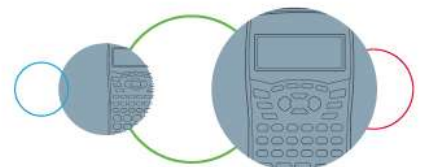


SHARP

Worksheet 8: Functions – Polynomials (Factor and Remainder Theorem)

Grade 12 Mathematics

- Factorise the following third degree polynomials:
 - $3x^3 - 28x^2 + 52x + 48$
 - $2x^3 - 17x^2 + 41x - 30$
 - $30x^3 + 53x^2 - 4x - 15$
 - $x^3 + 10x^2 + 8x - 64$
 - $x^3 + 15x^2 + 75x + 125$
 - $x^3 - 7x^2 - 14x + 48$
 - $2x^3 - 39x^2 + 157x + 330$
 - $15x^3 + 53x^2 - 58x - 120$
 - $x^3 + 14x^2 + 41x - 56$
 - $x^3 + 3x^2 - 88x + 240$
- Solve for x in of the following equations:
 - $x^3 - 2x^2 - x + 2 = 0$
 - $x(x^2 - 67) = 126$
 - $3(x^3 + 8) = 7x(x + 10)$
 - $x(3x^2 + 8x - 48) = 128$
 - $10(x^3 + 10) = 3x(11x + 35)$
 - $x^3 - 3x^2 - 126x + 648 = 0$
 - $x(x^2 - 41) = -4(x^2 + 9)$
 - $2x^3 = 3x^2 + 98x + 48$
 - $5x^3 - 31x^2 = 4(17x + 8)$
 - $3x^3 + 7x^2 - 22x - 8 = 0$
- Use the factor and remainder theorem to prove that each of the factors given is a factor of the expression given.
 - Factor: $x - 1$ Expression: $f(x) = x^3 + 2x^2 - x - 2$
 - Factor: $x - 4$ Expression: $f(x) = x^3 - 9x^2 + 26x - 24$
 - Factor: $x + 6$ Expression: $f(x) = x^3 + 13x^2 + 54x + 72$
 - Factor: $2x + 1$ Expression: $f(x) = 2x^3 + 11x^2 - 23x - 14$
 - Factor: $5x - 1$ Expression: $f(x) = 5x^3 - 26x^2 - 65x + 14$
- Use the factor and remainder theorem to find the value of p in the equations below:
 - When $f(x) = px^2 + 25x + 4$ is divided by $x - 2$ the remainder is 78.
 - When $f(x) = x^2 - 7x - p$ is divided by $x + 1$ the remainder is -52.
 - When $f(x) = 5x^3 + px^2 - 47x - 10$ is divided by $x + 4$ the remainder is 114.
 - When $f(x) = x^2 + px - 21$ is divided by $x - 5$ the remainder is -16.
 - When $f(x) = x^3 + 11x^2 + px - 216$ is divided by $x - 7$ it gives a remainder of 624.



5. Determine the remainder if each of these equations are divided by the factor given

a) $f(x) = x^3 - 5x^2 + 2x + 8$ divided by $x + 10$

b) $f(x) = x^2 + 2x - 15$ divided by $x - 12$

c) $f(x) = x^2 - 14x + 40$ divided by $x + 5$

d) $f(x) = 4x^3 - 12x^2 - 67x - 30$ divided by $x + 4$

e) $f(x) = x^3 + 2x^2 - 111x + 108$ divided by $5x - 1$

6. Which of the 3 divisors given for each equation is a perfect factor of that equation?

a) A $\rightarrow x + 2$ B $\rightarrow x - 2$ C $\rightarrow 5x - 1$
 $g(x) = 6x^2 + 11x - 2$

b) A $\rightarrow 2x + 1$ B $\rightarrow x - 4$ C $\rightarrow x - 2$
 $g(x) = x^3 - 7x^2 - 6x + 72$

c) A $\rightarrow 2x - 1$ B $\rightarrow x + 3$ C $\rightarrow x - 1$
 $g(x) = x^3 - 3x^2 - x + 3$

