

Edexcel GCE
Core Mathematics C1
Practice Paper A3
(Question Paper)

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1.
$$\frac{dy}{dx} = 5 + \frac{1}{x^2}.$$

(a) Use integration to find y in terms of x . (3)

(b) Given that $y = 7$ when $x = 1$, find the value of y at $x = 2$. (4)

2. The sum of an arithmetic series is

$$\sum_{r=1}^n (80 - 3r).$$

(a) Write down the first two terms of the series. (2)

(b) Find the common difference of the series. (1)

Given that $n = 50$,

(c) find the sum of the series. (3)

3. The points A and B have coordinates $(1, 2)$ and $(5, 8)$ respectively.

(a) Find the coordinates of the mid-point of AB . (2)

(b) Find, in the form $y = mx + c$, an equation for the straight line through A and B . (4)

4. (a) Solve the equation $4x^2 + 12x = 0$. (3)

$$f(x) = 4x^2 + 12x + c,$$

where c is a constant.

(b) Given that $f(x) = 0$ has equal roots, find the value of c and hence solve $f(x) = 0$. (4)

5. Find the set of values for x for which

(a) $6x - 7 < 2x + 3$, (2)

(b) $2x^2 - 11x + 5 < 0$, (4)

(c) both $6x - 7 < 2x + 3$ and $2x^2 - 11x + 5 < 0$. (1)

6. Given that $f(x) = 15 - 7x - 2x^2$,

(a) find the coordinates of all points at which the graph of $y = f(x)$ crosses the coordinate axes. (3)

(b) Sketch the graph of $y = f(x)$. (2)

7. Initially the number of fish in a lake is 500 000. The population is then modelled by the recurrence relation

$$u_{n+1} = 1.05u_n - d, \quad u_0 = 500\,000.$$

In this relation u_n is the number of fish in the lake after n years and d is the number of fish which are caught each year.

Given that $d = 15\,000$,

(a) calculate u_1 , u_2 and u_3 and comment briefly on your results. (3)

Given that $d = 100\,000$,

(b) show that the population of fish dies out during the sixth year. (3)

(c) Find the value of d which would leave the population each year unchanged. (2)

8. A curve C has equation $y = x^3 - 5x^2 + 5x + 2$.

(a) Find $\frac{dy}{dx}$ in terms of x .

(2)

The points P and Q lie on C . The gradient of C at both P and Q is 2. The x -coordinate of P is 3.

(b) Find the x -coordinate of Q .

(2)

(c) Find an equation for the tangent to C at P , giving your answer in the form $y = mx + c$, where m and c are constants.

(3)

This tangent intersects the coordinate axes at the points R and S .

(d) Find the length of RS , giving your answer as a surd.

(4)

9. The points $A(-1, -2)$, $B(7, 2)$ and $C(k, 4)$, where k is a constant, are the vertices of ΔABC . Angle ABC is a right angle.

(a) Find the gradient of AB .

(2)

(b) Calculate the value of k .

(2)

(c) Show that the length of AB may be written in the form $p\sqrt{5}$, where p is an integer to be found.

(3)

(d) Find the exact value of the area of ΔABC .

(3)

(e) Find an equation for the straight line l passing through B and C . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(2)

END