Polynomials - Past Edexcel Exam Questions

1. **(Question 3 - C2 May 2018)**

$$f(x) = 24x^3 + Ax^2 - 3x + B$$

where A and B are constants.

When $f(x)$ is divided by $(2x - 1)$ the remainder is 30.

(a) Show that $A + 4B = 114$. [2]

Given also that $(x + 1)$ is a factor of $f(x)$

(b) find another equation in A and B. [2]

(c) Find the value of A and the value of B. [2]

(d) Hence find a quadratic factor of $f(x)$. [2]

2. **(Question 6 - C2 May 2017)**

$$f(x) = -6x^3 - 7x^2 + 40x + 21$$

(a) Use factor theorem to show that $(x + 3)$ is a factor of $f(x)$. [2]

(b) Factorise $f(x)$ completely. [4]

(c) Hence solve the equation

$$6\left(2^{3y}\right) + 7\left(2^{2y}\right) = 40\left(2^{y}\right) + 21$$

giving your answer to 2 decimal places. [3]

3. **(Question 4 - C2 May 2016)**

$$f(x) = 6x^3 + 13x^2 - 4$$

(a) Use the remainder theorem to find the remainder when $f(x)$ is divided by $(2x + 3)$. [2]

(b) Use the factor theorem to show that $(x+2)$ is a factor of $f(x)$. [2]

(c) Factorise $f(x)$ completely. [4]

4.   **(Question 3 - C2 May 2015)**

$$f(x) = 6x^3 + 3x^2 + Ax + B, \quad \text{where } A \text{ and } B \text{ are constants.}$$

Given that when $f(x)$ is divided by $(x+1)$ the remainder is 45,

(a) show that $B - A = 48$. [2]

Given also that $(2x+1)$ is a factor of $f(x)$,

(b) find the value of A and the value of B. [4]

(c) Factorise $f(x)$ fully. [3]

5.   **(Question 2 - C2 May 2014)**

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

(a) Use the factor theorem to show that $(x-2)$ is a factor of $f(x)$. [2]

(b) Factorise $f(x)$ completely. [4]

6.   **(Question 3 - C2 May 2013)**

$$f(x) = 2x^3 - 5x^2 + ax + 18$$

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

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

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

7. **(Question 2 - C2 Jan 2013)**

$f(x) = ax^3 + bx^2 - 4x - 3$, 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 of your working. [4]

8. **(Question 4 - C2 May 2012)**

$$f(x) = 2x^3 - 7x^2 - 10x + 24$$

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

(b) Factorise $f(x)$ completely. [4]

9. **(Question 5 - C2 Jan 2012)**

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

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]

10. **(Question 1 - C2 May 2011)**

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

(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]

11. **(Question 1 - C2 Jan 2011)**

$$f(x) = x^4 + x^3 + 2x^2 + ax + b,$$

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]

12. **(Question 2 - C2 Jun 2010)**

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

(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]

13. **(Question 3 - C2 Jan 2010)**

$$f(x) = 2x^3 + ax^2 + bx - 6,$$

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]

Solutions

1. (a) -

    (b) $A + B = 21$

    (c) $A = -10$, $B = 31$

    (d) $24x^2 - 34x + 31$

2. (a) -

    (b) $(x + 3)(2x + 1)(7 - 3x)$

    (c) $y = 1.22$

3. (a) 5

    (b) $f(-2) = 0$

    (c) $(x + 2)(3x + 2)(2x - 1)$

4. (a) -

    (b) $A = -96$, $B = -48$

    (c) $3(2x + 1)(x + 4)(x - 4)$

5. (a) $f(2) = 0$

    (b) $(x - 2)^2(2x + 1)$

6. (a) -

    (b) $(x - 3)(2x - 3)(x + 2)$

    (c) $y = 1$, $y = 0.37$

7. (a) -

    (b) ... $a = 2$, $b = 5$

8. (a) $f(-2) = 0$

    (b) $(x + 2)(2x - 3)(x - 4)$

9. (a) -

    (b) $a = 2$, $b = -2$

10. (a) -6

    (b) $f(-1) = 0$

    (c) $(x+1)(2x-1)(x-4)$

11. (a) -

    (b) $a = 9$, $b = -6$

12. (a) -98

    (b) $x = 5$, $x = \frac{2}{3}$, $x = -4$

13. (a) $a = 5$, $b = -1$

    (b) $(x+2)(2x+3)(x-1)$