NANYANG PRIMARY SCHOOL

2022
PRIMARY 6
PRELIMINARY EXAMINATION

SCIENCE
(BOOKLET A)

Total Time for Booklets A and B: 1 h 45 min

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the space provided.
2. Do not open this booklet until you are told to do so.
3. Follow all instructions carefully.
4. Answer all questions.
5. For each question from 1 to 28, four options are given.
   Indicate your choice in this booklet.
   Shade the correct oval (1, 2, 3 or 4) on the Optical Answer Sheet provided.

Name:_____( )

Class: Primary 6 ( )

Booklet B consists of 15 printed pages including this cover page.

Section A: Multiple Choice Questions [56 marks]

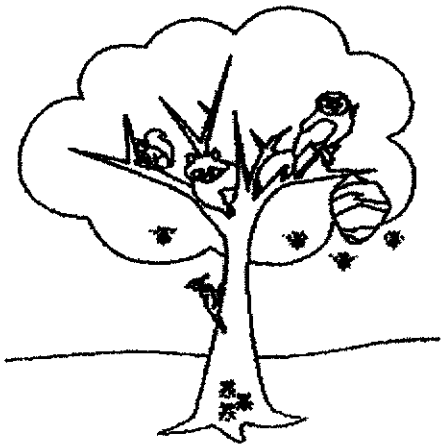
1. The number of organisms in a pond community is shown in the table below.

Organism	Number
Frog	2
Tadpole	8
Goldfish	1
Dragonfly	1
Dragonfly Nymph	2
Tortoise	3
Water Lily	5
Hydrilla	6
Duckweed	30

How many populations are there in the pond community?

(1) 6
(2) 7
(3) 8
(4) 9

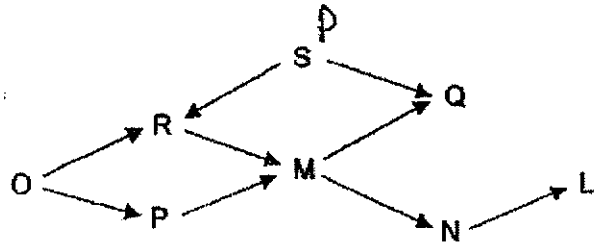
2. Study the diagram below.



Which of the following statements best explains whether the diagram above shows a community?

	Is it a community?	Reason
(1)	No	A single tree is too small to be a habitat.
(2)	No	There are no plant populations for the animals to feed on.
(3)	Yes	There are different types of animals living together on the tree.
(4)	Yes	There are different populations of organisms living together on the tree.

Study the food web shown below and answer Questions 3 and 4.



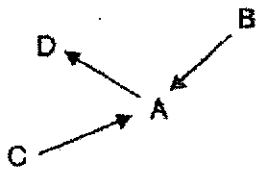
3. How many consumers are there in the food web above?

(1) 6 (2) 2
(3) 7 (4) 8

4. Which one of the following organisms is both a predator and prey?

(1) M (2) Q
(3) R (4) S

5. Study the food web below.



What would be the immediate effect on the populations of organisms B, C and D when the number of organism A decreases drastically?

	B	C	D
(1)	decrease	decrease	increase
(2)	decrease	increase	increase
(3)	increase	increase	decrease
(4)	increase	decrease	decrease

6. Which of the following statements describe how plants adapt to obtain more light?

A Growing on the branches of trees.
B Growing out of the surface of the water.
C Stems that can twine around and climb up support.
D Growing on the forest floor that is less exposed to sunlight.

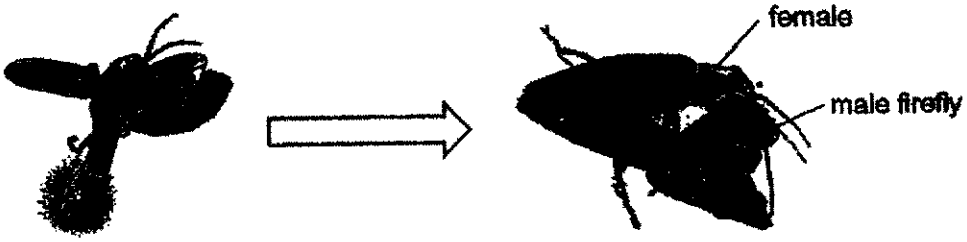
(1) A and D only
(2) B and C only
(3) A, B and C only
(4) B, C and D only

7. Which of the following describe structural adaptations for living in a hot and dry environment?

A Plants have fleshy stem full of water.
B Animals stay underground in the daytime and hunt at night.
C Animals have large, flexible ears which are exposed to the surroundings.

(1) A and B only
(2) A and C only
(3) B and C only
(4) A, B and C

8. Female fireflies often give out a light signal. When a male spots these signals, it would respond with its own light signal and fly closer to the female to mate with it. Sometimes, the female would eat the male rather than mate with it.



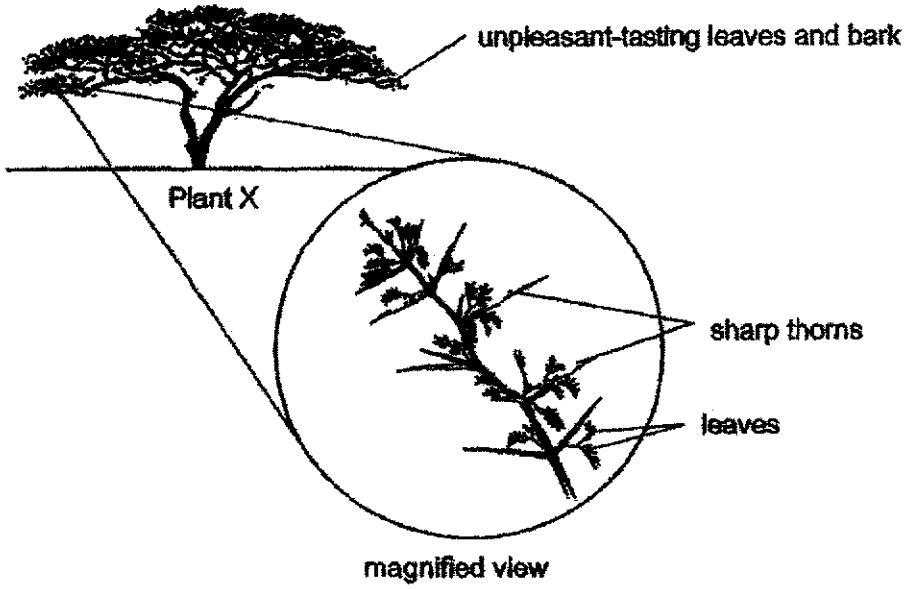
female firefly gives out light

a male firefly approaches in response to the female's signal and gets eaten

Which of the following correctly matches the observations above with the type of adaptation?

	Observation	Type of Adaptation
(1)	The female firefly eats the male firefly.	behavioural
(2)	The female firefly has a body part that produces light.	behavioural
(3)	The male firefly flies closer to the female to mate with it.	structural
(4)	The male firefly responds to the female with its own light.	structural

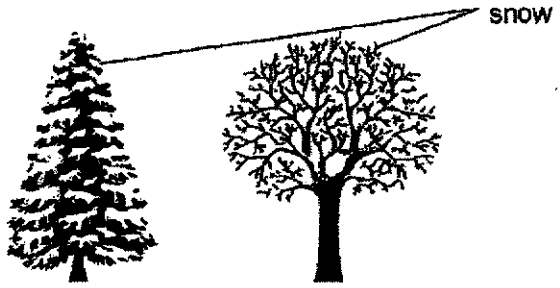
9. Study the information about plant X below.



Which of the following is the most likely purpose of the adaptations of plant X shown above?

(1) to prevent predators from eating the leaves
(2) to reduce the rate of water loss on a hot day
(3) to deter plant-eaters from feeding on the plant
(4) to allow the branches to climb and reach towards sunlight

10. Two different types of plants found during winter are shown in the diagram below.



plant F plant G

During winter, the ground is frozen and little water is available. The heavy snowfall will also weigh down the branches of trees and cause them to break. Plant G sheds its leaves before winter while plant F does not. The diagram below shows the leaves of plants F and G.

Leaves of plant F Leaves of plant G

Based on the information above, which of the following statements best describe how the plants are adapted to the winter conditions?

	Plant F	Plant G
(1)	increase weight of snow on the branches	allow maximum rate of photosynthesis
(2)	decrease weight of snow on the branches	reduce water loss
(3)	allow maximum rate of photosynthesis	increase weight of snow on the branches
(4)	reduce water loss	allow maximum rate of photosynthesis

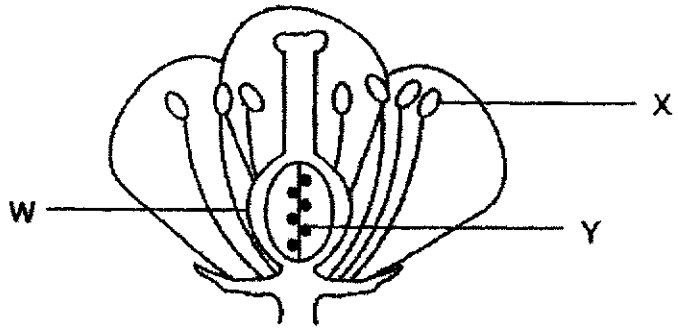
11. Which one of the following is not a direct cause of global warming?

(1) burning of petrol in vehicles
(2) cutting down of trees from the forest
(3) disposing of litter into rivers and lakes
(4) releasing of greenhouse gases into the atmosphere

12. Which one of the following is an example of Man's negative impact on the environment?

(1) recycling waste
(2) mining coal from the ground
(3) replanting trees in deforested areas
(4) limiting the number of wild-caught animals

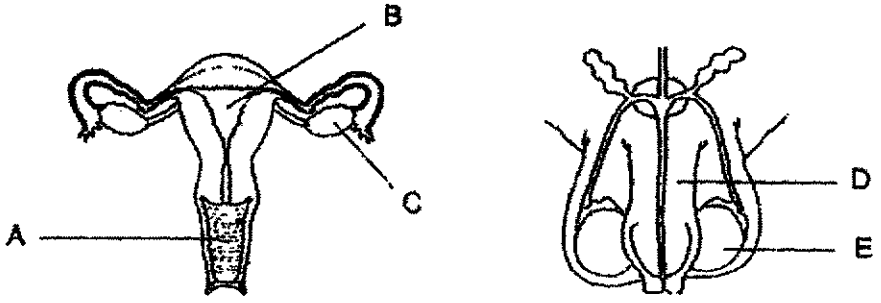
13. The diagram below shows the parts of a flower.



Which of the following correctly shows what would happen to the parts of the flower after fertilisation?

	Develop into fruit	Develop into seeds	Drop off
(1)	W	Y	X
(2)	W	X	Y
(3)	Y	W	X
(4)	Y	X	W

14. The diagram below shows the female and male reproductive parts.

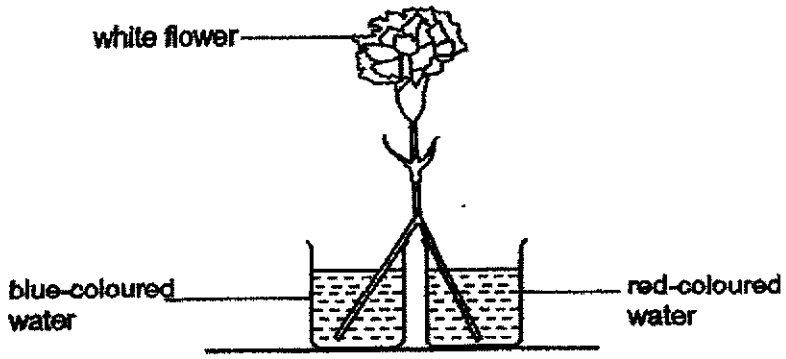


Female Male

Which of the following is correct?

	Produce(s) the female reproductive cells	Produce(s) the male reproductive cells
(1)	C	D
(2)	C	E
(3)	A and B	E
(4)	A and B	D and E

15. Vanessa carried out an experiment by splitting the stalk of a white flower into two equal parts and immersing each part into blue-coloured and red-coloured water as shown below.



After 6 hours, what will Vanessa likely observe?

(1) The white flower turned red.
(2) The white flower turned blue.
(3) The white flower turned purple.
(4) Half of the flower turned red and the other half turned blue.

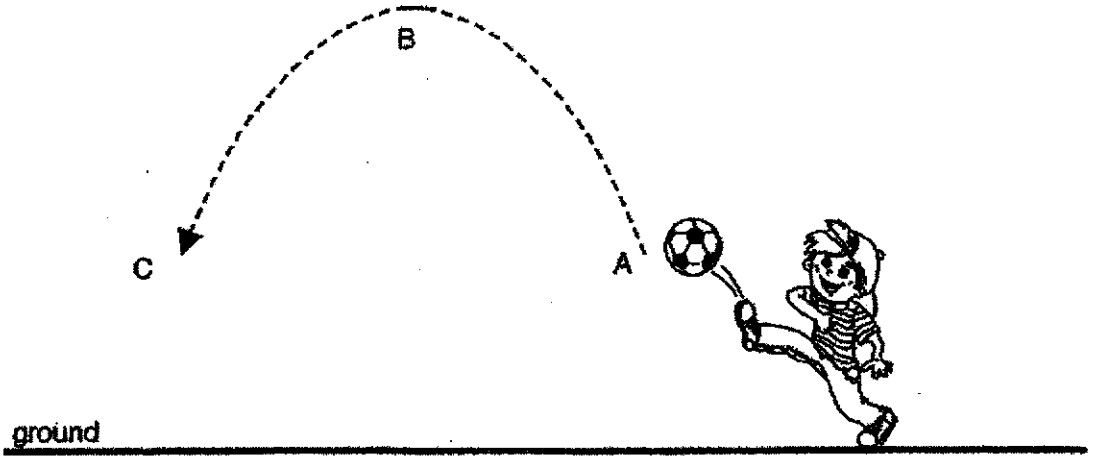
16. Jaffar wrote some notes about the digestive system but they were jumbled up.

Arrange the following steps to show what happens to food as it moves through the different parts of the human digestive system.

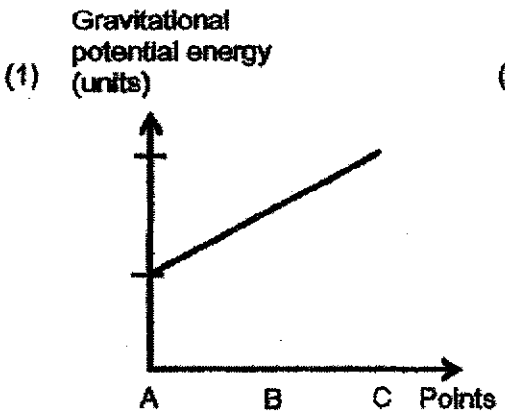
A Food is chewed into smaller pieces.
B Water is absorbed from undigested food.
C Strong muscles mix smaller pieces of food with digestive juices.
D Digestion is completed and digested food is absorbed into the bloodstream.
E Smaller pieces of food are pushed through a muscular tube with no new digestive juice added

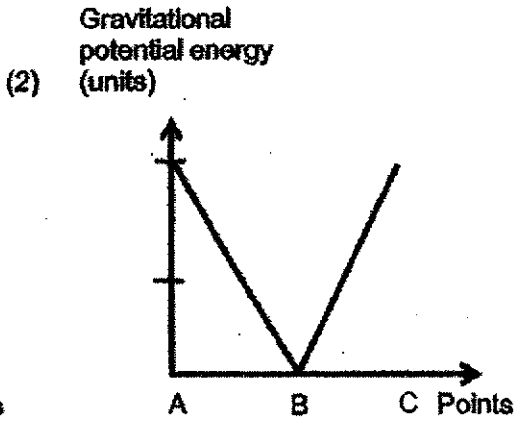
(1) A → C → E → B → D
(2) A → E → C → D → B
(3) C → A → E → B → D
(4) C → E → A → D → B

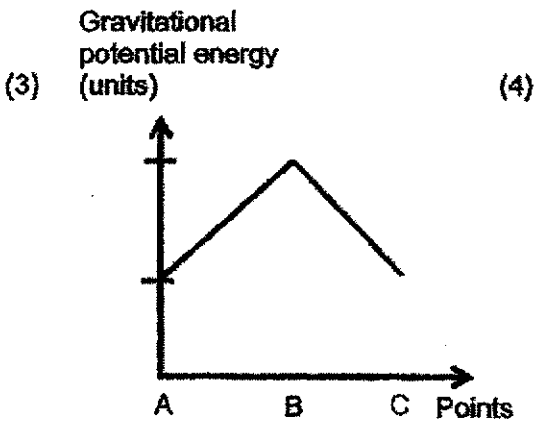
17. John kicked a football into the air as shown in the diagram below.

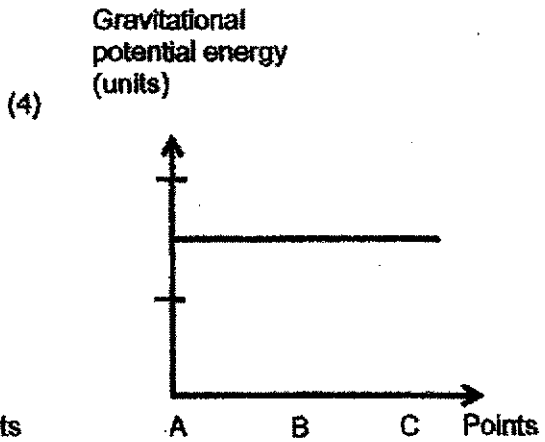


Which one of the following graphs shows the gravitational potential energy possessed by the ball as it moved from point A to C?

(1)


(2)


(3)


(4)


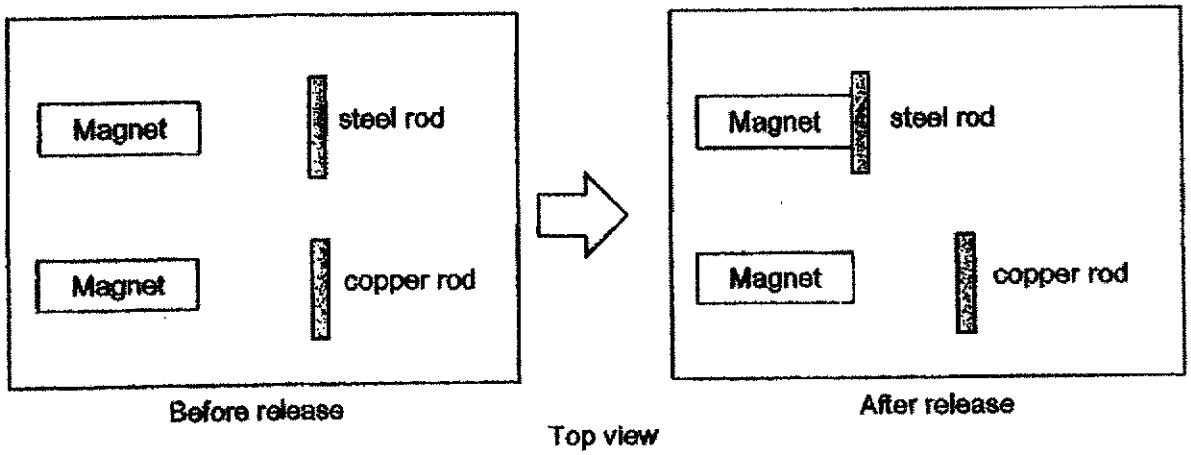
18. Alison did the following actions:

Rubbing her hands together
Jogging on the school's track

Which of the following shows the correct energy conversion for both actions?

(1) potential energy → sound energy → heat energy
(2) kinetic energy → potential energy → sound energy
(3) potential energy → kinetic energy + sound energy + heat energy
(4) kinetic energy → potential energy + heat energy + sound energy

19. Harry held a steel rod and a copper rod an equal distance from two identical magnets. The diagram below shows the top view of the set-up, before and after the rods were released.



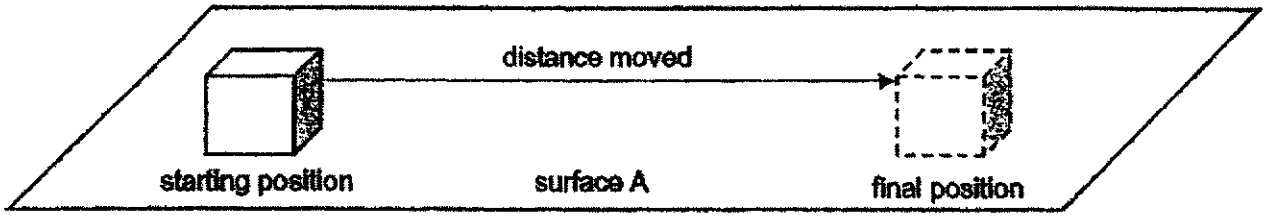
After both rods were released, the steel rod was observed to roll towards the magnet, but the copper rod stayed in the same position.

Based on the observations, which of the following statements are definitely true?

A Steel is a magnetic material.
B Magnetic force can act at a distance.
C The copper rod is too light to be attracted by the magnet.

(1) A and B only
(2) A and C only
(3) B and C only
(4) A, B and C

20. Jun Ming gave the box below a push from the starting position as shown in the diagram below. It slid and came to a stop. He measured the distance moved by the box. He repeated the experiment two more times, pushing the box each time with the same force.



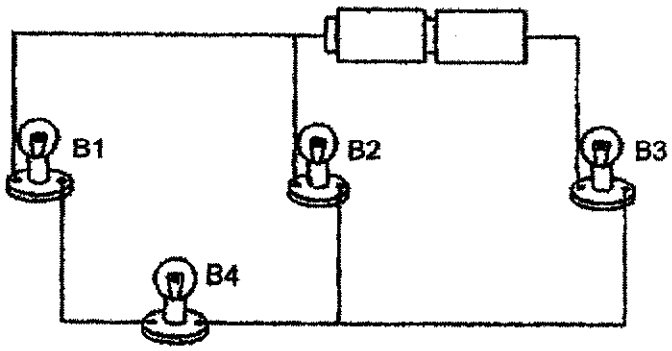
He then repeated the experiment on surfaces B, C and D. He recorded the results in the table below.

Surface	Distance moved (cm)			
	1st try	2nd try	3rd try	Average
A	4.2	4.8	5.2	4.7
B	8.1	7.7	7.5	7.8
C	12.0	12.2	11.3	11.8
D	8.8	10.2	9.9	9.6

Based on Jun Ming's results, which surface will cause the most wear and tear of the box?

(1) A
(2) B
(3) C
(4) D

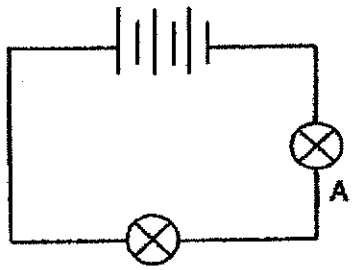
21. The diagram below shows 4 bulbs, B1, B2, B3 and B4, connected to 2 batteries.



One bulb fused and none of the bulbs could light up.
Which of the bulb(s) could have fused to cause this result?

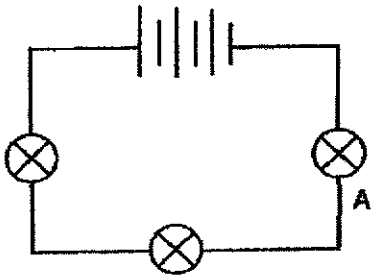
(1) B1
(2) B2
(3) B3
(4) B4

22. Two bulbs lit up with equal brightness in a circuit as shown in set-up 1 below.



Set-up 1

In set-up 2, a third light bulb was added to the circuit.



Set-up 2

What would be observed about bulb A's brightness in set-up 2?

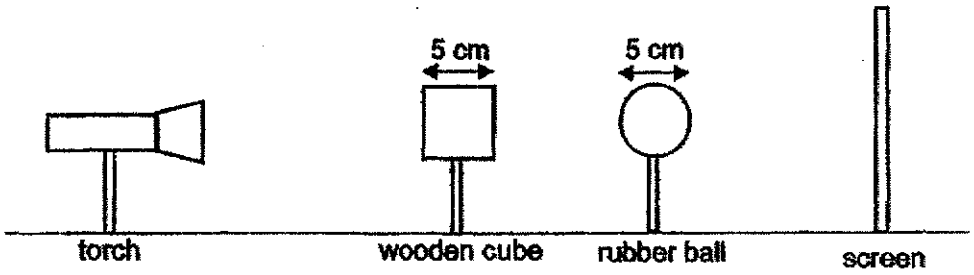
(1) It would not light up.
(2) It would be less bright.
(3) It would light up more brightly.
(4) It would light up with the same brightness as before.

23. Which of the following actions will help to conserve electricity?

A Use energy-efficient appliances.
B Turn off electrical appliances when not in use.
C Use the water heater when bathing on a hot day.
D Keep electrical appliances switched on, in standby mode, when not in use.

(1) A and B only
(2) A, C and D only
(3) B, C and D only
(4) A, B, C and D

24. In a dark room, a torch, a wooden cube and a rubber ball were arranged in a straight line as shown below.



Which one of the following would most likely be seen on the screen when the torch was switched on?

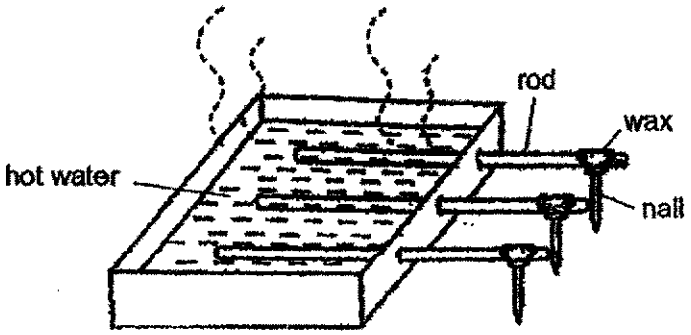
(1) 

(2) 

(3) 

(4) 

25. Mr Hafiz placed three different rods in hot water to find out which was the best conductor of heat. On the dry end of each rod, he attached a nail with some wax. When the wax melts, the nails will drop.

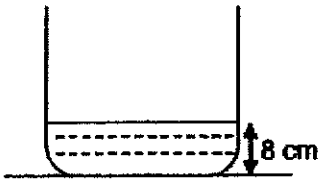


To conduct a fair test, which of the following variables must he keep the same?

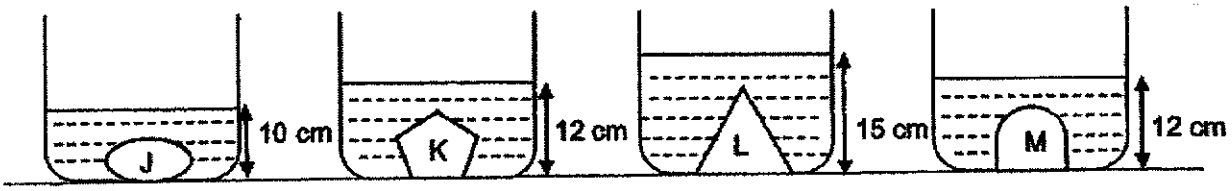
A mass of nails
B amount of wax
C material of rods
D time taken for the nail to drop

(1) A and B only
(2) C and D only
(3) A, B and C only
(4) A, B, C and D

26. Peiling took 4 identical beakers and filled them with water to a height of 8 cm.



She placed 4 different objects, J, K, L and M in each beaker. Then she measured the height of water in the beakers as shown in the diagram below.

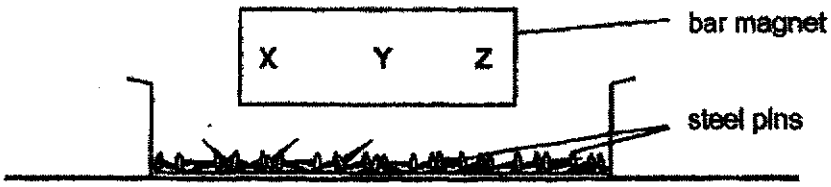


Based on her observations, which of the following are correct conclusions?

A Object J has the smallest mass.
B Object L has the greatest volume.
C Objects K and M have the same mass.
D Objects K and M occupy the same amount of space.

(1) A and C only
(2) B and D only
(3) A, B and C only
(4) A, B, C and D

27. Jeremy lowered a bar magnet into a container of steel pins as shown in the diagram below.

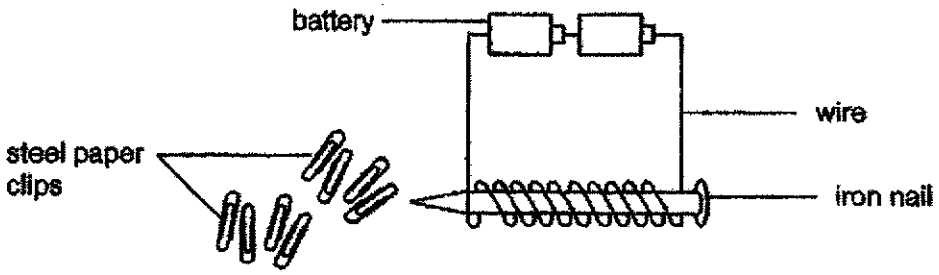


Then, he counted the number of steel pins that were attracted to each of the parts marked X, Y and Z.

Which one of the following correctly shows the most likely number of steel pins attracted to the bar magnet?

	Number of steel pins attracted		
	Part X	Part Y	Part Z
(1)	2	4	11
(2)	0	9	2
(3)	8	2	9
(4)	5	5	5

28. Geraldine made an electromagnet using two batteries, an iron nail and a piece of wire. She then brought some steel paper clips near the electromagnet as shown in the diagram below.



Geraldine counted the number of steel paper clips attracted by the electromagnet. If she wants more paper clips to be attracted by the electromagnet, which of the following should she do?

A Use a longer wire.
B Use more batteries.
C Use heavier steel paper clips.
D Increase the number of coils of the wire around the iron nail.

(1) A and C only
(2) B and D only
(3) A, B and C only
(4) B, C and D only

~ END OF BOOKLET A ~

NANYANG PRIMARY SCHOOL

2022
PRIMARY 6
PRELIMINARY EXAMINATION

SCIENCE
(BOOKLET B)

Total Time for Booklets A and B: 1 h 45 min

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the space provided.
2. Do not open this booklet until you are told to do so.
3. Follow all instructions carefully.
4. Answer all questions.
5. Write your answers to Questions 29 to 40 in the spaces provided.

Booklet A:		56
Booklet B:		44
Total:		100

Name: _____ ( )

Class: Primary 6 ( )

Parent's signature: _____

Please sign and return the paper the next day. Any queries should be raised at the same time when returning the paper.

Booklet B consists of 17 printed pages including this cover page.

Section B: Open-Ended Questions [44 marks]
Write your answers to questions 29 to 40 in the spaces provided.

29. Shawn carried out a study on animal X by setting up two cages. He placed 70 of animal X in cage 1, and another 70 of them with several animal Z in cage 2, for three years and provided them with enough food and water throughout. The tables below show his results.

Year	0	1	2	3
Number of animal X	70	74	69	72

Cage 1
(Animal X only)

Year	0	1	2	3
Number of animal X	70	69	71	70

Cage 2
(Animals X and Z)

(a) Describe and explain the changes in the population of animal X in **cage 1** from; [2]

Year 0 to 1: _____

_____

Year 1 to 2: _____

_____

(b) Based on the two tables above, state the effect of the presence of animal Z on the population of animal X over three years. [1]

_____

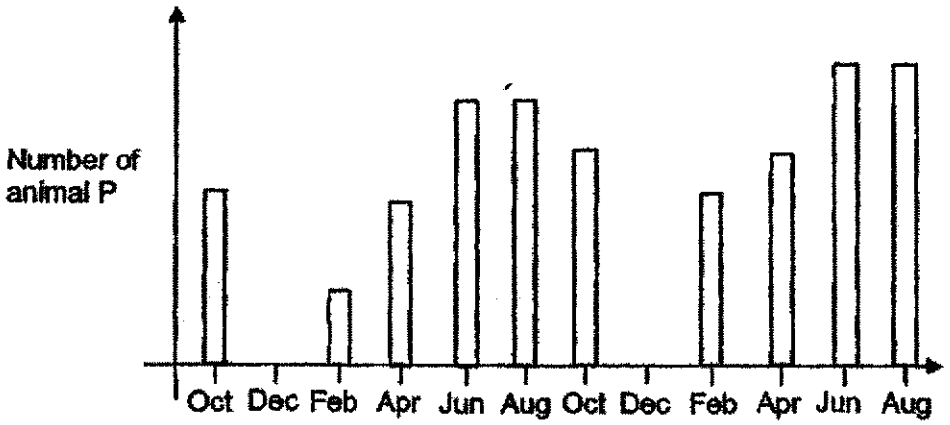
_____

30. The food chain below shows the relationship between organisms in a habitat.

grass → animal P → animal K

(a) What is the most likely effect of increasing the population of animal K on the population of animal P? Explain why. [2]

Animal K was then totally removed from the habitat. The population of animal P was studied and shown in the graph below. The habitat receives heavy snowfall during the winter months of December to January.

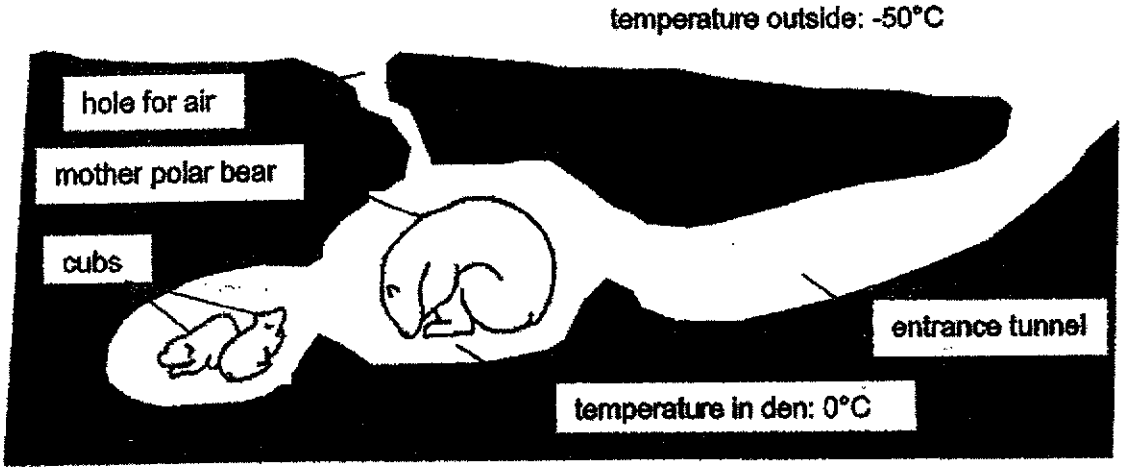


(b) Explain how the heavy snowfall most likely affects the grass population in this habitat. [1]

(c) Based on all the information above, describe the change in the number of animal P from October to December each year. Give a possible reason for the change. [1]

(d) What is a disadvantage for animal P if its population size continues to increase? [1]

31. Pregnant polar bears build dens in the snow before giving birth as shown below.



(a) State whether building a den is a behavioural or structural adaptation. [1]

_____

(b) Based only on the information given above, state two advantages and explain how building a den helps to increase the chances of survival of the cubs instead of being out on the ground [2]

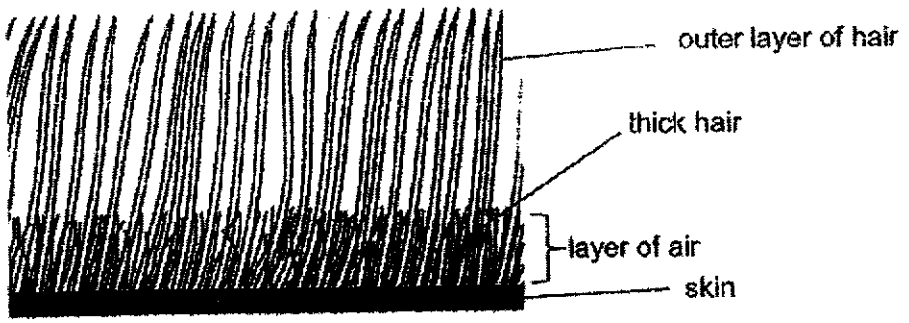
Advantage 1: _____

_____

Advantage 2: _____

_____

The diagram below shows the hair of the polar bear.



(c) Explain how the thick hair of the polar bear helps it survive the cold environment. [1]

_____

_____

32. Zhiming performed three different activities, X, Y and Z, for 30 minutes.

The three activities are as follows:

X Strolling with his dog at the park.
Y Taking an afternoon nap on the bed.
Z Playing a game of basketball with his friends.

After each activity, he immediately measured the number of breaths he took in one minute and recorded the readings in the table below.

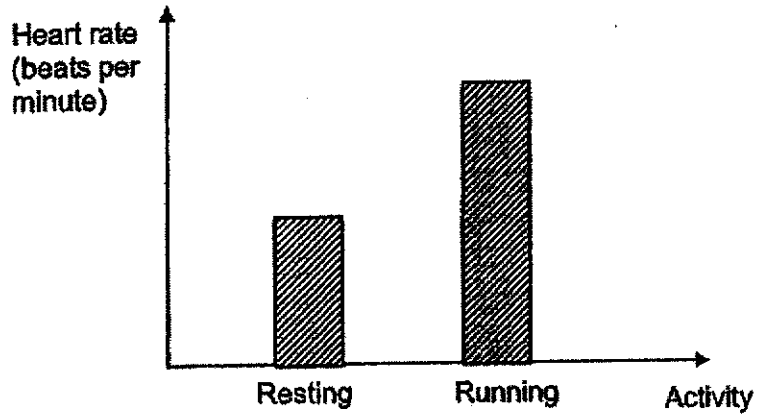
Activity	Number of breaths taken in one minute			
	1st reading	2nd reading	3rd reading	Average
X	21	22	20	21
Y	12	16	14	14
Z	46	45	44	45

(a) What was the aim of his experiment? [1]

(b) Explain why Zhiming's breathing rate increased when his activity gets more intense. [1]

(c) Explain why Zhiming recorded three readings for each activity in the table above. [1]

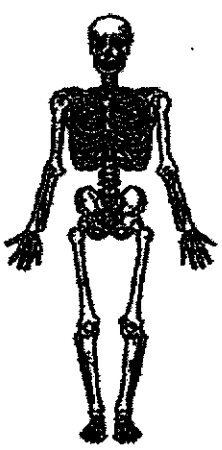
33. Jaime recorded her heart rate during two activities, resting and running, in the graph below.



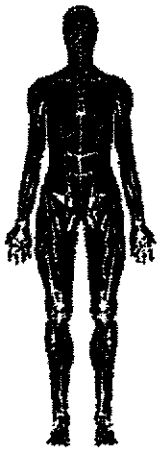
Explain why her heart rate needs to increase when she was running. [2]

2

34. The diagram below shows organ systems P and Q in the human body.



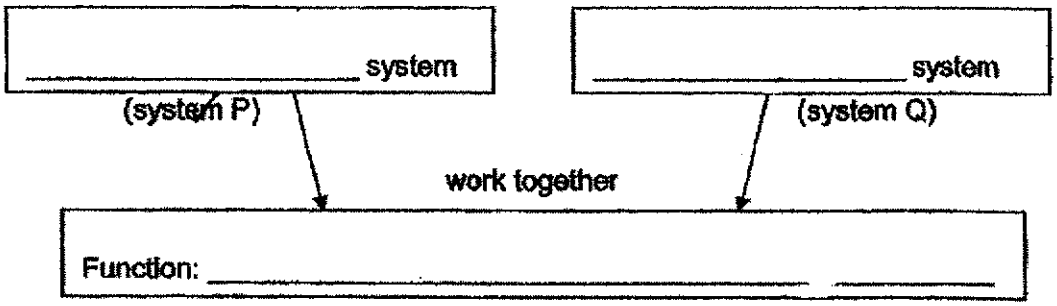
Organ system P



Organ system Q

Organ system P works closely together with organ system Q to provide an important function in the human body.

(a) Name systems P and Q and state the function that they perform together. [2]

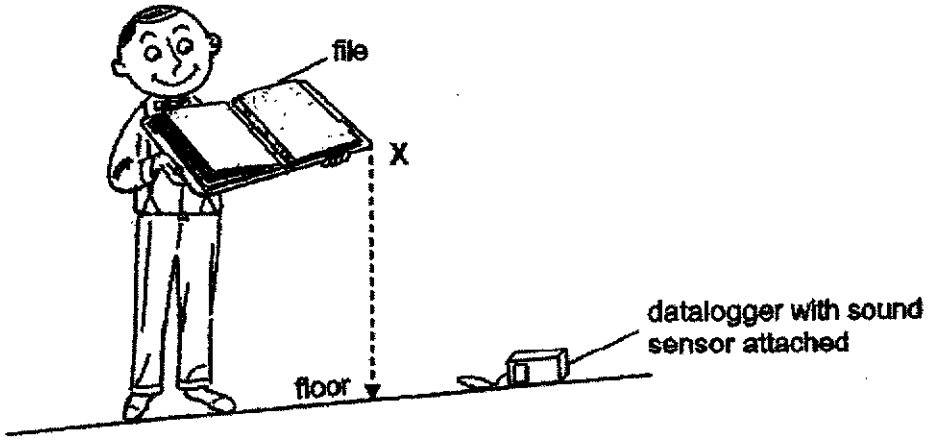


Mr Lim was in a car with a seatbelt strapped on when he met with an accident. He knocked his head and got a cut but his brain was not affected.

(b) State the function of organ system P that prevented Mr Lim from getting a brain injury. [1]

_____

35. Mr Chan conducted an experiment by lifting a file to point X and releasing it. He placed a datalogger with sound sensor on the floor to measure the amount of sound the file made when it hit the floor.

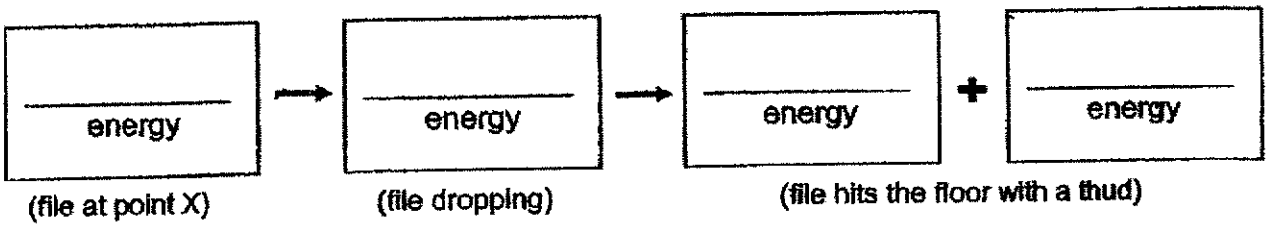


(a) Why must Mr Chan remain silent when he was conducting this experiment? [1]

_____

_____

(b) Fill in the boxes below to show the main energy conversions as the file dropped to the floor. [1]



2

(Continue from Q35)

Mr Chan repeated the experiment with different heights of point X and recorded the readings from the datalogger in the table below.

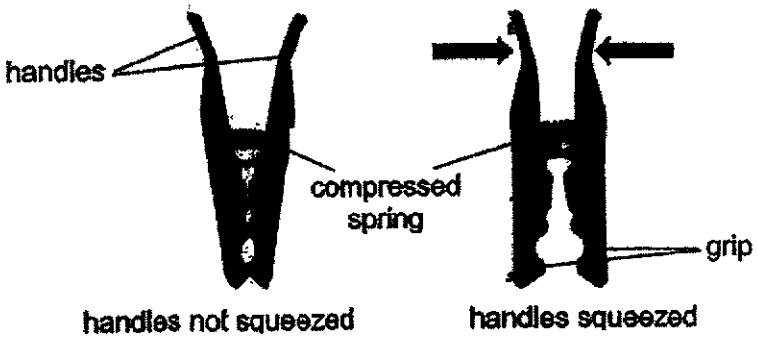
(c) In the table below, fill in the possible value for the amount of sound measured by the sound sensor when the file hit the floor. [1]

Distnace between point X and the floor (cm)	Amount of sound measured by the sound sensor (units)
40	20
60	45
80	
100	84

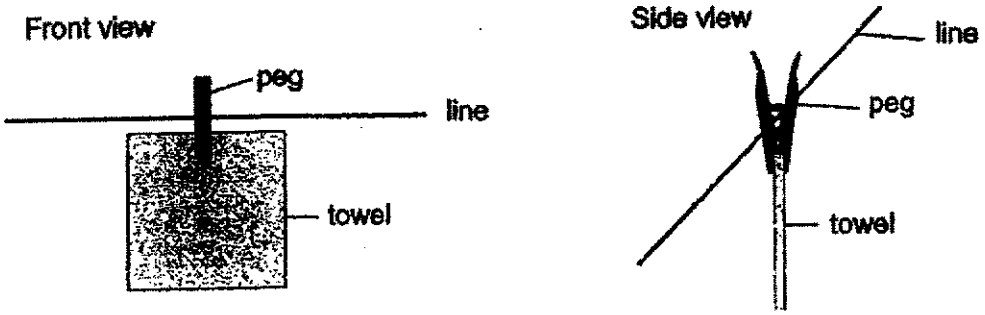
Mr Chan removed all the worksheets from the file.

(d) What would he observe about the amount of sound detected by the sound sensor? Explain your answer in terms of energy conversion. [2]

36. Springs are used in a peg as shown below. The arrows show the way the peg is squeezed at the handles to open its grip.



After Mrs Tan squeezes the peg and releases it, the peg can hold her towel up on the line as shown in the diagram below.



(a) Explain, in terms of forces:

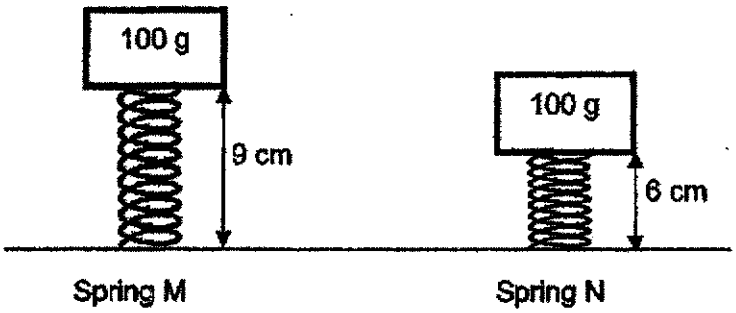
(i) How the spring keeps the peg closed. [1]

(ii) How the peg prevents the towel from slipping down. [1]

2

(Continue from Q36)

Mrs Tan wanted to investigate the effect of a force on two 12cm springs, M and N. She placed a 100g load on top of each spring and measured their new lengths as shown in the diagram below.



(b) Based on the results of Mrs Tan's investigation above, explain in terms of forces, which spring, M or N, should be used for the pegs so that they can hold the towel more tightly. [2]

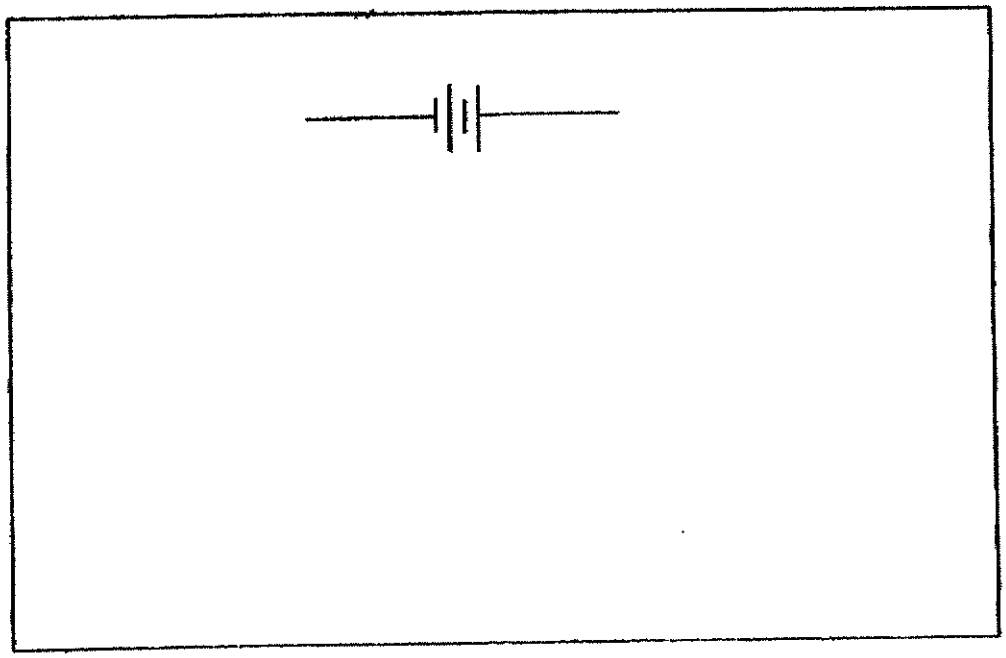
2

37. Valli constructed a circuit using 2 batteries and 2 bulbs in working condition. She added two switches, P and Q.

She opened and closed the switches to investigate the number of bulbs that lit up. The results are shown in the table below.

Switch		Number of bulbs lit
P	Q	
open	open	0
open	close	1
close	open	0
close	close	2

(a) Based on the observations, **draw** the circuit diagram that Valli had most likely constructed. **Label** switches P and Q clearly. [2]



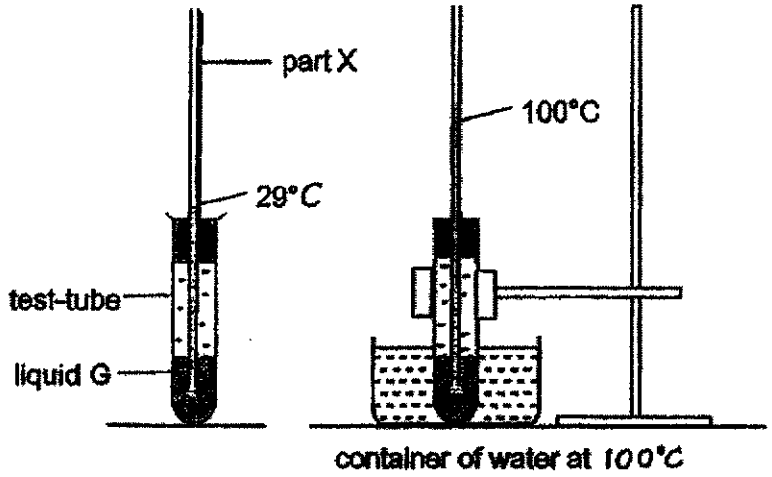
(b) Give one advantage of using a switch in an electrical circuit. [1]

_____

_____

38. Janelle wanted to make her own thermometer using the set-up below.

She poured a colourless liquid G into a test-tube with part X inserted. Then, she placed the test-tube in a container of water at 100°C and observed liquid G moving down before moving up part X.



When liquid G reached the highest point possible in part X, she marked the point as 100°C.

(a)(i) Explain why liquid G moved down at first when the test-tube was placed in the container of water. [1]

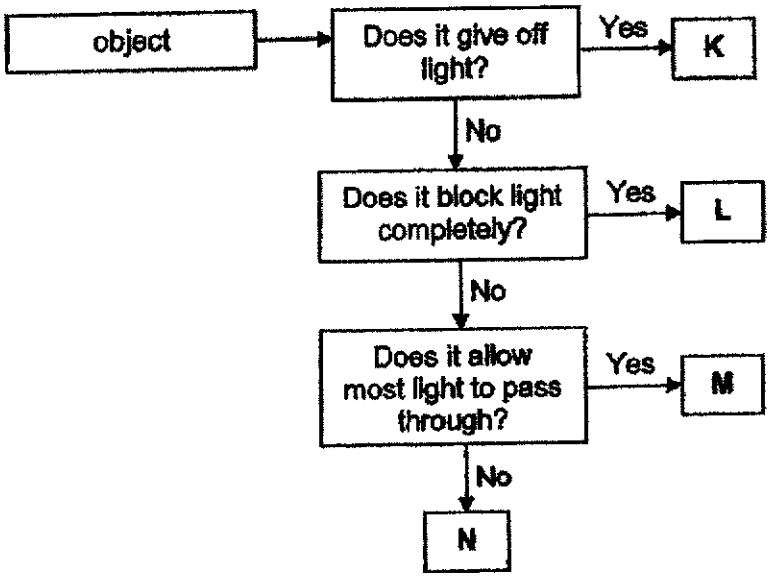
(a)(ii) Explain why after one minute, liquid G moved up part X. [1]

Janelle's sister told her that she should make part X narrower. She should also add colour to liquid G. Explain how these 2 actions can help to improve Janelle's thermometer. [2]

	Action	Explain how it improves the accuracy of the thermometer
(b)(i)	~~Mark~~ part X narrower.	
(b)(ii)	Add colour to liquid G.	

4

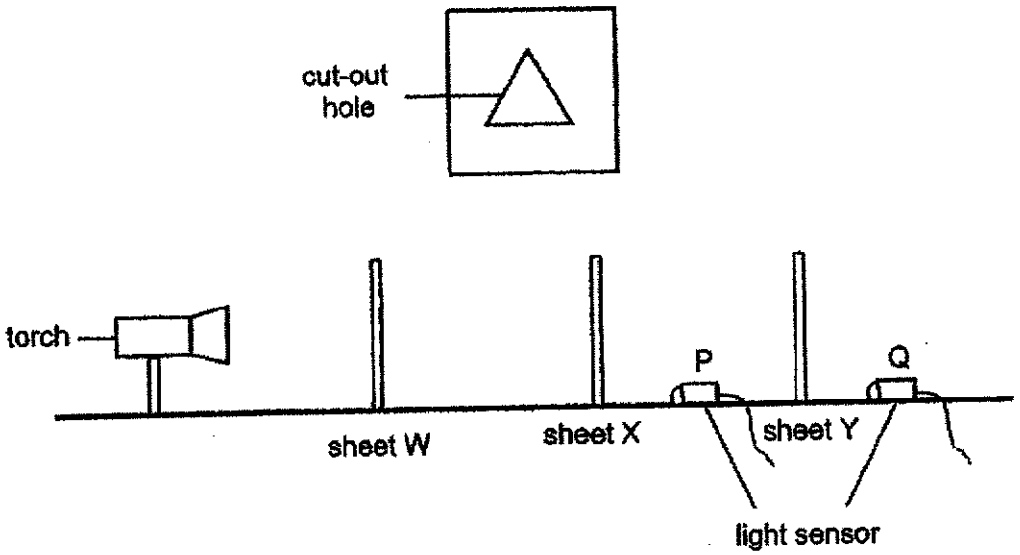
39. Study the flowchart below.



(a) Give an example of object K. [1]

Ethan cut out a triangular hole in sheet W and arranged it in line with two rectangular sheets, X and Y, made of different materials. When the torch was switched on, a bright triangular patch of light was observed on sheet Y.

The amount of light was measured behind sheet X at position P and then behind sheet Y at position Q, as shown in the diagram below.



1

(Continue from Q39)

The results are recorded in the table below.

Position of light sensor	Light detected (units)
torch	500
P	490
Q	150

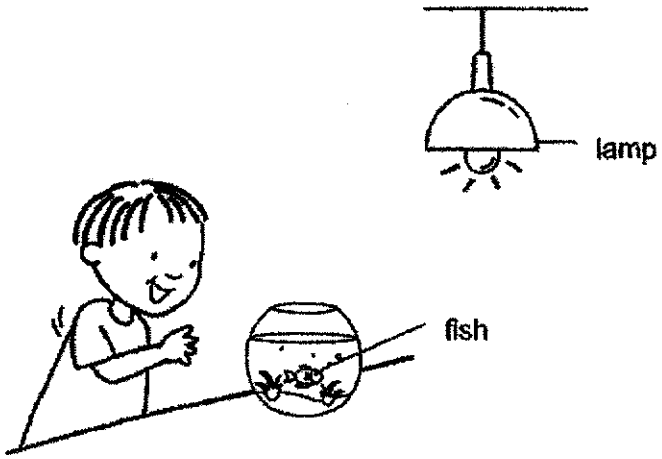
(b) Based on the observation, which objects L, M or N have a similar property to sheets W, X and Y? Use each letter only once. [1]

Sheet	Object
W	
X	
Y	

(c) State one property of light that was observed in Ethan's investigation. [1]

_____

Ethan kept a fish in a bowl as shown in the diagram below.

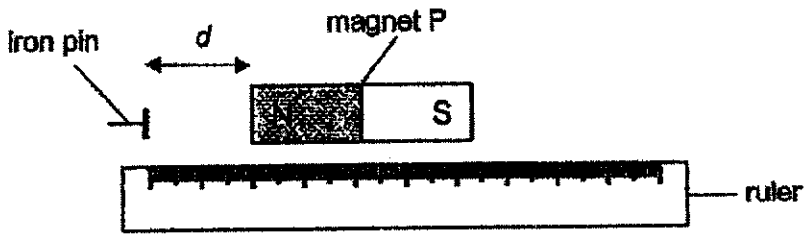


(d) Explain clearly how Ethan was able to see the fish inside the bowl when the lamp was turned on at night. [1]

_____

_____

40. Li-Tseng set up the experiment as shown below to compare the strength of four magnets P, Q, R and S.



He placed the pin at one end of the plastic ruler and moved the magnet towards it. He measured the distance, *d*, at which the iron pin was first attracted to magnet P. He repeated the experiment using three other magnets, Q, R and S.

Li-Tseng recorded the results of his experiment in the table below.

Magnet	Distance between magnet and iron pin, *d* (cm)
P	3
Q	6
R	1
S	4

(a) Based on his results, arrange the magnets, P, Q, R and S from the strongest to the weakest in magnetic strength. [1]

Strongest → Weakest			

(b) Which of the following variables should Li-Tseng keep constant to ensure a fair test? Put a tick (✓) in the correct box/ boxes below. [1]

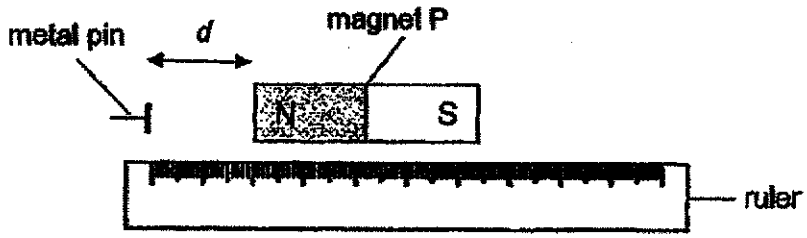
	Variables to be kept constant for a fair test	Tick (✓)
(i)	Distance between the magnet and the pin	
(ii)	Material of pin used	
(iii)	Mass of pin used	

Continue →

2

(Continue from Q40)

Li-Tseng repeated the experiment using another metal pin of the same mass as shown below. He observed that the metal pin did not move towards magnet P.



(c)(i) Give an example of a material the metal pin was most likely made of. [1]

_____

(ii) Explain his observation above. [1]

_____

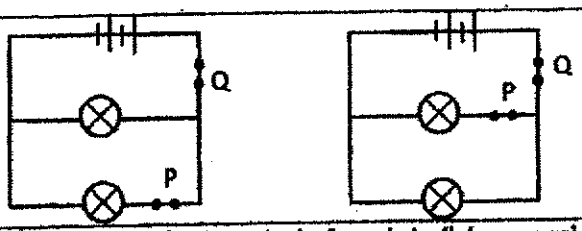
_____

~ END OF BOOKLET B ~

2022 Prelim Science Suggested Answer

1	1	6	3	11	3	16	2	21	3	26	2
2	4	7	2	12	2	17	3	22	2	27	3
3	1	8	1	13	1	18	3	23	1	28	2
4	1	9	3	14	2	19	1	24	4		
5	3	10	2	15	4	20	1	25	1		

Qn	Acceptable Answers
29a	Year 0 to 1: The population of animal X **increased** due to **reproduction**. Year 1 to 2: The population of animal X **decreased** due to **death**
29b	Animal Z has **no effect** on the population of animal X.
30a	The number of animal P **decreased** as there is **more animal K preying on animal P.**
30b	Grass population **decreases** as it is covered with snow and it **cannot photosynthesise/ die.**
30c	Population of P **decreases** due to **migration/ death.**
30d	There will be **more competition for food/ water/ shelter** and P will **die/ cannot survive.**
31a	It is a **behavioural** adaptation.
31b	Any 2 i) The mother polar bear can block the entrance of den to protect the cubs from predators. ii) The inside of the den is warmer so less heat is lost from the body of the bears/ to the (colder) surroundings. iii) Cubs out of sight from predators, this prevents the cubs from being eaten by predators.
31c	The thick hair **traps air**, which is a **poor conductor of heat** and **reduces heat loss** from the body of the bear/ to the surroundings.
32a	To find out how the different activities affect his breathing rate/ number of breaths per min.
32b	To get **more oxygen/ get oxygen faster** and **remove more carbon dioxide/ remove carbon dioxide faster.**
32c	To ensure reliability/ consistency of the results.
33	Her heart needs to **pump blood** faster to transport **oxygen and digested food** to **all parts of her body** and to **remove carbon dioxide** (from all parts of her body).
34a	System P – **skeletal** System Q – **muscular** Function: to allow movement of the body.
34b	P protects the organs/ brain.

35a	Only the sound made by the file when it hit the floor will be detected by the sound sensor.
35b	(Gravitational) Potential energy (file at point X) → Kinetic energy (file dropping) → Kinetic / Heat energy + Sound energy (file hits the floor with a thud)
35c	46 ≤ answer ≤ 83
35d	Choice **Softer sound** detected Data- File has **less mass** Explain- **less potential energy convert to (less) kinetic and sound energy.**
36ai	The compressed spring exerts an **elastic spring force** on the **handles** to close the peg.
36aii	**Frictional force** between the peg and towel **acts against gravitational force**.
36b	Choice: Spring **M**. Data: It **decreased less** in length when the same load was placed on it. Explain: It is **stiffer/ not as flexible** and would close the peg with **more (elastic spring) force**.
37a	
37b	It allows independent control of each bulb/ convenient to turn the bulb off and on.
38ai	The test-tube **gained heat from the hot water** and **expanded faster/ more** than liquid G.
38aii	Liquid G **gained heat from the test-tube** and **expanded**.
38bi	The same volume of liquid G moving up or down part X would **result in a greater change in the height of the liquid level.**
38bii	Liquid G will be **more clearly seen**.
39a	Any object that is a light source i.e. sun, fire, lit bulb, lantern, star
39b	Sheet W – object L Sheet X – object M Sheet Y – object N
39c	Light travels in a straight line./ Light can be blocked./ Light can be reflected. Light can pass through transparent/ translucent materials.
39d	The fish reflected light from the lamp into Ethan's eye.
40a	Q, S, P, R
40b	Tick (ii) and (iii)
40ci	Any non-magnetic metal. i.e. Copper/ aluminium/ silver/ gold/ titanium/ platinum/ bronze.
40cii	It is a non-magnetic material so it is not attracted to magnet P.