## SECTION A: ( $28 \times 2$ MARKS $)$

For questions 1 to 28, four options are given. Choose the correct answer for each question and shade its appropriate answer in the Optical Answer Sheet (OAS) provided.

1 Which of the following characteristics can be used to differentiate between birds and insects?
(1) Presence of wings
(2) Outer body covering
(3) Number of wings
(4) Method of reproduction

2 The graph below shows the amount of carbon dioxide exhaled by Jim, Melissa and Sky in 1 minute, while they were doing some activities.

Amount of carbon dioxide/ $\mathrm{cm}^{3}$


Which of the following correctly describes the activity they were doing?

|  | Jim | Melissa | Sky |
| :--- | :---: | :---: | :---: |
| $(1)$ | jogging | swimming | writing |
| $(2)$ | writing | jogging | swimming |
| $(3)$ | jogging | writing | swimming |
| $(4)$ | writing | swimming | jogging |

3 Study the diagram below.


Which of the following correctly identifies the organs where digestion and absorption of water takes place?

|  | Organs where digestion takes <br> place | Organ where absorption of water <br> takes place |
| :---: | :---: | :---: |
| $(1)$ | $\mathrm{A}, \mathrm{C}, \mathrm{D}$ | D |
| $(2)$ | $\mathrm{B}, \mathrm{C}, \mathrm{D}$ | D |
| $(3)$ | C and D | E |
| $(4)$ | $\mathrm{A}, \mathrm{C}, \mathrm{D}$ | E |

4 Afiq studied the onion cell, cheek cell and leaf cell under the microscope. He counted the number of cell parts, $A, B$ and $C$ in each cell and recorded his observations in the table below.

|  | Number of cell parts |  |  |
| :---: | :---: | :---: | :---: |
|  | $\mathbf{A}$ | $\mathbf{B}$ | $\mathbf{C}$ |
| Onion cell | 1 | 1 | 0 |
| Cheek cell | 1 | 0 | 0 |
| Leaf cell | 1 | 1 | 15 |

Which cell parts do $\mathrm{A}, \mathrm{B}$ and C represent?
(1)
(2)
(3)
(4)

| A | B | C |
| :---: | :---: | :---: |
| nucleus | chloroplast | cell wall |
| nucleus | cell wall | chloroplast |
| cell wall | cell membrane | chloroplast |
| cell membrane | chloroplast | Nucleus |

5 Which of the following substances are carried in both plant transport system and human circulatory system?

A water
B oxygen
C glucose
D carbon dioxide
(1) A and C
(2) A and D
(3) $B$ and C
(4) $B$ and D

6 Study the flow chart below.


Which one of the following is correct?

|  | Question P | Q |
| :--- | :---: | :---: |
| $(1)$ | Does it make its own food? | mushroom |
| $(2)$ | Can it be seen with naked eyes? | moss |
| $(3)$ | Does it make its own food? | bird's nest fern |
| $(4)$ | Can it be seen with naked eyes? | bread mould |

7 Two identical celery stalks, each with a part cut out, were lowered into two beakers of blue-coloured water. After a few hours, the two stalks were cut at EF and GH as shown in the diagram below.


Which diagrams show how the stalk at EF and GH would look like?
(1) (2)

8 The diagram below shows the female reproductive system in humans.


At which part of the female reproductive system, $A, B, C$ or $D$, does the fertilised egg develop in?
(1) A
(2) $B$
(3) C
(4) D

9 The diagram below shows a flower taken from a pot of plant.


Daniel wanted to find out which part(s) of the flower is/are necessary for fruit to develop. He removed some parts of the flowers as shown below and left the pot of plant in the garden for one month.


P


Q


R

Which flower(s) will not develop into a fruit?
(1) P only
(2) Q only
(3) P and R
(4) $Q$ and $R$

Two plants, M and N were planted on an island as shown below.


Wind direction
Three months later, the plants M and N were found as shown below. .


Wind direction

Based on the above diagrams, which of the following characteristics are correctly matched to the fruits of Plants M and N ?

|  | Fruits of Plant M | Fruits of Plant N |
| :---: | :---: | :---: |
| $(1)$ | dry and hard | wing-like structure |
| $(2)$ | dry and hard | juicy and edible |
| $(3)$ | fibrous husk | wing-like structure |
| $(4)$ | fibrous husk | hook-like structure |

11 What is the impact of global warming?
A soil erosion
B air pollution
C rise in sea level
D loss of habitat for plants and animals
(1) D only
(2) A and B
(3) $C$ and $D$
(4) A, C and D

12 The diagram below shows the flow of energy among the sun and some organisms.


Which one of the following correctly represents process $\mathrm{A}, \mathrm{B}$ and C ?
(1)

| A | B | C |
| :---: | :---: | :---: |
| photosynthesis | digestion | decomposition |
| photosynthesis | respiration | decomposition |
| respiration | photosynthesis | respiration |
| respiration | photosynthesis | digestion |

13 Siti Hawa carried out an experiment to study the preferred environment of Organism S. Thirty Organism S were placed in the middle of dish A. Ten minutes later, the number of Organism $S$ in each section was counted and recorded.

The experiment was repeated with dish B.


Dish A


Dish B

Dark and warm

Bright and warm


Dish C

Which of the following will likely be observed in sections $M, N, O$ and $P$ of dish C?
(1) No Organism $S$ will be found in section $P$.
(2) Most Organism $S$ will be found in section M.
(3) Number of Organism S found in section O will be lesser than N .
(4) Number of Organism $S$ found in sections $N$ and $P$ should be the same.
14. Maryam wanted to find out how the presence of carbon dioxide affects the growth of plant. The diagram below shows her set-up in a sealed glass tank.


Using the same type of plants, which of the following could be used as a control for her experiment?
(1)

(3)

(2)

(4)


15 The diagram below shows an electrical plug.


The table below shows some properties of four materials, A, B, C and D. A tick ( $\checkmark$ ) indicates that the material has the property.

| Material | Strong | Conductor <br> of electricity | Waterproof |
| :---: | :---: | :---: | :---: |
| A | $\checkmark$ | $\checkmark$ |  |
| B | $\checkmark$ |  | $\checkmark$ |
| C |  |  | $\checkmark$ |
| D | $\checkmark$ | $\checkmark$ | $\checkmark$ |

Which one of these materials, $A, B, C$ or $D$, is most suitable for making part $X$ of the plug?
(1) A
(2) $B$
(3) C
(4) D
16. Mohamad sets up an electrical circuit as shown below. The batteries are in working condition.


How many bulbs would light up?
(1) 0
(2) 2
(3) 3
(4) 4
17. Many shopping malls provide plastic bags for wet umbrellas on rainy days. Shoppers are advised to put their wet umbrellas in these bags.


Which property of the plastic bag allows it to perform the function described?
(1) Strength
(2) Flexible
(3) Waterproof
(4) Ability to float
18. The diagram below shows the stages, $A, B, C$ and $D$, of the water cycle.


Which of the following, $A, B, C$ and $D$, of the water cycle do(es) not cause a change in state?
(1) A only
(2) B and C only
(3) C and D only
(4) A, B and D
19. Figure 1 shows a spring. Figure 2 shows what happens when a ball is attached to the spring.


Figure 1


Figure 2

Which of the following shows the direction of the forces acting on the ball and the spring?

|  | Direction of the force <br> acting on the ball | Direction of the force acting <br> on the spring |
| :---: | :---: | :---: |
| $(1)$ | $\downarrow$ |  |
| $(2)$ | $\downarrow$ |  |
| $(3)$ | $\downarrow$ |  |
| $(4)$ | $\square$ |  |

20. Substance $P$ is a solid at $20^{\circ} \mathrm{C}$ and a liquid at $150^{\circ} \mathrm{C}$

Which of the following is possible?

|  | Melting point of $\mathbf{P}\left({ }^{\circ} \mathbf{C}\right)$ | Boiling point of $\mathbf{P}\left({ }^{\circ} \mathbf{C}\right)$ |
| :--- | :---: | :---: |
| $(1)$ | 10 | 80 |
| $(2)$ | 10 | 200 |
| $(3)$ | 50 | 80 |
| $(4)$ | 50 | 200 |

21. A compass has a small magnet that can move freely. The diagram below shows the compass when a magnet is brought near it.


Four bar magnets were arranged such that they were attracted to one another. A compass was then placed near end $F$ as shown below.


What are the poles of $E$ and $F$ ?

|  | E | F |
| :--- | :--- | :--- |
| $(1)$ | South | South |
| $(2)$ | North | North |
| $(3)$ | South | North |
| $(4)$ | North | South |

22. The diagram below shows four circuits. All the bulbs and batteries are new and identical.


Which of the following two bulbs have the same brightness?
(1) A and D
(2) B and C
(3) B and D
(4) C and D
23. The diagram below shows the flow of heat between an egg, water and a glass container.


Which of the following diagrams shows the temperature of the egg and water for the flow of heat to happen?
(1)
(2)


(3)
(4)

24. The diagram below shows a person preparing to bungee jump from a bridge.


Compare the potential energy and kinetic energy of the person at points X and Y , which one of the following is correct?

|  | potential energy at X compared <br> to $\mathbf{Y}$ | kinetic energy at Y compared <br> to $\mathbf{X}$ |
| :--- | :---: | :---: |
| $(1)$ | more | less |
| $(2)$ | more | more |
| $(3)$ | less | less |
| $(4)$ | less | more |

25. Keegan wanted to find out how well the three materials, $P, Q$ and $R$ conduct heat. He poured water into the three similar containers made of the different materials.


He recorded the time taken for the water to boil in the table below.

| Material | Amount of water (ml) | Time taken for water to start <br> boiling (min) |
| :---: | :---: | :---: |
| P | 300 | 10 |
| Q | 100 | 10 |
| R | 200 | 10 |

Which of the following shows how well the three materials conduct heat?

|  | P | Q | R |
| :---: | :---: | :---: | :---: |
| $(1)$ | poor | very good | good |
| $(2)$ | very good | poor | good |
| $(3)$ | poor | good | very good |
| $(4)$ | very good | good | poor |

26. Winston conducted an experiment using a wooden block W and a flat wooden plank XY placed horizontally as shown in Figure 1 below.


Figure 1

He raised the end of the plank slightly as shown in Figure 2 but the block did not slide down. When end X was raised high enough, he observed the block sliding down as shown in Figure 3.


Figure 2


Figure 3

Which of the following statements are true?

A Frictional force acted on the block when it was resting on plank in Figure 1.
B Frictional force acted on the block when the plank was being raised in Figure 2.
C Frictional force acted on the block when it was sliding down the plank in Figure 3.
(1) A only
(2) C only
(3) B and C only
(4) A, B and C
27. Aziz wanted to find out the time taken for a wooden block to slide down two different surfaces, $A$ and $B$ using the set-up below. Surface $A$ is smoother than surface $B$.


He measured the time taken for the wooden block to slide down the two surfaces.
Which of the following graphs likely shows the results?
(1)


Distance travelled by block (cm)
(3)


Distance travelled by block (cm)
(2)

Time taken (s)


Distance travelled by block (cm)
(4)


Distance travelled by block (cm)
28. Selvi carried out an experiment using materials $M, N, O$ and $P$. She placed them on the $2 \mathrm{~cm}, 4 \mathrm{~cm}, 6 \mathrm{~cm}$ and 8 cm mark respectively. She shone a torch on the materials as shown below.


She measured the distance the light travels. She repeated the experiment by rearranging the positions of the materials and recorded the results below.

| Order of material | Distance light travels (cm) |
| :---: | :---: |
| $\mathrm{M}, \mathrm{N}, \mathrm{O}$ and P | 2 |
| $\mathrm{O}, \mathrm{N}, \mathrm{M}$ and P | 6 |

Which of the following correctly describes the materials $\mathrm{M}, \mathrm{N}, \mathrm{O}, \mathrm{P}$ ?

|  | Does it allow light to pass through? |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | $\mathbf{M}$ | $\mathbf{N}$ | $\mathbf{O}$ | $\mathbf{P}$ |
| $(1)$ | no | no | yes | not sure |
| $(2)$ | not sure | yes | no | yes |
| $(3)$ | no | not sure | yes | no |
| $(4)$ | no | yes | yes | not sure |

## Section B: (44 MARKS)

Write your answers in the blank spaces provided. The number of marks available is shown in the brackets [ ] at the end of each question or part question.
29. Farul wanted to find out how temperature affects the rate of photosynthesis. He used water at $10^{\circ} \mathrm{C}$ and placed the set-up near the torch for an hour as shown below.


He measured the amount of gas produced by the plant and repeated the experiment with increasing temperatures as shown below.

| Temperature of water $\left({ }^{\circ} \mathbf{C}\right)$ | Amount of gas produced (cm $\left.{ }^{\mathbf{3}}\right)$ |
| :---: | :---: |
| 10 | 3 |
| 20 | 10 |
| 30 | 30 |
| 40 | 25 |

(a) Name the gas produced by the plant.
(b) Based on the results, what is the relationship between temperature and rate of photosynthesis?
$\qquad$
$\qquad$
30. Kai Jie wanted to find out if the presence of oxygen is needed for germination. He placed five identical seeds in two bags, $A$ and $B$ and added the same amount of water to wet the cotton wool as shown below.


He recorded his observations after 5 days in the table below.

|  | Bag A | Bag B |
| :---: | :---: | :---: |
| Number of seeds that germinated | 0 | 3 |

(a) What would Kai Jie first observe when the seeds germinate?
$\qquad$
(b) Name another variable that Kai Jie should keep the same.
$\qquad$
$\qquad$
(c) If bag B was placed in a dark room, will the seeds still germinate? Give a reason for your answer.
$\qquad$
$\qquad$
31. The diagram below shows an air sac found in the lungs.

(a) Name the gases as indicated by arrows X and Y .

X: $\qquad$
Y: $\qquad$
In the diagram below, the arrows show the flow of blood between different human body parts.

(b) What is the difference between the amount of carbon dioxide being transported by the blood in $A$ and $B$ ?
$\qquad$
(c) Which of the arrows, B or D, represents blood with more amount of digested food after digestion? Explain.
$\qquad$
$\qquad$
32. The diagram below shows Organism $X$.

(a) State a structural adaptation of Organism $X$ that allows it to hunt for its prey.
$\qquad$
(b) When the body temperature of Organism X increases, it opens its mouth exposing its moist mouth and tongue to the surrounding while keeping itself in the shade. Explain how such behavior helps Organism X to lower its body temperature.
$\qquad$
$\qquad$

Organism P flew into the mouth of Organism X and removed scraps of food trapped in between Organism X's teeth. It then flew away unharmed.


Explain how both Organisms X and P benefit from each other.

Benefit for Organism X: $\qquad$
$\qquad$

Benefit for Organism P:
33. The diagram below shows the movement of substances in a plant.

(a) Based on the diagram above, identify part X and state its function.
$\qquad$
$\qquad$

The diagram below shows the measured depth and the horizontal distance of root growth.


The results for plant $A, B$ and $C$ are as shown below.

| Plant | Depth of root growth (m) | Average horizontal distance of root <br> growth from plant (m) |
| :---: | :---: | :---: |
| A | 2.8 | 1.4 |
| B | 1.3 | 2.0 |
| C | 2.2 | 2.7 |

(b) Which plant, A, B or C, is most likely found in the desert? Explain your answer.
$\qquad$
$\qquad$

The diagram below shows Plant D with food stored in its roots. When Plant D was planted in non-fertile soil, the leaves of the plant remained green and did not wilt.

(c) Based on the information above, what would be observed of the root after a week? Give a reason for your answer.
$\qquad$
$\qquad$
34. Abby and Connie set up the circuit as shown below.


When they closed both switches, they realised that none of the bulbs above lit up. Given that only one bulb ( Y or Z ) is fused, both girls wrote the following conclusions in their Science journals.

Abby:"Bulb $Y$ is fused." Connie: "Bulb $Z$ is fused."
a) Which student, Abby or Connie, is correct in her conclusion and give a reason for your answer.
$\qquad$
b) Abby and Connie replaced the fused bulb with a working one. Rearrange 3 bulbs, 2 batteries and one switch to construct a circuit in the space provided below so that all the three bulbs would light up with equal and maximum brightness.
35. Alden uses the set-up shown below to take photographs of birds automatically. Rod $R$ is pivoted at $W$. The metal contacts, $A$ and $B$, are connected to a special camera by wires so that when $A$ touches $B$, the camera will take a photograph of the object at $P$.

(a) Explain how this set-up enables the camera to take a photograph of a bird when it lands on P to eat the seeds.
$\qquad$
$\qquad$
$\qquad$
(b) Alden noticed that small birds have been feeding on the seeds at $P$ but no photographs of the birds were taken even though the setup was working properly.

Describe one change that Alden can make to the set-up so that the camera will also take photographs of smaller birds. Explain.
$\qquad$
$\qquad$
36. 200 ml of blue-coloured water was mixed with 200 ml of red-coloured water. The mixture was then heated as shown in the diagram below.


Droplets of liquid W were formed on the inner side of the funnel after the set-up was heated.
(a) What is the colour of liquid W?
$\qquad$
(b) Explain how liquid W was formed.
$\qquad$
$\qquad$
$\qquad$
(c) The diagram below represents the water cycle.


Which part of the water cycle does liquid W represent?
$\qquad$
37. Bowen wants to investigate if the amount of potential energy is affected by the height of the object using the set-up below.


He dropped the ball from a certain height onto a container of sand. The ball created a circular dent and he measured the depth of the dent, d .


He repeated the experiment using balls of various mass and height of release. He then recorded his results in the table shown below.

| Set-up | Mass of ball <br> $(\mathbf{g})$ | Height of release <br> $(\mathbf{c m})$ | Depth of dent, d <br> $(\mathbf{c m})$ |
| :---: | :---: | :---: | :---: |
| A | 20 | 40 | 0.5 |
| B | 20 | 50 | 1 |
| C | 30 | 40 | 2.5 |
| D | 30 | 30 | 2 |

(a) Which two set-ups should he use to investigate his experiment?
$\qquad$

Fruit P and fruit Q are from the same tree. They drop from the tree when they are ripe.

Fruit P
2 kg

Fruit Q
4kg
(b) Bowen concluded that fruit Q has more potential energy than fruit P when they are at the same height. Using the results Bowen obtained, explain how he arrived at his conclusion.
$\qquad$
$\qquad$
$\qquad$
38. Samples of water were collected from three different rivers. One of the rivers was next to a vegetable farm, where soil and fertilizers tend to get washed into the river. Another was next to a chemical factory which dispenses its chemical waste into the river. The last was running through a nature reserve.


The table below shows the three samples and their descriptions.

| Sample | Description |
| :---: | :---: |
| P | - colourless and odourless <br> - guppy died within two hours after being placed in the water |
| Q | - muddy particles suspended in the water <br> - algae been growing abundantly on the water surface <br> - strong stench of faeces |
| R | - colourless and odourless <br> - guppy survived when placed in the water |

(a) Which water sample was likely taken from a river next to a vegetable farm? Explain.
$\qquad$
$\qquad$
(b) Although the water collected in Sample P was clear and odourless, suggest a possible reason for why did the guppy died?
$\qquad$
$\qquad$

The water in Sample Q was poured through a filter as shown in the diagram below.


Algae in Sample Q were caught above the layer of pebbles. The bit of faeces were caught above the layer of coarse sand and the particles of soil were caught above the layer of fine sand. The water collected now looked similar to Sample R, however a guppy still died when placed in the water collected.
(c) Based on the observations above, state two conclusions of the effects of pollution on water consumption.
i) $\qquad$
$\qquad$
ii) $\qquad$
$\qquad$
39. Jeremy proposed a new design for cooler bus shelter as shown below. The solar panels, fan and light box form a complete electrical circuit.


Solar panels are placed above the bus shelter. Under strong amount of light, electricity will flow from the solar panels to the fan which causes the fan to work.
(a) Write down the energy conversion which causes the fan to work.


The graph below shows the amount of light the solar panel received on a particular day.

Amount of light/ units

(b) Given that the fan will require at least 200 units of light to work, place a tick $(\checkmark)$ beside the time when the fan is able to cool the bus shelter.

| Time of the day | Place a tick $(\checkmark)$ when the fan will work |
| :---: | :--- |
| 8 a.m. |  |
| 10 a.m. |  |
| 12 p.m. |  |
| 2 p.m. |  |
| 4 p.m. |  |

Jeremy wants to choose a circuit for his bus shelter where the fan and the light box will work at the same time. The following shows two possible circuits for the bus shelter.

(c) Which circuit should Jeremy choose for the bus shelter? Give a reason for your answer.
$\qquad$
$\qquad$
$\qquad$
40. Susan wanted to find out how the angle of a slope would affect how far a ball travelled. She released a ball at the top of a plank as shown in Diagram 1 and measured the distance the ball travelled from the bottom of the plank. She repeated the experiment with a bigger angle as shown in Diagram 2.
ball
(mass of 50 g )


Diagram 1


Diagram 2

Siti concluded that the bigger angle would cause the ball to travel further. However, her teacher told her that her experiment was not fair and her results were wrong.
(a) Name the force(s) that act on the ball as it rolled down the slope.
(b) Give two possible reasons why the results were wrong.
$\qquad$
$\qquad$
(c) Suggest how Susan could improve her experiment.
$\qquad$
$\qquad$

