1 Make r the subject of the formula $A = \pi r^2(x+y)$, where $r > 0$. [2]

2 A line L is parallel to $y = 4x+5$ and passes through the point $(-1, 6)$. Find the equation of the line L in the form $y = ax+b$. Find also the coordinates of its intersections with the axes. [5]

3 Evaluate the following.

(i) 200^0 [1]

(ii) $\left(\frac{25}{9}\right)^{-\frac{1}{2}}$ [3]

4 Solve the inequality $\frac{4x-5}{7} > 2x+1$. [3]

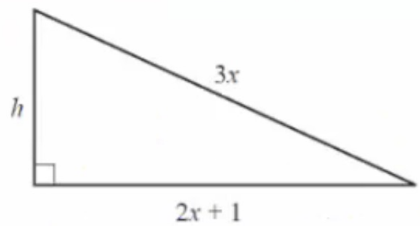
5 Find the coordinates of the point of intersection of the lines $y = 5x-2$ and $x+3y = 8$. [4]

6 (i) Expand and simplify $(3+4\sqrt{5})(3-2\sqrt{5})$. [3]

(ii) Express $\sqrt{72}+\frac{32}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible. [2]

7 Find and simplify the binomial expansion of $(3x-2)^4$. [4]

8 Fig. 8 shows a right-angled triangle with base $2x+1$, height h and hypotenuse $3x$.



Not to scale

Fig. 8

(i) Show that $h^2 = 5x^2 - 4x - 1$. [2]

(ii) Given that $h = \sqrt{7}$, find the value of x, giving your answer in surd form. [3]

9 Explain why each of the following statements is false. State in each case which of the symbols $\Rightarrow$, $\Leftarrow$ or $\Leftrightarrow$ would make the statement true.

(i) ABCD is a square $\Leftrightarrow$ the diagonals of quadrilateral ABCD intersect at 90° [2]

(ii) x^2 is an integer $\Rightarrow$ x is an integer [2]

10 You are given that $\mathrm{f}(x) = (x+3)(x-2)(x-5)$.

(i) Sketch the curve $y = \mathrm{f}(x)$. [3]

(ii) Show that $\mathrm{f}(x)$ may be written as $x^3 - 4x^2 - 11x + 30$. [2]

(iii) Describe fully the transformation that maps the graph of $y = \mathrm{f}(x)$ onto the graph of $y = \mathrm{g}(x)$, where $\mathrm{g}(x) = x^3 - 4x^2 - 11x - 6$. [2]

(iv) Show that $\mathrm{g}(-1) = 0$. Hence factorise $\mathrm{g}(x)$ completely. [5]

11.

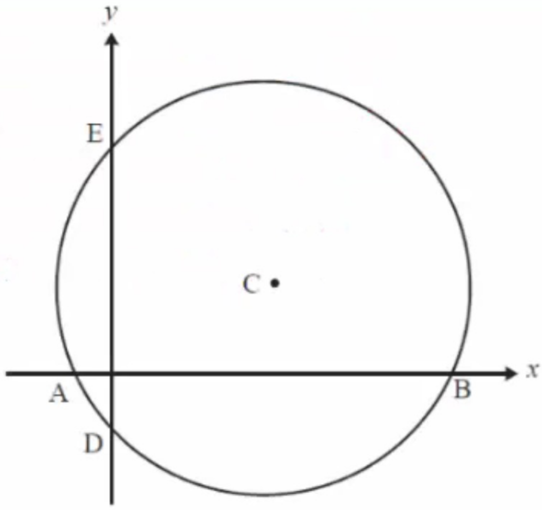


Fig. 11

Fig. 11 shows a sketch of the circle with equation $(x-10)^2+(y-2)^2=125$ and centre C. The points A, B, D and E are the intersections of the circle with the axes.

(i) Write down the radius of the circle and the coordinates of C. **[2]**

(ii) Verify that B is the point (21, 0) and find the coordinates of A, D and E. **[4]**

(iii) Find the equation of the perpendicular bisector of BE and verify that this line passes through C. **[6]**

12 **(i)** Find the set of values of k for which the line $y=2x+k$ intersects the curve $y=3x^2+12x+13$ at two distinct points. **[5]**

(ii) Express $3x^2+12x+13$ in the form $a(x+b)^2+c$. Hence show that the curve $y=3x^2+12x+13$ lies completely above the x-axis. **[5]**

(iii) Find the value of k for which the line $y=2x+k$ passes through the minimum point of the curve $y=3x^2+12x+13$. **[2]**