Edexcel Maths C2

Topic Questions from Papers

Algebra & Functions
3. (a) Use the factor theorem to show that $(x + 4)$ is a factor of $2x^3 + x^2 - 25x + 12$. 

(2)

(b) Factorise $2x^3 + x^2 - 25x + 12$ completely. 

(4)
1. \( f(x) = 2x^3 + x^2 - 5x + c \), where \( c \) is a constant.

Given that \( f(1) = 0 \),

(a) find the value of \( c \), \hfill (2)

(b) factorise \( f(x) \) completely, \hfill (4)

(c) find the remainder when \( f(x) \) is divided by \((2x - 3)\). \hfill (2)
4. \( f(x) = 2x^3 + 3x^2 - 29x - 60. \)

(a) Find the remainder when \( f(x) \) is divided by \( (x + 2) \).

(b) Use the factor theorem to show that \( (x + 3) \) is a factor of \( f(x) \).

(c) Factorise \( f(x) \) completely.
5. \[ f(x) = x^3 + 4x^2 + x - 6. \]

(a) Use the factor theorem to show that \((x + 2)\) is a factor of \(f(x)\). (2)

(b) Factorise \(f(x)\) completely. (4)

(c) Write down all the solutions to the equation

\[ x^3 + 4x^2 + x - 6 = 0. \] (1)
2. \( f(x) = 3x^3 - 5x^2 - 16x + 12. \)

(a) Find the remainder when \( f(x) \) is divided by \( (x - 2) \).

(2) Given that \( (x + 2) \) is a factor of \( f(x) \),

(b) factorise \( f(x) \) completely.

(Total 6 marks)
1. (a) Find the remainder when

\[ x^3 - 2x^2 - 4x + 8 \]

is divided by

(i) \( x - 3 \),

(ii) \( x + 2 \).

(b) Hence, or otherwise, find all the solutions to the equation

\[ x^3 - 2x^2 - 4x + 8 = 0. \]
1. \[ f(x) = 2x^3 - 3x^2 - 39x + 20 \]

(a) Use the factor theorem to show that \((x + 4)\) is a factor of \(f(x)\). (2)

(b) Factorise \(f(x)\) completely. (4)
6. \[ f(x) = x^4 + 5x^3 + ax + b, \]

where \( a \) and \( b \) are constants.

The remainder when \( f(x) \) is divided by \((x - 2)\) is equal to the remainder when \( f(x) \) is divided by \((x + 1)\).

(a) Find the value of \( a \). \( (5) \)

Given that \((x + 3)\) is a factor of \( f(x) \),

(b) find the value of \( b \). \( (3) \)
3. \( f(x) = (3x - 2)(x - k) - 8 \)

where \( k \) is a constant.

(a) Write down the value of \( f(k) \).

(1)

When \( f(x) \) is divided by \( (x - 2) \) the remainder is 4

(b) Find the value of \( k \).

(2)

(c) Factorise \( f(x) \) completely.

(3)
3. \[ f(x) = 2x^3 + ax^2 + bx - 6 \]

where \( a \) and \( b \) are constants.

When \( f(x) \) is divided by \((2x - 1)\) the remainder is \(-5\).

When \( f(x) \) is divided by \((x + 2)\) there is no remainder.

(a) Find the value of \( a \) and the value of \( b \).

(b) Factorise \( f(x) \) completely.
2. \( f(x) = 3x^3 - 5x^2 - 58x + 40 \)

(a) Find the remainder when \( f(x) \) is divided by \( (x - 3) \). 

Given that \( (x - 5) \) is a factor of \( f(x) \),

(b) find all the solutions of \( f(x) = 0 \).
1. \[ f(x) = x^4 + x^3 + 2x^2 + ax + b \]

where \( a \) and \( b \) are constants.

When \( f(x) \) is divided by \( (x - 1) \), the remainder is 7.

(a) Show that \( a + b = 3 \). (2)

When \( f(x) \) is divided by \( (x + 2) \), the remainder is \(-8\).

(b) Find the value of \( a \) and the value of \( b \). (5)
1. \( f(x) = 2x^3 - 7x^2 - 5x + 4 \)

(a) Find the remainder when \( f(x) \) is divided by \( (x - 1) \).  

(b) Use the factor theorem to show that \( (x + 1) \) is a factor of \( f(x) \).  

(c) Factorise \( f(x) \) completely.
5. \( f(x) = x^3 + ax^2 + bx + 3 \), where \( a \) and \( b \) are constants.

Given that when \( f(x) \) is divided by \( x + 2 \) the remainder is 7,

(a) show that \( 2a - b = 6 \) \( (2) \)

Given also that when \( f(x) \) is divided by \( x - 1 \) the remainder is 4,

(b) find the value of \( a \) and the value of \( b \). \( (4) \)
4. \[ f(x) = 2x^3 - 7x^2 - 10x + 24 \]

(a) Use the factor theorem to show that \((x + 2)\) is a factor of \(f(x)\). 

(2)

(b) Factorise \(f(x)\) completely. 

(4)
2. \( f(x) = ax^3 + bx^2 - 4x - 3 \), where \( a \) and \( b \) are constants.

Given that \( (x - 1) \) is a factor of \( f(x) \),

(a) show that

\[ a + b = 7 \]  

(2)

Given also that, when \( f(x) \) is divided by \( (x + 2) \), the remainder is 9,

(b) find the value of \( a \) and the value of \( b \), showing each step in your working.  

(4)
4. \( f(x) = ax^3 - 11x^2 + bx + 4 \), where \( a \) and \( b \) are constants.

When \( f(x) \) is divided by \( (x - 3) \) the remainder is 55

When \( f(x) \) is divided by \( (x + 1) \) the remainder is –9

(a) Find the value of \( a \) and the value of \( b \).

(b) Given that \( (3x + 2) \) is a factor of \( f(x) \), factorise \( f(x) \) completely.
3. \[ f(x) = 2x^3 - 5x^2 + ax + 18 \]

where \( a \) is a constant.

Given that \((x - 3)\) is a factor of \(f(x)\),

(a) show that \(a = -9\)

(b) factorise \(f(x)\) completely.

Given that

\[ g(y) = 2(3^y) - 5(3^y) - 9(3^y) + 18 \]

(c) find the values of \(y\) that satisfy \(g(y) = 0\), giving your answers to 2 decimal places where appropriate.
Question 3 continued

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Core Mathematics C2

Candidates sitting C2 may also require those formulae listed under Core Mathematics C1.

Cosine rule

\[ a^2 = b^2 + c^2 - 2bc \cos A \]

Binomial series

\[(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + b^n \quad (n \in \mathbb{N})\]

where \( \binom{n}{r} = \frac{n!}{r!(n-r)!} \)

\[(1+x)^n = 1 + nx + \frac{n(n-1)}{1\times2}x^2 + \ldots + \frac{n(n-1)\ldots(n-r+1)}{1\times2\ldots r}x^r + \ldots \quad (|x| < 1, n \in \mathbb{R})\]

Logarithms and exponentials

\[ \log_a x = \frac{\log_b x}{\log_b a} \]

Geometric series

\[ u_n = ar^{n-1} \]

\[ S_n = \frac{a(1-r^n)}{1-r} \]

\[ S_{\infty} = \frac{a}{1-r} \quad \text{for } |r| < 1 \]

Numerical integration

The trapezium rule:

\[ \int_{a}^{b} y \, dx \approx \frac{1}{2} h \{y_0 + y_n + 2(y_1 + y_2 + \ldots + y_{n-1})\}, \text{ where } h = \frac{b-a}{n} \]
Core Mathematics C1

**Mensuration**

Surface area of sphere = $4\pi r^2$

Area of curved surface of cone = $\pi r \times \text{slant height}$

**Arithmetic series**

\[ u_n = a + (n - 1)d \]

\[ S_n = \frac{1}{2} n(a + l) = \frac{1}{2} n[2a + (n - 1)d] \]