CBSE

Class IX Science

Sample Paper – 6

Time: 3 hrs. **Total Marks: 80**

General Instructions:

- The question paper comprises five sections – A, B, C, D and E. You are to attempt all the sections.
- All questions are compulsory.
- Internal choice is given in sections B, C, D and E.
- Question numbers 1 and 2 in Section A are one mark questions. They are to be answered in one word or in one sentence.
- Question numbers 3 to 5 in Section B are two marks questions. These are to be answered in about 30 words each.
- Question numbers 6 to 15 in Section C are three marks questions. These are to be answered in about 50 words each.
- Question numbers 16 to 21 in Section D are five marks questions. These are to be answered in about 70 words each.
- Question numbers 22 to 27 in Section E are based on practical skills. Each question is a two marks question. These are to be answered in brief.

Section A

1. Name two processes involved in the formation of soil. (1)

2. List two initiatives taken to increase the availability of water for agriculture. (1)

Section B

3. List the properties of suspension and give examples. (2)

OR

Name the gas which is added during the purification of water. Why is it called a disinfectant?

4. Disha performed an experiment in which she kept the cells of onion peel and RBCs separately in a hypotonic solution. What would happen to both these types of cells? (2)

5. A weight of the box on the Earth is 200 N. What will be its mass on the Moon? (2)
($g = 10\ m/s^2$)

Section C

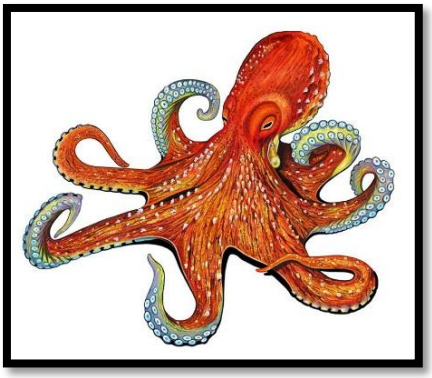
6. Answer the following: (3)

(a) Define velocity. Give the SI unit of velocity.

(b) Define non-uniform acceleration.

(c) Give the formula of average velocity.

7. Identify the organism. Name the phylum to which this organism belongs. Write any two characteristic features of this phylum. (3)



8. (3)

(a) In which direction of the bus will passengers move when the bus starts suddenly from its rest position? Give explanation.

(b) A boy is riding a cycle on a circular track. Is he exhibiting accelerated motion? Give reason for your answer.

9. How many moles of Cr are present in 85 g of Cr_2S_3? (3)
(Cr = 52, S = 32)

OR

(a) Calculate the formula unit mass of $CaCO_3$.
(Given, Ca = 40 u, C = 12 u and O = 16 u)

(b) Calculate the mass of 10 moles of carbon dioxide.

(c) How many atoms are present in 100 a.m.u. of helium if the atomic mass of helium is 4 a.m.u.?

10. Rahul observed that his friend Anil was behaving differently for the past one week. He used to get tired easily and sat on the bench after playing for 5–10 minutes. His eyes were yellow pale and he complained of nausea and vomiting. Rahul advised him to visit the doctor. (3)

(a) Symptoms of which disease are reflected in Anil's situation?

(b) Which causative organism is responsible for the disease?

(c) Which values are depicted by Rahul?

11. A bullet of mass 15 g is fired from a gun of mass 5 kg with a velocity of 500 m/s. Calculate the recoil velocity of the gun. Also explain what you mean by recoil velocity. (3)

OR

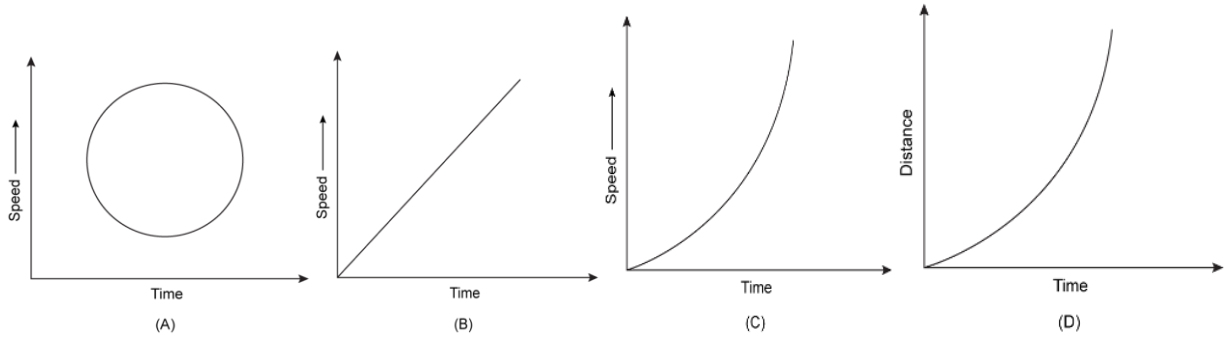
Which graph represents the following cases?

(a) Driving a car on a crowded street

(b) Ball dropped from the top of a building

(c) Incorrect graphical representation

Give reason for each case.



12. Farmers use pesticides to control weeds and insects. Chemicals which are used to eliminate weeds and insects have harmful effects on the environment. (3)

(a) What are the harmful effects of pesticides on the environment?

(b) Should farmers use pesticides to protect their crops from weeds and insects? Suggest an alternative to pesticides.

OR

State the management practices followed in a livestock firm to ensure healthy and productive livestock population. (3)

13. Give reason: (3)

(i) A large part of the atom is neglected when calculating the mass of the atom.

(ii) Atoms combine with each other.

14. How will you differentiate between squamous, cuboidal and columnar epithelia under the microscope, if slides of each of these are individually prepared? (3)

15. 'We can easily move our hand in the air but not through any solid material'.
Justify the statement. (3)

Section D

16. (5)

(a) Define kinetic energy. Give its formula.

(b) What is potential energy? Give its formula.

(c) State which energy the following cases represent:

(i) A book kept on a table

(ii) A ball rolling down the hill

(iii) A ball which has reached the bottom of a hill

(iv) A stone released through a stretched string

OR

a) Two bodies of equal masses move with uniform velocities v and 4v, respectively. Find the ratio of their kinetic energies.

b) Write an expression for work done in raising a load of mass 'm' at height 'h'.

17. Answer the following: (5)

(a) Why is solid carbon dioxide called dry ice? Give its uses.

(b) Why is dry ice more effective for cooling purposes than ordinary ice?

(c) Why is dry ice stored under high pressure?

18. (5)

(a) Draw a neat and labelled diagram of the nitrogen cycle in nature.

(b) Describe in brief the role of nitrogen-fixing bacteria and lightning in atmospheric nitrogen fixation.

OR

(c) Draw a neat and labelled diagram of the carbon cycle in nature.

(d) What is the greenhouse effect? How does carbon dioxide cause global warming in the atmosphere?

19. Briefly describe how to separate a mixture of (5)

(a) Fine mud particles suspended in water

(b) Tea leaves and tea

(c) Butter and curd

(d) Camphor and salt

(e) Common salt and water

OR

(a) What is the basic difference between a physical and chemical change?
Classify the following into a physical or chemical change:
Freezing of water
Mixing of iron filings and sand
Fading of clothes
Spoiling of food

(b) Explain how during the burning of a candle, both physical and chemical changes take place.

20. (5)

(a) A weed is growing among the hedges which border your school playground. How will you identify whether it is a monocot or a dicot?

(b) Why is the coelom absent in diploblastic organisms?

21. (5)

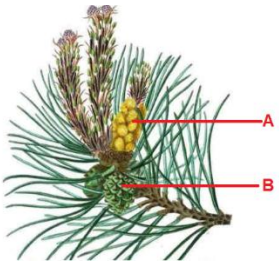
(a) A football and a tennis ball are dropped from a certain height. Which ball will reach the ground faster? Give reason for your answer.

(b) An iron nail sinks, but a ship made of iron and steel does not. Why?

(c) Bricks of different volumes are dropped in water. What will be experienced by the two bricks? What amount of water will be displaced by the bricks?

Section E

22. Observe the figure carefully. (2)



(a) Which structures are marked A and B in the given figure?

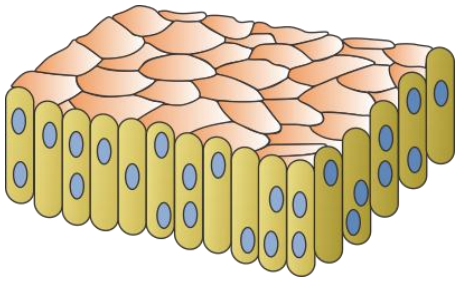
(b) What is the distinguishing feature of this group of plants?

OR

(a) Dinesh observed the specimen of an earthworm in the school laboratory and noted its features. What is the first segment of the body of an earthworm called?

(b) To which phylum does earthworm belong?

23. The given figure represents a tissue found in the human body. (2)



(a) Identify the tissue and state its function.

(b) Mention any two locations where this tissue is found in the body.

24. On which principle is the working of a stethoscope based? State a one-word term for the text 'hall giving many echoes when sound is incident on its ceiling or wall'. (2)

25. There are two nails A and B. Nail A is sharp and nail B is blunt. The area of nail A is 0.1 m^2 and that of nail B is 1.5 m^2. These nails are to be hammered into a wooden plank. Which nail will be hammered more easily if the force applied is 200 N to hammer both nails? Explain why. Calculate the pressure required to hammer each nail. (2)

OR

Why is the weight of the object more at the poles than at the equator? [2]

26. 10 g of solution P was added to solution of Q taken in a beaker. The mass of product formed is 25 g. What is the mass of solution Q? Justify.

27. You are given a mixture of mercury, oil and water. How will you separate this mixture? Suggest a method to separate them. (2)

OR

During the distillation of a salt water mixture, what remains behind in the distillation flask after completion of the distillation process and why?

CBSE
Class IX Science
Sample Paper – 6 Solution

Section A

1. Processes involved in soil formation:
(a) Weathering
(b) Paedogenesis

2. Initiatives taken to increase the water availability for agriculture:
(a) Rainwater harvesting
(b) Watershed management

Section B

3. Properties of suspensions:
- They are heterogeneous mixtures.
- Their particles can be easily seen by the naked eye.
- They are unstable since their particles settle after some time when left undisturbed.
  Examples: Oil and water, sand and water

OR

Chlorine gas is added to water to purify it. It kills the germs present in water.
It is called a disinfectant as it is used to sterilise water. After this treatment, water becomes safe for drinking.

4. When the cells of onion peel and RBCs are kept separately in a hypotonic solution, RBCs will burst because there is no mechanism to resist the entry of water inside the cells. Cells of the onion peel will not burst. Entry of water due to endosmosis will cause some initial swelling in the onion peel cells. However, the cell wall acts as a mechanical barrier and restricts the further entry of water inside the cell. As a result, the onion peel cells do not burst.

5. Weight of box on the Earth = 200 N
Thus, its mass on the Earth is given by
$W = m \times g$
$\Leftrightarrow m = \frac{W}{g} = \frac{200}{10} = 20$ kg
As the mass of the box is 20 kg on the Earth, its mass will remain the same on the Moon.
Hence, the mass of the object on the Moon is also 20 kg.

Section C

6.

(a) Speed is the distance travelled by a body per unit time. Its SI unit is metre per second (m/s).

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{\text{m}}{\text{s}}$$

(b)

(i) Velocity of the body is the distance travelled by it per unit time in a given direction.

(ii) The body exhibits non-uniform acceleration if its velocity increases by equal intervals of time.

(c) Average velocity ($\bar{v}$) = $\frac{\text{initial velocity (u) + final velocity(v)}}{2}$

7. The given organism is an octopus. It belongs to Phylum Mollusca.

Characteristics of Phylum Mollusca: (Any two)

(a) Bilateral symmetry

(b) Open circulatory system

(c) Coelomic cavity is reduced

(d) Metanephridia or kidney-like organ for excretion

8.

(a) Passengers in the bus will move in a backward direction. When the bus is at rest, the passengers in the bus are also in the rest position. When the bus starts suddenly, the speed of the bus changes. The passengers' lower portion of the body is in contact with the bus, but the upper portion is still at rest for that moment. Hence, the passengers get a sudden jerk and move in the backward direction.

(b) Yes, the boy is experiencing accelerated motion. As he is moving in a circular track, his direction keeps on changing continuously. Thus, he is said to be moving in accelerated motion.

9. Given:

Molecular mass of Cr_2S_3 = (2 × 52) + (3 × 32)

= 200 g

Now, 200 g of Cr_2S_3 contains = 104 g of Cr

So, 85 g of Cr_2S_3 will contain=$\frac{104 \times 85}{200}$

= 44.2 g of Cr

Hence, the number of moles of Cr = $\frac{44.2}{52}$

= 0.85 moles

OR

(a)

Formula unit mass of $CaCO_3$ = 40 u + 12 u + 3 x 16 u

= 100 u

(b)

Molar mass of CO_2 = $(12 + 2 \times 16)$ g mole^{-1}

= 44 g mole^{-1}

mass of 10 moles of CO_2 = 10 mole x 44 g mole^{-1}

= 440 g

(c)

$$\text{Number of He atoms} = \frac{\text{Given mass of Helium}}{\text{Mass of 1 atom of Helium}}$$

$$= \frac{100}{4}$$

$$= 25$$

10.

(a) Yellow pale eyes, general weakness, nausea and vomiting are symptoms of jaundice.

(b) Jaundice is a disease caused by viruses.

(c) Helping nature, friendly concern and general awareness are some values depicted by Rahul.

11. Mass of the bullet, m_1 = 15 g

$$m_1 = \frac{15}{1000} = 0.015 \text{ kg}$$

Velocity of the bullet, v_1 = 500 m/s

Mass of the gun, m_2 = 5 kg

Recoil velocity of the gun, v_R = ?

Recoil velocity can be obtained by using the relation:

Mass of bullet × velocity of bullet = mass of gun × recoil velocity

$$\therefore m_1 v_1 = m_2 v_R$$

$$\therefore v_R = \frac{m_1 v_1}{m_2} = \frac{0.015 \times 500}{5}$$

$$\therefore v_R = 1.5 \text{ m/s}$$

OR

(a) Graph (C) represents the motion of a car on a crowded street. As the street is crowded, the driver drives the car with different speeds in equal intervals of time. This graph represents non-uniform acceleration.

(b) Graph (D) represents the motion of a ball falling from a height. The ball falling from a height covers unequal distances in equal intervals of time. This graph represents non-uniform motion of the ball.

(c) Graph (A) is incorrectly represented. This graph shows that with increasing speed, time goes on decreasing which is not possible. Hence, the graph is incorrectly represented.

12.

(a) Pesticides when washed away into the soil or water bodies get absorbed by plants. Because they are non-biodegradable, they remain in the soil, water and bodies of plants. When plants are consumed as food by man or other animals, these chemicals enter the food chain and harm human beings and other animals.

(b) As far as possible, farmers should avoid the use of pesticides or they can use pesticides in limited amounts. Instead, they should use biological methods to control pests as they do not cause any environmental pollution. It is our responsibility to keep our environment pollution-free.

OR

Management practices followed in a livestock firm: (any six points)

(a) Provision of shelter facilities under well-ventilated roofed sheds
(b) Proper cleaning of shelters
(c) Regular brushing of animals to remove dirt and loose hair
(d) Provision of nutritious food which includes a balanced ratio of fibre, roughage and concentrates
(e) Provision of special food during the lactation period
(f) Check against external parasites and skin check against internal parasites such as norms and flukes
(g) Vaccination against viral and bacterial diseases

13.

(i) The large or extranuclear part of the atoms contains electrons which have negligible mass. Heavier particles like protons and neutrons are contained in the nucleus. So, only the nucleus is taken into account when calculating the mass of an atom.

(ii) Atoms combine with other atoms to achieve the electronic configuration of the nearest noble gas to become more stable.

14. It is possible to differentiate between squamous, cuboidal and columnar epithelia under the microscope just by looking at the cells. The shape of the cells in these epithelia helps us to identify the type of epithelium. If the slide shows flat and irregular cells, the epithelium is squamous; if the cells are cube-like, the epithelium is cuboidal, whereas if the cells are tall and pillar-like, the epithelium is columnar.

15. Possible reasons to justify this statement:

1. Forces of attraction between particles are maximum in solids and minimum in gases.
2. Spaces between the constituent particles and kinetic energy of the particles are minimum for solids and maximum for gases.
3. Solids have fixed shape and are not compressible. The arrangement of particles is the most ordered for solids.

Section D

16.

(a) Energy of a body due to its motion is called kinetic energy.

Formula: $K.E. = \frac{1}{2}mv^2$

(b) Potential energy is due to its higher position above the Earth and it is equal to the work done in moving the body against gravity.
Formula: $P.E. = m \times g \times h$

(c)

(i) A book kept on a table possesses potential energy.
(ii) A ball rolling down the hill possesses both potential and kinetic energy.
(iii) After the ball reaches the ground, it possesses kinetic energy.
(iv) A stone released through a stretched string possesses kinetic energy.

17.

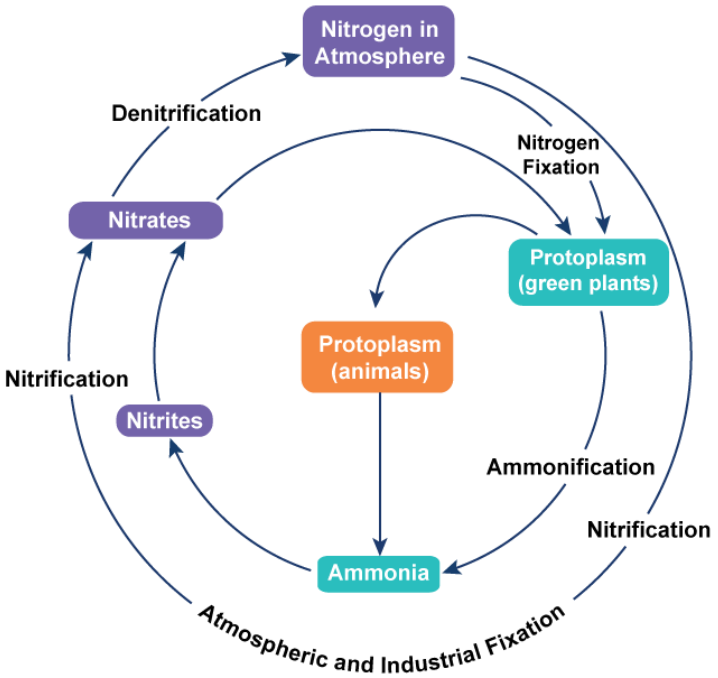
(a) Solid carbon dioxide directly changes to carbon dioxide and does not melt to produce a liquid (like ordinary ice); hence, it is called dry ice.
Dry ice is used to deep freeze food and to keep ice cream cold.

(b) Dry ice can produce much lower temperatures than that produced by ordinary ice; hence, it is much more effective for cooling purposes than ordinary ice.

(c) Dry ice is stored under high pressure because on decreasing the pressure on dry ice, it gets converted directly to carbon dioxide.

18.

(a) Nitrogen cycle

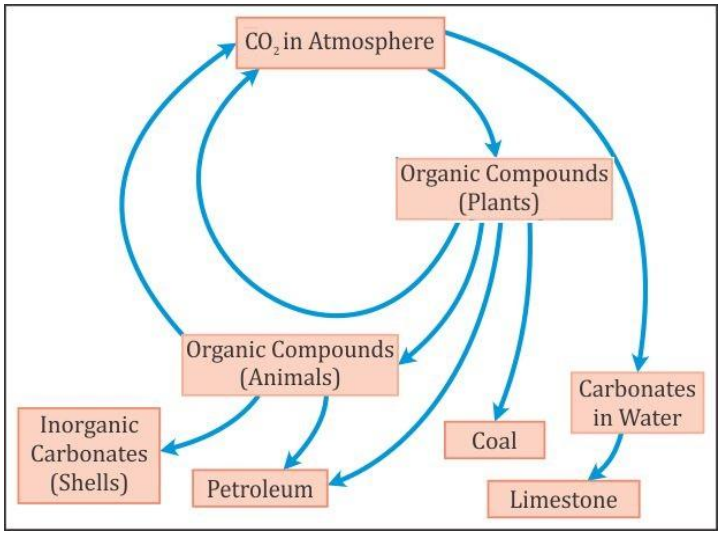


(b) <u>Role of nitrogen-fixing bacteria and lightning in atmospheric nitrogen fixation:</u>

- Nitrogen-fixing bacteria (free-living or symbiotic) which are mostly found in the roots of leguminous plants convert atmospheric nitrogen to ammonia.
- During lightning, the high temperature and pressure created in the air convert nitrogen to oxides of nitrogen.
- These oxides dissolve in water to give nitrous and nitric acids which fall on the Earth along with rain.

OR

(a) Carbon cycle



(b) Gases such as carbon dioxide and methane present in the Earth's atmosphere prevent the escape of heat from the Earth by absorbing the infrared rays from the Sun. An increase in the percentage of these greenhouse gases in the atmosphere causes an increase in the average temperature worldwide. This phenomenon is known as the Greenhouse Effect. As the concentration of carbon dioxide in the atmosphere increases, more heat is retained by the atmosphere causing global warming.

19.

(a) <u>Mixture of fine mud particles suspended in water:</u>

The mixture is allowed to pass through a filter to separate the solid particles from water. The filter allows the liquid to pass through but not the solids.
The solid particles remain on the filter paper.

(b) <u>Mixture of tea leaves and tea:</u>

The mixture is allowed to pass through a filter to separate the tea leaves from tea. The filter allows the liquid to pass through but not the solids.
Tea leaves remain on the filter paper, separating them from the tea.

(c) Mixture of butter and curd:

Centrifugation is used to separate butter from milk. The milk is put in a closed container in a centrifuge machine. When the centrifuge machine is switched on, the curd is rotated (or spun) at a high speed in its container. The centrifugal force acts on the curd, and due to this, the curd separates into butter and skimmed milk. Butter, being lighter, floats over the skimmed milk and can be removed.

(d) Mixture of camphor and salt:

Sublimation is a process which is used to separate a mixture of camphor and salt. Camphor gets directly converted to its gaseous state, leaving the salt behind.

(e) Mixture of common salt and water:

A salt solution is allowed to evaporate. The heat of the Sun gradually evaporates water, and common salt is left behind as a solid.

OR

(a) In a physical change, no new substance is formed. In a chemical change, one or more new substances with different composition and properties can be formed.

Freezing of water - Physical change
Mixing of iron filings and sand - Physical change
Fading of clothes - Chemical change
Spoiling of food - Chemical change

(b) Wax of a candle is made of carbon and hydrogen, which react with oxygen on burning and change into carbon dioxide and water, which escape into the air. This is a chemical change.

As a result, the candle melts and reduces in size. This is a physical change. So, during the burning of a candle, both physical and chemical changes take place.

20.

(a)

- It is possible to identify whether the weed is a monocot or a dicot based on the peculiar characteristics shared by each of these groups.
- A dicot plant has reticulate venation, a tap root system and pentamerous or tetramerous floral arrangement. It also has seeds with two cotyledons.
- A monocot plant has parallel venation, a fibrous root system and trimerous flowers. Monocot seeds contain only one cotyledon.

(b) In diploblastic organisms, only two germ layers are present—endoderm and ectoderm—which enclose a non-cellular jelly-like layer called mesoglea. The middle layer or mesoderm is absent in diploblastic animals. Hence, they do not have a body cavity called coelom.

21.

(a) Even if a football and tennis ball have different masses, both balls reach the Earth at the same time because acceleration of a freely falling body is independent of the mass of the body.

(b) We know that iron has a higher density than water. So, an iron nail sinks in water. However, a ship made of iron does not sink because its average density is less than that of water as there is a lot of airspace within.

(c) Bricks of different volumes experience a different upward buoyant force and the weight of water displaced by the brick with more volume will be more than that of water displaced by the brick with less volume.

OR

a) In case (1), mass of the first body = m
Velocity of the first body = v
So, kinetic energy = ½ mv^2 … (1)
In case (2), mass of the body = m
Velocity of the second body = 4v
So, kinetic energy = ½ m $(4v)^2$ = 16/2 mv^2 … (2)
From (1) and (2),
KE of the first body/KE of the second body = 1/16

b) Work done 'W' in raising an object of mass 'm' to height 'h' is
W = mgh
where g – acceleration due to gravity

Section E

22. The figure shows the male and female cones of the *Pinus* plant.

(a) A → Megasporophyll; B → Microsporophyll

(b) *Pinus* belongs to Division Gymnospermae. Gymnosperms are characterised by the presence of naked seeds which are not enclosed within fruits.

OR

(a) The first body segment is called peristomium or buccal segment. The peristomium contains the mouth.

(b) Earthworm belongs to Phylum Annelida.

23.

(a) The figure shows simple columnar epithelial tissue. Its main functions include absorption and secretion.

(b) Simple columnar epithelial tissue forms the lining of the stomach, small intestine, colon, gall bladder and oviducts.

24. A stethoscope works on the principle of multiple reflections.
The one-word term reverberation can be used to explain the text.

25. Nail A is the pointed one, so it has a surface area which is less than nail B. Thus, nail A will move inside the wooden plank more easily than nail B.
Area of nail A = A_a = 0.1 m^2
Area of nail B = A_b = 1.5 m^2
Force applied on both nails = 200 N
Pressure for nail A = $P_A = \frac{F}{A_a} = \frac{200}{0.1}$ = 2000 Pa

Pressure for nail B = $P_B = \frac{F}{A_b} = \frac{200}{1.5}$ = 133.3 Pa

Hence,
$P_A > P_B$ (less the surface area, more is the pressure applied to that object)

OR

Weight of the object is more at the poles than at the equator because w = weight = mg. At the equator, g is less because the Earth's radius is more, and hence, the weight is less and *vice versa* for the poles.

26. According to the law of conservation of mass, the total mass of reactants is equal to the total mass of the product.
Mass of solution Q is
= Total mass of the solution after mixing − Mass of solution P
= 25 − 10
= 15 g

27. A mixture of more than two immiscible liquids is separated by using a separating funnel. So, a mixture of mercury, oil and water will be put in a separating funnel and the mixture would separate into three layers according to their densities. Mercury (being heavier than water) forms the bottom layer, water forms the middle layer and oil (being the lightest) forms the top layer. On opening the stop-cock, mercury will run out first, followed by water and then oil.

OR

During the distillation of a salt water mixture, the salt remains behind in the distillation flask because it is non-volatile and hence does not form vapour on heating.