S2 Science Practice Paper: Cells and Life, Substances and Mixtures, Force and Motion, Heat and Temperature, Electricity and Circuits, Earth and Resources

S2 | Science | Time: 60 minutes | Total: 100 marks | 24 questions

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Part A - Cells and Life (16 marks)

Show working in questions 1 and 2; answer questions 3 and 4 in full sentences.

1. A microscope has a 10x eyepiece and a 40x objective lens. Find the total magnification, and the image diameter of a cell whose real diameter is 0.05 mm. [5]

2. One cell divides 4 times in a row. Find the number of cells produced, and state what this kind of division means for the growth of an organism. [4]

3. Compare photosynthesis and respiration: in which part of the cell does each take place, which gas does each take in, and which gas does each release? [4]

4. State the main function of each cell structure: (a) cell membrane, (b) nucleus, (c) cell wall, (d) vacuole. [3]

Part B - Substances and Mixtures (17 marks)

Show working in questions 1 to 3; in question 4 state the mass relationship before and after the reaction.

5. 20 g of salt is completely dissolved in 80 g of water. Find the mass percentage of the solution. [5]

6. Choose a suitable method to separate each mixture and state the principle: (a) sand and water, (b) salt from salt water, (c) nitrogen and oxygen in air, (d) iron powder and copper powder. [4]

7. A stone has a mass of 78 g and a volume of 30 cm^3. Find its density in g/cm^3 and state whether it floats or sinks in water (density 1.0 g/cm^3). [4]

8. 12 g of carbon reacts completely with 32 g of oxygen to form only carbon dioxide. Find the mass of the product and name the law this supports. [4]

Part C - Force and Motion (17 marks)

Show working with units in questions 1 to 3; answer question 4 in words.

9. Ming runs 120 m in 15 s. Find his average speed in m/s and convert it to km/h. [5]

10. A car travels 30 km at 60 km/h and then another 30 km at 40 km/h. Find the average speed for the whole trip and explain why it is not (60 + 40) / 2. [5]

11. A student has a mass of 45 kg. Taking g = 10 N/kg on Earth, find his weight; find it again on the Moon where g = 1.6 N/kg, and state whether his mass changes. [4]

12. The same wooden block is pushed across a rough desk and a smooth desk. In which case is friction larger? State two factors that affect the size of friction. [3]

Part D - Heat and Temperature (17 marks)

Show working in questions 1 and 2; answer questions 3 and 4 in words.

13. 0.5 kg of water is heated from 20°C to 40°C. The specific heat capacity of water is 4200 J/(kg·°C). Find the heat absorbed in J and in kJ. [5]

14. 200 g of water at 80°C is mixed with 300 g of water at 20°C. Assuming no heat loss, find the final temperature. [5]

15. Why does a metal handrail feel colder than a wooden one in winter? Explain using heat conduction. [3]

16. Name the main mode of heat transfer in each case: (a) heat from the Sun reaching the Earth, (b) a metal spoon warming in hot soup, (c) an air conditioner cooling a whole room, (d) a fan heater blowing warm air. [4]

Part E - Electricity and Circuits (17 marks)

Show working in questions 1 to 3; answer question 4 in words.

17. Resistors of 4 Ω and 6 Ω are connected in series to a 6 V supply. Find the total resistance, the current in A and the total power in W. [5]

18. Two 6 Ω resistors are connected in parallel to a 12 V supply. Find the equivalent resistance and the total current. [5]

19. A 1500 W heater is used 2 hours a day for 30 days. Find the energy used in kWh and the total cost at $1.2 per kWh. [4]

20. What is the function of a fuse in a circuit? Why are household appliances earthed? State one safety rule for using electricity. [3]

Part F - Earth and Resources (16 marks)

Answer questions 1, 2 and 4 in words; show working in question 3.

21. State three main processes in the water cycle and explain why it matters to living things. [4]

22. Give three non-renewable energy sources and two renewable ones, and state one limitation of renewable energy. [5]

23. A school uses 320 kWh a month, of which solar panels supply 40 kWh. Find the solar percentage, and the extra kWh needed each month to raise it to 25%. [4]

24. Classify each waste as recyclable or non-recyclable and give one way of handling it: (a) aluminium can, (b) used tissue, (c) glass bottle, (d) food waste. [3]
