

Edexcel GCE

Core Mathematics C1

Advanced Subsidiary

Algebra and Functions

Materials required for examination

Mathematical Formulae (Pink or Green)

Items included with question papers

Nil

Calculators may NOT be used in this examination.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.

1. Find the set of values of x for which

(a) $4x - 3 > 7 - x$ (2)

(b) $2x^2 - 5x - 12 < 0$ (4)

(c) **both** $4x - 3 > 7 - x$ **and** $2x^2 - 5x - 12 < 0$ (1)

2. The equation $x^2 + 3px + p = 0$, where p is a non-zero constant, has equal roots.

Find the value of p . (4)

3. Factorise completely $x^3 - 9x$. (3)

4. (a) By eliminating y from the equations

$$y = x - 4,$$

$$2x^2 - xy = 8,$$

show that

$$x^2 + 4x - 8 = 0. \quad (2)$$

(b) Hence, or otherwise, solve the simultaneous equations

$$y = x - 4,$$

$$2x^2 - xy = 8,$$

giving your answers in the form $a \pm b\sqrt{3}$, where a and b are integers. (5)

5.
$$x^2 - 8x - 29 \equiv (x + a)^2 + b,$$

where a and b are constants.

(a) Find the value of a and the value of b . (3)

(b) Hence, or otherwise, show that the roots of

$$x^2 - 8x - 29 = 0$$

are $c \pm d\sqrt{5}$, where c and d are integers to be found. (3)

6. Solve the simultaneous equations

$$y = x - 2,$$

$$y^2 + x^2 = 10.$$

(7)

7. Find the set of values of x for which

$$x^2 - 7x - 18 > 0.$$

(4)

8. Factorise completely

$$x^3 - 4x^2 + 3x.$$

(3)

9. The equation $kx^2 + 4x + (5 - k) = 0$, where k is a constant, has 2 different real solutions for x .

(a) Show that k satisfies

$$k^2 - 5k + 4 > 0.$$

(3)

(b) Hence find the set of possible values of k .

(4)

10. Solve the simultaneous equations

$$x - 2y = 1,$$

$$x^2 + y^2 = 29.$$

(6)

11. Given that the equation $2qx^2 + qx - 1 = 0$, where q is a constant, has no real roots,

(a) show that $q^2 + 8q < 0$.

(2)

(b) Hence find the set of possible values of q .

(3)

12. The equation

$$x^2 + kx + 8 = k$$

has no real solutions for x .

(a) Show that k satisfies $k^2 + 4k - 32 < 0$.

(3)

(b) Hence find the set of possible values of k .

(4)

13. The equation $x^2 + kx + (k + 3) = 0$, where k is a constant, has different real roots.

(a) Show that $k^2 - 4k - 12 > 0$.

(2)

(b) Find the set of possible values of k .

(4)

14. Solve the simultaneous equations

$$x + y = 2$$

$$x^2 + 2y = 12.$$

(6)

15. The equation $2x^2 - 3x - (k + 1) = 0$, where k is a constant, has no real roots.

Find the set of possible values of k .

(4)

16. The equation $x^2 + 2px + (3p + 4) = 0$, where p is a positive constant, has equal roots.

(a) Find the value of p .

(4)

(b) For this value of p , solve the equation $x^2 + 2px + (3p + 4) = 0$.

(2)

17. Find the set of values of x for which

(a) $3(2x + 1) > 5 - 2x$, (2)

(b) $2x^2 - 7x + 3 > 0$, (4)

(c) **both** $3(2x + 1) > 5 - 2x$ **and** $2x^2 - 7x + 3 > 0$. (2)

18. Given that the equation $kx^2 + 12x + k = 0$, where k is a positive constant, has equal roots, find the value of k .

19.
$$x^2 + 2x + 3 \equiv (x + a)^2 + b.$$

(a) Find the values of the constants a and b . (2)

(b) Sketch the graph of $y = x^2 + 2x + 3$, indicating clearly the coordinates of any intersections with the coordinate axes. (3)

(c) Find the value of the discriminant of $x^2 + 2x + 3$. Explain how the sign of the discriminant relates to your sketch in part (b). (2)

The equation $x^2 + kx + 3 = 0$, where k is a constant, has no real roots.

(d) Find the set of possible values of k , giving your answer in surd form. (4)