

3. On separate diagrams, sketch the graphs of

(a) $y = (x + 3)^2$,

(3)

(b) $y = (x + 3)^2 + k$, where k is a positive constant.

(2)

Show on each sketch the coordinates of each point at which the graph meets the axes.



4. A sequence a_1, a_2, a_3, \dots is defined by

$$a_1 = 3,$$
$$a_{n+1} = 3a_n - 5, \quad n \geq 1.$$

(a) Find the value of a_2 and the value of a_3 .

(2)

(b) Calculate the value of $\sum_{r=1}^5 a_r$.

(3)



10. The curve C with equation $y = f(x)$, $x \neq 0$, passes through the point $(3, 7\frac{1}{2})$.

Given that $f'(x) = 2x + \frac{3}{x^2}$,

(a) find $f(x)$.

(5)

(b) Verify that $f(-2) = 5$.

(1)

(c) Find an equation for the tangent to C at the point $(-2, 5)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(4)



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11. The line l_1 passes through the points $P(-1, 2)$ and $Q(11, 8)$.

(a) Find an equation for l_1 in the form $y = mx + c$, where m and c are constants. (4)

The line l_2 passes through the point $R(10, 0)$ and is perpendicular to l_1 . The lines l_1 and l_2 intersect at the point S .

(b) Calculate the coordinates of S . (5)

(c) Show that the length of RS is $3\sqrt{5}$. (2)

(d) Hence, or otherwise, find the exact area of triangle PQR . (4)



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Question 11 continued

(Area containing horizontal lines for writing answers)

Q11

(Total 15 marks)

TOTAL FOR PAPER: 75 MARKS

END



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