

- 1** Find the set of values of the constant k for which the quadratic equation

$$3kx^2 + (k+8)x + 3 = 0$$

has two distinct real roots.

[4]

- 4 (a) Express $1 - 6x - x^2$ in the form $a - (x + b)^2$, where a and b are constants.

[3]

- (b) The graph of $y = x^2$ is transformed to the graph of $y = 1 - 6x - x^2$ by a reflection followed by a translation of $\begin{pmatrix} m \\ n \end{pmatrix}$. Give details of the reflection and determine the values of m and n . [3]

1 (a) Express $9x^2 - 36x + 8$ in the form $p(x+q)^2 + r$, where p , q and r are constants. [2]

[illegible]

(b) Hence find the set of values of the constant k for which the equation $9x^2 - 36x + 8 = k$ has no real roots. [1]

[illegible]

(c) Find the exact roots of the equation $9x^2 - 36x + 8 = -15$. [2]

[illegible]

2 Find the coordinates of the points of intersection of the curve and the line with equations

$$2xy + 5y^2 = 24 \quad \text{and} \quad 2x + y + 4 = 0. \quad [4]$$

[illegible]

- 11 (a)** Express $x^2 + 4x + 2$ in the form $(x + a)^2 + b$, where a and b are integers. [2]

[illegible]

The functions f and g are defined as follows.

$$f(x) = x^2 + 4x + 2 \quad \text{for } x \leq -2$$

$$g(x) = -x - 4 \quad \text{for } x \geq -2$$

- (b) (i)** Find an expression for $f^{-1}(x)$. [3]

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- (ii) Find an expression for $(gf)^{-1}(x)$. [4]

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For the answer to any question, the question number must be clearly

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