THE PIQUE LAB LEARNING CENTRE

Primary School Science Programme

P5 CCI™ SCIENCE COURSE

Answer Booklet (2024)

Name: _____

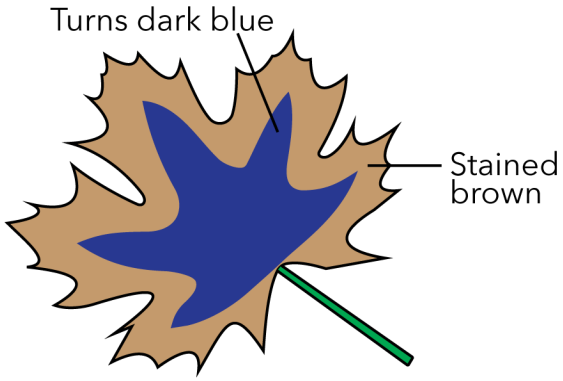
Class: _____

TOPICS COVERED

2024 CCI™ SCIENCE COURSE
TOPIC: CELLS

Technique: Use the function of cell part to expand your answer.

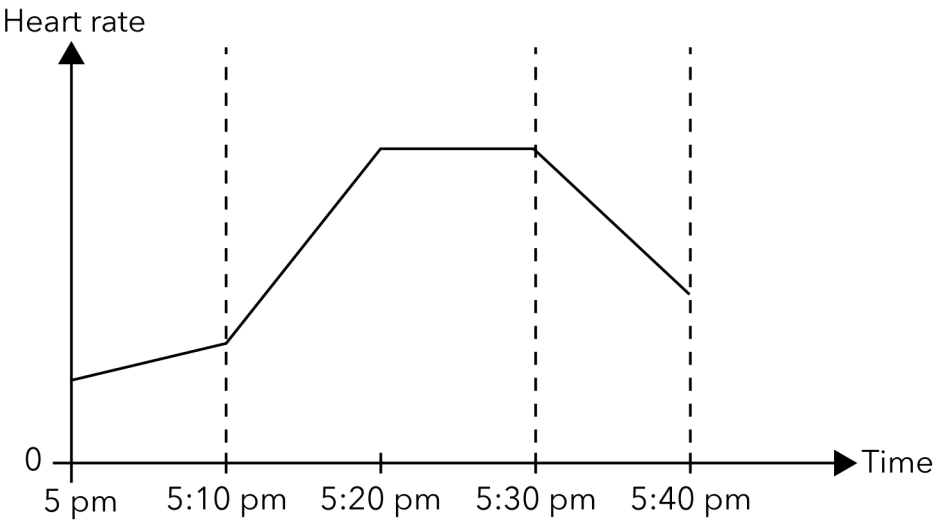
Usage of the technique:
BOLD – Cell part
UNDERLINE – Function of the cell part

Qn	Answer
Q1 (a)	**Choose:** Cell A. **Use Data:** Cell A has **chloroplasts**, **Explain Data:** which contain chlorophyll to trap sunlight for photosynthesis to make food, unlike cell B. Chlorophyll is the green pigment that gives the leaf its green colour.
Q1 (b)	
Q2 (a)	**Choose:** No. **Use Data:** Cell X has a **cell wall** **Explain Data:** to give the cell a regular shape, which is found only in plant cells. Hence, Cell X cannot be a cheek cell, which is an animal cell.
Q2 (b)	**Choose:** Cell X. **Use data:** It has a cell wall but does not have chloroplasts. **Explain data:** The root cell of the plant is found underground and is not exposed to sunlight. Thus, it does not carry out photosynthesis and would not require **chloroplasts**, which contain chlorophyll to trap sunlight for photosynthesis to make food, which is similar to cell X.
Q2 (c)	Cell Y has a **cell wall** to give the cell a regular shape and prevent it from bursting when placed in sugar solution, unlike cell Z.

Q3 (a)	**Choose:** Part B. **Use data:** Part B has a **nucleus**, **Explain data:** which contains genetic information and controls all the activities in the cell such as respiration to release energy, allowing it to continue to grow. This is unlike part A, which will eventually die.
Q3 (b)	Cell Y's **cell membrane** controlled the movement of substances entering and leaving the cell. It allowed water to enter the cell but not substance Q.

Techniques:

1) 3 ways on how the 5 systems work together
2) Apply template answers - Heart rate/breathing rate/pulse rate
3) Increased (exposed) surface area (Chewing/Air sacs/Villi)
4) Graph for oxygen/ carbon dioxide in the circulatory system
5) Inhaled Air VS Exhaled Air

Qn	Answer
Q1 (a)	
Q1 (b)	*[Try by yourself: Refer to page 22 of CCI notes Volume 1]* As Faith was running, her body needed more energy. Thus, her heart rate increased to pump blood faster to transport more oxygen and digested food through the blood vessels to all parts of the body, where they are used for respiration to release more energy and carbon dioxide at a faster rate. Blood containing carbon dioxide is then transported away from her body at a faster rate for the carbon dioxide to be removed.

Q1 (c)	**Choose:** Sample B. **Use Data:** It had less oxygen and more carbon dioxide than Sample A. **Explain Data:** As Faith was running, her body needed more energy. Thus, more oxygen was used by her body to carry out respiration at a faster rate to release more energy and carbon dioxide.
Q2 (a)	Mouth, stomach and small intestine.
Q2 (b)	*[Try by yourself: Refer to page 11 of CCI notes Volume 1]* There are numerous folds found on the walls of the small intestine. They increase the surface area of the walls of the small intestine in contact with the digested food for faster absorption of digested food into the bloodstream.
Q2 (c)	The digestive juices released by the digestive system are not able to break down some of the undigested food into simpler substances, causing them to remain as undigested food.
Q3	In extremely cold conditions, the blood vessels near the skin surface become extremely narrow, causing insufficient blood to be transported to the surface of the skin. Thus, the skin cells receive insufficient oxygen and digested food from the blood for respiration to release energy and die.

Techniques:

1) HPC Structure of writing

Qn	Answer
Q1 (a)	*[Hint: Refer to page 7 of CCI notes Volume 2]* The water (H) gained heat from the warmer surrounding air (P) to evaporate (C) and form water vapour.
Q1 (b)	*[Hint: Refer to page 9 of CCI notes Volume 2]* Choose any 2 factors: i) Greater wind speed ii) Larger exposed surface area of the water puddle iii) Higher temperature of the surrounding air iv) Lower humidity level (not in syllabus)
Q1 (c)	*[Try by yourself: Refer to page 10 of CCI notes Volume 2]* The presence of wind from the breeze caused the water in the sweat on the surface of his skin to (H) gain heat faster from his body to (P) evaporate faster, causing his body to lose heat to the water faster and cool faster.
Q2 (a)	*[Try by yourself: Refer to page 12 of CCI notes Volume 2]* The cups lost heat to the cold water to become cooler. The warmer water vapour from the surrounding air came into contact with the cooler outer surface of the cups, (H) lost heat to them (P) and condensed (C) to form water droplets.
Q2 (b)	Cup A is made of a better conductor of heat than cup B. Thus, the warmer water vapour from the surrounding air (H) lost heat faster to the cooler outer surface of cup A and (P) condensed faster to (C) form more water droplets.

Q2 (c)	**Choose:** Cup A. **Use Data:** There were more water droplets on the outer surface of cup A than cup B. **Explain Data:** This shows that cup A is made of a better conductor of heat, allowing the hot coffee to lose heat faster to the cooler surrounding air and cool faster.
Q3 (a)	Yes. The metal lid is a better conductor of heat than the glass bottle. Thus, the metal lid would (H) gain heat faster from the hot water and (P) expand faster than the glass bottle, allowing the metal lid to loosen and be removed more easily.
Q3 (b)	Glass is a poor conductor of heat. When the jam jar was placed in iced water, the outer surface of the jar lost heat faster to the iced water and contracted faster than the inner surface of the jar. The difference in the rate of contraction between the outer and inner surface of the jar caused it to crack.

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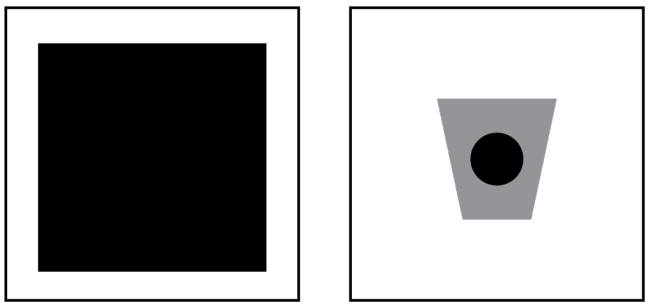
TOPIC: WATER CYCLE

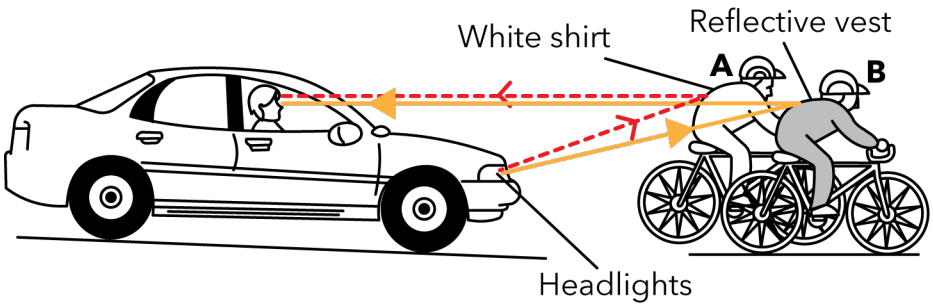
Qn	Answer
Q1 (a)	**Clouds:** Water droplets **Water from water bodies:** Water at 80 °C **Cooler surrounding air:** Plastic sheet
Q1 (b)	*[Try by yourself: Refer to page 26, Q1 of CCI notes Volume 2]* **Plastic sheet:** The plastic sheet prevents water vapour from escaping. The warmer water vapour that comes into contact with it would (H) lose heat to the plastic sheet and (P) condense (C) to form water droplets. *[Try by yourself: Refer to page 26, Q3 of CCI notes Volume 2]* **Ice cubes:** The plastic sheet loses heat to the ice cubes and becomes cooler. This allows the warmer water vapour that comes into contact with the cooler underside of the plastic sheet to (H) lose heat faster to it and (P) condense faster (C) to form more water droplets.
Q1 (c)	*[Try by yourself: Refer to page 27, Q4 of CCI notes Volume 2]* Water droplets would form on the outer surface of the beaker instead of on the underside of the plastic sheet. The beaker would lose heat to the cold 5 °C water to become cooler. The warmer water vapour from the surrounding air would come into contact with the cooler outer surface of the beaker, (H) lose heat to it and (P) condense (C) to form water droplets.
Q2 (a)	There were holes in terrarium B. Thus, when the water in the soil evaporated to form water vapour, the water vapour was able to escape through the holes. This caused the soil to become dry and the roots did not have water to absorb. As the plants did not have water for photosynthesis to make food, they died.

Q2 (b)	*[Try by yourself: Refer to page 22, Q1 of CCI notes Volume 2]* The water from the moist soil (H) gains heat from the warmer surrounding air to (P) evaporate and (C) form water vapour. Water is also lost through the stomata of the plants as water vapour (in the process of transpiration). The warmer water vapour then rises and comes into contact with the cooler inner surface of terrarium A, (H) loses heat to it and (P) condenses to (C) form water droplets. The water droplets fall back to the soil and the cycle repeats itself.
Q2 (c)	**Benefit 1:** The snails carry out respiration, releasing carbon dioxide for the plants to take in for photosynthesis to make food. **Benefit 2:** The waste materials that the snails pass out are decomposed and return to the soil as mineral salts, which act as fertiliser for the plant.
Q3 (a)	*[Try by yourself: Refer to page 23, Q1 of CCI notes Volume 2]* The water in the sea water (H) gains heat from the flame of the Bunsen burner and (P) evaporates to (C) form water vapour. The warmer water vapour rises and enters the delivery tube, (H) loses heat to the cooler inner surface of the delivery tube, and (P) condenses (C) to form water droplets, which drip into the beaker to be collected as pure water.
Q3 (b)	*[Try by yourself: Refer to page 27, Q5 of CCI notes Volume 2]* The cold cloth and delivery tube gained heat from the warmer water vapour to become warmer. This causes the warmer water vapour to (H) lose heat slower to the cooler inner surface of the delivery tube and (P) condense slower (C) to form less water droplets, causing pure water to collect in the beaker at a slower rate.
Q3 (c)	Salt will be left behind in the conical flask as it is unable to evaporate.

Techniques:

- Apply light template answer
- Apply shadow template answer

Qn	Answer
Q1 (a)	1
Q1 (b)	Light travels in a straight line.
Q1 (ci)	*[Hint: Refer to page 1 of CCI notes Volume 3]* The shadow of the puppet is formed when light from the light source, which travels in a straight line, is (completely) blocked by the puppet, which is opaque.
Q1 (cii)	If a rejected object is used, the shadow formed on the screen facing the audience may be too faint for them to see the shadow clearly.
Q1 (d)	Bring the puppet closer to the screen.
Q1 (e)	When the puppet is closer to the screen, the size of the shadow formed on it would decrease. The audience may not be able to see the movement of the smaller shadow easily.
Q2 (a)	 **Box 1** **Box 2**
Q2 (b)	Material P is opaque. Thus, light from the torch could not pass through material P and **Use Shadow Template:** no light from the torch, which travels in a straight line, would be blocked by the mirror, preventing a shadow from being cast on the screen.

Q3 (a)	
Q3 (b)	*[Hint: Refer to page 1 of CCI notes Volume 3]* **Choose:** Cyclist B. **Use Data:** Cyclist B is wearing a reflective vest, unlike Cyclist A. **Explain Data:** Thus, more light from the headlights of the car would be reflected off the reflective vest of cyclist B into the driver's eyes, allowing the driver to see cyclist B more easily.

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TOPIC: MAGNETS

Techniques:

1) 3 Golden Rules of magnetism
2) Unlike poles of magnets facing each other attract
3) Like poles of magnets facing each other repel
4) Attract object with a GREATER magnetic force

Qn	Answer
Q1 (a)	*[Hint: Refer to page 19 of CCI notes Volume 3]* Place the magnet beside the bottom right corner of the plastic tank. (1) The magnet's magnetism will act at a distance and (2) pass through the plastic tank and the oil, which are non-magnetic objects, to (3) attract the iron disc, which is made of a magnetic material. Move the magnet towards the small opening with the iron disc still attracted to it.
Q1 (b)	No. Aluminium is a non-magnetic material and would not be attracted by the magnet.
Q2 (a)	*[Try by yourself: Refer to page 17 of CCI notes Volume 3]* **Choose:** The steel rod would move towards iron rod Y. **Use data:** Circuit B has more batteries, **Explain data:** causing iron rod Y to become an electromagnet with a greater magnetic strength and attract the steel rod with a greater magnetic force than iron rod X.
Q2 (b)	When the switch is closed, there would be a closed circuit with the coils of wire. Thus, electric current flows through the coils of wire, causing the iron core to become an electromagnet. (1) The electromagnet's magnetism acts at a distance (3) to attract the steel block, which is made of a magnetic material. This exerts a pull force on the steel block, causing it to move downwards, lifting the barrier arm up.

Q3 (a)	*[Try by yourself: Refer to page 15 of CCI notes Volume 3]* The moving belt carries the metals towards the roller with a magnet in it. As the metals move over the roller, the magnet attracts only the magnetic metals, causing them to remain on the moving belt while the non-magnetic metals fall off the belt and are collected in container B. As the magnetic metals move towards container A, (*add on) ***P5 Answer:** they move further away from the magnet. The magnet can no longer attract the magnetic metals, causing them to fall into container A to be collected. ***P6 Answer:** the magnetic force of attraction acting on the magnetic metals becomes weaker than the gravitational force acting on the magnetic metals, causing them to fall into container A to be collected.
Q3 (b)	**P5 Answer: (Use magnets to explain)** Some of the magnetic metals were too heavy. Thus, the magnetic force of attraction was not strong enough to attract the magnetic metals, causing them to fall into container B. **P6 Answer: (Use forces to explain)** The gravitational force acting on the magnetic metals was stronger than the magnetic force of attraction acting on the magnetic metals, causing them to fall into container B.

Commonly tested processes:

1) Germination
2) Photosynthesis
3) Respiration
4) Transpiration
5) Types VS agents of pollination (Special characteristics of the flower)
6) Seed Dispersal
7) Each time an adaptation is mentioned, it is mandatory to EXPLAIN the adaptation.

Qn	Answer
Q1 (a)	A, C, B, D
Q1 (b)	**Decrease in the mass of the seed leaves:** The food stored in the seed leaves is used by the plant to carry out respiration to release energy until the true leaves are formed, causing the mass of the seed leaves to decrease. **Increase in the mass of the seedling:** The seedling carries out respiration to release energy for growth. As the seedling grows, the seedling increases in size/height, causing its mass to increase.
Q1 (c)	At stage D, the plant has developed its true leaves, which contain **chloroplasts** that contain chlorophyll to trap sunlight in the process of photosynthesis to make its own food.
Q2 (a)	*[Hint: Refer to page 12 of CCI notes Volume 4]* **Choose:** W. **Use data:** Only the stem above part Q swelled. **Explain data:** At part Q, the food-carrying tubes were removed. Thus, food **made by the leaves** between parts P and Q during photosynthesis could not be transported past part Q **down to the roots**. The food **accumulated** above part Q, causing only the part of the stem above part Q to swell.

Q2 (b)	*[Try by yourself: Refer to page 14, scenario 3B of CCI notes Volume 4]* No. At part P, both the food-carrying tubes and the water-carrying tubes were removed. Water **absorbed by the roots** could not be transported past part P **up** to the leaves. Thus, the leaves above part P **could not receive water for photosynthesis to make food** and died.
Q3 (a)	Plant Q; Plant P
Q3 (b)	*[Hint: Refer to page 18 of CCI notes Volume 4]* **Use data:** The number of young plants P found further from the parent plant is greater than that of young plants Q. **Explain data:** The fruits of plant P have wing-like structures that increase the exposed surface area of the fruits in contact with the surrounding air. This allows more air resistance to act on the fruits for them to stay longer in the air and be dispersed further away from the parent plant by wind, as shown in the graph.
Q3 (c)	*[Try by yourself: Refer to page 24 of CCI notes Volume 4]* It is likely that the fruits of the plants on Island Y have a fibrous husk that traps air, allowing them to float on water to reach island Z. Under suitable conditions, the seeds in the fruits germinated, causing new plants of the same species to grow on Island Z.
Q4 (a)	It decreases/ slows down water loss (through the stomata).
Q4 (b)	1. When the stomata reduce in size, less carbon dioxide enters the stomata and the rate of photosynthesis decreases. 2. When the amount of water absorbed decreases, the plant does not have enough water for photosynthesis, causing the rate of photosynthesis to decrease. 3. The wilting leaves have less exposed surface area in contact with sunlight, causing the leaves to trap less sunlight for photosynthesis, causing the rate of photosynthesis to decrease.
Q5	The plants at the upper layers block sunlight from reaching the forest floor. Thus, the plants at the forest floor could not trap enough sunlight for photosynthesis to make food. Less food was available for respiration to release energy, which is needed for growth and reproduction, causing fewer plants to be observed.

Commonly asked questions:

- Advantage of having 2 ovaries/testes.
    - Why are many sperms released at once?
    - Why do insects lay many eggs at once?
- What is the similarity/difference between the process of fertilisation in plants and animals?
- Note that some teachers prefer their students to use "nucleus of sperm fuses with nucleus of egg" while others simply require "sperm fuses with egg".

Qn	Answer
Q1 (a)	**Flower A is pollinated by:** Wind **Reason:** The anthers are dangling outside of the flower. This allows the wind to carry the pollen grains from the anther away easily.
Q1 (b)	**Flower B is pollinated by:** Birds/Insects **Reason:** The anthers are inside the flower. When the birds or insects visit the flower to obtain nectar, their bodies would rub against the anther, causing pollen grains to be stuck on them.
Q2 (a)	*[Try by yourself: Refer to page 37 of CCI notes Volume 4]* Cutting the flower at point A removes the stigma. Thus, there is no stigma to receive the pollen grains. As a result, pollination and fertilisation cannot occur.
Q2 (b)	*[Try by yourself: Refer to page 37 of CCI notes Volume 4]* No. Cutting the flower at point B and C removes the anthers. Pollen grains from the anthers of other flowers of the same species can still land on the flower's stigma in the process of pollination, allowing fertilisation to still occur.
Q2 (c)	*[Try by yourself: Refer to page 30 of CCI notes Volume 4]* The ovaries are still functioning normally and will continue to produce and release the mature eggs. However, the sperm deposited in the vagina cannot reach the egg in the fallopian tube to fuse with the egg in the process of fertilisation.

Q2 (d)	*[Try by yourself: Refer to page 33 of CCI notes Volume 4]* When one ovary is damaged, the other ovary can still produce eggs. The mature egg released by the ovary can then fuse with a sperm in the process of fertilisation, ensuring the continuity of our kind. *Fertilisation takes place in the fallopian tubes.
Q2 (e)	*[Try by yourself: Refer to page 38 of CCI notes Volume 4]* Fertilisation in the human female reproductive system takes place at the fallopian tube while fertilisation of the flower takes place in the ovary.
Q3 (a)	**Choose:** Flower X. **Use data:** The flower has brightly-coloured petals **Explain data:** to attract pollinators. **Use data:** Additionally, it still has its stigma **Explain data:** to receive pollen grains from the pollinators' body in the process of pollination, allowing fertilisation to occur and the flower to develop into a fruit.
Q3 (b)	The male wasps will be attracted to the hammer orchid. The pollen grains on the body of the male wasps will be transferred to the stigma of the hammer orchid in the process of pollination.