Mixed Exercise 3

1. AQA/Jan 2006/MPC1/Q3)

(a) (i) Express $x^2 - 4x + 9$ in the form $(x-p)^2 + q$, where p and q are integers.

(2 marks)

(ii) Hence, or otherwise, state the coordinates of the minimum point of the curve with equation $y = x^2 - 4x + 9$.

(2 marks)

(b) The line L has equation $y + 2x = 12$ and the curve C has equation $y = x^2 - 4x + 9$.

(i) Show that the x-coordinates of the points of intersection of L and C satisfy the equation

$$x^2 - 2x - 3 = 0$$

(1 mark)

(ii) Hence find the coordinates of the points of intersection of L and C.   *(4 marks)*

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2. AQA/Jan 2006/MPC1/Q4)

The quadratic equation $x^2 + (m+4)x + (4m+1) = 0$, where m is a constant, has equal roots.

(a) Show that $m^2 - 8m + 12 = 0$.   *(3 marks)*

(b) Hence find the possible values of m.   *(2 marks)*

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3. Solve ,
$$2x^2 - 5x - 7 < 0$$

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4. Sketch the following graphs showing the coordinates of the points where they intersect the coordinate axes.

(a) $y = (2-x)(x-4)(x-1)$

(b) $y = (x-1)^2(x+6)$

(c) $y = x^3 + 5x^2 + 4x$

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5. (Edexcel/Jan 2005/C2)

(a) Use the factor theorem to show that $(x+4)$ is a factor of $2x^3 + x^2 - 25x + 12$.

(2)

(b) Factorise $2x^3 + x^2 - 25x + 12$ completely.

(4)

6.

(a) Write down the first three terms, in ascending powers of x, of the binomial expansion of $(1 + px)^{12}$, where p is a non-zero constant.

(2)

Given that, in the expansion of $(1 + px)^{12}$, the coefficient of x is $(-q)$ and the coefficient of x^2 is $11q$,

(b) find the value of p and the value of q.

(4)

7.

(a) Find all the values of θ, to 1 decimal place, in the interval $0° \leq \theta < 360°$ for which

$$5 \sin (\theta + 30°) = 3.$$

(4)

(b) Find all the values of θ, to 1 decimal place, in the interval $0° \leq \theta < 360°$ for which

$$\tan^2 \theta = 4.$$

(5)