S1 Science Practice Paper (Set 4): biodiversity, food webs, sound and light, moon phases and seasons, the water cycle and energy

S1 Science | Time: 60 minutes | Total: 100 marks | 22 questions

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Section A: Biodiversity and Classification (16 marks)

Read the passage above and answer the questions.

1. (a) How many kinds of living things were recorded in the survey, and how many of them were insects? (4 marks)

Twenty kinds were recorded, of which 9 were insects.

2. (b) How does the number of insect kinds in the leaf litter differ from that on the sunny grassland? (4 marks)

The leaf litter had the greatest number of insect kinds, while the sunny grassland had only 2. The difference is large, showing that leaf litter offers more food and shelter.

3. (c) According to the teacher, what three levels does biodiversity include? (4 marks)

The number of species, the differences within one species (genetic variation), and the number of different habitats (ecosystems).

4. (d) From the data, which two groups have the fewest kinds, and how many does each have? (4 marks)

Snails and plants, with only 2 kinds each.

Section B: Food Web and Energy Flow (16 marks)

Read the passage above and answer the questions.

5. (a) From the passage, write two complete food chains. (4 marks)

Mangrove -> beetle -> fiddler crab -> egret; algae -> mudskipper -> egret.

6. (b) Which trophic level(s) does the egret occupy in this food web? (4 marks)

In the two chains the egret is at the third and the fourth trophic level respectively.

7. (c) If the producers make 12 000 kJ a year and one tenth passes on at each step, how much energy reaches the fiddler crabs? (4 marks)

12 000 x 0.1 = 1 200 kJ.

8. (d) Why is there usually less energy at higher trophic levels? (4 marks)

Because organisms use energy for respiration, movement, growth and heat loss; most energy is lost as heat and only a small part is stored in the body and passed on.

Section C: Sound and Light (16 marks)

Answer the questions below and show your working.

9. (a) A person shouts in a valley and hears the echo 2.5 s later. If the speed of sound is 340 m/s, how far is the rock face? (4 marks)

Distance = 340 x 2.5 / 2 = 425 m.

10. (b) Sunlight takes about 500 s to reach the Earth. If light travels at 3 x 10^8 m/s, how far is the Sun from the Earth? (4 marks)

Distance = 3 x 10^8 x 500 = 1.5 x 10^11 m.

11. (c) State two features of the image formed by a plane mirror. (4 marks)

It is a virtual image; it is the same size as the object; it is as far behind the mirror as the object is in front (and left and right are reversed).

12. (d) Why can two astronauts in space not talk to each other directly? (4 marks)

Because sound needs a medium (solid, liquid or gas) to travel; space is a vacuum with no particles to carry the vibration, so sound cannot travel.

Section D: Moon Phases and Seasons (16 marks)

Read the passage above and answer the questions.

13. (a) About how many days pass from new moon to full moon? (5 marks)

29.5 / 2 = 14.75, that is about 15 days.

14. (b) Why does the Earth have seasons? (5 marks)

Because the Earth's axis is tilted at 23.5 degrees, so during the orbit different places receive sunlight at different angles and for different lengths of time.

15. (c) Using the passage, calculate the number of hours of daylight in Hong Kong on 21 June. (6 marks)

From 05:41 to 19:12 is 13 hours 31 minutes (19:12 - 05:41 = 13 h 31 min).

Section E: Water Cycle and Water Quality (16 marks)

Read the passage above and answer the questions.

16. (a) Name three main processes in the water cycle and explain each in one sentence. (5 marks)

Evaporation: sea water is heated and becomes vapour; condensation: vapour cools and forms cloud droplets; precipitation: water falls back to the ground as rain or snow.

17. (b) Calculate the percentage by mass of suspended solids in the river sample. (5 marks)

2.5 / 500 x 100% = 0.5%.

18. (c) What does filtration remove, what does distillation remove, and which method gives purer water? (6 marks)

Filtration removes only insoluble solids (suspended matter) and dissolved salts stay in the filtrate; distillation separates water from dissolved impurities, so distilled water is purer.

Section F: Energy and Data Analysis (20 marks)

Read the passage above and answer the questions.

19. (a) Calculate the electricity used by the hall in one month in kWh. (5 marks)

4 x 60 W x 5 h x 30 days = 36 000 Wh = 36 kWh.

20. (b) Using your answer above, what is the electricity cost for one month? (5 marks)

36 x 1.2 = $43.2.

21. (c) Name two renewable energy sources and one limitation of each. (5 marks)

Solar energy: output depends on weather and daylight and drops on cloudy days; wind energy: wind is not steady, and turbines may affect scenery and birds.

22. (d) From the data, by how many percentage points did the coal share fall between 2015 and 2023, and what is the relative decrease? (5 marks)

It fell by 48 - 25 = 23 percentage points; the relative decrease is about (48 - 25) / 48 x 100% = 47.9%, that is about 48%.

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