

Questions taken from the WJEC Specimen Paper (Part 1)

Question	1	2	3	4	5	13	14	Total
Marks								
Max Marks	7	6	6	5	12	7	8	51

SPEND ABOUT AN HOUR ON THE QUESTIONS
THEN
CHECK AND CORRECT YOUR ANSWERS USING THE MARK SCHEME

1. The circle C has centre A and equation

$$x^2 + y^2 - 2x + 6y - 15 = 0.$$

- (a) Find the coordinates of A and the radius of C . [3]

- (b) The point P has coordinates $(4, -7)$ and lies on C . Find the equation of the tangent to C at P . [4]

2. Find all values of θ between 0° and 360° satisfying

$$7 \sin^2 \theta + 1 = 3 \cos^2 \theta - \sin \theta. \quad [6]$$

3. Given that $y = x^3$, find $\frac{dy}{dx}$ from first principles. [6]

4. The cubic polynomial $f(x)$ is given by $f(x) = 2x^3 + ax^2 + bx + c$, where a, b, c are constants. The graph of $f(x)$ intersects the x -axis at the points with coordinates $(-3, 0)$, $(2.5, 0)$ and $(4, 0)$. Find the coordinates of the point where the graph of $f(x)$ intersects the y -axis. [5]

5. The points $A(0, 2)$, $B(-2, 8)$, $C(20, 12)$ are the vertices of the triangle ABC . The point D is the mid-point of AB .

- (a) Show that CD is perpendicular to AB . [6]

- (b) Find the exact value of $\tan \hat{CAB}$. [5]

- (c) Write down the geometrical name for the triangle ABC . [1]

13. In triangle ABC , $BC = 12$ cm and $\cos \hat{A}BC = \frac{2}{3}$.

The length of AC is 2 cm greater than the length of AB .

(a) Find the lengths of AB and AC . [4]

(b) Find the exact value of $\sin \hat{B}AC$. Give your answer in its simplest form. [3]

14. The diagram below shows a closed box in the form of a cuboid, which is such that the length of its base is twice the width of its base. The volume of the box is 9000 cm^3 . The total surface area of the box is denoted by $S \text{ cm}^2$.



(a) Show that $S = 4x^2 + \frac{27000}{x}$, where x cm denotes the width of the base. [3]

(b) Find the minimum value of S , showing that the value you have found is a minimum value. [5]