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)

1. (a) Find the remainder when

$$x^3 - 2x^2 - 4x + 8$$

is divided by

(i) $x - 3$,

(ii) $x + 2$.

(3)

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

$$x^3 - 2x^2 - 4x + 8 = 0.$$

(4)

Leave
blank

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)

H 3 0 9 5 7 A 0 1 4 2 8

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.

(6)

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

(3)

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)

5. $$f(x) = x^3 + ax^2 + bx + 3, \quad \text{where } a \text{ and } b \text{ are constants.}$$

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)

1.

$$f(x) = 2x^3 - 8x^2 - 39x + 20$$

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

(2)

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

(4)

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)

2.
$$f(x) = 3x^3 - 5x^2 - 58x + 40$$

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

(2)

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

(b) find all the solutions of $f(x) = 0$.

(5)

4. $f(x) = 2x^3 + 3x^2 - 29x - 60.$

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

<div align="right">(2)</div>

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

<div align="right">(2)</div>

   (c) Factorise f(x) completely.

<div align="right">(4)</div>

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.

(4)

(Total 6 marks)

1.

$$f(x) = 2x^3 - 7x^2 - 5x + 4$$

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

(2)

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

(2)

(c) Factorise f(x) completely.

(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)

Leave
blank

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 $a = -9$

(2)

(b) factorise f(x) completely.

(4)

Given that

$$g(y) = 2(3^{3y}) - 5(3^{2y}) - 9(3^y) + 18$$

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

(3)