

Algebraic division and the factor theorem

AS Pure Mathematics | Edexcel 8MA0 | 12 questions, 63 marks

A-level Maths topic practice



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Name: _____ **Date:** _____ **Score:** _____ / 63

1 $f(x) = 2x^3 + x^2 - 13x + 6$. Use the factor theorem to show that $(x + 3)$ is a factor of $f(x)$. (2 marks)

Answer _____

2 Given that $(x + 1)$ is a factor of $x^3 + 2x^2 - 5x - 6$

a. divide $x^3 + 2x^2 - 5x - 6$ by $(x + 1)$

b. hence factorise $x^3 + 2x^2 - 5x - 6$ completely. (4 marks)

Answer _____

3 $g(x) = x^3 - 4x^2 + kx + 10$, where k is a constant. Given that $(x + 2)$ is a factor of $g(x)$, find the value of k . You must make your method clear. (3 marks)

Answer _____

4

$$f(x) = 2x^3 - 5x^2 - 4x + 3$$

- Show that $(x + 1)$ is a factor of $f(x)$.
- Hence factorise $f(x)$ completely.
- Write down all the solutions of $f(x) = 0$

(5 marks)

Answer _____

5

Given that $x^3 - 7x - 6 \equiv (x + 1)(x^2 + px + q)$, where p and q are constants,

- find the values of p and q
- hence factorise $x^3 - 7x - 6$ completely.

(4 marks)

Answer _____

6

$$f(x) = x^3 - 2x^2 - 5x - 12$$

- Use the factor theorem to show that $(x - 4)$ is a factor of $f(x)$.
- Write $f(x)$ in the form $(x - 4)(x^2 + bx + c)$, where b and c are integers.
- Hence show that the equation $f(x) = 0$ has exactly one real root.

(5 marks)

Answer _____

7

$f(x) = x^3 + ax^2 + bx - 12$, where a and b are constants. Given that $(x - 3)$ and $(x + 1)$ are both factors of $f(x)$,

- find the values of a and b
- factorise $f(x)$ completely.

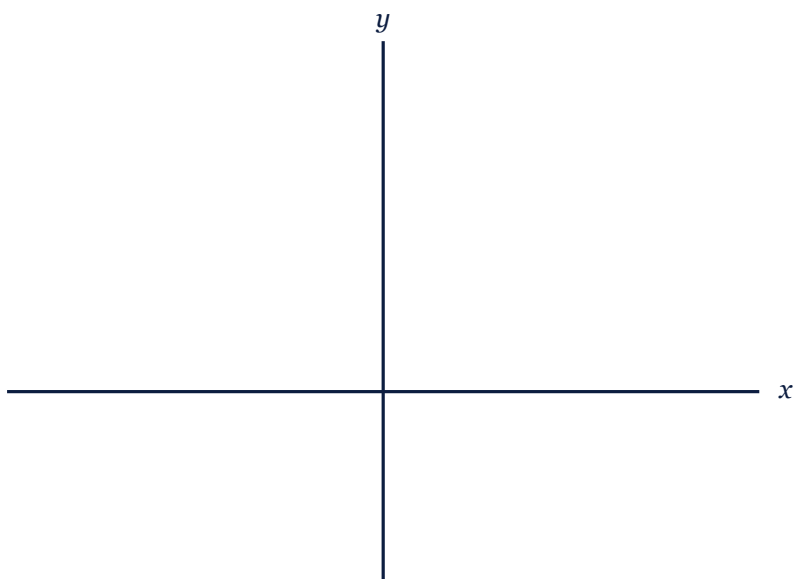
(6 marks)

Answer _____

8

$$f(x) = x^3 - x^2 - 8x + 12$$

- Show that $(x - 2)$ is a factor of $f(x)$.
- Factorise $f(x)$ completely.
- Sketch the curve with equation $y = f(x)$, showing the coordinates of the points where the curve meets the coordinate axes.



(6 marks)

Answer _____

9 $g(x) = 3x^3 - 7x^2 + 2x + 2a$, where a is a positive constant.

Given that $(x - a)$ is a factor of $g(x)$,

a. show that $a(3a - 4)(a - 1) = 0$

b. For the integer value of a , solve $g(x) = 0$, giving your answers in exact form.

(7 marks)

Answer _____

10 The curve C has equation $y = f(x)$, where $f(x) = x^3 + px^2 + qx + 6$ and p and q are constants.

Given that $(x + 2)$ is a factor of $f(x)$ and that C passes through the point $(2, -4)$,

a. find the values of p and q

b. hence find the coordinates of the points where C meets the x -axis.

(7 marks)

Answer _____

11

In this question you must show all stages of your working. Solutions relying entirely on calculator technology are not acceptable.

a. Show that the equation $8^x - 7(4^x) + 14(2^x) - 8 = 0$ can be written as $u^3 - 7u^2 + 14u - 8 = 0$, where $u = 2^x$

b. Hence solve $8^x - 7(4^x) + 14(2^x) - 8 = 0$

(6 marks)

 Answer

12

A joiner in Glasgow makes a wooden storage box in the shape of a closed cuboid. The box has length $(x + 4)$ cm, width x cm and height $(x - 1)$ cm. The volume of the box is 96 cm^3 .

a. Show that $x^3 + 3x^2 - 4x - 96 = 0$

b. Use the factor theorem to show that $(x - 4)$ is a factor of $x^3 + 3x^2 - 4x - 96$

c. Hence show that $x = 4$ is the only real solution of the equation in part (a).

d. Find the total surface area of the box.

(8 marks)

 Answer

End of questions | Total 63 marks