Mock Paper 2

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Paper 2

1. (3 points) Allan buys a car for £26000. It depreciates at a rate of 9% every year. Calculate the value of the car after 5 years.

2. (3 points) Barbara finds a jacket in a sale for £27. Given that it is on sale at 40% off, calculate its original price.

3. (3 points) Microwave signals travel at a speed of 3×10^8 metres per second. A microwave signal is ejected from a laboratory on Earth and travels in a straight line until it reaches a satellite in space precisely 1.6 seconds later. How far (in metres) is the satellite from the laboratory? **Give your answer in scientific notation**.

4. (a) (4 points) The results, in metres, of a high school javelin final in 2021 are shown below.

   $$70.7 \quad 70.5 \quad 70.5 \quad 69.6 \quad 68.5 \quad 68.3$$

   Calculate the mean and standard deviation of these distances correct to 2 decimal places.

   (b) (2 points) At the same competition a year later, the mean distance was 70.2 metres and the standard deviation was 0.14 metres. Make two valid comparisons between the competition results.

5. (3 points) Solve algebraically
   $$6(x + 7) = 5(4 - x)$$

6. (3 points) Solve the equation
   $$\frac{4x - 5}{6} = 2x,$$
   giving your answer in its simplest form.

7. (2 points) Simplify the following expression
   $$\frac{9x^2 \times 4x^5}{6x^3}$$

8. (4 points) Solve the equation
   $$2x^2 + 5x - 11 = 0,$$
   giving your answer(s) correct to two decimal places.

9. (3 points) Use an appropriate mathematical method to determine the nature of the roots of
   $$y = 4x^2 - 20x + 25$$

10. (3 points) Solve the equation $5 \cos x^\circ + 2 = 1, 0 \leq x \leq 360$.

11. (3 points) A triangle has side lengths 6.3cm, 7.2cm and 8.5cm. What is the size of the smallest angle in this triangle?

12. (3 points) This question concerns a sector of a circle AOB. It is given that $\angle AOB = 135^\circ$ and that $|OB| = 3.5$cm. Calculate the length of the arc AB correct to 2 decimal places.

13. (4 points) This question concerns a sector of a circle AOB. It is given that the area of the sector is 55.6 square centimetres and that $|OA| = 7$cm. Calculate $\angle AOB$ correct to the nearest degree.

14. Throughout this question you should answer to 1 decimal place.
    (a) (2 points) Calculate the volume of a cone of diameter 3cm and height 7cm.
    (b) (3 points) Calculate the radius of a sphere of volume 268.08 cubic centimetres.

15. (a) (2 points) Write down the coordinates of the turning point of the graph $y = (x-2)^2 + 1$.
    (b) (1 point) Write down its axis of symmetry.
    (c) (1 point) Write down the coordinates of the y-intercept.
    (d) (2 points) Give a fully annotated sketch of $y = (x-2)^2 + 1$.

16. (3 points) Carol is tasked with constructing a perfect right angled triangle in technical class. She produces one with side lengths 8.1cm, 10.8cm and 13.5cm. Is her work acceptable?

17. (3 points) Find an expression for the gradient of the line joining the points $(6, 9)$ and $(4p, 4p^2)$.