Chapter 1 to 4 End test

/45 Marks

Name:

1. Solve the equation $|5 - 3x| = 10$.

[3]

2. The polynomial $p(x)$ is $x^4 - 2x^3 - 3x^2 + 8x - 4$.
   a. Show that $p(x)$ can be written as $(x - 1)(x^3 - x^2 - 4x + 4)$.

[2]

   b. Hence write $p(x)$ as a product of its linear factors, showing all your working.

[4]

Chapter 1 to 4 End test

3. **Do not use a calculator in this question.**

In this question, all lengths are in centimetres.

A triangle *ABC* is such that angle$B = 90°$, $AB = 5\sqrt{3} + 5$ and $BC = 5\sqrt{3} - 5$. Find , in its simplest surd form, the length of AC.

[4]

4. Solve the inequality $(2 - x)(x + 9) < 10$.

[4]

5. Simplify $\frac{4-3\sqrt{6}}{\sqrt{3}+\sqrt{2}}$ giving your answer in the form $p\sqrt{3} + q\sqrt{2}$, where *p* and *q* are integers.

[4]

Chapter 1 to 4 End test

6. Given that $\frac{p^{\frac{1}{3}}q^{\frac{-1}{2}}r^{\frac{3}{2}}}{p^{\frac{-2}{3}}\sqrt{(qr)^5}} = p^a q^b r^c$, find the value of each of the integers a, b and c.

[3]

7. The function f is defined by $f(x) = 2 - \sqrt{x + 5}$ for $-5 \leq x < 0$.

(i) Write down the range of f.

[2]

(ii) Find $f^{-1}(x)$ and state its domain and range.

[4]

Chapter 1 to 4 End test

The function g is defined by $g(x) = \frac{4}{x}$ for $-5 \leq x < -1$.

(iii) Solve $fg(x) = 0$.

[3]

8. (i) Express $4x^2 + 8x - 5$ in the form $p(x + q)^2 + r$, where *p*, *q* and *r* are constants to be found.

[3]

(ii) State the coordinates of the vertex of $y = \left|4x^2 + 8x - 5\right|$.

[2]

Chapter 1 to 4 End test

(iii) Sketch the graph of $y = \left|4x^2 + 8x - 5\right|$, showing the coordinates of the points where the curve meets the axes.

[3]

9. Find the values of *a* for which the line $y = ax + 9$ intersects the curve $y = -2x^2 + 3x + 1$ at 2 distinct points.

[4]