

2.1 The Remainder Theorem

Example #1: Using long division, evaluate:

a) $5216 \div 15$

$$\begin{array}{r} 347 \\ 15 \overline{) 5216} \\ \underline{45} \\ 71 \\ \underline{60} \\ 116 \\ \underline{105} \\ 11R \end{array}$$

$$\frac{5216}{15} = 347 + \frac{11}{15}$$

OR

$$5216 = 15(347) + 11$$

c) $(4x^2 - 31 + 8x^3) \div (2x - 3)$

$$\begin{array}{r} 4x^2 + 8x + 12 \\ 2x-3 \overline{) 8x^3 + 4x^2 + 0x - 31} \\ \underline{8x^3 - 12x^2} \\ 16x^2 + 0x \\ \underline{16x^2 - 24x} \\ 24x - 31 \\ \underline{24x - 36} \\ 5R \end{array}$$

So $4x^2 - 31 + 8x^3$
 $= (2x - 3)(4x^2 + 8x + 12) + 5$

b) $(5x^3 - 7x^2 + 2x - 8) \div (x + 5)$

$$\begin{array}{r} 5x^2 - 32x + 162 \\ x+5 \overline{) 5x^3 - 7x^2 + 2x - 8} \\ \underline{5x^3 + 25x^2} \\ -32x^2 + 2x \\ \underline{-32x^2 - 160x} \\ 162x - 8 \\ \underline{162x + 810} \\ -818R \end{array}$$

So $5x^3 - 7x^2 + 2x - 8 = (x + 5)(5x^2 - 32x + 162) - 818$

d) If $f(x) = 5x^3 - 7x^2 + 2x - 8$,
 find the value of $f(-5)$

$$f(-5) = -818$$

e) If $g(x) = 4x^2 - 31 + 8x^3$,
 find the value of $g\left(\frac{3}{2}\right)$

$$g\left(\frac{3}{2}\right) = 5$$

f) What do you notice about the previous questions?