1 You are given that $a = \frac{3}{2}$, $b = \frac{9 \quad \sqrt{17}}{4}$ and $c = \frac{9 + \sqrt{17}}{4}$. Show that $a + b + c = abc$. [4]

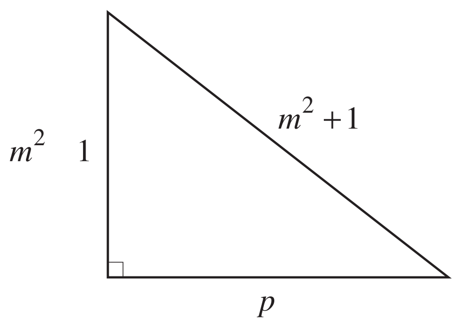
2 **(i)** Simplify $3a^3b \times 4(ab)^2$. [2]

(ii) Factorise $x^2 - 4 \qquad x^2 - 5x + 6$.

Hence express $\frac{x^2 - 4}{x^2 - 5x + 6}$ as a fraction in its simplest form. [3]

3 Simplify $(m^2 + 1)^2 - (m^2 - 1)^2$, showing your method.

Hence, given the right-angled triangle in Fig. 10, express p in terms of m, simplifying your answer. [4]



4 Answer the whole of this question on the insert provided.

The insert shows the graph of $y = \frac{1}{x}$, $x \neq 0$.

(i) Use the graph to find approximate roots of the equation $\frac{1}{x} = 2x + 3$, showing your method clearly. [3]

(ii) Rearrange the equation $\frac{1}{x} = 2x + 3$ to form a quadratic equation. Solve the resulting equation, leaving your answers in the form $\frac{p \pm \sqrt{q}}{r}$. [5]

(iii) Draw the graph of $y = \frac{1}{x} + 2$, $x \neq 0$, on the grid used for part (**i**). [2]

(iv) Write down the values of x which satisfy the equation $\frac{1}{x} + 2 = 2x + 3$. [2]

5 (i) Write $x^2 - 7x + 6$ in the form $(x - a)^2 + b$. [3]

(ii) State the coordinates of the minimum point on the graph of $y = x^2 - 7x + 6$. [2]

(iii) Find the coordinates of the points where the graph of $y = x^2 - 7x + 6$ crosses the axes and sketch the graph. [5]

(iv) Show that the graphs of $y = x^2 - 7x + 6$ and $y = x^2 - 3x + 4$ intersect only once. Find the x-coordinate of the point of intersection. [3]

6

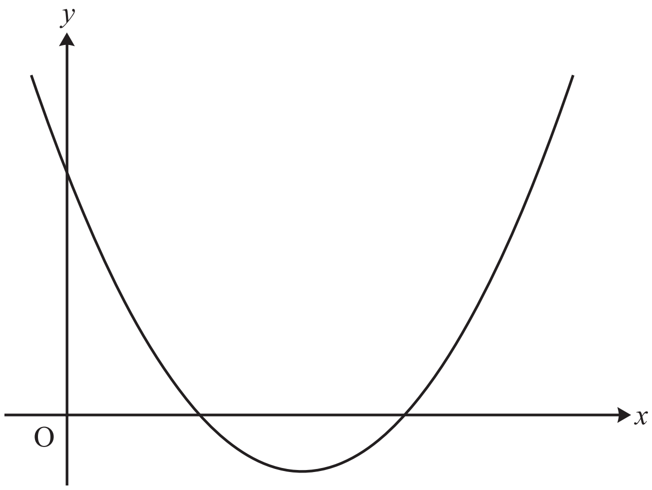


Fig. 11

Fig. 11 shows a sketch of the curve with equation $y = (x-4)^2 - 3$.

(i) Write down the equation of the line of symmetry of the curve and the coordinates of the minimum point. **[2]**

(ii) Find the coordinates of the points of intersection of the curve with the x-axis and the y-axis, using surds where necessary. **[4]**

(iii) The curve is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$. Show that the equation of the translated curve may be written as $y = x^2 - 12x + 33$. **[2]**

(iv) Show that the line $y = 8 - 2x$ meets the curve $y = x^2 - 12x + 33$ at just one point, and find the coordinates of this point. **[5]**

7 **(i)** Describe fully the transformation which maps the curve $y = x^2$ onto the curve $y = (x + 4)^2$. **[2]**

(ii) Sketch the graph of $y = x^2 - 4$. **[2]**