1. Solve the simultaneous equations

$$x + y = 2$$

$$4y^2 - x^2 = 11$$

(Total 7 marks)

_____

4. Given the simultaneous equations

$$2x + y = 1$$

$$x^2 - 4ky + 5k = 0$$

where k is a non zero constant,

(a) show that $x^2 + 8kx + k = 0$.

(2)

Given that $x^2 + 8kx + k = 0$ has equal roots,

(b) find the value of k.

(3)

(c) For this value of k, find the solution of the simultaneous equations.

(3)

(Total 8 marks)

_____

6. Find the set of values of x for which

(a) $2(3x + 4) > 1 - x$,

(2)

(b) $3x^2 + 8x - 3 < 0$.

(4)

(Total 6 marks)

_____

Turn over

7. Find in set notation the set of values of x for which

(a) $3x - 7 > 3 - x$, **(2)**

(b) $x^2 - 9x \leq 36$, **(4)**

(c) **both** $3x - 7 > 3 - x$ **and** $x^2 - 9x \leq 36$. **(1)**

(Total 7 marks)

_____

9. The equation

$$(k + 3)x^2 + 6x + k = 5, \text{ where } k \text{ is a constant,}$$

has two distinct real solutions for x.

(a) Show that k satisfies

$$k^2 - 2k - 24 < 0.$$

(4)

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

(3)

(Total 7 marks)

_____

10. The equation

$$(p - 1)x^2 + 4x + (p - 5) = 0, \text{ where } p \text{ is a constant,}$$

has no real roots.

(a) Show that p satisfies $p^2 - 6p + 1 > 0$.

(3)

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

(4)

(Total 7 marks)

_____

Turn over

11. The straight line with equation $y = 3x - 7$ does not cross or touch the curve with equation $y = 2px^2 - 6px + 4p$, where p is a constant.

(a) Show that $4p^2 - 20p + 9 < 0$.

(4)

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

(4)

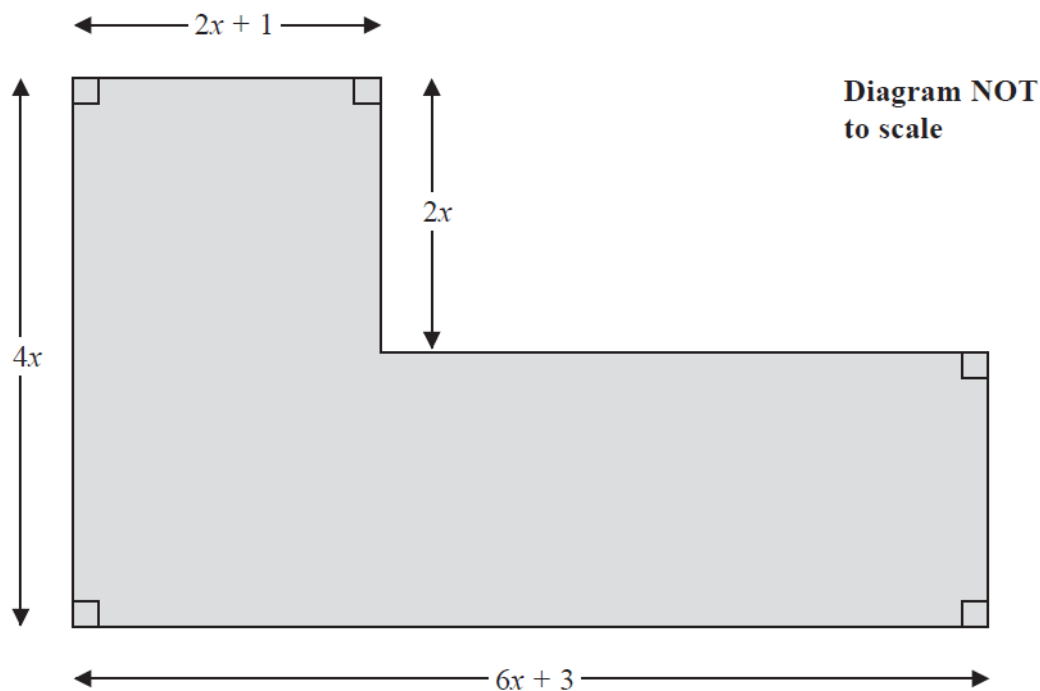**(Total 8 marks)**

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12.

Figure 1

Figure 1 shows the plan of a garden. The marked angles are right angles.

The six edges are straight lines.

The lengths shown in the diagram are given in metres.

Given that the perimeter of the garden is greater than 40 m,

(a) show that $x > 1.7$.

(3)

Given that the area of the garden is less than 120 m²,

(b) form and solve a quadratic inequality in x.

(5)

(c) Hence state the range of the possible values of x.

(1)

(Total 9 marks)