledge for scientific deduction ➢ Data interpretation from Figure ➢ Deducting conclusions from multiple statements.	

Scientific Literacy

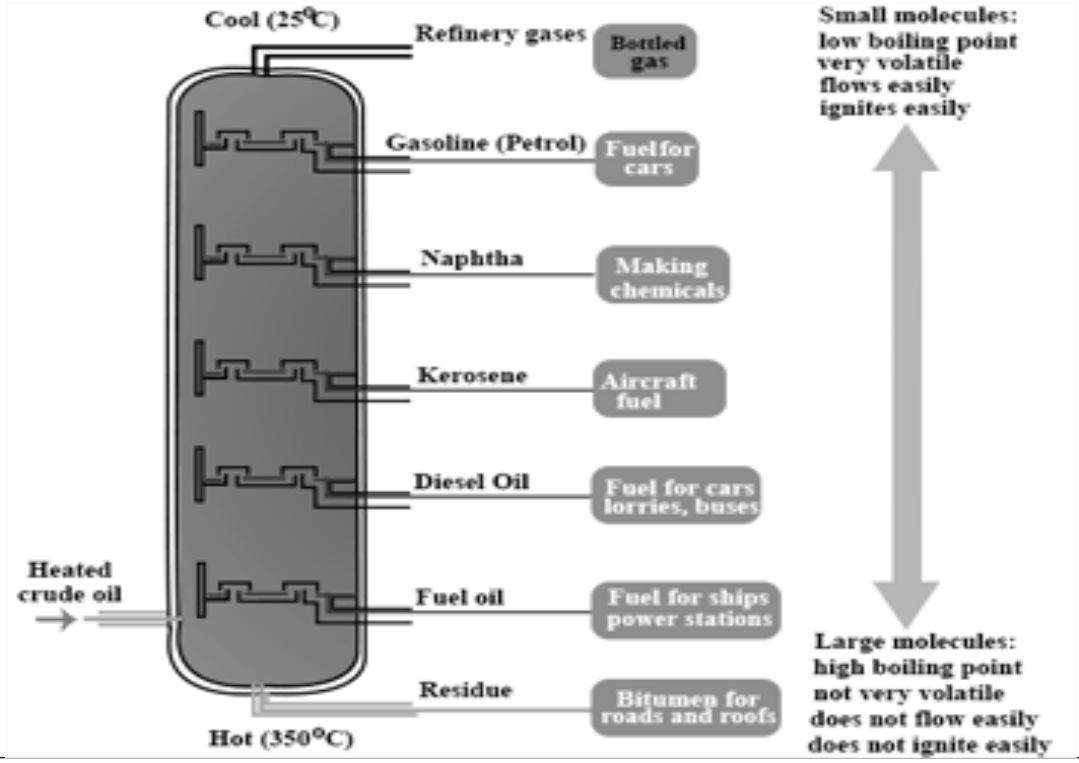
FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ Petroleum Refining/ Global
Cognitive Demand	Easy/Medium/ Difficult
Item format	Close Ended/Simple MCQ/MIXED MCQ
Proficiency Level	**1-4**

Item format /Types of Questions:

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02

Yes	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
--	Closed Constructed Response
--	Open Construct response

Partial Credit: 01
No Credit :00

SLM02	**The process of crude oil refining:**
	Petroleum is a dark oily liquid. It has an unpleasant odor. It is a mixture of various constituents such as petroleum gas, petrol, diesel, lubricating oil, paraffin wax, etc. The process of separating the various constituents/ fractions of petroleum is known as **refining**. It is carried out in a **petroleum refinery**. At the refinery, the crude oil mixture is '**fractionated**' into different components by **fractional distillation**. Many useful substances are obtained from petroleum. These are termed as '**Petrochemicals**'. These are used in the manufacture of detergents, synthetic fibres and man-made plastics. Hydrogen gas obtained from natural gas is used in the production of fertilisers. Due to its great commercial importance, petroleum is also called '**black gold'**. **Light gases** are the **topmost fraction**, followed by **petrol** and **kerosene**. **Diesel** is the heaviest. The other heavier fractions are not useful and are usually used to make **asphalt** to **surface roads**. **(Source: Internet- Wikipedia)**
	
	Based on understanding of the above paragraphs and figures, answer the following:
(1)	The basic process of crude refining is done by Fractional Distillation towers. How this fractionation is done?

	----------
(2)	"Polythene is a petroleum product". (A) TRUE (B) False
(3)	Check the statements for their validity: (W) Boiling Point of petroleum fractions lies between 250^{0}C – 350^{0}C. (X) Petrol has high Boiling Point than Kerosene. (Y) Kerosene is volatile compared to Diesel. (Z) Diesel and Petrol (Gasoline) has same size of molecules. Choose the option for correct statements: (A) Only Y (B) Only X and Y (C) Only W, X and Y (D) Only Y and Z
(4)	Choose the option which is not a petroleum product:
	(A) Gold (B) Urea (a type of organic fertilizer) (C) Asphalt (D) Nylon (a synthetic fibre)
(5)	Compare the statements written below, from the paragraph above: (L) Petroleum does not have pleasant odor. (X) Helium Gas can be obtained from Petroleum Products. (T) Petroleum products are used in road construction. (P) Petroleum products with smaller molecules are separated at greater temperature. Choose the statements which does not match with the paragraph: (A) Only X and P (B) Only L and T (C) Only X, T and P (D) Only T
(6)	The boiling point of Petrol is 210 , this value in Fahrenheit : (A) 296 (B) 410 (C) 389 (D) None of these

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level-3** : FULL CREDIT: Principles of fractional distillation based on separation of fractions as per their boiling points, different boiling points of components. NO CREDIT: any other response OR no response
(2)	**Level-2**: True (Polythene being a plastic product/ indirect knowledge) FULL CREDIT:(A) TRUE NO CREDIT: any other response OR no response
(3)	**Level -3**: (analytical type) FULL CREDIT: (B) X and Y NO CREDIT: any other response OR no response
(4)	**Level -1**: (interpreting statement) FULL CREDIT: (A) Gold NO CREDIT: any other response OR no response
(5)	**Level – 4**: (Doesn't Match with paragraph) FULL CREDIT: (A) Only X and P NO CREDIT: any other response OR no response
(6)	**Level- 2** FULL CREDIT: (b) 410 NO CREDIT: Any other option or No option

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 3

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 10 min Total Credit: 10
Description of Item: Yes – Text Yes – Image -- – Table Yes – Graph	Learning Outcome : ➢ Understanding of Process and Deduct scientific statements from the text ➢ Energy dependence on Coal ➢ Apply the basic knowledge for scientific deduction ➢ Data interpretation from Figure	

--	Map	➢ Deducting conclusions from multiple statements.
--	Poem	

Scientific Literacy

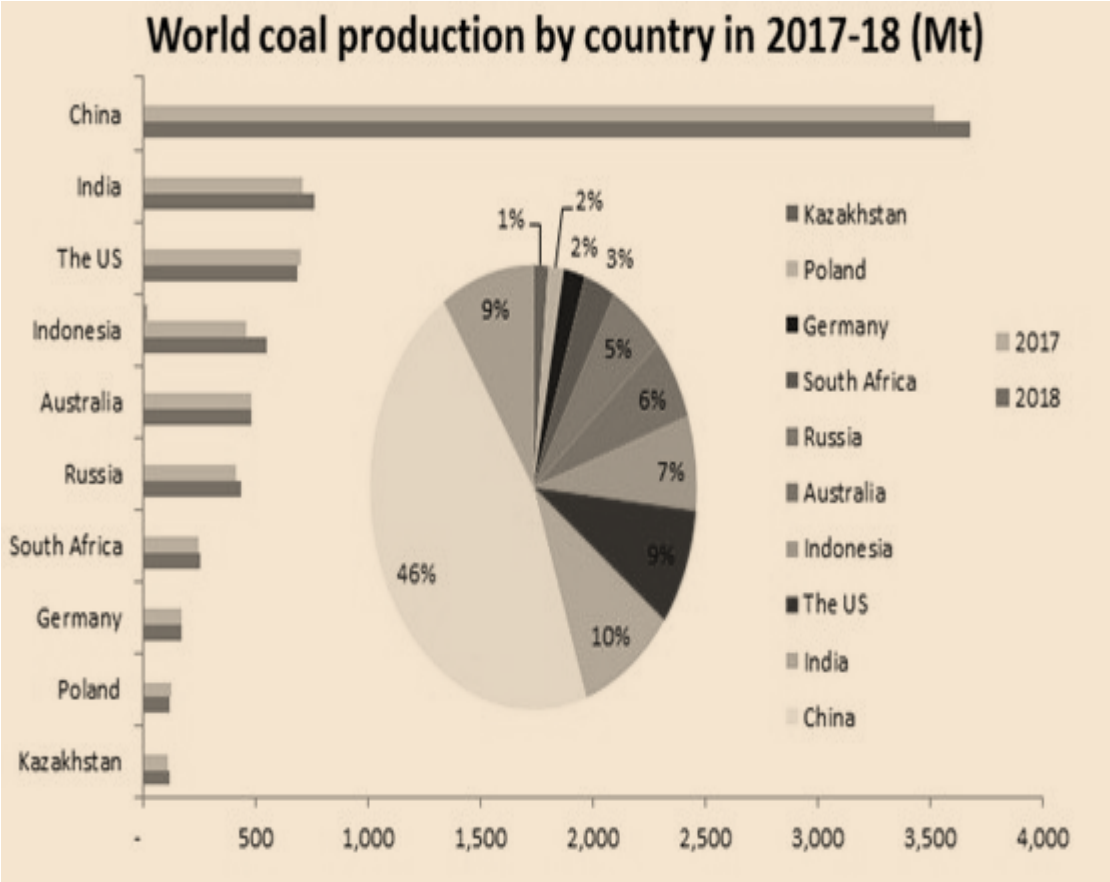
FRAMEWORK	CHARACTERISTICS
Competency	Interpretation of fundamental information & Data interpretation
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ Global
Cognitive Demand	Simple-Medium
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-3**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

Yes	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
--	Closed Constructed Response
--	Open Construct -response

SLM03	**THIS BLACK STONE IS DARKER**
	Coal is a combustible black or brownish-black sedimentary rock, formed as rock strata called coal seams. Coal is mostly carbon with variable amounts of other elements; chiefly hydrogen, sulphur, oxygen, and nitrogen. Coal is formed when dead plant matter decays into peat and is converted into coal by the heat and pressure of deep burial over millions of years. Vast deposits of coal originates in former wetlands—called coal forests—that covered much of the Earth's tropical land areas during the late Carboniferous and Permian times. As a fossil fuel burned for heat, coal supplies about a quarter of the world's primary energy and two-fifths of its electricity. The extraction and use of coal causes many premature deaths and much illness. Individuals suffer from Occupational Respiratory Disorders. Samples for cancer and bone TB were confirmed positive in mining workers. Coal industry damages the environment, including by climate change as it is the largest anthropogenic source of carbon dioxide, in 2016, which is 40% of the total fossil fuel emissions. As part of the worldwide energy transition many countries have stopped using or use less coal, and the UN Secretary General has asked governments to stop building new coal plants by 2020. The largest consumer and importer of coal is China. China mines almost half the world's coal, followed by India with about a tenth. Australia accounts for about a third

	of world coal exports followed by Indonesia and Russia.  **(Source: Internet)**
	Based on above context, answer the following:
(1)	Estimate the percentage of world's primary energy needs supplied by coal: (A) 25% (B) 17.5 % (C) 40% (D) 67.5%
(2)	Name the fourth largest consumer of coal in the world: (A) Russia (B) India (C) Indonesia (D) Australia
(3)	Coal causes many premature deaths and much illness. Name two such illness or problems, related to coal.
(4)	Correlate the given statements from the data above :

	(W) The US has significantly reduced coal production. (X) China's productivity is higher than the next four countries taken together. (Y) India produces more coal than Australia and Russia taken together. (Z) China's share of world production in greater than rest of the countries taken together excluding Germany Chose the answer from options mentioned below: (A) Only W and Z are correct (B) Only W, X and Z are correct. (C) Only W and X are correct (D) All the four statements are correct
(5)	According to the article, which element is chiefly present in coal: (A) Hydrogen (B) Sulphur (C) Carbon (D) Oxygen and Nitrogen combined together

EXPECTED OUTCOMES/RESPONSES:	
(1)	Level-2 : FULL CREDIT: (A) 25% NO CREDIT: Any other response OR no response
(2)	Level 1 FULL CREDIT: (C) Indonesia NO CREDIT: Any other response OR no response
(3)	Level-3: FULL CREDIT: Occupational Respiratory Disorders, Bone TB, Cancer, Bronchitis, Asthma, Respiratory Disorders, Eye related disorders, carbon monoxide poisoning, Hypoxia/asphyxiation (any two related problems in technical language) PARTIAL CREDIT: Use of semi technical language or Only one correct response. NO CREDIT: Any other response OR casual responses or no response
(4)	Level-3: (Data interpretation and correlation) FULL CREDIT: (C) Only W and X are correct NO CREDIT: Any other response OR no response
(5)	Level 1 (C) Carbon

	NO CREDIT: Any other response OR no response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 4

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 15 min Total Credit: 10
Description of Item: Yes – Text - – Image - – Table - – Graph - – Map - – Poem	Learning Outcome : ➢ Environmental awareness and climate change ➢ Understanding and Deduct scientific statements from the text ➢ Apply the basic knowledge for scientific deduction ➢ Deducting conclusions from multiple statements. ➢ Form opinion based on science in everyday life	

Scientific Literacy

FRAMEWORK	**CHARACTERISTICS**
Competency	Critically evaluating the process/Mechanism Scientifically
Knowledge-system	Content Knowledge/ Newspaper Article
Context	Fossil Fuel/ Global warming
Cognitive Demand	Simple-Medium-Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-5**

Item format /Types of Questions:

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01

Yes	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
YES	Open Construct-response

[Type text]

No Credit :00

SLM 04	***<u>If We Dig Out All Our Fossil Fuels, Here's How Hot We Can Expect It to Get</u>*** Next, look at fossil fuel reserves, the deposits we know to be recoverable under today's prices and technology. That is, they are inexpensive to access. If we were to use all of this coal, natural gas and petroleum, the planet would warm by an additional 2.8 degrees. Add the heat from those reserves to the 1.7 degrees from what has already been emitted, and you get a world that is 4.5 degrees warmer since the industrial revolution; this is beyond scientists' recommended 3.6-degree threshold. The next set of fossil fuels in line is referred to as resources, rather than reserves. The difference is that they are recoverable with today's technology, but not at current prices. There is '3.1 degrees' worth of warming if the oil and natural gas in this category are utilized, which would lead to a total increase in global temperatures of 7.6 degrees. This warming does not even consider our coal resources. A middle-of-the-road estimate of the coal that qualifies as resources indicates that its use would lead to an additional increase of 8.6 degrees. Thus, the use of all reserves and resources would lead to a total increase of 16.2 degrees. Today's climate and planet would very likely be unrecognizable. Without pricing carbon to reflect expected climate damages, all of this coal, oil and natural gas are worth many trillions of dollars, so keeping it in the ground would mean passing up economic opportunities that are waiting to be taken and turning our backs on a long history of going to great lengths to recover these energy sources. A January study in Nature developed estimates of which fuels would have to be abandoned to stay below the 3.6-degree threshold. It found that most Canadian tar sands; all Arctic oil and gas; and a significant share of potential shale gas would need to stay locked up. It also found that major coal producers like the United States would need to keep 90 percent of their reserves in the ground. **(Source: Article on climate change, by Michael Greenstone, published in the New York Times, April 8, 2015, taken from Internet)**
	[Michael Greenstone, the Milton Friedman professor of economics at the University of Chicago, runs the Energy Policy Institute there. He was the chief economist of President Obama's Council of Economic Advisers from 2009 to 2010.]
	Based on your understanding and interpretations from the above-mentioned article, answer the following:
(1)	The degree to which the heat generated from fossil fuels has increased the global temperature, is: (A) 2.8 (B) 1.7 (C) 4.5 (D) 3.6
(2)	*"The next set of fossil fuels in line is referred to as resources, rather than reserves."* In the above context, which fuel is/are been talked about:

	(J) Coal (K) Oil (L) Solar cells (M) Natural Gas (A) Only J and K (B) Only K, L and M (C) Only K and M (D) only L, M and J
(3)	"Human is not able to utilize all the resource present on the earth". Citing two examples from the article support the statement. --- ---
(4)	What remedy to global rise in temperature, has been suggested in the article? --- --- ---
(5)	"Life will exist on earth if all the reserves were consumed and the heat generated due to this increase the earth's temperature as mentioned in the article. Hence, the article is an exaggeration". Justify this view, giving scientific logics and examples. --- --- ---

EXPECTED OUTCOMES/RESPONSES:	
(1)	Level-1 FC: (B) 1.7 NC: any other response or no response
(2)	Level – 3 FC: (C) Only K and M NC: any other response or no response
(3)	Level -4 FC: (A) Some resources are inexpensive to access. (B) With current technology we can't access some resources. (C) Exhausting all resources will drastically increase earth's temperature to render it unfit for life to survive. (Any Two) PC: any one point as above NC: any other response or no response
(4)	Level – 3 FC: US to shut down 90% of their coal reserves, most Canadian tar sands; all Arctic oil and gas; and a significant share of potential shale gas would need to stay locked up. PC: any of the point mentioned above. NC: any other response or no response

(5)	Level – 5 FC: "Life" not necessary means human only. Certain microbes and other organisms are habitually adapted for very high temperature. As temperature will rise, we will adapt accordingly. Some species may extinct but not all. NC: any other deviating response or no response.

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Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 5

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 12 min Total Credit: 10
Description of Item: Yes – Text Yes – Image - – Table - – Graph - – Map - – Poem	Learning Outcome : ➢ Environmental awareness and climate change ➢ Understanding and Deduct scientific statements from the text ➢ Apply the basic knowledge for scientific deduction ➢ Deducting conclusions from multiple statements.	

Scientific Literacy

FRAMEWORK	**CHARACTERISTICS**
Competency	Understanding vast versatility of Crude oil
Knowledge-system	Content Knowledge/ Figure Interpretation
Context	BYPRODUCTS OFCRUDE OIL
Cognitive Demand	Simple-Medium
Item format	MIXED MCQ/ information based / Closed Constructed
Proficiency Level	**1-3**

Item format /Types of Questions:

Proficiency Level of Question:

Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Yes	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
---	Open Construct response

SLM05	**What is crude oil used for?**

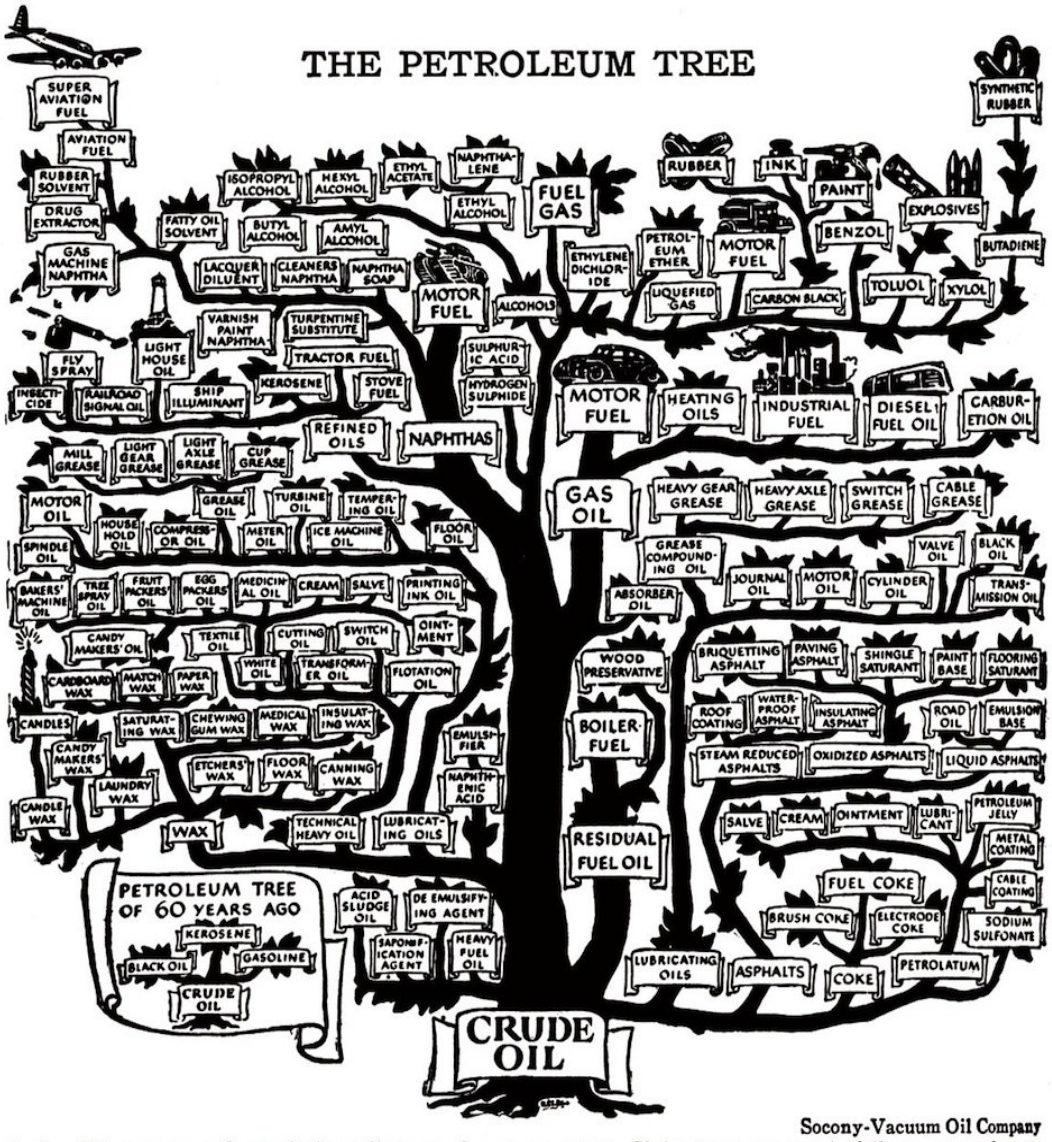
Unprocessed crude oil contains various metals, other minerals, some sand and gravel fragments, and thousands of different organic compounds, depending on the origin of the crude. Some of these things are separated and sold, such as sulphur. Parts of stone and gravel have to be removed and these fragments wind up in a land fill or hazardous waste disposal facility. You might be surprised that nearly everything you use in a day is in some way a by-product of crude oil production or refining. From the HGL's that are used to make plastic, the polymers in synthetic fibres and even to the paraffin wax in lipstick, paint thinner, paint, adhesives, medicines etc.

There are many chemical compounds that are too large to be easily refined, which end up as components in asphalt paving. Some people consider asphalt a by product, others do not. But most of the contents of a barrel of crude are sold as gasoline (petrol), diesel fuel, so called bunker fuel for ships, or asphalt. There are often some natural gases like methane, ethane, etc, dissolved in crude, which are separated during the refining process and either sold or used on site at the refinery to run the refinery itself.

Depending on the quality of the crude itself and where it comes from, there may be a lot of so-called petroleum coke left over, which is generally burnt as fuel like coal. Petroleum coke is a very dirty fuel that releases a lot of pollutants when it is burned.

The graphic below is helpful in listing the primary products but what it does not show are all of the products produced from the extraction and refining process.

(Source: Google inputs)



Crude oil has as many by-products as there are leaves on a tree. Sixty years ago, most of them were unknown.

(1)	(V) PLASTIC & COSMETICS(W) SUPER AVIATION FUEL & DIESEL FUEL OIL (X) NEPHTHAS &ASPHALT (Y) REFINED OIL &GAS OIL (Z) RESIDUAL FUEL OIL & COKE From the Petroleum Tree and indications of products given above, identify the option which has not been marked as primary products of crude oil extraction: (a) V Only (b) V,Y and Z only (c) W,X and Z only (d) V and W only
(2)	"Petroleum coke is a very dirty fuel……". What does "dirty" indicate in the above passage? ----------

	----------
(3)	What happen to the larger byproducts of petroleum refining? ----------
(4)	Which petroleum product is disputed as by-product: (A) NEPHTHAS (B) COKE (C) ASPHALT (D) RESIDUAL FUEL OIL
(5)	As per the text, Name the four Basic materials extracted from crude oil during refining process? ----------

EXPECTED OUTCOMES/RESPONSES:	
(1)	Level-2 (tree provides primary products of extraction only and not of refining) FC: option (V) PLASTIC & COSMETICS NC: any other option
(2)	Level-2 FC: Dirty refer to as Pollution causing/ anything related to this NC: Any other response.
(3)	Level-2 FC: used up in Asphalt paving
(4)	Level-1 FC: option (C) ASPHALT NC: any other option
(5)	LEVEL -3 FC: names like Petrol (or Gasoline), Diesel, Asphalt and Gases like Methane & Ethane (at least four names to be mentioned) NC: less than four names or any other response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 2

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 08 min Total Credit: 10

Description of Item:

Yes	Text
--	Image
--	Table
--	Graph
Yes	Map
--	Poem

Learning Outcome :

13. Interpret the data from the text.
14. Explain scientific principles involved.
15. Evaluate the situation and deduct enquiries.
16. Apply previous scientific knowledge to deduct conclusions.

Scientific Literacy

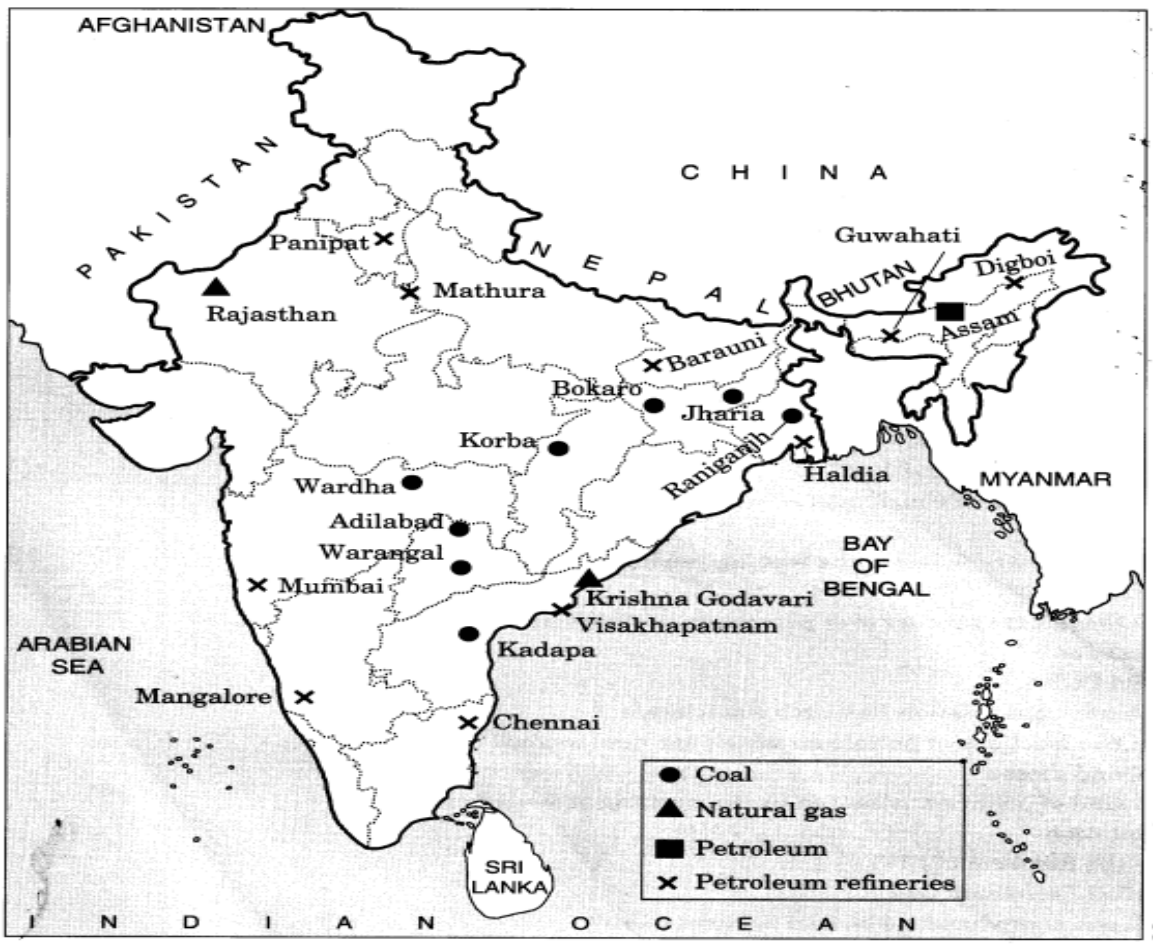
FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ National/Global
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**2-4**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

Yes	Simple Multiple Choice
--	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
Yes	Open Construct-response

SLM02	**DISTRIBUTION OF FOSSIL FUELS IN INDIA**
	A dark colour mineral which is so versatile so that government levies a tax of 1% on the processing of this fuel, not so in other cases, Fossil fuels as they are called, comprises coal, oil, petroleum, and natural gas products. In India, the largest reserves are found in the Western Offshore (40%) , and Assam (27%) . The estimated reserves of natural gas in India as on March 2018 was 1,339.57 billion cubic meters, increasing by 3.87 % from the previous year. Given below is the map of India showing distribution of fossil fuels in different states. Study it and answer the questions that follow-



(1)	Coal and petroleum is also known as black gold. Comment --- --- --- --- ---
(2)	As per the given map, the number of petroleum refineries in India are- A. Six C. Eight B. Ten D. Nine
(3)	Which city is known as 'OIL CITY OF ASSAM'? Why it is called so? --- ---
(4)	The places where there are most concentrations of coal mines? (A) East Indian Plateau (B) West Indian Deserts (C) North Indian Plains (D) Deccan Plateau area

(5)	Taj Mahal is suffering from marble cancer and Mathura oil refinery is held responsible for it. Do you agree? Justify your answer. --- --- --- --- ---

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level- 2** **Full credit:** Coal and petroleum is termed as black gold as crude oil as well as coal is black in colour and their high applicative by-products are numerous. These are sold at very high prices. **No Credit**: Any other response or no response
(2)	**Level- 1** **Full Credit:** option (C) Ten **No Credit**: Other response or missing response
(3)	**Level- 3** **Full Credit:** Digboi is known as oil city of Assam. It is known so as the first oil well was drilled here. The first Digboi crude oil refinery established here was first in Indian continent. **Partial Credit:** Digboi or one response is correct **No Credit :** No response or other response
(4)	**Level- 2** **Full Credit**: Deccan Plateau area (Knowledge extracted from Geography) **No Credit:** No response or other response
(5)	**Level- 5** **Full Credit: Yes**, I agree that Mathura oil refinery is responsible for the marble cancer of Taj Mahal as its harmful gases react with rainwater and fall as acid rain and damage it. The marble is becoming yellow day by day. Although other industries are also responsible for emission of gases that are causing acid rain over Taj Mahal. **No Credit:** No response or other response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 3

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 10 min Total Credit: 10

Description of Item:

Yes	Text
Yes	Image
--	Table
--	Graph
--	Map
--	Poem

Learning Outcome :

1. Interpret the data from the text/graph.
2. Explain scientific principles involved.
3. Evaluate the situation and deduct enquiries.
4. Apply previous scientific knowledge to deduct conclusions.

Scientific Literacy

FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/ National/Global
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-4**

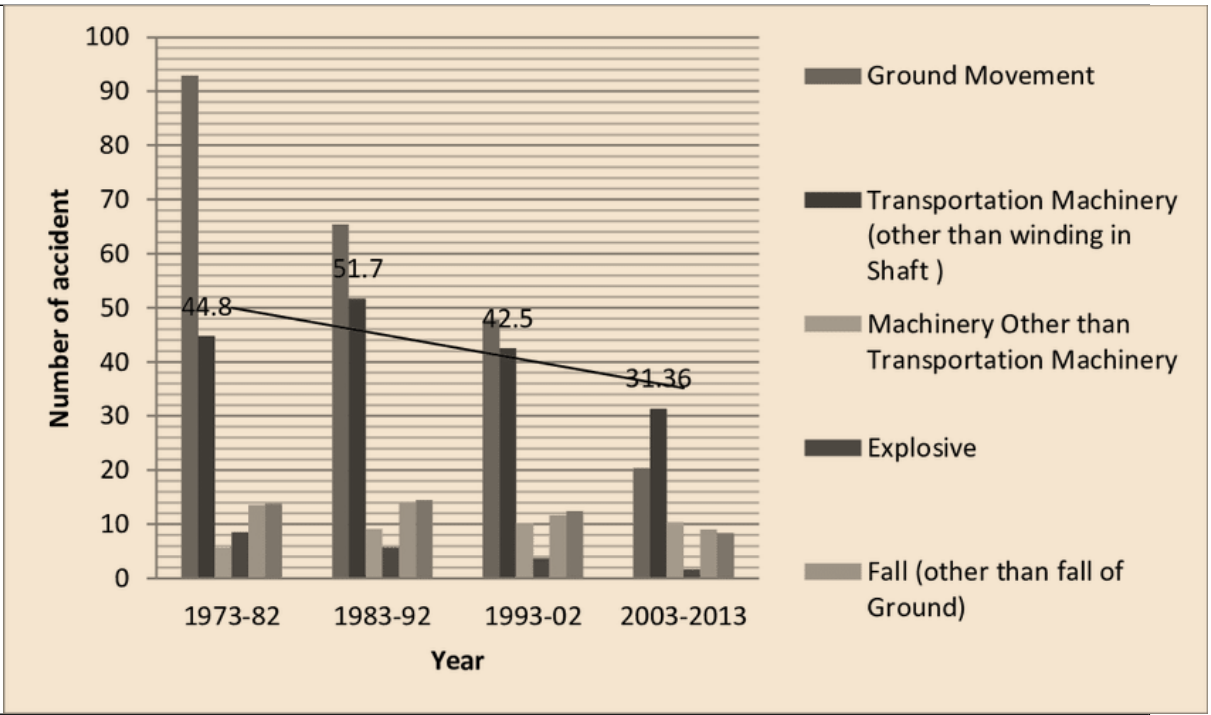
Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

--	Simple Multiple Choice
--	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
---	Open Construct response

SLM03	**ACCIDENTS IN COAL MINES**
	Mining is one of the most hazardous industries amongst where the rate of casualty is still very high from workplace accidents. A large number of mobile mining equipment

	such as haul trucks, dumpers, tractors, tankers are used for different operation and such operations contribute significantly in causation of fatal and serious accidents. In this study, 33 years 'fatal accident data from Indian coal mines were analyzed from 1970. The rate of fatal accident shows a significant reduction from1980 to 2013 but it becomes almost flat for the last 13 years since 2000. Though all the accidents were investigated, and recommendation were made for preventing recurrence, there is no further reduction in the rate in last 13 years which reflects the gaps in our investigation procedure or recommendation or implementation. When the causes of fatal accident in coal mines are analyzed for the last 43 years since nationalization of coal mines, it is clearly observed that there are five major causes, such as Ground movement, Fall other than fall of ground, Transportation machinery (other than winding), machinery other than transportation machinery and explosives which contributes almost 91% of the total accident.
	
(1)	"Mining is considered as a hazardous industry". Justify. ---------- ----------
(2)	Name any two mobile mining equipment? Why they are termed as mobile equipment? ---------- ----------
(3)	Study the graph given below and answer in which year there occurred most accidents due to different reasons?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(4)	Too many accidents occur in mines. What are the different reasons for this? ----------
(5)	**. "**Mining is harmful for the environment and places nearby them". Suggest any two reasons. ----------

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level- 1** **Full credit:** Coal mining is considered as hazardous industry because the rate of causality and accidents is very high in mines **No Credit:** Any other response or no response
(2)	**Level- 3** **Full Credit:** Haul trucks, dumpers, or any other correct response.

	They are mobile equipment as they are carried from place to place for doing job for public interest. **Partial response:** First response or second response is correct. **No Credit:** Other response or missing response
(3)	**Level- 2** **Full Credit:** 1973-82 **No Credit :** No response or other response
(4)	**Level- 4** **Full Credit:** There are five reasons for accidents in coal mines Ground movements./Fall other than ground movements./Transportation Machinery Machinery other than transport machinery./Explosives./The rate of occurrence of accidents has decreased in last 40 years considerably but still we are not able to curb it completely. **Partial Credit:** Any three correct response . **No Credit :** No response or other response
(5)	**Level- 4** **Full Credit:** Coal mines cause ecological imbalance. Coal dust from mines cause soil degradation, soil erosion and makes the air totally polluted by particulate matter. **No Credit :** No response or other response

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Annexure 4

Template for preparation of Practice Items for Scientific Literacy

PRACTICE ITEM 5

DOMAIN : **SCIENTIFIC LITERACY**	THEME **Chapter: Coal & Petroleum**	CLASS : **08th** Expected time: 08 min Total Credit: 10
Description of Item: Yes – Text Yes – Image -- – Table	Learning Outcome : 17. Interpret the data from the text/chart. 18. Explain scientific principles involved. 19. Evaluate the situation and deduct enquiries. 20. Apply previous scientific knowledge to deduct	

--	Graph	conclusions.
--	Map	
--	Poem	

Scientific Literacy

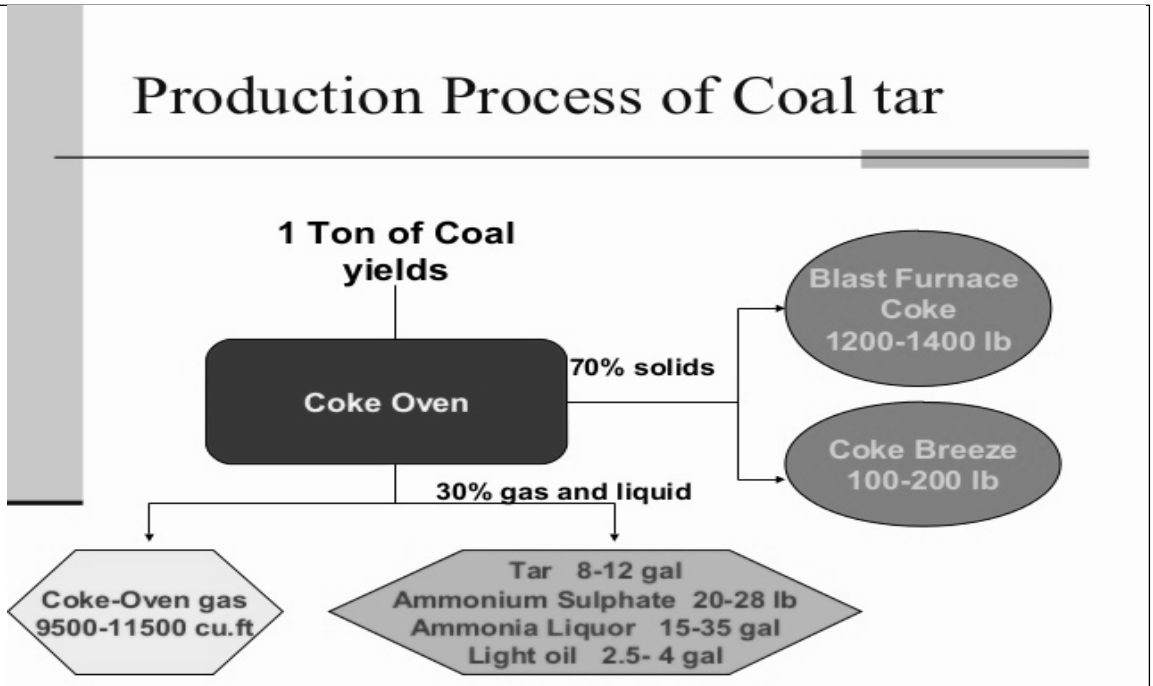
FRAMEWORK	**CHARACTERISTICS**
Competency	Explaining Process/Mechanism Scientifically
Knowledge-system	Content Knowledge
Context	Fossil Fuel/Global
Cognitive Demand	Medium - Difficult
Item format	MIXED MCQ/ Open Constructed / Closed Constructed
Proficiency Level	**1-4**

Proficiency Level of Question:
Credit Pattern :
Full Credit : 02
Partial Credit: 01
No Credit :00

Item format /Types of Questions:

YES	Simple Multiple Choice
Yes	Complex Multiple Choice
YES	Short response items
Yes	Closed Constructed Response
---	Open Construct response

SLM05	**Making of coke, coal tar and coal gas.**
	Coal is a very important fossil fuel. It is being used for thousands of years for generating electricity, running trains and by industries. It is also used for making many important by products like coke, coal tar and coal gas. These by products are also beneficial for us too. Coke is produced slowly in a coke oven. Powdered coal is heated in the oven. If 1 tonne (1000 kg) of coal is heated it gives, 70% solid coke and 30 % coal tar and coal gas. Coke is effective scientifically as it produces double the heat content of the coal required to create. It is mostly used in blast furnace to make steel. Coal tar is a thick dark liquid which is used in soaps, ointments and shampoos. It has antifungal, anti itching, anti-inflammatory and ant parasitic properties. It was a component of the first sealed roads. Coal gas is used as lightning fuel and some industries use it as fuels which are close by to coal processing plant.



(1)	Coal is heated inside it to give many useful by products- a) Blast Furnace b) Fractional distillation plant c) Coal Mines d) Coke oven
(2)	Coke is considered as better option rather using coke as- A) Coal is a fossil fuel. B) Coke produces double the heat content of the coal. C) Coke burns with smokeless flame. D) Coke has very high calorific value than coal. **Choose correct option** 1) Option B 2) Option B and D

	3) Option A and C 4) Option B, C and D
(3)	If 1 tonne coal is used, then how much solids and liquids would be produced in kilograms? A) 400 kg solids and 300 kg liquids B) 700 kg solids and 300 kg liquids C) 800 kg solids and 200 kg liquids D) 700 kg solids and 400 kg liquids
(4)	Coal tar is nowadays used in hospitals for treating many skin diseases. Write any four properties which make coal tar an important medicine in treating skin diseases?
(5)	Coke, coal tar and coal gas are being used for doing so many important tasks. Moreover, coke is a clean fuel; it is thus advised to use more and more such byproducts of coal. Do you agree? Justify your answer with correct explanation?

EXPECTED OUTCOMES/RESPONSES:	
(1)	**Level- 1** **Full credit:** Coke Oven **No Credit**: Any other response or no response
(2)	**Level- 2** **Full Credit:** Option D **No Credit**: Other response or missing response
(3)	**Level- 3** **Full Credit:** 700 kg solids and 300 kg liquids **No Credit:** No response or other response
(4)	**Level- 3** **Full Credit:** antifungal, anti itching, anti-inflammatory and ant- parasitic **Partial Credit:** Any two correct responses **No Credit :** No response or other response
(5)	**Level- 5** **Full Credit:** Although by-products of coal are useful for us but we cannot emphasize their use, as coal is a fossil fuel which would finish up in coming years. It is better to

	find other alternative forms in place of these by products. **Partial Credit**: Any one response **No Credit:** No response or other response

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