Chapter 1 to 6 test

/42 marks

1. **DO NOT USE A CALCULATOR IN THIS QUESTION.**

The polynomial $p(x) = 2x^3 - 3x^2 + qx + 56$ has a factor $x - 2$.

a) Show that $q = -30$.

[1]

b) Factorise p(x) completely and hence state all the solutions of p(x) = 0.

[4]

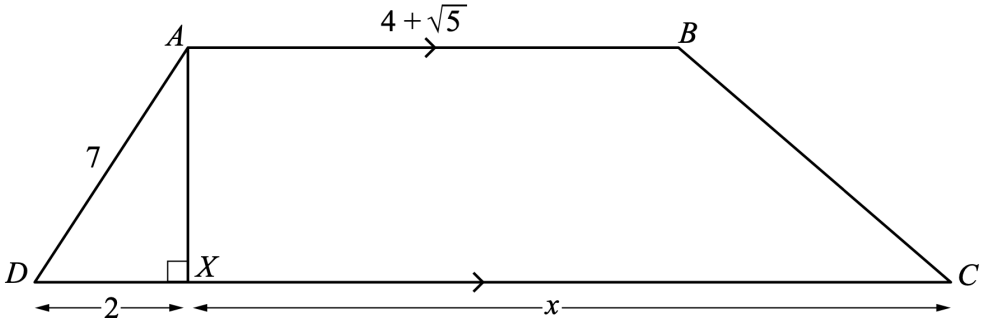
2. (a) Express $12x^2 - 6x + 5$ in the form $p(x - q)^2 + r$, where *p*, *q* and *r* are constants to be found.

[3]

(b) Hence find the greatest value of $(12x^2 - 6x + 5)^{-1}$ and state the value of *x* at which this occurs.

[2]

3. **DO NOT USE A CALCULATOR IN THIS QUESTION.**



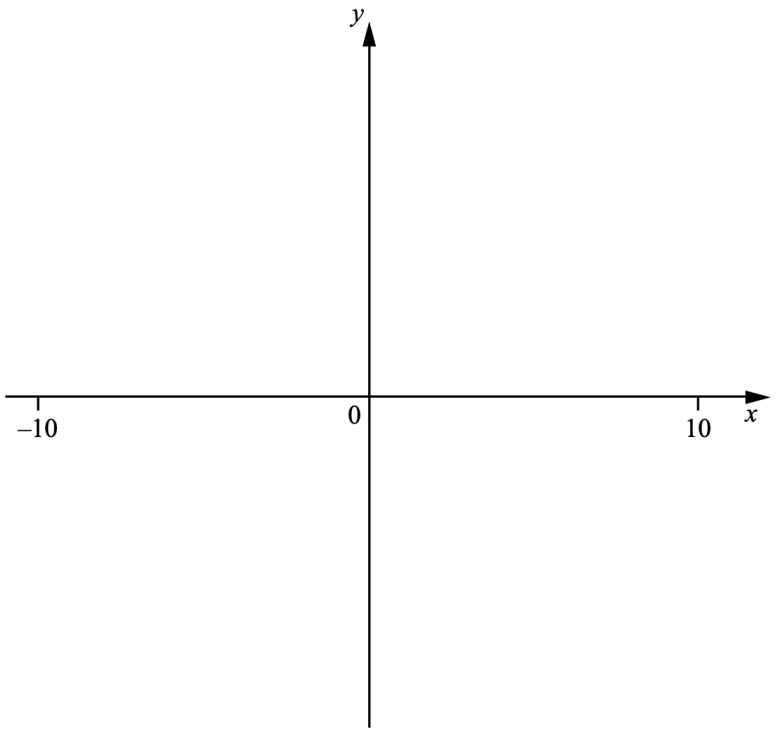
The diagram shows a trapezium *ABCD* in which *AD* = 7 cm and *AB* = (4 + $\sqrt{5}$) cm. *AX* is perpendicular to *DC* with *DX* = 2 cm and *XC* = *x* cm.

Given that the area of trapezium *ABCD* is 15($\sqrt{5}$ + 2)cm^2, obtain an expression for *x* in the form *a* + *b*$\sqrt{5}$, where *a* and *b* are integers.

[6]

4. (a) On the axes below, sketch the graph of $y = |2x + 5|$ and the graph of $y = |2 - x|$, stating the coordinates of the points where each graph meets the coordinate axes.

[4]



(b) Solve $|2x + 5| \leq |2 - x|$.

[3]

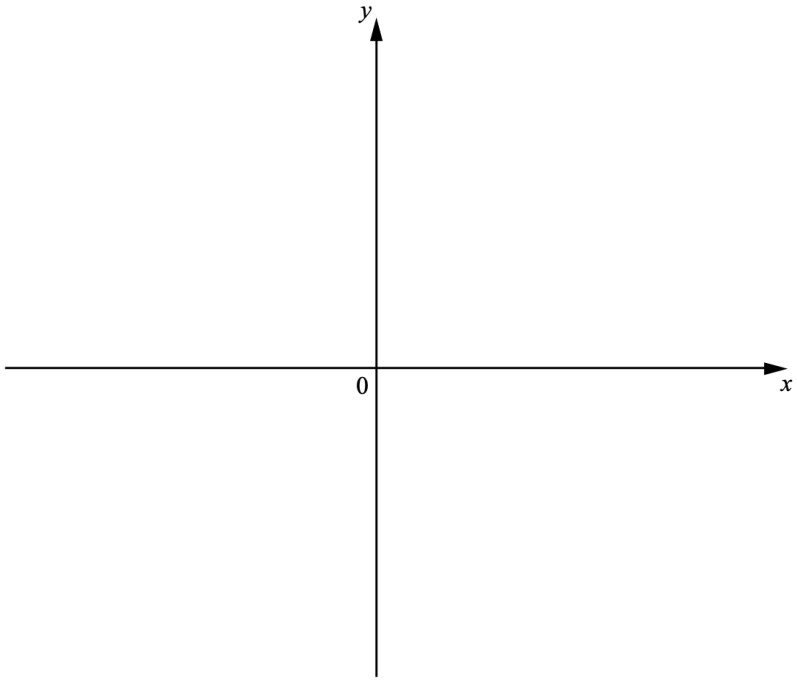
5. Solve

$$xy = 3$$
$$x^4 y^5 = 486$$

[3]

6. (a) On the axes below, sketch the graph of $y = \frac{1}{5}(x - 2)(x - 4)(x + 5)$, showing the coordinates of the points where the graph meets the coordinate axes.

[2]



(b) Hence solve $(x - 2)(x - 4)(x + 5) \leq 0$.

[1]

7. Functions g and h are such that

$$g(x) = 2 + 4\,lnx \text{ for } x > 0,$$
$$h(x) = x^2 + 4 \quad \text{for } x > 0.$$

(a) Find $g^{-1}(x)$.

[4]

(b) Solve $gh(x) = 10$.

[3]

8. (a) Simplify $log_a\sqrt{2} + log_a 8 + log_a(\frac{1}{2})$, giving your answer in the form $p\ log_a 2$, where p is a constant.

[2]

(b) Solve the equation $log_3 x - log_9 4x = 1$.

[4]