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.

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 $3x + 2$

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 $4x - 3$

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

3)a) $\frac{3x^4-4x^3-6x^2+17x-8}{3x-4} = x^3 - 2x + 3 + \frac{4}{3x-4}$ **b)** $3x^4 - 4x^3 - 6x^2 + 17x - 8 = (3x - 4)(x^3 - 2x + 3) + 4$

4)a) $\frac{x^3+7x^2-3x+4}{x+2} = x^2 + 5x - 13 + \frac{30}{x+2}$ **b)** $\frac{6x^3+x^2-14x-6}{3x+2} = 2x^2 - x - 4 + \frac{2}{3x+2}$

c) $\frac{10x^3-9x^2-8x+11}{5x-2} = 2x^2 - x - 2 + \frac{7}{5x-2}$ **d)** $\frac{-4x^4+11x-7}{x-3} = -4x^3 - 12x^2 - 36x - 97 - \frac{298}{x-3}$

e) $\frac{6x^3+x^2+7x+3}{3x+2} = 2x^2 - x + 3 - \frac{3}{3x+2}$ **f)** $\frac{8x^3+4x^2-31}{2x-3} = 4x^2 + 8x + 12 + \frac{5}{2x-3}$

g) $\frac{6x^2-6+8x^3}{4x-3} = 2x^2 + 3x + \frac{9}{4} + \frac{3}{4(4x-3)}$

5) $2x^3 + 17x^2 + 38x + 15 = (x + 5)(x + 3)(2x + 1)$

6) $k = 3$