2.1 Long Division of Polynomials and the Remainder Theorem Worksheet

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The course material originated from www.jensenmath.ca

1) Use the remainder theorem to determine the remainder when $2x^3 + 7x^2 - 8x + 3$ is divided by each binomial.

a) $x + 1$

b) $x - 2$

c) $x + 3$

2) a) Divide $x^3 + 3x^2 - 2x + 5$ by $x + 1$. Express the result in quotient form.

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b) Write the corresponding statement that can be used to check the division.

3) Divide $3x^4 - 4x^3 - 6x^2 + 17x - 8$ by $3x - 4$. Express the result in quotient form.

b) Write the corresponding statement that can be used to check the division.

4) Perform each division. Express the result in quotient form.

a) $x^3 + 7x^2 - 3x + 4$ divided by $x + 2$

b) $6x^3 + x^2 - 14x - 6$ divided by $3x + 2$

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c) $10x^3 + 11 - 9x^2 - 8x$ divided by $5x - 2$

d) $11x - 4x^4 - 7$ divided by $x - 3$

e) $6x^3 + x^2 + 7x + 3$ divided by $3x + 2$

f) $8x^3 + 4x^2 - 31$ divided by $2x - 3$

g) $6x^2 - 6 + 8x^3$ divided by $4x - 3$

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5) The volume, in cubic cm, of a rectangular box can be modelled by the polynomial expression $2x^3 + 17x^2 + 38x + 15$. Determine possible dimensions of the box if the height, in cm, is given by $x + 5$.

6) Determine the value of k such that when $P(x) = kx^3 + 5x^2 - 2x + 3$ is divided by $x + 1$, the remainder is 7.

Answer Key

1) a) 16 b) 31 c) 36

2) a) $x^2 + 2x - 4 + \frac{9}{x+1}$ b) $x^3 + 3x^2 - 2x + 5 = (x+1)(x^2 + 2x - 4) + 9$

3) $x^3 - 2x + 3 + \frac{4}{3x-4}$; check: $3x^4 - 4x^3 - 6x^2 + 17x - 8 = (3x-4)(x^3 - 2x + 3) + 4$

4) a) $x^2 + 5x - 13 + \frac{30}{x+2}$ b) $2x^2 - x - 4 + \frac{2}{3x+2}$ c) $2x^2 - x - 2 + \frac{7}{5x-2}$ d) $-4x^3 - 12x^2 - 36x - 97 - \frac{298}{x-3}$ e) $2x^2 - x + 3 - \frac{3}{3x+2}$ f) $4x^2 + 8x + 12 + \frac{5}{2x-3}$ g) $2x^2 + 3x + \frac{9}{4} + \frac{3}{4(4x-3)}$

5) dimensions: $x + 5$ (height), $x + 3$ (length), $2x + 1$ (width)

6) $k = 3$

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