Science Entry Assessment

Question paper

Year 8
placement screener

Name ..... Date ..... Score .....

Time: about 60 minutes. Hampstead Tuition Centre - Year 8 Science Entry Assessment. Answer every question and show full working in calculations. Always give units. A calculator is allowed. This paper is deliberately demanding: lead questions are on-level, later ones are multi-step and require explanation. Attempt every part - method marks are awarded. Show your working where you can. Marks for each question are shown in brackets, like [2]. Total marks: **57**.

1 Define each term in one sentence: (a) photosynthesis, (b) respiration. (c) A sealed jar contains a healthy green plant in bright light. Explain why, over 24 hours, the levels of oxygen and carbon dioxide in the jar change differently during the day than during the night, naming both gases. **[3]**

WORKING

Answer _____

BIOLOGY: PHOTOSYNTHESIS AND RESPIRATION

2 A 2 kg block sits on a table. (gravitational field strength g = 10 N/kg.) (a) Write the equation linking weight, mass and g. (b) Calculate the block's weight, with units. (c) The same block is taken to the Moon where g = 1.6 N/kg. State its mass on the Moon and calculate its weight there. **[4]**

WORKING

Answer _____

PHYSICS: MASS, WEIGHT AND GRAVITY

3 Magnesium burns in oxygen to form magnesium oxide. (a) Is this a chemical or physical change? Give one piece of evidence. (b) Write a word equation for the reaction. (c) The mass of the white powder is greater than the mass of the magnesium ribbon at the start. Explain why, without breaking conservation of mass. **[4]**

WORKING

Answer _____

CHEMISTRY: COMBUSTION AND CONSERVATION OF MASS

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4 Describe the path of a sound wave from a guitar string to a person's ear, explaining how they hear it. Use the words 'vibrate', 'particles' and 'eardrum'. Then explain why the same guitar cannot be heard by an astronaut floating in space next to it. [4]

WORKING

Answer

PHYSICS: SOUND WAVES AND THE EAR

5 A pupil tests how exercise affects heart rate. Resting pulse = 70 beats per minute (bpm). After 3 minutes of running it is 130 bpm. (a) Calculate the increase in heart rate. (b) Explain why the heart beats faster during exercise (mention oxygen and muscles). (c) After resting, the pulse falls back. Name the gas that the faster breathing must remove from the blood. [4]

WORKING

Answer

BIOLOGY: CIRCULATION, RESPIRATION AND EXERCISE

6 The particle model explains pressure. (a) Explain, in terms of particles, why a sealed gas syringe is harder to push in as you compress the gas. (b) A gas at a pressure of 100 kPa has its volume halved at constant temperature. State and explain the new pressure. [4]

WORKING

Answer

CHEMISTRY/PHYSICS: GAS PRESSURE AND PARTICLE MODEL

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7 A pupil neutralises hydrochloric acid (pH 1) by adding small amounts of solid calcium carbonate. (a) Describe how the pH changes as more calcium carbonate is added. (b) Name the type of reaction between an acid and a carbonate, and name the gas given off. (c) How could she test for that gas? [4]

WORKING

Answer

CHEMISTRY: NEUTRALISATION AND GAS TESTS

8 A pupil measures the extension of a spring as she adds weights. Results: 0 N -> 0 cm; 1 N -> 2 cm; 2 N -> 4 cm; 3 N -> 6 cm; 4 N -> 9 cm. (a) State the pattern shown by the first three readings. (b) The 4 N reading does not fit the pattern. Suggest what has happened to the spring. (c) Predict the extension that 2.5 N would have produced if the spring had kept its original pattern. [4]

WORKING

Answer

PHYSICS: FORCES, SPRINGS AND HOOKE'S LAW (DATA INTERPRETATION)

9 Describe in words how you would separate a mixture of sand, salt and water to obtain (a) dry sand and (b) dry salt. Name each separation technique you use in order. [4]

WORKING

Answer

CHEMISTRY: SEPARATING MIXTURES (REQUIRED PRACTICAL REASONING)

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10 Light hits a flat mirror at an angle. (a) State the law of reflection linking the angle of incidence and the angle of reflection. (b) These angles are measured from a particular line - name it. (c) A ray hits the mirror with an angle of incidence of 35 degrees. State the angle of reflection. [3]

WORKING

Answer _____

PHYSICS: REFLECTION OF LIGHT

11 The human skeleton works with muscles to move the body. (a) Name the type of joint at the elbow (think of the movement it allows). (b) Muscles work in pairs called antagonistic pairs. Name the muscle that contracts to bend (flex) the arm at the elbow. (c) Explain why muscles must work in pairs to move a bone back and forth. [4]

WORKING

Answer _____

BIOLOGY: SKELETON, MUSCLES AND JOINTS

12 Define an element, a compound and a mixture, giving one example of each. [3]

WORKING

Answer _____

CHEMISTRY: ELEMENTS, COMPOUNDS AND MIXTURES

13 STRETCH. A car travels 90 km in 1 hour 30 minutes. (a) Calculate its average speed in km/h. (b) Convert this speed to metres per second (m/s). (1 km = 1000 m, 1 hour = 3600 s.) (c) The car was not actually at this speed the whole time. Explain what 'average speed' means here. [4]

WORKING

Answer _____

PHYSICS: SPEED, UNIT CONVERSION AND REASONING

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14 STRETCH. Two pupils plant identical seedlings. Plant X is kept on a sunny windowsill; Plant Y is kept in a dark cupboard. Both are watered equally. After two weeks Plant Y is tall, pale yellow and floppy, while Plant X is shorter, green and sturdy. (a) Explain why Plant Y is yellow rather than green. (b) Explain why Plant Y has grown taller than Plant X. (c) Predict what will eventually happen to Plant Y if it stays in the dark, and explain why using the idea of food production. [4]

WORKING

Answer _____

BIOLOGY: PHOTOSYNTHESIS, PLANT RESPONSES AND REASONING

15 STRETCH. A pupil burns a fuel to heat 100 g of water. The water temperature rises from 20 C to 50 C. (a) Calculate the temperature rise. (b) The pupil repeats the test with the beaker further from the flame and gets a smaller temperature rise. Explain why, using the idea of energy transfer. (c) Suggest TWO ways the pupil could make this a fair comparison between two different fuels. [4]

WORKING

Answer _____

CHEMISTRY/PHYSICS: ENERGY TRANSFER AND FAIR TESTING (STRETCH)

End of assessment. Hand your paper back when you are finished. Well done!

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