



AQA Qualifications

AQA Level 2 Certificate

FURTHER MATHEMATICS

Level 2 (8365)

Worksheet 10
Factor Theorem

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10 Factor Theorem

Question 1

- (a) Show that $x(x + 4)(x - 9) = x^3 - 5x^2 - 36x$ (1 mark)
- (b) Write down the x values of the three points where the graph of $y = x^3 - 5x^2 - 36x$ crosses the x -axis. (2 marks)

Question 2

$$f(x) = x^3 + 2x^2 - 5x - 6$$

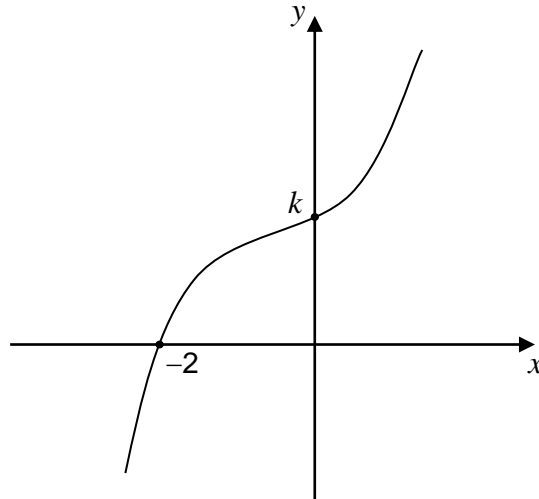
- (a) Work out $f(1)$ and $f(-1)$ (2 marks)
- (b) Work out $f(2)$ and $f(-2)$ (2 marks)
- (c) Work out $f(3)$ and $f(-3)$ (2 marks)
- (d) Write down the three linear factors of $f(x)$. (1 mark)

Question 3

- (a) Show that $(x + 5)$ is a factor of $x^3 + 7x^2 + 2x - 40$ (2 marks)
- (b) Work out the other two linear factors of $x^3 + 7x^2 + 2x - 40$ (3 marks)
- (c) Hence, solve $x^3 + 7x^2 + 2x - 40 = 0$ (1 mark)

Question 4

A sketch of $y = x^3 + 5x^2 + 9x + k$ where k is an integer, is shown.



Work out the value of k .

(3 marks)

Question 5

(a) $(x + 3)$ is a factor of $f(x) = x^3 + x^2 + ax - 72$ where a is an integer.

Work out the value of a .

(3 marks)

(b) Work out the other linear factors of $f(x)$.

(3 marks)

Question 6

$(x - 3)$ and $(x + 4)$ are factors of $f(x) = x^3 + ax^2 + bx + 24$ where a and b are integers.

(a) Work out the third linear factor of $f(x)$.

(2 marks)

(b) Work out the values of a and b .

(4 marks)

Question 7

(a) $(x - 5)$ is a factor of $f(x) = x^3 + kx^2 + 9x - 20$ where k is an integer.

Work out the value of k .

(3 marks)

(b) Express $f(x)$ as a product of $(x - 5)$ and a quadratic factor.

(2 marks)

(c) Show that $(x - 5)$ is the only linear factor of $f(x)$.

(2 marks)

Question 8

Solve $x^3 - 6x^2 - 25x - 18 = 0$

*(5 marks)***Question 9**

$f(x) = x^5 - 2x^4 - 81x + 162 = 0$

(a) Use the factor theorem to show that $f(x)$ has a factor of $(x - 2)$

(1 mark)

(b) Hence work out the integer solutions of $f(x) = 0$

*(4 marks)***Question 10**

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

(2 marks)

(b) Factorise fully $3x^3 + 2x^2 - 3x - 2$

(2 marks)