

1. Algebra and Functions

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1) Simplify the following [4]

a) $\frac{8x^2 + 3x^6 + 7x}{3x}$

b) $\frac{x^2 + 4x - 32}{x + 8}$

c) $\frac{8x^2 + 22x + 5}{(2x + 5)(x - 7)}$

d) $\frac{6x^2 + 55x + 9}{x^2 + 14x + 45}$

2) Divide the following [6]

a) $x^4 - x^3 - 44x^2 - 11x + 6$ by $(x + 6)$

b) $4x^3 - 33x^2 + 50x + 24$ by $(x - 6)$

c) $2x^5 - 15x^4 + 19x^3 + 39x^2 - 13x + 4$ by $(x - 4)$

d) $x^3 - 4x + 3$ by $(x - 1)$

e) $4x^3 + 27x^2 + 49$ by $(x + 7)$

f) $x^3 - 6x^2 - 5x + 30$ by $(x - 6)$

3) Find the remainder when [2]

a) $4x^3 + 5x^2 - 26x - 14$ is divided by $(x + 3)$

b) $18x^3 - 54x^2 + 49x - 22$ is divided by $(3x - 5)$

4) Work out if $(x - 6)$ is a factor of $2x^3 - 8x^2 - 21x - 18$ [1]

5) Factorise completely [2]

a) $x^3 + 5x^2 - 4x - 20$ given that $(x - 2)$ is a factor.

b) $x^3 - 9x^2 + 14x + 24$

6) Given that $(x - 5)$ is a factor of $4x^3 - 39x^2 + cx - 105$ find the value of c . [1]

7) Given that $(x - 3)$ and $(x - 5)$ are factors of $4x^3 - 29x^2 + ax + b$ find the value of a and b . [1]

8) When $2x^3 + x^2 + cx - 55$ is divided by $(x + 4)$ the remainder is 5. Find the value of c . [1]

9) Given $f(x) = 3x^3 + bx^2 + 29x + 11$ and $f(-1) = -4$. Find $f(-7)$. [1]

10) The expression $4x^3 + ax^2 + bx + 27$ gives a remainder 2 when divided by $(x - 1)$ and a remainder 138 when divided by $(x + 3)$. Find the value of a and b .

[1]

Solutions for the assessment 1. Algebra and Functions

1) a) $\frac{8}{3}x + x^5 + \frac{7}{3}$

b) $x - 4$

c) $\frac{4x + 1}{x - 7}$

d) $\frac{6x + 1}{x + 5}$

2) a) $x^3 - 7x^2 - 2x + 1$

b) $4x^2 - 9x - 4$

c) $2x^4 - 7x^3 - 9x^2 + 3x - 1$

d) $x^2 + x - 3$

e) $4x^2 - x + 7$

f) $x^2 - 5$

3) a) 1

b) -7

4) As the remainder is 0 then $(x - 6)$ is a factor of $2x^3 - 8x^2 - 21x - 18$.

5) a) $(x - 2)(x + 2)(x + 5)$

b) $(x - 6)(x - 4)(x + 1)$

6) 116

7) $a = 36$ and $b = 45$

8) -43

9) -388

10) $a = 11$ and $b = -40$