Measurement & Geometry

Question 1 **(6 marks)**

A flagpole is held upright by several support wires attached to the top of the pole and anchored to the ground. Each wire, together with the pole and the ground, forms a right-angled triangle.

(a) One wire is anchored 6 m from the base of the pole, and the pole is 8 m tall at the point where the wire is attached. Find the length of this wire. (2 marks)

(b) A second wire is 13 m long and is anchored 12 m from the base of the pole. Find the height at which this wire is attached to the pole. (2 marks)

(c) A third wire is 20 m long and makes an angle of 30° with the ground. Find the height at which this wire is attached to the pole. (2 marks)

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Question 2 **(7 marks)**

A cylindrical plastic container has a radius of 7 cm and a height of 10 cm. Use $\pi \approx \frac{22}{7}$ throughout this question.

(a) Find the volume of the container. (2 marks)

(b) Find the total surface area of the container, including both circular ends. (2 marks)

(c) The container is packaged inside a rectangular box measuring 20 cm × 20 cm × 10 cm. Find the volume of empty space inside the box surrounding the container. (3 marks)

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Number & Algebra

Question 3 **(6 marks)**

(a) Expand and simplify $(x + 4)(x - 3)$. (2 marks)

(b) Factorise $x^2 + 7x + 12$. (2 marks)

(c) Factorise $6x^2 - 9x$ by taking out the highest common factor. (2 marks)

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Question 4 **(6 marks)**

(a) Solve the following simultaneous equations using substitution: $y = x + 2$ and $2x + y = 11$. (3 marks)

(b) Simplify $x^5 \times x^{-2}$, giving your answer with a positive index. (1 mark)

(c) Simplify $(2x^3)^2 \div x^4$, giving your answer with a positive index. (2 marks)

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Statistics & Probability

Question 5 **(5 marks)**

Ten Year 9 students in Group A sat a 20-mark quiz. Their scores were: 12, 14, 15, 15, 17, 18, 18, 19, 20, 20.

(a) Construct an ordered stem-and-leaf plot for Group A's scores, using the tens digit as the stem. (2 marks)

(b) Group B's ten scores had a median of 14 and a range of 9. Using your stem-and-leaf plot, find the median and the range of Group A's scores, then state which group's scores were more consistent, giving a reason. (3 marks)

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Question 6 **(6 marks)**

A bag contains 3 red counters and 2 blue counters. Two counters are drawn at random from the bag, one after the other.

(a) Suppose the first counter is replaced before the second counter is drawn. Draw a probability tree diagram showing all possible outcomes and their probabilities. (3 marks)

(b) Using your tree from part (a), find the probability that both counters drawn are red. (1 mark)

(c) Suppose instead the first counter is NOT replaced before the second counter is drawn. Find the probability that both counters drawn are red. (2 marks)

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