

CLASS-VII

STIMULUS

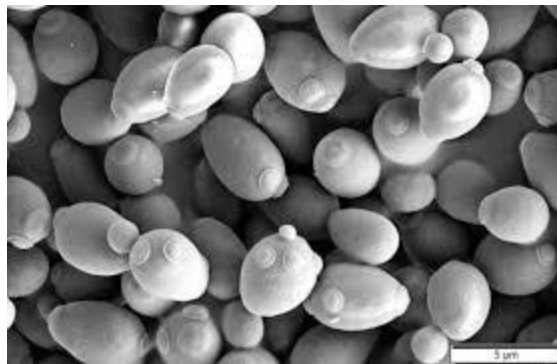
Area : Frontiers of Science and Technology

Topic : Reproduction in plants

Class: VII

Yeast are single-celled microorganisms that are classified, along with moulds and mushrooms, as members of the Kingdom Fungi. The most common mode of vegetative reproduction in yeast is asexual reproduction by budding. They multiply rapidly by this method. The nucleus of the parent cell splits into a daughter nucleus and migrates into the daughter cell.

Q.No.1. The diagram below shows yeast cells budding during asexual reproduction.



- Give a reason to explain why this type of reproduction is considered to be asexual.
- Does the parent cell exist after asexual reproduction? Comment.
- What must a single celled organism do before it can reproduce?

Q.No.2. The figure below shows the seeds of three different plants:



A

B

C

- Arrange the distance covered by the seeds in ascending order while they get dispersed away from the parent plant.
- Why can't all seeds be dispersed efficiently by wind?
- How are wind pollinated seeds adapted for dispersal?
- How do plants benefit from seed dispersal?

Q.No.3. Anika saw three different types of flowers growing in her garden:

- Flower A possesses only pistil.
- Flower B possesses only stamens.
- Flower C is bisexual.

Which among these three flowers is most likely to produce seeds and fruits on its own. Justify your answer.

Q.No.4. Suppose a bee collects food material from flower A and B of the same plant. It also assists in reproductive processes of the flower.

- Name the stage of plant reproduction in which bee is involved.
- Suggest how this process might take place between flowers A and B

Q.No.5. If you plant strawberries, you will notice that a row of plants will quickly spread into a large mass of plants. This is because they do a type of vegetative propagation by producing runners. Strawberry plants send out horizontal stems known as stolons. These stems will work their way into the ground in places and form roots, and eventually a new plant will grow. They also possess seeds outside their surface. Strawberries want to flower and come to harvest in cool to warm weather. The ideal temperature for growing strawberry is 60°F to 80°F; those temperatures allow strawberries to develop strong roots and take up nutrients necessary to produce lots of flowers and fruit.

- Which method of reproduction does strawberry undergo?
 - Sexual reproduction
 - Asexual reproduction
 - Both sexual and asexual reproduction
 - None of these
- How do strawberries spread so quickly?
- Do you think strawberries can propagate without the way mentioned in the paragraph, in nature? If yes, how?
- On the basis of the above topic, give your opinion:

S.no.	Observation	Strongly agree (a)	Strongly disagree(b)	Partially agree(c)	Partially disagree (d)
1.Strawberries are hardy perennials.					
2. The lifespan of strawberries is 3-4 years.					
3.Strawberries can survive in mild winters.					
4. Runners should be cut off from where they emerge to allow fruit production.					

Answer/scoring Key:

1a. Full credit: Single parent involved (2)

Partial credit: No males or females involved (1)

No credit: Any other answer besides these. (0)

1b. No the parent cell does not exist but split into two daughter cells. (2)

1c. It must make a copy of its genetic material or Nucleus of the parent cell splits.(2)

It must grow in size.(1)

2a. Full credit: $A < C < B$ (2)

Partial credit: $A < B < C$ (1)

No Credit: For any other options beside the above two. (0)

2b. Wind pollinated seeds are light weighted; some seeds are heavy. (2)

2c. They possess hair, fur or wings/ are light weighted. (2)

2d. It improves the chances of seeds to grow to the adult stage. (2)

3. Full credit: Flower C because both male and female parts are present in the same flower.(2)

Partial credit: Flower C (1)

No credit: Flower A, B or all three. (0)

4a. Full credit: pollination (2)

No credit: dispersal or any other. (0)

4b. Full credit: Self Pollination between anther of flower A/B and pistil of flower A/B (2)

Partial credit: Self pollination (1)

No credit: Cross pollination or any other. (0)

5a. Full credit for option iii or i and ii (2)

No credit : for option i or ii or iv. (0)

5b. Full credit: By producing **runners** or horizontal stems called **stolons** touch the ground and root.(2)

Partial credit: Mentioning about **vegetative propagation** or stolons or both of these. (1)

No credit : If above terms are missing.

5c. Full credit: **Sexual reproduction** by **seeds** present on the surface of strawberry.(2)

Partial credit: Sexual reproduction (1)

No credit: Any other thing mentioned besides the above mentioned things. (0)

5d. Full credit : if all the four options have ans (a) (2)

Partial credit: if any 2 or three options have ans (a) (1)

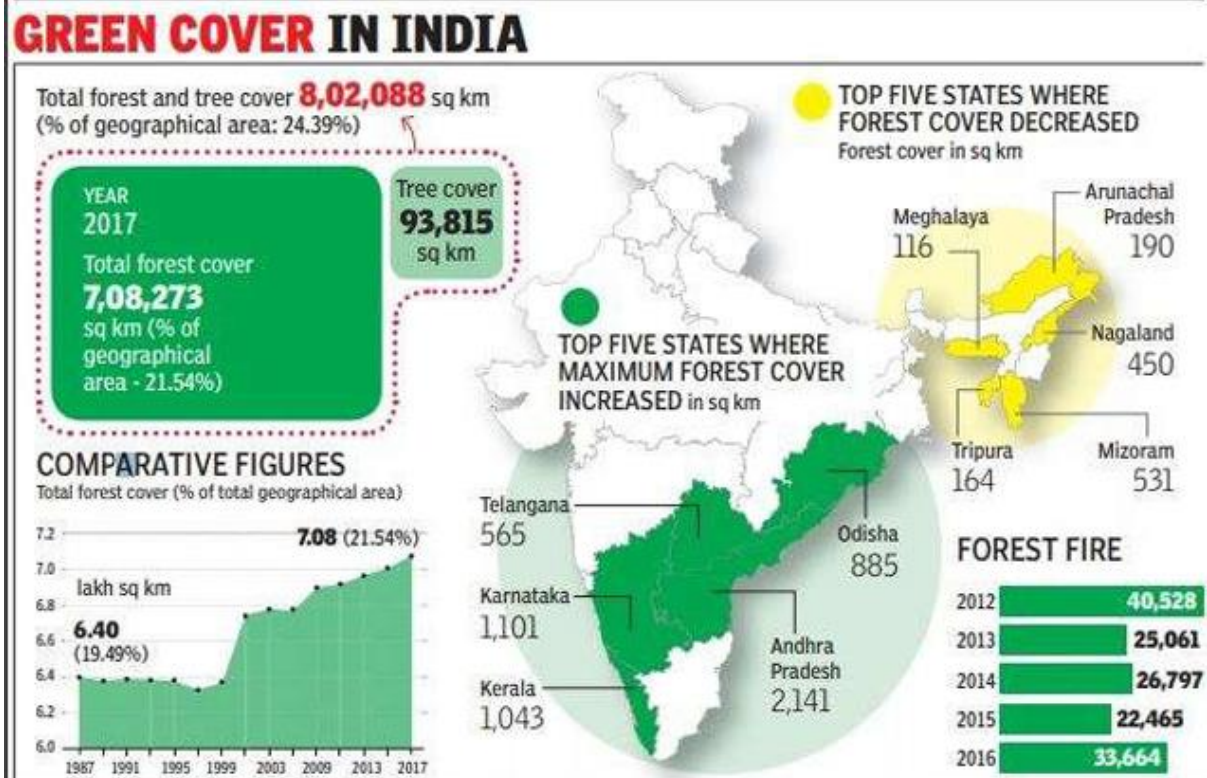
No credit: if any 1 or no options have ans (a) (0)

Item description:

Q.No.	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Closed ended	Explaining phenomenon scientifically.	Content	Global	Low
2	Closed ended	Explaining phenomenon scientifically.	Content	Global	Low
3	Closed ended	Explaining phenomenon scientifically.	content	Global	Low
4	Closed ended	Evaluate and design scientific enquiry.	epistemic	Global	Medium
5	Closed - ended	Evaluate and design scientific enquiry.	epistemic	Global	Medium

STIMULUS

Area: Natural Resources
Chapter: Forests
Class: VII



Source:

<https://www.insightsonindia.com/2018/07/09/insights-into-editorial-indias-forest-cover-what-data-shows/>

Global Forest Watch, (GFW)—a collaborative project of the University of Maryland, Google, USGS, and Nasa—suggests that **green cover has declined sharply in the country**. Forest Survey of India employs satellite imagery to estimate “forest cover”, considering “all lands which have a tree canopy density of **more than 10%** when projected vertically on the horizontal ground, within a minimum areal extent of one hectare” as forests.

This definition fails to distinguish between **native forests and man-made tree plantations**, overstating the extent of forest cover.

While the Convention on Biological Diversity has a similar definition of forests, it mentions that the land in question should not be under agricultural or non-forest use

While the latest estimate of tree cover extent from GFW is of 2010, data on loss of forest cover is updated annually. The tree cover loss for Indian states shows an accelerating trend in recent years, with the heavily forested **north-eastern states, Odisha, and Kerala showing the greatest amount of tree cover loss in the period 2001-2017**.

However, the official data represents that **Kerala gained 30% forest cover** in the same period. This can be explained by the fact that Kerala is one of the **biggest producers of plantation crops in India**, with rapidly growing plantation crops likely compensating for the loss of native forest cover.

According to the GFW data, all states and union territories with the exception of Chandigarh show a **decline in the extent of tree cover** in the time period 2000-2010. In contrast, in terms of official data, 28 of 36 states and UTs have registered an increase in forest cover.

Q1. A forest cover be defined as

1. All trees which are projected vertically on the horizontal ground,
2. All land which have a tree canopy density of **more than 10%**
3. All Land area which shows distribution of trees.
4. All area except the water bodies are included as forest cover.

Q2. Which states have shown drastic decrease of forest cover in last 5 years

1. Kerala , Andhra Pradesh, Karnataka, Maharashtra
2. Meghalaya, Tripura, Arunachal Pradesh, Nagaland , Mizoram .
3. Punjab , Haryana, Himachal Pradesh, UP

Q3. Kerela had Forest cover loss in the period 2001-2017 . How could the loss of the state was compensated so fast and current data reveals that tree loss have been recovered?

Q4. From the data shown above kindly interpret the forest area cover in sq. Km from 1995 till 2017

Year	Total Forest Cover in sq. Km
1995	
1999	
2003	
2009	
2013	
2017	

Q5.a) Find out the states which have shown increase of the forest cover , till date as mentioned in the data provided above

SR.NO	STATE NAME	INCREASE OF FOREST COVER(sq. Km)

Q6. Find out the percentage increase of the forest cover of one state over the other state

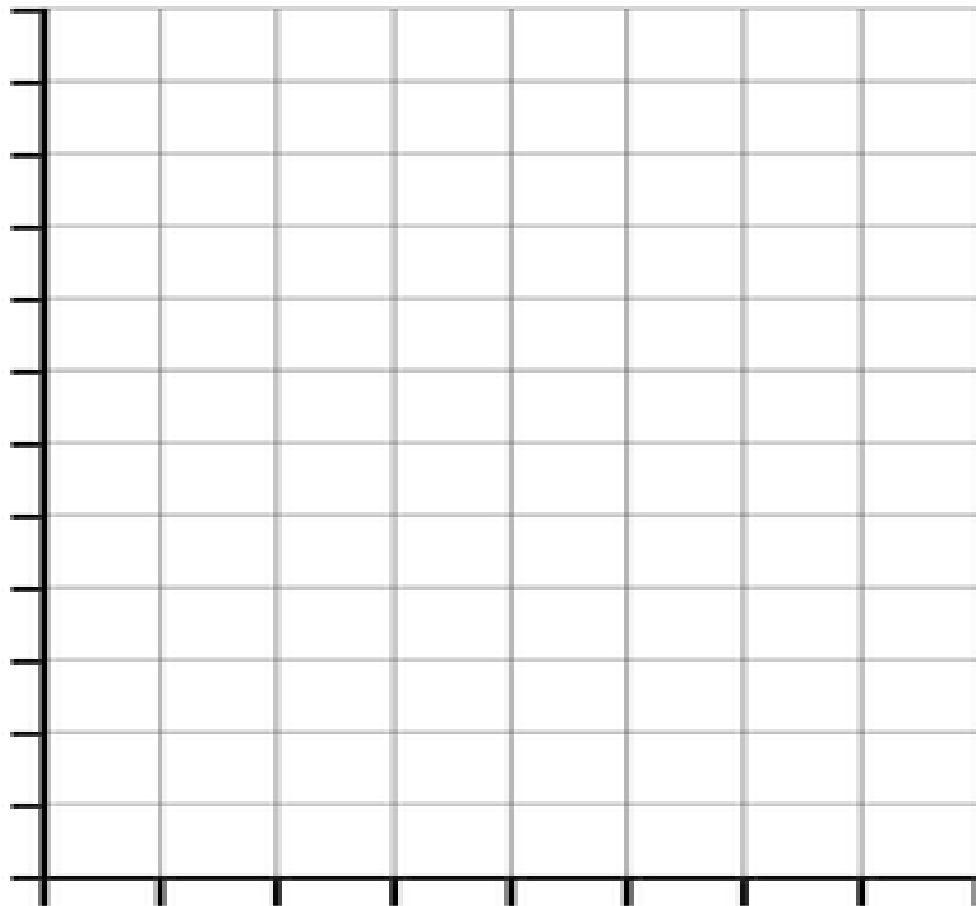
SR.NO	% increase from one STATE over other STATE	INCREASE OF FOREST COVER(sq. Km)
1	Andhra Pradesh from Telengana	
2	Karnataka from Kerela	
3	Kerela from Odisha	
4	Odisha from Telangana	

Q7. Fill in the table with the appropriate information (ATTITUDE BASED)

SR.NO	Statement	Agree	Disagree	Partially Agree	Partially Disagree
1.	Forest Fires play a major role in the destruction of the forest cover of any area.				
2.	Citizens of any country doesnt contribute in the				

	green growth of any place				
3.	As a citizen we all must pledge and take steps towards the green progress of our country				
4.	Tree Cover loss can be recovered in few months				
5.	Of all the union Territories ,Chandigarh outshines in the green cover growth.				

Q8 prepare a Bar graph of the data provided in question no 5 below



Answer Key:

Ans1: option 1 and 2

Ans 2: option 2

Ans.3: Kerala is one of the **biggest producers of plantation crops in India**, with rapidly growing plantation crops likely compensating for the loss of native forest cover.

Ans 4.

Year	Total Forest Cover in sq. Km
1995	6.4
1999	6.4
2003	6.8
2009	6.9
2013	7.0
2017	7.08

Ans 5.

SR.NO	STATE NAME	INCREASE OF FOREST COVER(sq. Km)
1	Telangana	565
2	Odisha	885
3	Kerela	1043
4	Karnataka	1101
5	Andhra Pradesh	2141

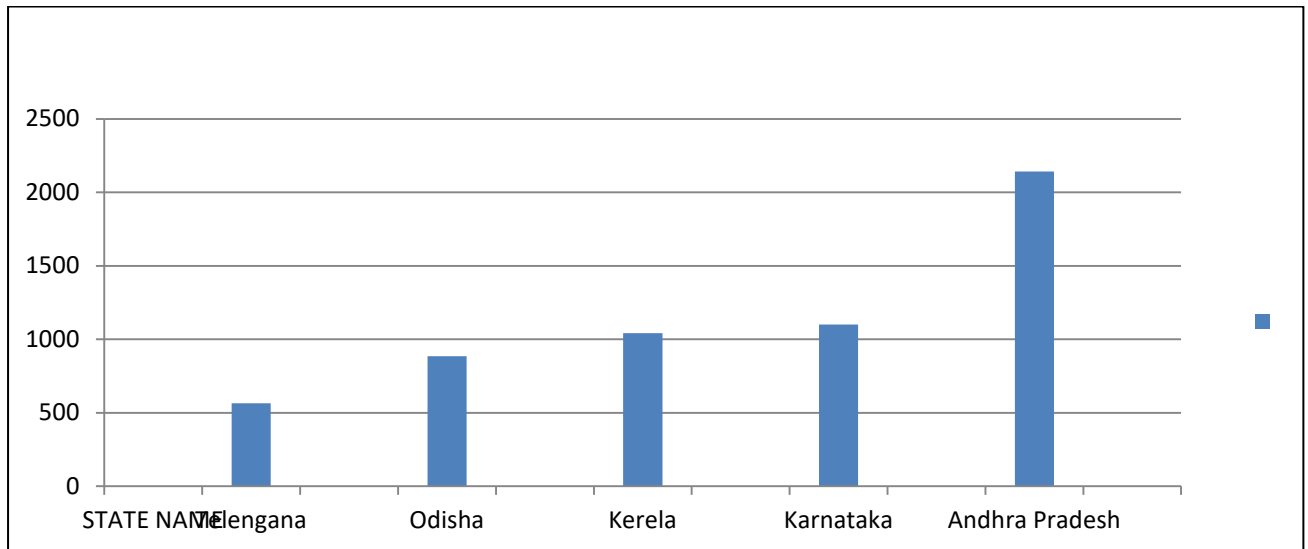
Ans 6.

SR.NO	% increase from one STATE over other STATE	INCREASE OF FOREST COVER(sq. Km)
1	Andhra Pradesh from Telangana	$2141-1043=1098$ $1098/2141*100=51.28\%$
2	Karnataka from Kerela	$1101-1043=58$ $58/1101*100=5.26\%$
3	Kerela from Odisha	$1043-885=158$ $158/1043*100=15.14\%$
4	Odisha from Telangana	$885-565=320$ $320/885*100$

Ans. 7

1. Partially Agree
2. Disagree
3. Agree
4. Diagree
5. Agree

Ans 8. Bar chart



Scoring Key:

1. FULL CREDIT (2) if both answers are correct
NO CREDIT(0) any correct answer
2. FULL CREDIT (2) if correct answer given
NO CREDIT(0) any other answer
3. FULL CREDIT (2) If proper reason given
NO CREDIT(0) any other answer
4. FULL CREDIT (2) if all answers are correct
PARTIAL CREDIT(1) If any three answers correct
NO CREDIT(0) no correct answer
5. FULL CREDIT (2) if all answers are correct
PARTIAL CREDIT(1) If any three answers correct
NO CREDIT(0) no correct answer
6. FULL CREDIT (2) if all answers are correct
PARTIAL CREDIT(1) If any three answers correct
NO CREDIT(0) no correct answer
7. 7. FULL CREDIT (2) if all answers are correct
PARTIAL CREDIT(1) If any three answers correct
NO CREDIT(0) no correct answer
8. FULL CREDIT (2) if Bar graph is shown
NO CREDIT(0) If Bar graph not drawn

Item Description:

Q.NO	Q.TYPE	COMPETENCY	KNOWLEDGE	CONTEXT	DIFFICULTY LEVEL
1	Open ended	Explain the phenomenon scientifically	Content & Procedural	Global	Medium
2	Closed constructed	Explain the phenomenon scientifically	Content	Global	Medium
3	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium
4	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium
5	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium
6	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium
7	Closed constructed	Interpret the data & evidence scientifically	Epistemic	Global	Medium
8	Closed constructed	Interpret the data & evidence scientifically	Epistemic	Global	Medium

STIMULUS

Area: Natural Resources

Chapter: Soil

Class VII

Soil is made of a mixture of sand, silt, clay particles and rotted plant material. Different soil types have different percentages of each in the sample. Sandy soils have biggest particles and weigh more. It cannot hold the nutrients. Silt soil particles are smaller than sand and weigh less. Holds water and hard to drain, can hold limited nutrients. Clayey soil particles are the smallest of all. It can hold water well and become heavy when water logged. It can easily hold the nutrients.

To understand the different soil types let's do the following experiment.

EXPT : To identify the soil type in the given sample and find the percentage of each type in 3 different samples.

LEARNING OBJECTIVE: To help the learner understand what proportion of these are for the soil with which you work.

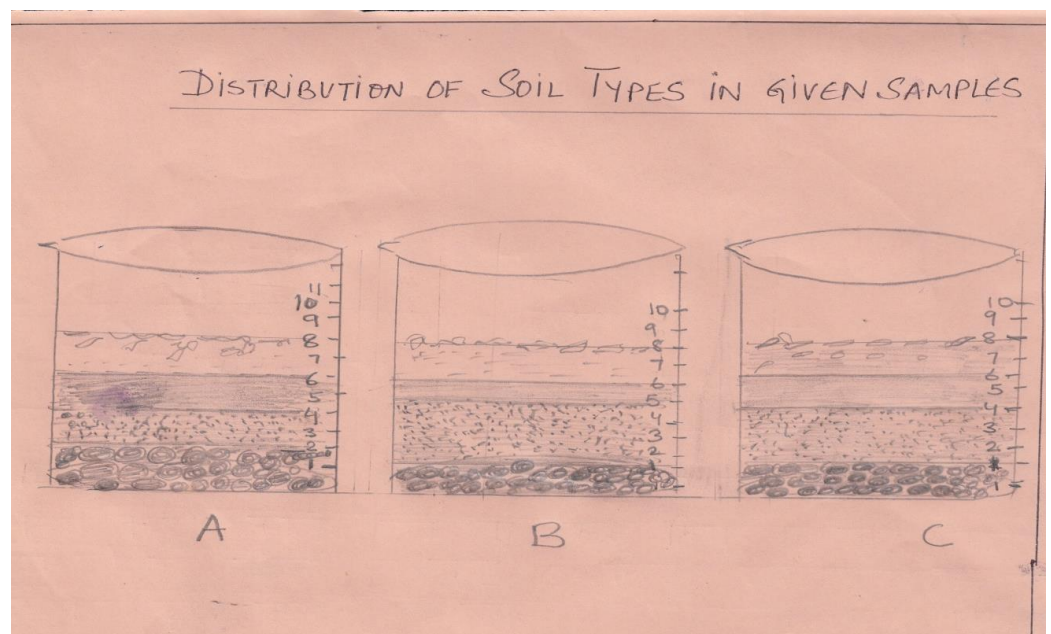
AIDS REQUIRED: 3 Beakers, 3 different soil samples, stirrer, scale for measurement

PROCEDURE:

1. Take the 3 beakers label it as A, B and C. Now fill each beaker as marked with sample soil A, B and C (3 spoons each)
2. Now fill each beaker $\frac{3}{4}$ with water and see the bubbles coming out of it.
3. Now stir the mixture well in each beaker and keep it stand still for few hours.
4. Observe the settlements.
5. Once the beakers are settled using scale measure the height of the total soil and water and then height of each soil layer.
6. Find the percentage of each part of soil and fill in the pie chart.

OBSERVATION

Below are shown the beakers after the layers get settled.



(FORMULA TO CALCULATE THE % OF SOIL LAYER=

MEASURE OF SOIL TYPE/TOTAL HEIGHT OF SOIL LAYERS INCLUDING WATER * 100)

Q1. What did you observe in the beakers shown above after the soil gets settled. Can you label the layers as shown after the soil gets settled. In all the beakers are the layers settled in the same manner.

LAYER 1: _____

LAYER 2: _____

LAYER 3: _____

LAYER 4: _____

Q2. What could be the possible reason of bubbles coming out of each beaker ?

Q3. From the figure shown above can you fill up the details as required below

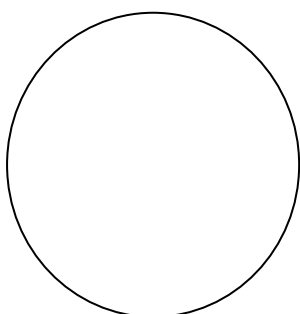
BEAKER NO.	HEIGHT OF SANDY SOIL (in cm)	HEIGHT OF CLAYEY SOIL (in cm)	HEIGHT OF HUMUS (in cm)	HEIGHT OF SILTY SOIL (in cm)
A				
B				
C				

Q4. Find out the percentage of each soil type and fill in the table shown below

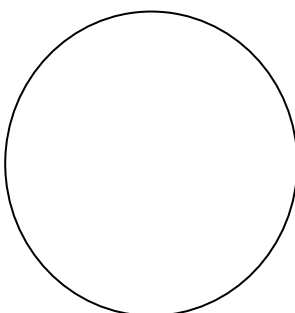
BEAKER SAMPLE NO.	PERCENTAGE OF SANDY SOIL (in cm)	PERCENTAGE OF CLAYEY SOIL (in cm)	PERCENTAGE OF HUMUS (in cm)	PERCENTAGE OF SILTY SOIL (in cm)
A				
B				
C				

Q5. Lets prepare 3 different pie chart by looking at the percentage of each soil type

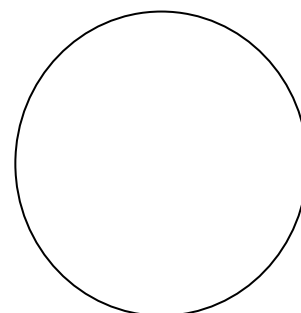
SAMPLE A



SAMPLE B



SAMPLE C



Answer Key :

1. a) Observation is that different soil types gets settled according to its constituent material in the beaker
 b) Different layers are
 LAYER 1: Sandy soil
 LAYER 2: Silty soil
 LAYER 3: Clayey soil
 LAYER 4: Humus
2. Bubbles start coming out of the mixture as soon as the water is poured on the soil due to the presence of air in the soil .Once the soil is stirred bubbles stops coming out.

3.

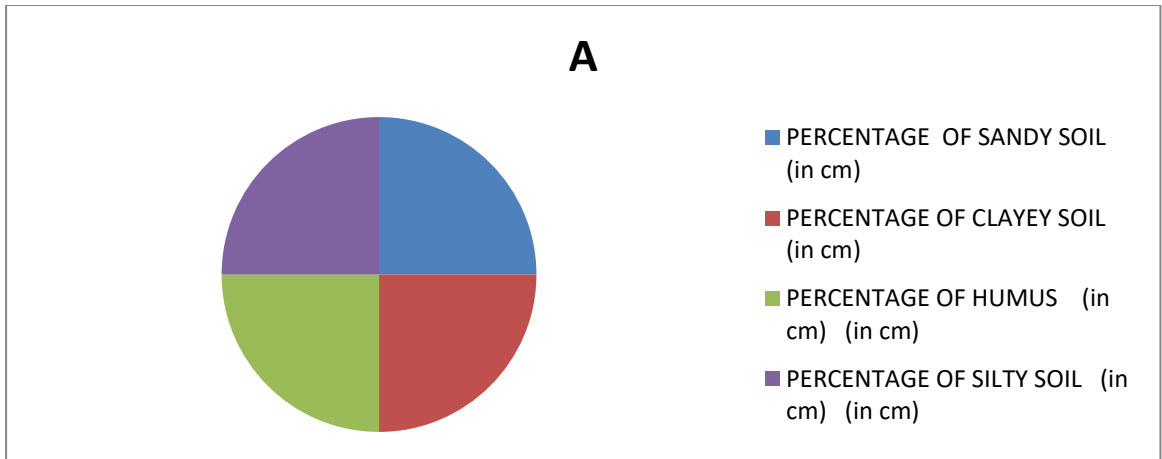
SAMPLE NO.	HEIGHT OF SANDY SOIL (in cm)	HEIGHT OF CLAYEY SOIL (in cm)	HEIGHT OF HUMUS (in cm)	HEIGHT OF SILTY SOIL (in cm)	TOTAL HEIGHT OF LAYERS (including soil & water)
A	2CM	2CM	2CM	2CM	8CM
B	1CM	1CM	2CM	4 CM	8 CM
C	1CM	3CM	2CM	2CM	8CM

4.

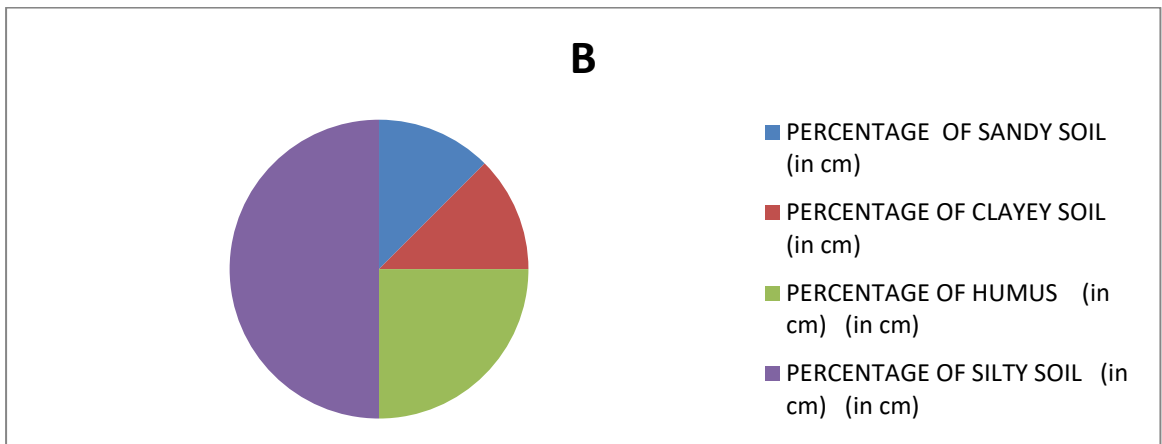
BEAKER SAMPLE NO.	PERCENTAGE OF SANDY SOIL (in cm)	PERCENTAGE OF CLAYEY SOIL (in cm)	PERCENTAGE OF HUMUS (in cm)	PERCENTAGE OF SILTY SOIL (in cm)
A	$2/8 \times 100 = 25\%$	$2/8 \times 100 = 25\%$	$2/8 \times 100 = 25\%$	$2/8 \times 100 = 25\%$
B	$1/8 \times 100 = 12.5\%$	$1/8 \times 100 = 12.5\%$	$2/8 \times 100 = 25\%$	$4/8 \times 100 = 50\%$
C	$1/8 \times 100 = 12.5\%$	$3/8 \times 100 = 37.5\%$	$2/8 \times 100 = 25\%$	$2/8 \times 100 = 25\%$

5. Pie chart

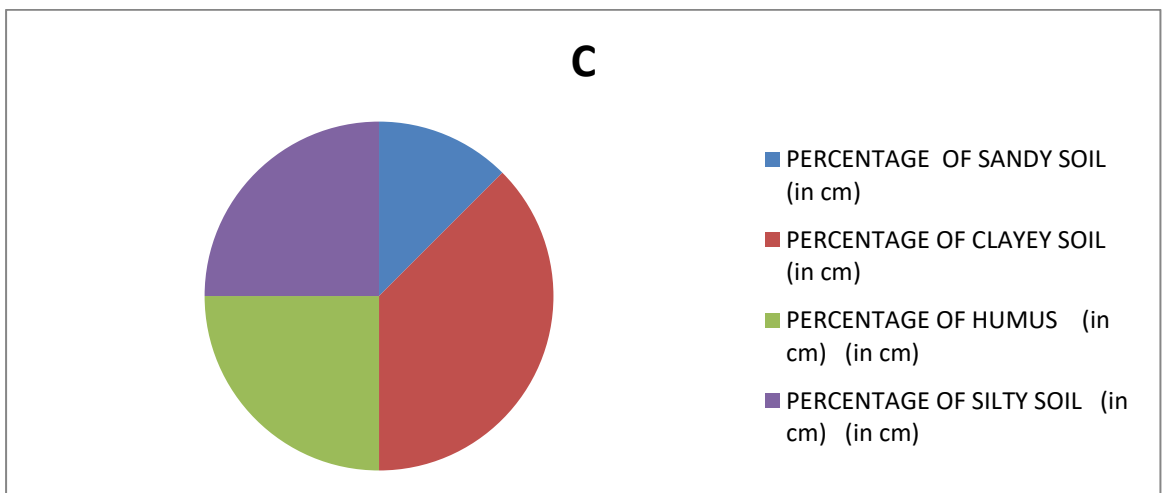
SAMPLE A



SAMPLE B



SAMPLE C



6. After the interpretation of data and making a pie chart can you find out which soil sample out of three is more suitable for pottery and which one is more suitable for growing coconuts :

SUITABLE FOR POTTERY : sample C
 SUITABLE FOR GROWING COCONUT : sample C

Scoring Key:

- 8. FULL CREDIT(2)if answers for both questions given
 PARTIAL CREDIT (1) If answers for any one question given
 NO CREDIT(0) if any other answer
- 9. FULL CREDIT (2)if correct answer given
 NO CREDIT(0) any other answer
- 10. FULL CREDIT (2) If all answers of 3 samples correct
 PARTIAL CREDIT (1)If answers of 2 samples correct
 NO CREDIT(0) any other answer
- 11. FULL CREDIT (2) If all answers of 3 samples correct
 PARTIAL CREDIT (1)If answers of 2 samples correct
 NO CREDIT(0) any other answer
- 12. FULL CREDIT (2)if all three correct pi charts
 PARTIAL CREDIT (1) if any 2 correct pi charts
 NO CREDIT(0) if wrong pi charts
- 13. FULL CREDIT (2) a.if answer is Sample C b. No sample
 PARTIAL CREDIT(1) If any one answer
 NO CREDIT(0) any other answer

Item Description:

Q.NO	Q.TYPE	COMPETENCY	KNOWLEDGE	CONTEXT	DIFFICULTY LEVEL
1	Open ended	Explain the phenomenon scientifically	Content & Procedural	Global	low
2	Closed constructed	Explain the phenomenon scientifically	Content	Global	Medium
3	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium
4	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	High
5	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	High
6	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium

PHOTOSYNTHESIS

Area: natural resources

Chapter : Nutrition In Plants

Class:VII



Teacher conducted an experiment in the class. . She took a potted plant of croton (variegated leaves) and kept in a dark room for three days. She then kept it in sun for three hours again. Now She also took a beaker, alcohol , Bunsen burner ,iodine solution & petridish to conduct the experiment.

While conducting the experiment ,a leaf was plucked from the same plant and was put in the beaker containing water and was allowed to boil. After some time the beaker containing alcohol solution and leaf was made to boil. Then leaf was taken and put it in a petridish and iodine s solution was put on it. Leaf showed bluish black in colour at some patchy areas.

what is shown here is a variegated leaf (a) before the test the leaf was patchy green in colour and same leaf (b) after the test was patchy black in colour.

1. What is the objective of the experiment shown above or what is it testing?
2. What do you think could be the reason of such variegated pattern of leaves ?
 - a. Uneven spread of the stomata on leaf
 - b. Different chlorophyll pigmentation
 - c. Excessive increase of magnesium ions
 - d. Increase of carbon dioxide level in the leaves
3. What could be the reason of keeping the plant in dark for three days and then shifting again in sun for 3 hours ?
 1. To make the plant consume all its starch for photosynthesis
 2. To breakdown the end products of photosynthesis
 3. To enhance the action of photosynthesis process
 4. To produce more chlorophyll pigment
4. Which products of photosynthesis may be present but not revealed by the test?why?

Choose the correct set of answer:

 - a. Organic compounds
 - b. Glucose, fructose ,sucrose

- c. Fat ,fatty acid ,glycerol
- d. Inorganic compounds only

5. What colour change would you expect to see if the test is positive for starch?

Answer Key:

Ans. 1 Objective of this experiment is to test the presence of starch .Plants through the process of photosynthesis make their own food and store it in the form of glucose. Glucose being soluble in nature dissolves into simpler forms thus is converted into starch which is insoluble in nature. Starch gets stored in the cells and thus cannot escape, which is further more used for respiratory processes. The motive of keeping the plant in dark is to enable it to consume all of its starch and help us test the presence of starch with the iodine solution.

Ans 2: Option (b)

Ans 3: Option(1)

Ans 4: Option (b)

Ans 5: A chemical test for starch is to add iodine solution (yellow/brown) and look for a colour change. In the presence of starch, iodine turns a blue/black colour. It is possible to distinguish starch from glucose (and other carbohydrates) using this iodine solution **test**.

Scoring Key:

1. FULL CREDIT(2) Testing of the presence of starch with other explanation
NO CREDIT(0) if any other answer
2. FULL CREDIT (2)option b
NO CREDIT(0) any other answer
3. FULL CREDIT (2)option 1
NO CREDIT(0) any other answer
4. FULL CREDIT (2)option b
NO CREDIT(0) any other answer
5. FULL CREDIT (2)if answer is blue/black
NO CREDIT(0) any other answer

Item Description

Q No.	Q.Type	Competency	Knowledge	Context	Difficulty Level
1	Open ended	Explain the phenomenon scientifically	Content & Procedural	Global	Medium
2	Simple multiple choice	Explain the phenomenon scientifically	Content	Global	Medium
3	Simple multiple choice	Explain the phenomenon scientifically	Content	Global	Medium

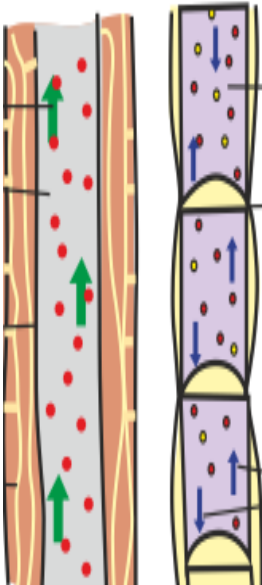
4	Simple multiple choice	Evaluate & Design scientific enquiry	Content	Global	Medium
5	Closed constructed	Interpret the data & evidence scientifically	Procedural	Global	Medium

STIMULUS

Area: Natural resources

Chapter: Nutrition In Plants

Topic :Conduction



Teacher was showing picture to its students on vessels which play major role in the transport of important nutrients in the plants. She explained how water , nutrients and food material gets transported in plants through these vessels which are similar to blood vessels in the human beings.

Vessel 1 tissues are used for transporting water from roots to stems and leaves and also some dissolved compounds. It has one way flow only and work against the gravity .It has no end walls between the cells .

vessel 2 is responsible for transporting food produced from photosynthesis from leaves to non-photosynthesizing parts of a plant such as roots and stems .It has two way flow and cell has the end walls with perforations ,

Vessel1 vessel2

Q1. Can you identify in the picture shown above the vessels we are referring to?

1. Chloroplasts and plastids
2. Fibres and tracheids
3. Xylem and phloem
4. Collenchyma and sclerenchyma

Q2: Why are there pores in the end walls of phloem?

Q3. Why vessel1 has to work against the gravity to create a negative pressure? comment

Q4. Explain the two major processes associated with the functioning of both the vessels?(choose the appropriate process from the listed ones : respiration, photosynthesis , fermentation, transpiration ,aerobic respiration , glycolysis , osmosis , translocation)

Q5. Fill up the flowchart to explain the functioning of vessel 1

Roots -> absorbs (1)_____→ creates _(2)_____ -pressure→works against the
_(3)_____ -→creates an upward(4)____→further causes loss of(5) _____→which is
known as _____process

Answer Key:

Ans. 1: Option 3

Ans 2: Sugar produced by photosynthesis in the leaves is transported up and down the plant to the meristems and other tissues in living phloem cells. Companion cells provide the energy for the sieve cells. The end walls of the sieve cells have pores through which sugar is transported from cell to cell.

Ans 3: The flow in vessel 1 is against the gravity as it has to carry water and minerals from the roots to all the other parts of the plant. Since there is a depiction of xylem cells in the figure 1 which does the same function, the pressure created is against the gravity.

Ans 4: Transpiration and translocation

Ans 5: (1) Water

(2) Suction

(3) Gravity

(4) Pull/ Pressure

(5) Water

(6) Transpiration

Item Description:

Q.No	Q.Type	Competency	Knowledge	Context	Difficulty Level
1	Open ended	Explain the phenomenon scientifically	Content	Global	LOW
2	Closed constructed	Explain the phenomenon scientifically	Content	Global	Medium
3	Closed constructed	Explain the phenomenon scientifically	Content	Global	Medium
4	Closed constructed	Explain the phenomenon scientifically	Content	Global	LOW
5	Closed constructed	Explain the phenomenon scientifically	Procedural	Global	Medium

CLASS VIII

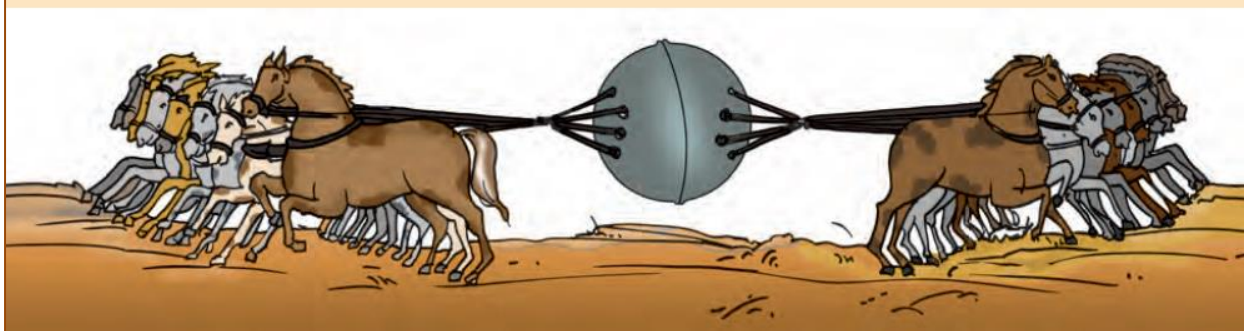
FORCE AND PRESSURE

Area-Frontiers of Science and Technology

Topic – Force and Pressure

Class 8

Otto von Guericke, a German scientist of the 17th century, invented a pump to extract air out of a vessel. With the help of this pump, he demonstrated dramatically the force of the air pressure. He joined two hollow metallic hemispheres of 51 cm diameter each and pumped air out of them. Then he employed eight horses on each hemisphere to pull them apart. So great is the force of air pressure that the hemispheres could not be pulled apart.



Q.1 Name the scientist who invented vacuum pump.

Q.2 For what purpose the above experiment was done?

Q.3 (i) What was the diameter of each hemisphere?

(ii) What was total no. of horses used in above experiment?

Q.4 Give reason: Why were horses unable to separate both hemispheres?

Q.5 Answer in Yes/No

(i) Was it possible to separate both hemispheres by increasing two horses on both sides?

Yes/No

(ii) Do you think there was an spiritual power which was helping hemispheres?

Yes/No

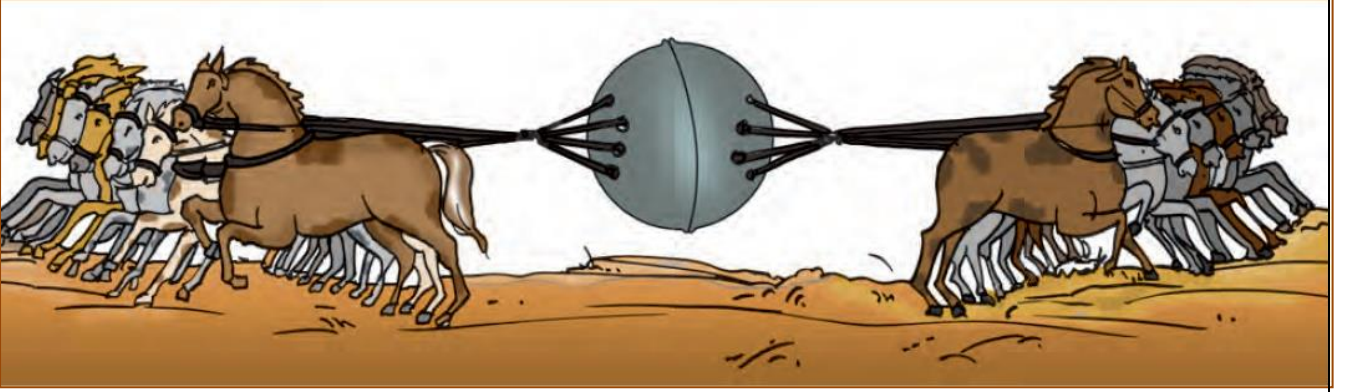
बल तथा दाब

Area-Frontiers of Science and Technology

Topic – Force and Pressure

Class 8

17वीं शताब्दी में जर्मनी के एक वैज्ञानिक ऑटो वॉन गेरिक ने बर्तनों से वायु बाहर निकालने के एक पम्प का आविष्कार किया। इस पम्प की सहायता से उन्होंने नाटकीय ढंग से वायु दाब के बल का प्रदर्शन किया। उन्होंने धातु के दो खोखले अर्धगोले लिए जिनमें प्रत्येक का व्यास 51 cm था। इन गोलों को एक साथ जोड़कर उनके बीच की वायु निकाल दी गई। तब प्रत्येक अर्धगोले पर आठ-आठ घोड़े विपरीत दिशा में खींचकर अलग करने के लिए लगाए। वायु दाब का बल इतना अधिक था कि इतने घोड़े भी अर्धगोलों को अलग न कर पाए।



प्र.1 निर्वात पम्प का आविष्कार करने वाले वैज्ञानिक का नाम बताइये ।

प्र. 2 ऊपर दिखाया प्रयोग क्यों किया गया?

(i) प्रत्येक अर्धगोले का व्यास कितना था?

(ii) इस प्रयोग में कुल कितने घोड़ों को उपयोग किया गया

प्र.4 कारण बताइये : घोड़े दोनों अर्धगोलों को अलग करने में असमर्थ क्यों थे?

प्र.5 हाँ या नहीं में उत्तर दें

- (i) क्या दोनों तरफ दो-दो घोड़े और बढ़ा देने पर दोनों अर्धगोलों को अलग करना संभव हो पाता? हाँ/नहीं
- (ii) क्या आपको लगता है की दैवी शक्ति थी जो इन दोनों अर्धगोलों की सहायता कर रही थी? हाँ/नहीं

Answer/Scoring Key:

Q.1 Score 1 for Otto von Guericke

Score 0 if no ans. Or wrong ans.

Q.2 Score 1 to demonstrate atmospheric pressure

Score 0 for other ans.

Q.3 (i) Score 1 for 51cm otherwise score 0

(ii) Score 1 for 16 otherwise score 0.

Q.4 Score 1 For ans. Due to no air pressure inside and only pressure from outside

Which is atmospheric pressure. Or similar explanation.

Q.5 (i) Score 1 for No

(ii) Score 1 for No

Items Description

Q.No.	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Closed	Interpreting data and evidence	Procedural	Global	Low
2	Open ended	Explaining phenomenon scientifically			Medium
3	Closed	Interpreting data and evidence			Medium
4	Open ended	Explaining phenomenon scientifically			High
5	Open ended	Evaluating and designing scientific enquiry			Medium

FRICTION

Area-Frontiers of Science and Technology

Topic – Friction

Class 8

A riddle for you

*In some situations, I oppose the motion
in other situations, I facilitate the motion
but, I always oppose
the relative motion
between two moving surfaces.
Put some lubricant, and
I become small there.
Make the moving surfaces rough
I make the movement tough.
I may be—
static, sliding or rolling
but whenever two surfaces are in motion
I am always there,
Tell me who I am!*

Q.1 Fill in the following blanks with two different words as shown above

I _____ the motion, I _____ the motion.

Q.2 The above riddle is about:

- a) force b) velocity c) work d) friction

Q.3 What according to you are benefits and losses of friction?

Q.4 (i) Where can you always find the friction?

(ii) How can friction be minimized and maximized?

Q.5 Answer Yes or No

(i) We can walk on road because we know how to walk. Yes/No

(ii) In winter when we rub both hands they get warmed due to friction between two hands.
Yes/No

घर्षण

Area-Frontiers of Science and Technology

Topic – Friction

Class 8

आपके लिए एक पहेली

कुछ स्थितियों में, मैं गति का विरोध करता हूँ
यद्यपि मैं गति को संभव बनाता हूँ
परन्तु मैं सापेक्ष गति का सदा विरोध करता हूँ
दो गतिमान पृष्ठों के बीच
लगाइए वहाँ कुछ स्नेहक
वहाँ बन जाता हूँ मैं छोटा
बनाइए गतिमान पृष्ठों को रूक्ष
बना देता हूँ मैं गति को कठिन
मैं हो सकता हूँ - स्थैतिक, सर्पी अथवा लोटनिक
परन्तु जब भी होते हैं दो पृष्ठ गतिमय,
होता मैं हूँ सदैव वहाँ, बताओं मैं हूँ कौन!

प्र1 ऊपर दिये अनुसार दो विभिन्न शब्दों की सहायता से रिक्त स्थान भरो :

मैं गति का _____ करता हूँ, मैं ही गति को _____ बनाता हूँ।

प्र.2 ऊपर दी पहेली किसके बारे में है?

क) बल ख) गति ग) कार्य घ) घर्षण

प्र.3 आपके अनुसार घर्षण के क्या लाभ तथा हानियाँ हैं?

प्र.4 (i) आपको सदा घर्षण कहाँ मिलेगा?

(ii) घर्षण को कैसे कम या ज्यादा कर सकते हैं?

प्र.5 हाँ या नहीं में उत्तर दीजिये:

- (i) हम सड़क पर चल सकते हैं क्योंकि हमें चलना आता है । हाँ / नहीं
(ii) सर्दियों में जब हम अपने दोनों हाथों को आपस में रगड़ते हैं तो दोनों के बीच की घर्षण के कारण ये गरम हो जाते हैं । हाँ / नहीं

Answer/Scoring Key:

Q.1 Score 2 for oppose and facilitate

Score 1 if only one correct.

Score 0 if no ans. Or both wrong

Q.2 Score 1 for d) Friction

Score 0 for a,b or c

Q.3 Possible ans. Benefits: Causes motion, helps in walking

Losses: wear and tear, heating up of parts of machines or bodies in contact.

Score 2 for both right benefits and losses

Score 1 if one is correct

Score 0 for both wrong answers.

Q.4 (i) Score 1 between two bodies or surfaces in contact or similar ans.

Score 0 for others

(ii) To minimize lubrication is applied and to maximize the surfaces are made more and more rough. Score 2 for both correct same or similar ans.

Score 1 for one correct same or similar ans.

Score 0 for both incorrect or irrelevant ans.

Q.5 (i) Score 1 for No

(ii) Score 1 for Yes

Items Description:

Q.No.	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Close constructed	Interpreting data and evidence			Low

2	Simple multiple choice	Interpreting data and evidence	Content	Global	Low
3	Open ended	Evaluating and designing scientific enquiry			Medium
4	Open ended	Explaining phenomenon scientifically			High
5	Open ended	Evaluating and designing scientific enquiry			Medium

STIMULUS

Area : Environment

Topic: Metals And Non Metals

Class : 8

One of the most beautiful and entertaining uses of fire occurs in firework displays.

To produce the colourful patterns and shapes we see, fireworks utilize a precise chemical mixture that's going to burn at the right temperature, at the right time, and with the right colours. That requires four main chemical ingredients — an oxidizer, a fuel, a colourant, and a binder.



Fireworks need plenty of oxygen to facilitate burning. The most commonly used oxidizers are nitrates, chlorates, and perchlorates.

Any fire needs fuel. In fireworks, that's typically charcoal or sulphur. The fuel combines with the oxygen setting the stage for an explosion when fire's added.

The colourant chemicals help determine the different colours we see and the binder — often a type of starch called dextrin — binds the fuel, oxidizer, and colorant together within the pellets. When the packets explode, the chemical elements emit light, and the colourant produces very specific wavelengths that can be seen by the naked eye.

However, there are limits on the types of chemicals one can use. For one, they can't be agents that absorb moisture, for eg sodium is great for making yellow fireworks but we can't use table salt for that purpose.

Q1 .what could be the role of an oxidizer in firecrackers?

Q2 .which is not likely to be an oxidiser?

- a. Potassium nitrate
- b. Potassium chloride
- c. Potassium chlorate
- d Potassium perchlorate

Q3. Why does table salt turns sticky during humid weather?

Q4. Suman went to a restaurant with her parents and noticed that even in humid weather, the salt sprinkler on the table had freely flowing salt. On close inspection, she saw a few rice of grains mixed with salt. What do you think is the purpose of adding rice grains ?

Q5.One limit on the types of chemicals used in making firecrackers used is mentioned above.

Can you think of one more reason to limit the use of certain type of chemicals used?

Answer/Scoring Key:

Q1. Oxidizer supplies excess oxygen to the fuel so that it burns efficiently.

Q2. (b)

Q3. Table salt turns sticky because certain compound in it absorbs moisture.

Q4. Rice grains absorb moisture and keep the salt dry.

Q5. The chemicals used should not be highly polluting.

Item description:

Q NO.	Q Type	Competency	Knowledge	Context	Difficulty Level
1	Close constructed	Explaining phenomena scientifically	Content	Global	medium
2	Simple MCQ	evaluating	Content	Global	Medium
3	Close constructed	Evaluating	Content	Global	Medium
4	Close Constructed	Interpreting	Epistemic	Personal	High
5	Open ended	Evaluating	Epistemic	Local	Medium

STIMULUS

Area : Environment

Topic: Metals And Non Metals

Class : VIII

Great diversity occurs between different elements. One element may be so reactive that it cannot be even exposed to air and on the other hand some other element may show contrasting physical and chemical properties.

Neon and Sodium are two such elements found in nature. Sodium has to be stored under a layer of Vaseline or kerosene whereas neon is an inert element. Surprisingly, they are neighbours in the periodic table.



PICTURE 1:



PICTURE 2:

- Q1. If people represent elements in picture 1, observe the above picture and identify which element could be element neon.
- Q2. What does the second picture show?
- Q3. What could be the role of Vaseline in storing sodium metal.?
- Q4. The physical state of sodium and neon respectively at room temperature is likely to be
- Solid, solid
 - Solid, gas
 - Gas, solid
 - Gas, gas

Answer/Scoring Key :

- Q1. Element Neon is the person who is standing alone and not socializing with anybody. It is an inert element.
- Q2. Second picture shows reaction of sodium with water in which sodium catches fire.
- Q3. Sodium reacts vigorously with air . Vaseline cuts off air supply and prevents the reaction.
- Q4. b) solid, gas

Item description:

Q No.	Q type	Competency	Knowledge	Context	Difficulty
1	Close constructed	Interpreting evidence	Content	Global	Medium

		scientifically			
2	Close constructed	Evaluating and designing scientific enquiry	Epistemic	Global	Medium
3	Close constructed	Evaluating and designing scientific enquiry	Procedural	Global	Easy
4	Simple MCQ	Explaining phenomena scientifically	Content	Global	Medium

METALS AND NON METALS



Elements have unique physical and chemical properties, which make them useful for specific purposes in our everyday world. All known elements can be classified as metals, nonmetals, or metalloids according to the substance's specific physical and chemical properties.

Physical properties: are properties that can be observed without changing the identity of a substance, and chemical properties are properties that are observed while altering, or changing, the identity of the substance involved.

Metals and nonmetals are separated by the zigzag or stair-step line on the periodic table. Most elements are classified as metals, which are located from the center to the left side of the zigzag line. Metals are elements that are usually silver-gray in color, with the exception of copper and gold. All metals are solid at room temperature except mercury, which is a liquid. Metals have a lustrous or shiny appearance and reflect light when polished. They can be bent or hammered flat (malleable), can be drawn into wire (ductile), are good conductors of heat and electricity, usually show reaction with acids, and generally have high melting points (many above 800°C). Nonmetals are found to the right of the zigzag line on the periodic table. There are fewer nonmetals than metals. Nonmetals are usually dull in appearance and do not reflect light. Many are brittle, and therefore cannot be hammered into sheets. Nonmetals are poor conductors of electricity and heat, show little or no reaction with acids, and generally have low melting points. At room temperature, nonmetals can exist as either solids or gases, with the exception of bromine, which is a liquid. Elements found along both sides of the zigzag line are called metalloids, with the exception of aluminum. Metalloids are elements that show properties of both metals and nonmetals.

Q 1. What are the name of elements which show properties of both metals and non metals?

Q 2. Metals can exist in all three states of matter- solid, Liquid and gas. (True or False) Justify.

Q 3. Why cooking utensils are made of metals but their handles are made of wood/plastic?

Q4. Which of the following can be beaten into thin sheets?

- (a) Zinc (b) Phosphorus (c) Sulphur (d) Gold

Q 5. Which of the following statement is correct ?

- (a) All metals are ductile.
(b) All non-metals are ductile.
(c) Generally, metals are ductile.
(d) Some non-metals are ductile.

Answer key/ Scoring:

1. Metalloids
2. True
3. Metals-conductors, Wood- insulator
4. Score -2 for **a** and **d** Score-0 for any other ans.

5. Score – 2 for c and score -0 for any other ans.

Item description:

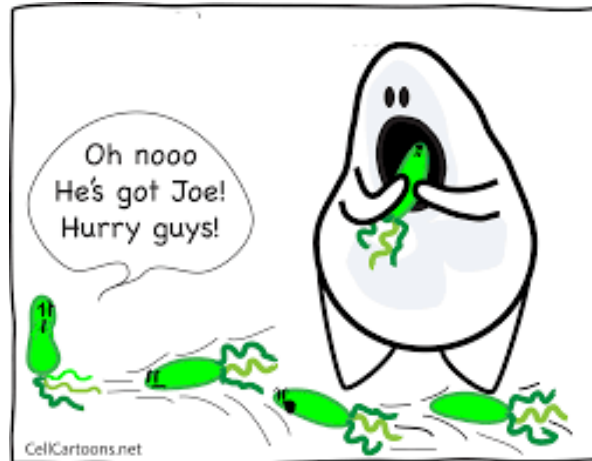
Q No.	Q Type	Competency	Knowledge	Context	Difficulty level
1	Close constructed	Explaining phenomenon scientifically	Content	Global	Low
2	Open ended	Evaluate and design scientific enquiry	procedural	Global	High
3	Close constructed	Explaining phenomenon scientifically	Content	Global	Medium
4	Complex MCQ	Explaining phenomenon scientifically	Content	Global	Medium
5	Simple MCQ	Explaining phenomenon scientifically	Content	Global	Medium

CLASS IX

BLOOD A CONNECTIVE TISSUE

Area: Health
Topic: Tissues
Class: IX

Blood is a specialized body fluid. It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, such as transporting oxygen and nutrients to the lungs and tissues; forming blood clots to prevent excess blood loss, carrying cells and antibodies that fight infection; bringing waste products to the kidneys and liver, which filter and clean the blood and regulating body temperature



The figure above shows one type of blood cells performing a specialised function. Observe the figure and answer the questions given below

Q1. What is happening in the figure given above? Draw conclusion from the figure.

.....

Q2. How do you think the process depicted above helps maintain a balanced internal environment?

.....

Item Description:

Q. No.	Q. Type	Competency	Knowledge	Context	Difficulty level
1	Closed constructed	Explain the process scientifically	content	Personal	Low
2	Closed constructed	?	content	Personal	Medium

INTELLIGENT STREET LIGHTS

Area: frontiers of science & technology

Topic:

Class: IX

Global demand for electricity is increasing day by day. Global consumption of power by street lighting is about 15% and contributes 5% of worldwide greenhouse gas emissions. Street lighting energy consumption is an important domain that needs major attention with the objective of saving energy. In Chennai, daily consumption of power on streetlights is more than 27MW which is around 20% of the total energy. The Greater Chennai Corporation maintains 2,77,902 street-lights, of which 1,71,229 are energy-saving LED lights. People won't be using the streetlights for all the 12 hours at night and hence there is need to decrease the power consumption. A team of students from the Indian Institute of Technology, Madras have now developed an Intelligent Lighting System idea called "Efficient Management of Energy Consumption by Public Street Lights". The idea is based on IoT (Internet of Things) or i-lighting sensor based interactive system that can cut power consumption in streetlights by half after dark when not required. The device can dim or brighten the light according to the presence of a pedestrian or a vehicle on the road. When the road is empty, the lights go dim by 30%. This integrated system has three main units – Control unit, Sensor unit and LED driver. Control system is the brain of the system that contains a MCU responsible for synchronizing its lighting sensors and performing some basic computations. The module also allow street lights to send signals to each other and with the cloud. It uses both RF communication and cellular networks to transfer data. The Sensor unit comprises sensors such as the PIR (Passive Infrared Sensor) and ultrasonic sensor to detect the presence of a pedestrian or a vehicle. Finally, an LED driver is used to control the amount of power to be supplied to the LED panel to either increase or decrease the brightness of the light. Through this intelligent lighting system, which is compact, cost effective and easy to maintain, over 40% of power can be easily save. While auto-dimming streetlights already prevalent in a few countries, the IIT students have added features like the ability to keep track of faults in the lights and synchronize the lighting that makes their device different. This will reduce the time spent by an electrician on maintenance and repair, as the data will let them identify the exact problem. Because of the simple components, the device is also four times cheaper than those that are available.

Q1.Global consumption of power by street lighting is of the total energy ?

- a)15% b)50 % c) 30 % d)20%

Q2.Name the system developed by students of IIT Madras for street lighting of Chennai.

Q3.Select the correct choice.

- a)The device can dim or the brighten the light according to the presence of a pedestrian or a vehicle on the road .
- b) Through this intelligent lighting system, which is compact, cost effective and easy to maintain, over 80% of power can be easily saved.
- c) Chennai, daily consumption of power on streetlights is more than 27MW which is around 80% of the total energy.

Q4.Global demand of electricity is increasing day by day. Justify.

Answer key/scoring:

1. 15%
2. Intelligent Lighting System
3. a and b

Item description:

Q No.	Q Type	Competency	Knowledge	Context	Difficulty level
1	Simple MCQ	Explaining phenomenon scientifically	content	global	low
2	Closed constructed	Explaining phenomenon scientifically	content	local	low
3	Complex MCQ	Explaining phenomenon scientifically	content	local	medium
4	Open ended	Interpret data and evidence scientifically	content	global	high

ACTIVE AND PASSIVE MOVEMENT OF IONS

Area: Living System

Topic: Diffusion

Class: IX

Scientists dipped a layer of plant cells in Concentrated salt solution (A solⁿ) and a mixture of salt solution and freshwater (B solⁿ). They monitored the movement of sodium, chloride and potassium ions in both these cases and found that the concentration of water did not change. The observations of the scientists are given below:

Ions	Ion concentration		
	Plant Cell	Concentrated salt solution (A sol ⁿ)	Mixture of salt solution and fresh water (B sol ⁿ)
Sodium	70	400	40
Chloride	440	440	80
Potassium	667	13	2.4

Assuming that the cell membrane is fully permeable to these ions-

(a) Which ion will be able to enter through diffusion from the sea water, but will have to be transported actively inside, when kept in the Mixture of salt water and fresh water? Give reason.

.....

(b) Which of the ion will have to be transported actively in both solutions A and B? Give reason

.....

(c) How do plants survive in sea waters which have high ionic concentrations? Explain

.....

Answer Key:

(a) Sodium, as it will move passively from higher conc. in A soln to low conc. inside the cell but it has to moved inside actively when place in soln B as it needs to be moved from lower conc. to higher conc.

(b) Potassium, as its conc. is higher inside the cell as compared to Soln. A and Soln. B

(c) By the Process of Osmoregulation, performed by contractile vacuoles present inside the cell, they maintain the osmotic balance of the cell.

Scoring key:

(a) Score 1 for correct response and 2 if explanation is correctly written.

(b) Score 1 for correct response and 2 if explanation is correctly written.

(c) Score 2 for correct explanation.

Item Description:

Q. No.	Q. Type	Competency	Knowledge	Context	Difficulty level
a	Closed constructed	Evaluate and design scientific enquiry	content	Global	Medium
b	Closed constructed	Evaluate and design scientific enquiry	content	Global	Medium
c	Closed constructed	Interpret data and evidence scientifically	content	Global	High

IMPROVEMENT IN FOOD RESOURCES

Area-Frontiers Of Science And Technology

Topic-Vertical Farming: Will The Food Of The Future Grow
Inside, Underground And Up In The Sky?

Class IX

(Author: Sarah-Indra Jungblut/ RESET Editorial 2018)



A growing population, increased urbanisation, climate change and depleted soil - producing enough food to sustain the world is becoming more and more of a challenge. Agriculture needs new approaches and innovation. Could vertical farms hold the key?

What Exactly is Vertical Farming and Urban Agriculture?

This little trip through the vertical and urban farms of the world has clearly shown what it is exactly that vertical farming is all about:

Growing in limited space: As the name suggests, crops cultivated in vertical and urban farms are stacked one above the other and grow upwards.

Indoor farming: Most plants do not grow outdoors, but instead inside in shelves and cupboards, halls or underground.

Artificial conditions: Today's vertical or urban farm is most often an automated, self-regulating system in which sensors measure room temperature, humidity and light intensity and, if necessary, supply water, fertilizers or artificial light. Waste in any form is virtually non-existent.

What are the Advantages of Vertical Farming?

From an ecological perspective, vertical farming has a whole host of different advantages:

Saving space

By shifting production from the ground to the air, more can be grown per square metre than using traditional methods.

Reducing transportation

In these sophisticated, space-saving systems, plant and animal products are grown directly where they're most-needed: in the cities. The proximity to consumers shortens transport routes and thus also the cold chains, cutting down on transportation time and CO2 emissions.

Increasing productivity and diversity

Thanks to the artificially-created light and temperatures, a variety of plants can be grown all year round. By controlling the light spectra of the light-emitting diodes, the growth process, taste and size of plants can be influenced as needed - without genetic engineering or additional chemicals.

Eliminating pesticides

Vertical farming's closed systems make it difficult for weeds and animals to get in, meaning there's no need for pesticides. Removing them from the equation protects the soil, lakes, rivers and our groundwater.

Removing reliance on climate and soil quality

Climate change means that we are increasingly confronted with more extreme weather events such as floods, drought or storms. The advantage of closed systems is that they make agriculture weather-independent.

Soil quality is also irrelevant, as the plants on the high-tech farms do not come into contact with the soil. Since plants absorb everything from the soil that is soluble in water, they also absorb the pollutants. For Japan, for example, vertical farming after the nuclear disaster in Fukushima was primarily a way of producing food without radioactive contamination. One of Japan's largest cultivation areas, Sendai, is located only 80 kilometres south of Fukushima and was affected by the disaster.

Using alternative farming methods, and planting crops vertically up in the air rather than over the ground, also gives depleted soil time to rest and recover.

Q1. India with its growing population is facing food and space crisis.

Suggest some alternative to the traditional farming.

Q2. To have a vertical garden in your school what would be the requirements.

Q3. Vertical gardens are answer to pesticide free farming. Do you agree with statement.

Q4. Japan suffered from a nuclear disaster and the soil got contaminated. What alternative method did they use.

Q5. Is it possible to grow plants of different seasons all the year round.

Q6. Indian weather conditions are very unpredictable. Leading to farmers facing immense loses. What suggestions can you give to mitigate this issue.

Answer/Scoring Key:

Q1. Full Score-Hydroponics,vertical garden, aeroponics (2 marks)

Q2. Full score-Space, Source of lighting, fertilizer, Sensors for humidity-lighting, temperature etc. (2 marks)

Q3.Full Score- Vertical gardens eliminate the chance of infection as its difficult for the pathogens or animals to get inside the closed environment.(2 marks)

Q4. Full score-Vertical farming, as the soil was contaminated for traditional farming. (2 marks)

Q5. Full credit-In vertical farming the environmental conditions can be controlled so making it possible for growing all kind of plants round the year (2 marks).

Q6.Full score-Vertical farming is the answer, as in this process environmental conditions have been controlled so as to have a good crop.(2marks)

S.no	Q.Type	Competency	Knowledge	Context	Level
1	Close Constructed	Explain phenomena scientifically	Procedural	National	Medium
2	Close constructed	Explain phenomena scientifically	Procedural	Personal	Low
3	Open ended	Explain phenomenon scientifically	Epistemic	Global	Medium
4	Close constructed	Interpret data scientifically	Content	Global	Medium
5	Open ended	Explain phenomenon scientifically	Epistemic	Global	Medium
6	Open ended	Explain phenomenon scientifically	Procedural	National	Medium

RELATIONSHIP BETWEEN TEMPERATURE AND EXERCISE

Area: Living System

Topic: Muscle function/tissues

Class: IX

A student sets up an experiment to study the effect of muscle activity on body temperature. The student decides to use the school gym as the site of the experiment and ensures that the internal temperature of the gym is maintained at 25⁰ C, while the experiment is being conducted. He chooses 5 boys and 5 girl volunteers as participants. He gives the following instructions to the participants and asks them to eat one plate rice and daal 2hrs before beginning the exercise. Then he asks them to run at the same speed on the treadmill for 15mins. After that he measures their body temperature for 8 days and notes them in the table below:

Participants	Gender	Temperature in °F							
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Participant 1	Male	98.6	98.8	98.7	98.8	98.6	98.5	98.7	99
Participant 2	Male	98.8	98.6	98.7	98.8	98.6	98.7	98.8	99
Participant 3	Male	98.7	98.7	98.9	98	98.6	98.7	98.6	99
Participant 4	Male	98.9	98.6	98.8	98.9	98.7	98.9	98.8	98.6
Participant 5	Male	98.5	98.5	98.4	98.6	98.7	98.9	98.7	98.6
Participant 6	Female	99	98.7	98.6	98.5	98.7	98.9	98.7	99
Participant 7	Female	100	100	101	100	99	98	98.6	98.7
Participant 8	Female	98.7	98.7	98.7	98.9	98.7	98.7	98.7	98.6
Participant 9	Female	98.6	99	98.6	98.9	98.6	98.6	98.7	98.6
Participant 10	Female	97	98	98.6	99	98.7	98.6	98.7	98.6

After the experiment the student comes to the following conclusion :

The body temperature of only those females who put in all energy while exercising increases after exercising.

Read the above carefully and answer the following:

(a) Identify the control variables in the above experiment.

.....

(b) What is the main fault in the design followed by the student?

.....

(c) Do you agree with the conclusion made by the student? Give reasons.

.....

Answer Key:

(a) Controls are diet, time before which the food should be eaten, temp of the gym, type of exercise, duration of exercise.

(b) Initial temperature of the body was not taken, Sweating and other factors that help maintain body temperature were not taken into account.

(c) the conclusion seems incorrect as the design of the experiment was faulty hence we cannot be sure of the results/ it might be that the initial body temp of that particular is high in general/ that participant may be suffering from fever.

Scoring:

(a) 0.5 for every correct control identified. 2 scores if any four identified.

(b) 1 scores for any one fault identified in the design. 2 scores if any two identified.

(c) 1 score if disagree. 2 scores if any reason discussed.

Item Description:

Q. No.	Q. Type	Competency	Knowledge	Context	Difficulty level
a	Closed constructed	Evaluate and design scientific enquiry	procedural	global	Medium
b	Open ended	Evaluate and design scientific enquiry	procedural	global	Medium
c	Open ended	Interpret data and evidence scientifically	Epistemic	global	High

IMPROVEMENT IN FOOD RESOURCES

Area-Frontiers Of Science And Technology

Chapter-15

Class IX

(Source <https://en.reset.org/knowledge/india%E2%80%99s-%E2%80%98pink-revolution%E2%80%99>)

India has already seen the ‘green’ and ‘white’ revolutions in its food industry come to pass; it now seems well on its way to realising a ‘pink revolution’ too; the modernisation of meat production processes. Is going pink a health and environmental hazard in the making?



The ‘green revolution’ in India, and across the world, was brought upon by the introduction of high-yielding varieties of seeds, the use of fertilizers, as well as improving irrigation practices. The ‘white revolution’ in India was achieved through ‘Operation Flood’ designed by the late Sh. Verghese Kurien. It marked the world’s largest dairy development program and transformed India from being milk-deficient to being one of the largest producers.

Q1. The green revolution in India was brought by the

- a) Use of fertilizers and pesticides
- b) HYV
- c) Improved irrigation practices.
- d) All of the above.

Q2. The green revolution brought an increase in food production to feed the growing population, but it led to many environmental issues.

- a) Increased soil salinity

- b) Pollution of ground water resources
- c) Killing of useful microorganisms
- d) All of the above.

Q3. The transformation of India from being a milk deficient to largest producer has been possible due to

The Food and Agriculture Organization of the UN (FAO) has now found that India is well on its way to modernizing meat and poultry processing, thus realizing the ‘pink revolution’ too. In a report titled the ‘Indian Meat Industry Perspective’, the FAO outlined four steps that should be taken if India’s food industry is to successfully go pink. These recommended steps were: setting up state of the art meat processing plants; developing technologies to raise male buffalo calves for meat production; increasing the number of farmers rearing buffalo under contractual farming; and establishing disease-free zones for rearing animals.

Q4. The Pink revolution will mean an increased production of

Q5. The four steps recommended by FAO are for Pink revolution to be successful in India are

- a)
- b)
- c)
- d)

India has already become quite rosy and meat production has been steadily growing over the past decade. According to the United States Department of Agriculture (USDA) Foreign Agricultural Service, India became the largest exporter of buffalo meat in 2012, exporting approximately 1.5 million metric tons of beef. The largest importers of Indian meat are primarily countries in the Middle East and South East Asia.

The USDA also found that a record 3.2 million tons of broiler meat (i.e. chicken) had been produced in India last year. The broiler sector has seen a 30 percent growth since 2009 and is among the fastest growing sectors in the Indian economy at a rate of 8 percent. This increase has been largely attributable to growing domestic demands.



Q6. The Indian market has seen an 8% growth in the poultry production. This may be attributed to which factor.

Although the pink revolution has stimulated economic and production gains in India, it is important to also examine what some of the environmental and health risks associated with going 'pink' are. It is important to shed light on some of the often overseen, or plausibly ignored, problems associated with 'state-of-the-art' meat production.

In the wake of climate change, growing livestock production is a global concern. The FAO has estimated that approximately 18 percent of global greenhouse gas emissions come from livestock production. Despite its significant effect on climate change, meat production and consumption, and the food system more generally, is not always included in environmental discussions in India and elsewhere.

Q7. Though pink revolution is helping in the increased economic benefits but it has environmental issues. Justify the statement.

To produce one calorie from animal protein, 11 times as much fossil fuel is required than to produce one calorie from plant protein. Energy is devoured by growing feed, transporting feed, transporting animals, processing animals, packaging meat, transporting meat and keeping meat cold.

The amount of water that is required to irrigate crops, or provide drinking water for animals is also vast. On a global scale, agriculture represents 70 percent of blue water use, water which is taken from surface or groundwater sources. In India, 873 litres is used to produce one kilo of chicken meat, and 1,471 litres of blue water is used to produce beef in industrial systems. One might argue that you save more water by not eating a kilo of meat, than you would by not showering for six months.

Q8. Energy spent to produce meat is more than that of plants, what could be the reason.

Q9. Both production of meat as well as crops require water. Does this mean we stop eating food.

Of concern is not only what goes into producing meat, but also what comes out. The horrors of industrial food animal production facilities are known. Characteristically they confine and concentrate large animal populations in small areas who experience short-lived, poor quality lives. However beyond the ethical considerations of animal welfare, meat production facilities can also pose significant risks to human health and the environment.

The amount of excrement animals produce is far more than humans, yet their waste is even more unlikely to be treated properly. Much of the animal waste produced in the process of turning living animals into meat is used as fertilizer and applied to land, or runs off into streams and other surface water bodies.

Animal waste may be as useful as a fertilizer; however it may also be a serious source of contamination and pollution of groundwater and air. The concentration of parasites, bacteria's and chemical contaminants in animals waste can have drastically detrimental effects on ecosystems, and communities living near waste disposals.

Q10. Under what conditions do the animals live prior to they being used for meat.

Q11. In what way do animal wastes pose health and environmental hazard for humanity.

Answer key/scoring

Q1. Full score-option d (2marks)

Partial score-any other option (1mark)

Q2. Full score-option d (2marks)

Partial score-any other option (1mark)

Q3. Full score- Operation Flood developed by Sh Verghese Kurien (2 marks)

Partial score-any one option (1mark)

Q4. Full score-Meat and Poultry (2 marks)

Partial score-any one option (1mark)

Q5. Full score-all the four options (2marks)

- a) setting up state of the art meat processing plants;
- b) developing technologies to raise male buffalo calves for meat production;
- c) increasing the number of farmers rearing buffalo under contractual farming;
- d) establishing disease-free zones for rearing animals.

Q6. Full score-Answer-The increase has been largely attributable to growing domestic demands.

Q7. Full score- Answer-approximately 18 percent of global greenhouse gas emissions come from livestock production causing major climate change. (2 marks)

Partial score- Answer mentioning greenhouse gases.

Q8. Full score- Answer- Energy is devoured by growing feed, transporting feed, transporting animals, processing animals, packaging meat, transporting meat and keeping meat cold. (2 marks)

Q9. Full Score- Answer -There should be a balance between meat eating population and plant eating population so as to have sustainable development.

Q10. Full score-Answer- Large animal populations confined and concentrated in small areas who experience short-lived, poor quality lives.

Q11. Full Score-Answer-contamination and pollution of groundwater and air. The concentration of parasites, bacteria's and chemical contaminants in animals waste can have drastically detrimental effects on ecosystems, and communities living near waste disposals (2 marks)

Partial Score-Partial answer (1 mark)

S.no	Q.Type	Competency	Knowledge	Context	Level
1	Complex multiple	Interpret data and evidence scientifically	Procedural	National	Low
2	Complex Multiple	Interpret data and evidence scientifically	Procedural	National	Low
3	Close constructed	Explain phenomenon scientifically	Content	National	Low
4	Close constructed	Interpret data scientifically	Content	National	Medium
5	Close constructed	Explain phenomenon scientifically	Procedural	National	medium
6	Close Constructed	Explain phenomenon scientifically	Procedural	National	Low
7	Open ended	Explain phenomenon scientifically	Procedural	National	Medium
8	Open ended	Explain phenomenon scientifically	Procedural	Global	High
9	Open ended	Interpret data and evidence scientifically	Epistemic	Global	High
10	Close constructed	Interpret data and evidence scientifically	Procedural	National	Medium
11	Close constructed	Interpret data and evidence scientifically	Procedural	Global	High

ORGAN DONATION

Area - Health

Topic - Why do we fall ill

Class - IX

No specialist, so 100-plus donated organs wasted every day in Punjab

Chinmera Karwar
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Chandigarh: More than 100 organs salvaged from brain-dead people are wasted daily in hospitals across Punjab for want of proper brain-death certification committee and transplant specialists.

The organ donation committee of the Post Graduate Institute of Medical Education and Research (PGIMER) here has mentioned this in a report to which TOI has exclusive access. The committee was formed recently on the Punjab and Haryana high court orders for implementing the Transplantation of Human Organs Act.

Advocate Ranjan Lakhpal, man behind the petition, said: "Punjab lacks the infrastructure for organ transplant. There is either no brain-death certification committee in the state or its members live too far off from each other to assemble regularly. This wastes the gold-

PROCEDURE FOR BRAIN-DEAD ORGAN DONATION

- 1 A general surgeon or neurosurgeon identifies a potential brain dead person from the ICUs
- 2 Transplant coordinators are informed
- 3 Transplant coordinators do grief counselling of the bereaved family to get its consent
- 4 Consent is documented
- 5 In medico-legal cases, no-objection certificate is taken from police
- 6 Brain-dead certification committee is formed with the treating physician, a neurosurgeon, a medical specialist, and an expert from the hosp administration
- 7 The committee conducts a battery of tests to rule out any survival
- 8 The committee meets again in six hours in case of adult and 12 hours in case of child
- 9 The donor is certified as brain dead and maintained on life support
- 10 Donor is shifted to OT for organ assessment
- 11 The waitlist recipients, five for each donor, are called to submit their samples for match. The best match is taken for transplant

WINDOW FOR ORGAN DONATION

Heart	4-6 hrs
Lung	4-8 hrs
Intestine	6-10 hrs
Liver	12-15 hrs
Pancreas	12-24 hrs
Kidney	24-48 hrs

FACT FILE

8 Lives that a dead person can save, if all the organs are fit for transplant

1.51L Road accident deaths reported in India in 2016, highest in the world, followed by China at 58,022, says a World Health Organisation report

(Source: *Times of India*)

- Severe injury to the brain as a result of trauma or some other medical cause swells the organ and blocks blood supply.
- Without blood flow all brain tissues die.
- Artificial support can sustain heartbeat and breathing for a few days only.
- Brain death is established and legal diagnosis of the end of life.

It is the most common circumstance under which patients donate organs.

(Source: *The Tribune by Sandeep Rana*)

One organ donor can save up to eight lives. Still, thousands die for want of organs. At the heart of the huge gap are lack of awareness and the myths surrounding organ donation. At the Post-Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, one often comes across families of brain-dead patients battling their emotions as they are approached by a team of Regional Organ and Tissue Transplant Organisation (ROTO) for organ donation. A large number of these patients are road accident victims. The demand for organs is high, but the rate of donation is low. Experts say that finding a right match is a task. At times, organs have to be airlifted within a very short period of time. However, the rate of conversion of potential donors into actual donors is quite low. "The key reason behind this is lack of awareness and prevalent myths and misconceptions. So the focus is two-pronged: building an enabling environment through awareness campaigns and counselling and strengthening infrastructure and training of medical fraternity on the clinical front."

As per the available data, about five lakh people die in India for want of organs every year. About 1.50 lakh people await a kidney transplant, but only 5,000 are able to get one. Still, less than one thousand transplants are done in the country each year. Likewise, just 1,000 livers are available against the required 50,000. There are only 15 hearts for donation while there is a huge demand for 50,000 every year. As many as one lakh people need corneas while only 45,000 are available.

Q1. A patient who has undergone severe injury to the brain blocking the blood supply to the Brain tissues and has been on the ventilator for quite sometimes is considered under which category.

- a) Dead
- b) Brain dead
- c) Comatose
- d) Unconscious

Q2. Under what circumstances is organ donation legalised.

Q3. Which organ should be harvested first?

- a) Intestine
- b) Liver
- c) Kidney
- d) Heart

Q4. How many lives can a dead person save?

- a) 10
- b) 5
- c) 8
- d) 7

Q5. Who are the members of Brain dead certification committee.

- a) A physician
- b) A neurosurgeon
- c) A medical specialist
- d) An expert from the hospital administration

Q6. Donating organs is not very prevalent practise in India, what could be the reason for it.

Organ Donation	Agree	Disagree	Strongly agree
It is against our religion			
Law doesn't permit			
Lack of awareness and myths surrounding organ donation			
Lack of infrastructure and organ donation committee			
Emotional trauma of the families of the donor			

Answer Key/Scoring:

Q1. Full score-b) brain dead

Q2.Full score- when the patient is declared brain dead by the experts

Q3. Full score-d) heart (4-6hrs)

Q4. Full score-c) 8

Q5. Full score- All the four options

Partial score-Any one, two or three options (1 mark)

Q6. Statements may be ticked as per the student's choice

Item description:

Q.No	Q.Type	Competency	Knowledge	Context	Difficulty Level
1	Simple multiple choice	Explain phenomenon scientifically	Content	Personal	Low
2	Close constructed	Explain phenomenon scientifically	Procedural	Personal	Low
3	Simple multiple choice	Interpret data and evidence scientifically	Procedural	Personal	Medium
4	Simple multiple choice	Interpret data and evidence scientifically	Procedural	Personal	Medium
5	Complex multiple choice	Interpret data and evidence scientifically	Procedural	Personal	High
6	Open ended	Explain phenomenon scientifically	Content	Personal	Medium

OSMOSIS

Area: Science in Life

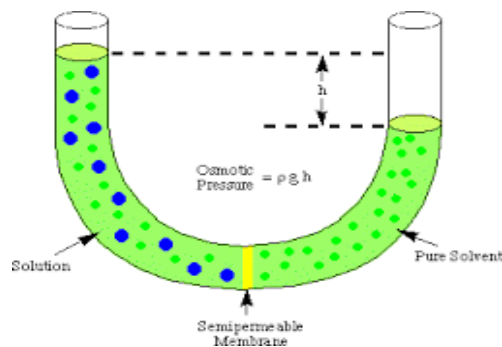
Topic: The Fundamental Unit Of Life

Class: I X

Osmosis is a special kind of diffusion in which movement of water molecules take place from region of its higher concentration to its lower concentration through semipermeable Water molecules are free to pass across the cell membrane in both directions, either in or out.

Q1 .In the following figure the level of pure solvent has decreased in one of the arms of U -tube and level of solution in other arm has increased. Name the phenomenon which is responsible for this and give the reason also.

Competency level: Explain the phenomenon scientifically



Q2. In the following table the nature of liquid outside and inside the plant cell is mentioned

What will be the direction of movement of water in each case: outside to inside, inside to outside or no movement ?

S.No	Liquid outside	Liquid inside	Water movement
1	water	10% sucrose	
2	10% sucrose	water	
3	water	water	
4	10% sucrose	10 %sucrose	

Competency level: Explain the phenomenon scientifically

Q3 Which of the following examples are supported by osmosis. Circle Yes or No in each case

- a) When salt is poured onto a slug water diffuses and slug shrinks Yes /No
- b) If you are there in a bath tub or in water for long your finger gets pruned i.e finger skin absorbs water and gets expanded. Yes /No
- c) After digestion the nutrients are absorbed into the intestine

and individual cells.

Yes/No

d) When throat is sore ,gargles with salt water gives relief .

Yes/No

Competency Level: scientific investigation

Answer/Scoring Key

1. Partial score(1) Osmosis

Reason : . Partial score (1) water has moved from right arm of U tube to left arm that contains concentrated solution through semipermeable membrane

Full score (2) Both osmosis and reason are correct

2.

.S.No	Liquid outside	Liquid inside	Water moves
1	water	10% sucrose	Outside to inside
2	10% sucrose	water	Inside to outside
3	water	water	No movement
4	10% sucrose	10 % sucrose	No movement

Partial score (1) If 1 and 2 are correct , Partial score (1) 3 and 4 are correct

Full score (2) All correct

3. Full score (2) Yes, Yes ,Yes ,Yes

Any other response score (0)

LEAD A SILENT KILLER

Area : Health/Environment

Topic: Natural Resources

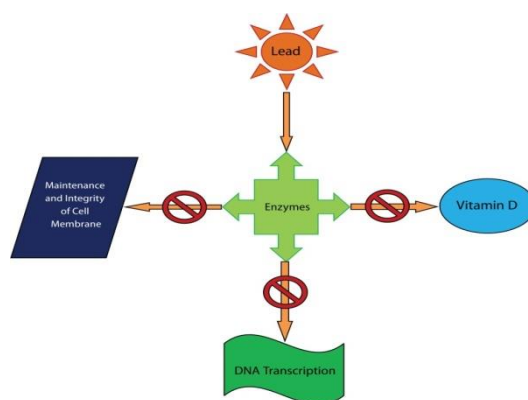
Class: IX

Lead is one of the toxic elements that contaminates the environment and also enters the human body. Long term build up of lead in the body could be fatal. Even though unleaded petrol is in vogue these days, it is reported lead is still used as an additive in certain types of fuels. An important source of lead in the environment is lead acid battery recycling facilities.

Lead can easily enter our body through the mouth, nose and eyes via the mucus membranes and also through skin. Tetra ethylate lead can easily enter through the skin while inorganic lead (present in food, paint and consumer items) is not easily absorbed through the skin. An important reason for lead toxicity is because it interferes with many enzymes. It gets bound to enzymes in lieu of other metals like calcium, iron and zinc. One such enzyme is responsible for synthesis of heme. Lead exposure damages cells responsible for memory. The WHO standard for lead in drinking water is 0.01mg/L. However, how far the standards are being implemented and monitored is an issue of concern.

Q1. People living in urban areas are much more at a risk of lead poisoning. Do you agree or disagree with the statement. Support your answer with three reasons.

Q2. The following illustration shows the interference of lead with the working of certain enzymes. List the processes that will be inhibited by lead absorption in the body



Q3. Tetra ethylate lead can easily enter through the skin while inorganic lead from various sources cannot enter through skin. There are two main processes by which inorganic lead is absorbed in our body.

Select the correct option from the following:

- a) ingestion and inhalation
- b) inhalation and digestion
- c) ingestion and digestion
- d) ingestion and respiration

Q4. One of the diseases in which the children are most affected is caused due to lead poisoning and it leads to impaired synthesis of heme, hemolysis of RBC (rupturing of RBC), shortened red cell survival. Name the disease.

Q5.The mineral whose role for bones and teeth is well known also effects processes such as learning and memory.(a) Identify the mineral (b) How does lead poisoning hampers the memorizing power?

Q6.Some of the following can be precautionary measures to protect the people from lead poisoning. Encircle yes or no against each statement

(a)	By using TEL petrol in automobiles.	Yes/No
(b)	Identifying the sources of lead in the environment and devise means to remove them.	Yes/No
(c)	Awareness among health officials about lead poisoning and treatment processes.	Yes/No
(d)	Screening of vulnerable population.	Yes/No

Answer key/Scoring

Ans 1.Agree

- a) leaded petrol in automobiles
- b) lead present in batteries used in homes/vehicles
- c) lead present in canned food /food /paints/ water pipes/toys/crystal glass ware/consumer items

For agreeing no score . Any two reasons score (1) .All 3 reasons score (2)

Ans 2

- 1) DNA transcription
- 2) maintenance and integrity of cell membrane
- 3) Vitamin synthesis

For all three points Score (2.) full credit. Any one point missing no credit

Ans 3. (a) ingestion and inhalation *score (2) full credit*

Ans4. Anemia *score (2) full credit*

Ans5. (a) Calcium *score (1)*

(b) Lead substitutes calcium and damage cells responsible for memory . *score (1)*

(a) and (b) both correct *score (2) full credit*

Ans 6 a) No b) Yes c) Yes d) Yes

If this sequence score (2) full credit

Item description:

Q.No.	Q.Type	Competency	Knowledge Type	Context	Level
1	Closed constructed	Scientific evidence	content	Health/ Environment	low
2	Closed constructed	Scientific evidence	content	Health/ Environment	low
3	Simple Multiple Choice	Explaining scientific phenomena	content	Health/ Environment	medium
4	Closed Constructed	Applying scientific knowledge	?	Health/ Environment	medium
5	Closed Constructed	Scientific evidence	content	Health/ Environment	medium
6	Multiple Choice	Scientific issues	?	Health/ Environment	medium

CLASSIFICATION AND EVOLUTION

Area: Natural Resources

Topic: Diversity

Class: IX

Organizing the living organisms into groups according to a certain set of characteristics is called classification.

The features belonging to a particular organism is called characteristics.

We need classification due to following reasons:

- It is not possible to study about each existing living organism in details.
- Classifying organisms into groups makes it easier to know about the different life forms.
- It helps us to understand the evolution of all life forms to a large extent.
- It also forms the basis for the giving scientific names to the living organisms in order to universalize their names so that people around the world can recognize the organism irrespective of their local word for the organisms.

Q1. What is the criteria of classification?

- Similarity of characters
- Differences of characters
- Both of these.

Q2. Classification helps to

- Study evolution
- Grouping organisms
- Giving scientific names to organisms
- All the above

Q3. Evolution is an ongoing process. Explain it.

Q4. State whether the following statement is true or not (Answer in Yes/No)

- Classification is based on similarities among the organisms (Yes/No)
- Every organism is distinct from other so there is no need to classify them (Yes/No)
- Diversity gives stability to biosphere (Yes/no)
- Evolution is the result of various processes happened in the past (Yes/No)
- Scientific names are must for all discovered organisms as they make the communication easy at International level (Yes/No)

Answer/Scoring Key: 1.c Full credit >2 ,any one of a or b >1partial credit

2. d full credit>2 ,any two of a,b,c partial credit >1, any one option of a,b,c >0

3 full credit> 2 for appropriate explanation

4. a,c,d,e are all yes, b is no.

Item description:

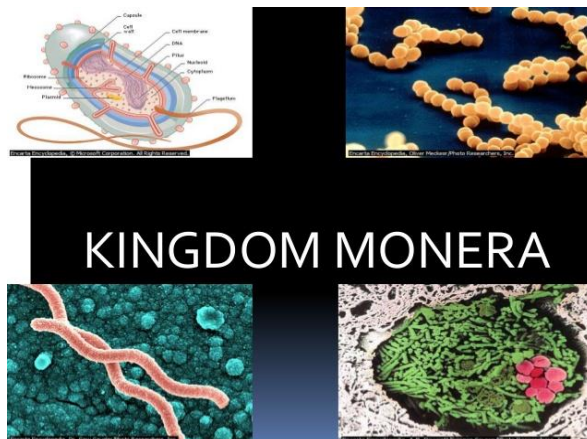
Q. No	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Simple Multiple	Scientific Enquiry	Content	Global	Low
2	Simple Multiple	Scientific Enquiry	Content	Global	Low
3	Open ended	Scientific Enquiry	Content	Global	Medium
4	Open Ended	Interpret Data	Content	Global	High

MONERA

Area: Natural Resources

Topic: Diversity

Class: IX



Q1. What are the criteria for five kingdom classification?

- a) cell type b) mode of nutrition c) unicellular/multicellular d) all the above

Q2. How are prokaryotes different from eukaryotes?

Q3. Various forms of bacteria found under Archaeobacteria?

- a) Halophiles b) thermoacidophiles c) Methanogens d) All the above

Q4. What are the various modes of nutrition in bacteria?

- a) Autotrophic b) Heterotrophic c) Chemoautotrophic d) All the above

Q5. State whether the following statements are true or false:

- a) A well defined nucleus is present in the bacteria.
b) Some bacteria can survive at very high temp. And highly acidic conditions.
c) Mode of nutrition is not considered during Whittaker's system of classification.
d) Bacteria are both friends and foes.
e) Monera is the most advanced group with 80s ribosome's.

Answer Key:- 1.d) full credit >2, any one from a,b,c partial credit >1

2. Nucleoid / Well defined nucleus

No membrane bound organelles / Membrane bound organelles present

Full credit >2 for both the points, Partial credit > 1 for any one point

3.d Full credit > 2, Partial credit Any two of a,b,c > 1

4.d.) Full credit >2, Partial credit > 1 for any two of a,b,c

5. a,c, e are false, b,d are true

Item description:

Q. No	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Simple Multiple	Scientific Enquiry	Content	Global	Low
2	Open ended	Scientific Enquiry	Content	Global	Medium
3	complex Multiple	Scientific Enquiry	Content	Global	Medium
4	Simple Multiple	Scientific Enquiry	Content	Global	Medium
5	Open-Ended	Interpret Data	Epistemic	Global	High

FUNGI

Area: Natural Resources

Topic: Diversity

Class: IX



- Q1. What characteristics separate the fungi from plantae?
a) Saprotrophic nutrition b) Colorless c) Reproduction by spores d) All the above .
- Q2. What special mode of nutrition is present in fungi?
a) Autotrophic b) Holozoic c) Myxotrophic d) Saprotrophic
- Q3. Organisms belonging to fungi have a diverse type of organisms
a) Unicellular b) Multicellular c) Filamentous d) Coenocytic e) All of them
- Q4. Dikaryon stage is present in which of the following
a) Mushrooms b) Bread mould c) Penicillium d) Yeast
- Q5. Do you agree/disagree with the following statements:
a) Some of the fungi are edible.
b) Fungi show saprotrophic nutrition i.e. extracellular digestion.
c) All members of the fungi are multicellular.
d) Classification of fungi is based on the mode of reproduction.
e) Coenocytic mycelium is present in bread mould.

Answer key:-

- 1) d) All the above (full credit) >2, Any two partial credit >1, Any one >0
2) d) full credit >2, Any other >0
3) e) All of them >2, Any one a, b, c, d. partial credit >1
4) a) Mushroom full credit >2,
5 a, b, d, e Agree , c) Disagree

Item Description:

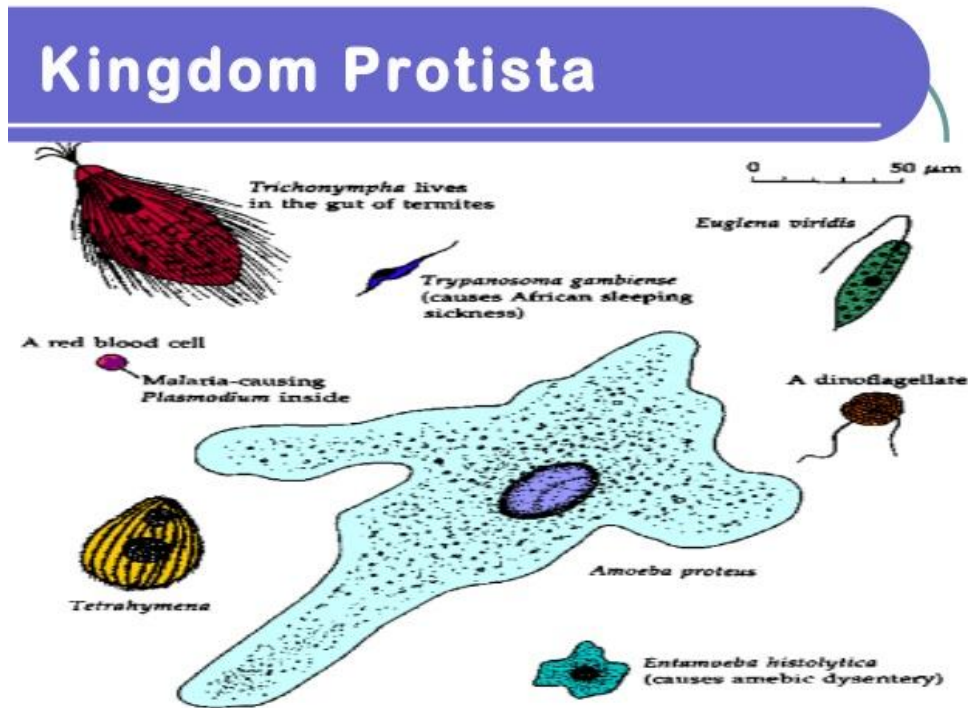
Q. No	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Simple Multiple	Scientific Enquiry	Content	Global	Low
2	Simple Multiple	Scientific Enquiry	Content	Global	Low
3	Simple Multiple	Scientific Enquiry	Content	Global	Medium
4	Simple Multiple	Scientific Enquiry	Content	Global	Medium
5	Open-Ended	Interpret Data	Epistemic	Global	High

PROTISTA

Area: Natural resources

Topic: Diversity in living organisms

Class: IX



Q1. Name the group of organisms having all unicellular eukaryotes?

- a) Monera b) Protista c) Fungi d) Algae

Q2. Name the various modes of locomotion in Protists?

- a) Flagella b) Cilia c) Pseudopodia d) All the above

Q3. Which organism is responsible for African sleeping sickness?

- a) Amoeba b) Euglena c) Trypanosoma d) Plasmodium

b) Name the member of the group show myxotrophic nutrition.

- a) Dinoflagellate b) Diatoms c) Euglena d) None of the above

c) Justify the following statements :-

- a) Euglena shows myxotrophic nutrition.
b) Paramecium has two nuclei.
c) Plasmodium completes its life cycle in two hosts.
d) Some members of the group are a-cellular.

Answer/Scoring Key:- 1).b 2) d 3) c 4) c 5) a) Yes b) Yes c) Yes d) Yes

Item Description:

Q. No	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Simple Multiple	Scientific Enquiry	Content	Global	Low
2	Simple Multiple	Scientific Enquiry	Content	Global	Low
3	Simple Multiple	Scientific Enquiry	Content	Global	Medium
4	Simple Multiple	Scientific Enquiry	Content	Global	Medium
5	Open-Ended	Interpret Data	Epistemic	Global	High

CLASS X

HEREDITARY AND VARIATION

Area: Natural resources

Topic: Analogous and Homologous Organs

Class: X

Evolution and classification

Both evolution and classification are interlinked.

1. Classification of species is reflection of their evolutionary relationship.
2. The more characteristic two species have in common the more closely they are related.
3. The more closely they are related, the more recently they have a common ancestor.
4. Similarities among organisms allow us to group them together and to study their characteristic

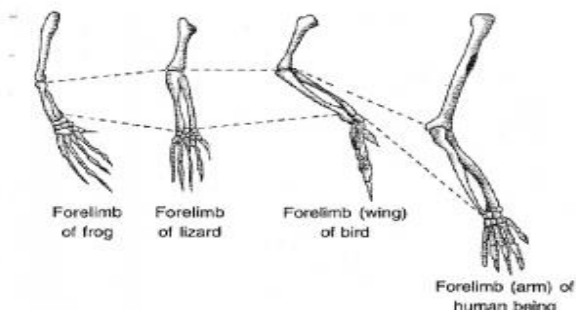


Fig. 5.9 Homologous organs of some vertebrates



(a) Wing of bird
(b) Wing of insect
Fig. Analogous organ of flying birds

Source: NCERT book

Q1. How the forelimbs of a frog and the wings of a bird are related to each other?

- a. Homologous organ b. Analogous organ c. Both d. None

Q2. Give two examples of animals showing analogous organs

Q3. Organs having same structure, but performing different functions are

- a. Analogous organ b. homologous organs c. vestigial organ

Q4. Tick the correct statement

- a) Wings of a bird and a bat are analogous
- b) Potato and the sweet potato are homologous.
- c) Potato and ginger are homologous organs
- d) Forearm of a man and a frog are analogous organs.
- e) Thorn of a lemon and tendril of a cucurbit are analogous.

Q5. What inference do we draw from the Homologous and the Analogous organs?

Answer/Scoring key::

- 1) a 2) Wing of an insect and a bird 3) b 4) c 5) Open-Ended

Item Description:

Q. No	Q. Type	Competency	Knowledge	Context	Difficulty Level
1	Simple Multiple	Scientific Enquiry	Content	Global	Low
2	Simple	Scientific	Content	Global	Low

	Multiple	Enquiry			
3	Simple Multiple	Scientific Enquiry	Content	Global	Medium
4	Simple Multiple	Scientific Enquiry	Content	Global	Medium
5	Open-Ended	Interpret Data	Epistemic	Global	High

ENVIRONMENT-I

Area:

Topic- Causes of Biodiversity Losses

Class-X

(source -Times of india)



Environmental pollution is the key concern for the humanity. It does not have any borders- each member of our planet is affected by its devastating effects. Air pollution is the main factor contributing to general environmental problems. It is the emission of particulates, harmful materials and biological molecules into Earth's atmosphere and is carried out both by human and natural factors. It causes numerous diseases to humans, plants and animals.

Q1. Your city's air quality is deteriorating due to some man made and natural causes. What do you think are the main causes.

- Vehicular emissions
- Smoke from the factories
- Burning of the fossil fuels
- Less rainfall

Q2. What are the strategies that can be employed to counter the pollution in our cities.

- Use of cleaner fuel
- Plant more trees
- Car Pool
- Use of coal and petroleum

Q3. Use of cleaner fuel would help in reducing air pollution. Which fuel will you suggest and how will it help in reducing pollution.

Q4. Sustainable development is the need of the hour. Suggest ways to have development without compromising on environment quality.

Q5. Can an individual be instrumental in bringing the change.

Answer Key/Scoring

Q1. Full score-option a, b and c (2 marks)

Partial score a and b/b and c/a and c or only a/b/c (1 mark)

No score-d (0 marks)

Q2. Full score-option a,b,c (2 marks)

Partial Score-any one or two options (1 mark)

No score-option d (0 marks)

Q3. Full score-CNG/Electricity or solar powered

No score- Petrol/diesel

Q4. Full score-development accompanied by environment friendly practices

-Tree plantation/using eco- friendly products which are biodegradable etc.

Q5. Yes- the change begins from an individual which leads to bigger change.

Q.No	Q Type	Competency	Knowledge	Context	Difficulty level
1	Complex multiple	Evaluate and design scientific enquiry	Content	Local	low
2	Complex multiple	Evaluate and design scientific enquiry	Epistemic	Global	Medium
3	Close constructed	Evaluate and design scientific enquiry	Procedural	Global	Medium
4	Open ended	Evaluate and design scientific enquiry	Epistemic	Global	Medium
5	Open ended	Evaluate and design scientific enquiry	Procedural	Local	Medium

ENVIRONMENT-II

Area:

Topic- Causes of Biodiversity Losses

Class-X



Habitat loss and fragmentation is the most important cause of driving animals and plants to extinction. The most dramatic example comes from tropical rain forests. Once covering 14% of the earth's land surface is now no more than 6%. The Amazon rain forests also known as the lungs of the planet are being cleared for cultivating soya bean or grasslands for raising beef cattle thus destroying millions of species.

- Q1. A young leopard was killed in a road accident resulting in the loss of a precious endangered animal. Why do you think the leopard reached the highway.
- Q2. Killing of a carnivore results in disturbing the food chain thus creating instability in the ecosystem. What could be the possible reasons for it.
- Q3. Amazon rain forests support the entire planet but are now in danger of becoming extinct, the reason for this maybe?
- Q4. Soyabean crop and grasslands are also plants but their plantation is endangering the amazon rain forests. What could be the possible reason for it.

Answer /Scoring key

Q1. Full score-Due to habitat loss/ Fragmentation of its habitat/ Deforestation(2marks)

Q2.Fullscore- Loss of carnivores will result in the increase in the prey population which if left unchecked would result in unbalancing the food chain.(2marks)

Q3. Full score- the forests are being cut for the cultivation of soyabean and grasslands for beef. (2 marks)

Partial score- only for cultivation of soyabean/ grassland (1 mark)

Q4. Full score- clearing of forests for the cultivation of soyabean or grasslands will result in

loss of species diversity, thus effecting the stability of the ecosystem.(2 marks)

Item Description:

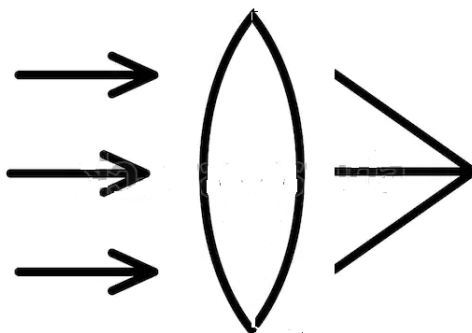
Q.No	Q Type	Competency	Knowledge	Context	Difficulty level
1	Close constructed	Explain phenomenon scientifically	Content	Local	Medium
2	Open ended	Evaluate and design scientific enquiry	Content	National	Medium
3	Close constructed	Evaluate and design scientific enquiry	Procedural	Global	Medium
4	Open ended	Evaluate and design scientific enquiry	Procedural	Global	Medium

MOVIE PROJECTOR ANALOGUE OF HUMAN EYE

Area: Frontier Science And Technology

Topic: Human Eye

Class: X



This is very interesting that working of few parts of many manmade machines have analogy with functioning of human body organs. Like in computer CPU works like a braining human body, both processes information and give out put in form of a new processed information. Same way image formation by human eyes has similar mechanism as movie projector has .In our eyes light enters the pupil, and strikes the eye lens. The lens placed behind the iris and is transparent. The lens' function is to focus light rays on the back of the eyeball— this part is called the **retina, image is formed on retina which is further transmitted to the brain through optical nerves.**

Similarly the lens of projector works much like the lens of a movie projector at the movies. In a theatre you must have seen behind you the beam of light coming from the projection booth. This light pass through a powerful lens, which focus the images onto the screen, and you can see the movie clearly.

Your retina is in the very back of the eye. It has millions of cells that are sensitive to light, colour and size. The retina absorbs the light and changes it into nerve signals so the brain can understand what the eye is seeing.

Q. 1 Which of the following phenomenon of light is responsible for image formation in movie projector and eye lens

- a) Refraction, Refraction
- b) Refraction, Reflection
- c) Reflection , Refraction
- b) Reflection , Reflection

Q. 2 Give answers in yes or no

- a) In both movie projector and eye, image formed is inverted Yes/ No
- b) In both movie projector and eye , image formed is real Yes/No
- c) In movie projector image formed is real and in eye it is virtual Yes/No
- d) In eye image formed is inverted and in movie projector it is real Yes/No

Q. 3 “ If image is not formed at retina then person will not be able to see object clearly “ Comment

Answer Key/scoring:

Q.No. 1 a

Q.No 2 Yes, Yes, No, Yes

Q.No 3 Descriptive

Q.No. 1 Score 2 for correct response, Score 0 for any other response

Q.No 2 Score 2 for correct response, Score 0 for any other response for each part

Q.No. 3 Yes, person will not be able to see objects clearly, image will be formed either before retina or behind retina, in both the cases person will have eye defect. This eye defect can be removed by using specs of suitable power.

Score 2 for to the point explanation, Score 1 for partially correct answer and score 0 for irrelevant explanation.

Item description:

Q.No.	Q.Type	Competency	Knowledge	Context	Difficulty Level
1	MCQ	Explain Phenomena Scientifically	Content	Personal	M
2	Closed Ended	Interpret Data and evidence Scientifically	Epistemic	Personal	H
3	Open Ended	Interpret Data and evidence Scientifically	Epistemic	Personal	M

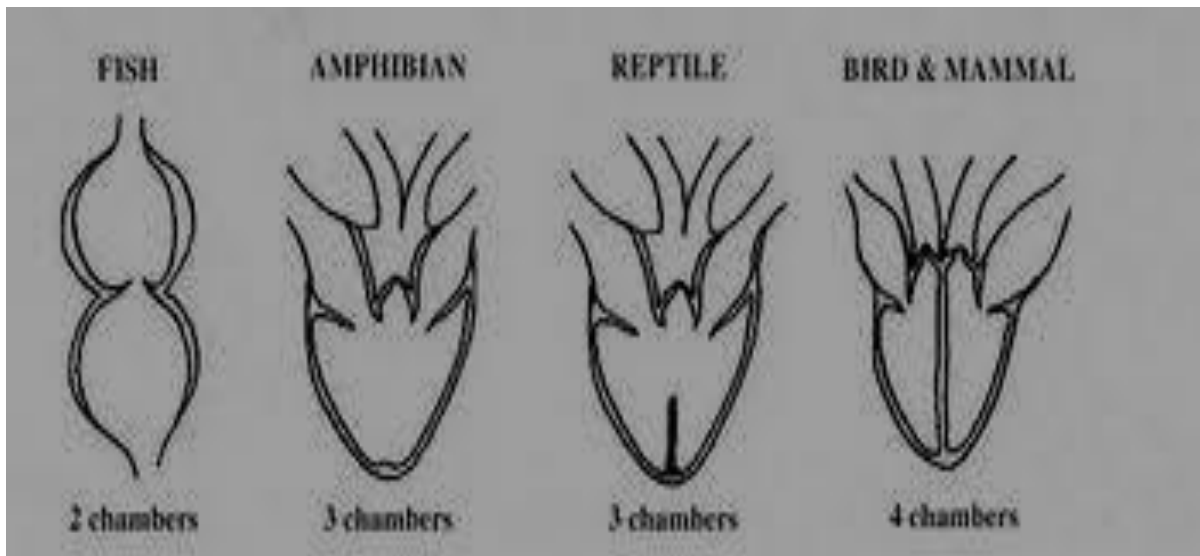
ANATOMY OF VERTEBRATES HEART

Area : Science in Life

Topic: Life Processes

Class: X

Study the following figures showing the anatomy of Vertebrates Heart with progressive complexity and answer the questions given below



Q1. Do you agree with the statement that mixing of oxygenated and deoxygenated blood occurs in the above figure/s? Select the correct option and justify

- a) Fish, bird, mammal
- b) Amphibian, bird, fish
- c) Reptile, amphibian, fish
- d) None of the above

Q2. No mixing of oxygenated and deoxygenated blood occurs in one of the above figures. Do you agree?

Identify the figure and give suitable reason to your answer.

Q3 All the animals in one of the above groups have incompletely divided ventricles but only one has completely divided right and left ventricles. Select the suitable reason with explanation from the following table and also name the animal

Reason	Explanation
They spend most of the time in water	When submerged in water heart beat slows down to 1 or 2 beats a minute and blood flow to muscles is decreased and save oxygen
They spend most of the time on land	On land heartbeat is very slow to save oxygen
They spend equal time in water and on land	Heart beat rate remains the same

Q4 Fish has one auricle and one ventricle so blood goes only once through the heart during one cycle whereas in mammals there are two auricles and two ventricles so blood goes through the

heart twice during each cycle. Identify the type of circulation in fish and mammals and match with the suitable option against it

a) Fish

- i) Single circulation : Pressure of blood is not maintained and doesn't reach the organs faster
- ii) Double circulation : Pressure of blood is not maintained and doesn't reach the organs faster
- iii) Single circulation : Pressure of blood is high and reaches the organs fast
- iv) Single circulation : Pressure of blood is not maintained and reaches the organs fast

b) Mammals

- i) Double circulation : Pressure of blood is maintained and oxygenated blood reaches the organs much slower
- ii) Single circulation : Pressure of blood is not maintained and oxygenated blood reaches the organs much slower
- ii) Double circulation : Pressure of blood is not maintained and oxygenated blood reaches the organs much faster
- iv)) Double circulation : Pressure of blood is maintained and oxygenated blood reaches the organs much faster

Answer key/Scoring:

Ans 1 .(c) for correct option *score (1)*

Justification:

Fish has 1 auricle and 1 ventricle

Amphibians have 2 auricles and 1 ventricle

Reptiles have 2 auricles and incompletely divided ventricle

If all the above justifications are correct then *score(1)*

If option and all the justification are correct then *score (2) full ccredit*

Ans 2 . Yes .Birds and mammals 2 auricles and 2 ventricles all are separated

Only Yes no credit

Birds and mammals Score (1)

2 auricle and 2 ventricles all the four chambers are separated Score (1)

Birds and mammals , 2 auricles and 2 ventricles all are separated Score (2) full credit

Ans 3. a) *score(1)*

Animal : Crocodile *score (1)*

If option (a) and name of animal correct *Score(2) full credit*

Ans 4. (a) Fish (i) *score (1)*

(b) mammal (iv) *score (1)*

If both (a) and (b) are correct then score (2) full credit

From RITU BHAVAN cHANDIGARH

Item description:

Q.No.	Q.Type	Competency	Knowledge	Context	Difficulty Level
1	Simple multiple choice	Interpreting diagram	Procedural	cience in life an Health	Medium
2	losed constructe response	Interpreting diagram	Procedural	cience in life an Health	Medium
3	losed constructe Response and Multiple choic	Explaining scientific phenomena	Content	cience in life an Health	Medium
4	Multiple choice	Explaining scientific phenomena	Content	cience in life an Health	Low

PHYSICAL EXERCISE

Area: Health

Topic: Life Processes

Class: X

Jessy and Jones are teenagers and both read an article saying that in order to stay healthy, one should do 30 minutes moderate exercise 5 days a week. During physical exercise two important organs of the body come into action: the heart and the lungs.



Jessy and Jones both got motivated and started going to park in the morning for exercise. Jessy started jogging at a steady pace .Jones not only jogged but at intervals started running fast also.

Q1. During exercise some changes occur in our body and different types of exercise bring about different changes.

Circle 'yes' or 'no' in each of the following statements.

	Jessy Yes or No	Jones Yes or
No		
Heart rate will increase	Yes / No	Yes / No
Breathing rate will increase	Yes / No	Yes / No
Aerobic respiration will take place	Yes / No	Yes / No
Anaerobic respiration will take place	Yes / No	Yes / No
Blood flow to the muscles will increase	Yes / No	Yes / No

Q.2 Fill in the following blank and identify the type of respiration



Q.3 The demon lactic acid that dread substance turns your legs into cement blocks . To get relief from this pain we should do one of the following treatments.

Two of the following options are correct.

Select the two options giving suitable reasons.

- a) Hot water bath b) Cold water bath c) Massage

Q.4.Two types of respiration can take place in your body during exercise – aerobic and anaerobic. Circle 'yes' or 'no' for each of the following statements.

Respiration	Anaerobic Respiration	
Aerobic		
Respiration that involves oxygen	Yes / No	Yes /
No		
Respiration that produces lots of energy	Yes / No	Yes /
No		
Respiration that leads to a build up of lactic acid	Yes / No	Yes /
No		

Q.5 Lactic acid produced during intense exercise is poisonous if it builds up in the body it must be broken down quickly.

Which organ is responsible for breaking down the lactic acid ?

- A) Lungs B) Heart C) Liver D) Kidneys

Q.6 Which of the following nutrients is used to supply the body with glucose ?

- A) Proteins B) Vitamins C) Fats D) Carbohydrates

Q.7 Which chemicals are responsible for breaking down the food we eat during the process of digestion ?

- A) Hormones B) Acetylcholine C) Enzymes D) Plasma

Answer key/Scoring

Ans1. Jessy. yes ,yes ,yes ,no, yes. If this order is correct score (1)

Jones : yes, yes ,yes, yes anaerobic will occur when jones did intense running, yes. If this order is correct score (1)

If both orders are correct score (2) full credit

Ans2. Oxygen score (2) full credit

Ans3. (a) Hot bath and (b) massage.

Both options are correct then score(1)

Reason:

i) Hot bath and massage both increase blood circulation.

ii) Increased blood circulation improves the supply of oxygen and lactic acid breaks down into carbon dioxide and water and gives the relief from pain in legs.

If both (i) and (ii) reasons are correct score (1)

If both options and reasons are correct score(2) full credit

Ans4. Anaerobic respiration .No, No, Yes

Aerobic respiration. Yes, Yes, No.

If both orders are correct score (2)

Ans 5. Liver score(2)

Ans6 Carbohydrates score (2)

Ans 7.Enzymes score (2)

Item description :

Q.No.	Q.Type	Competency	Knowledge Type	Context	Difficulty level
1	Multiple Choices	Explain phenomena scientifically	content	Health	Medium
2	Closed constructed response	Explain phenomena scientifically	content	Health	Low
3	Complex multiple choice	Explain phenomena scientifically	content	Health	High
4	Complex Multiple choice	Explain phenomena scientifically	content	Health	Medium
5	Simple Multiple choice	Explain phenomena scientifically	content	Health	Medium
6	Simple Multiple choice	Explain phenomena scientifically	content	Health	Low
7	Simple Multiple choice	Explain phenomena scientifically	content	Health	Low