The Remainder Theorem:

When a polynomial function **P(x)** is divided by **(x - b)** the remainder is: $P(b)$

and when it is divided by **(ax - b)**, the remainder is: $P\left(\frac{b}{a}\right)$, when **a** and **b** are integers, and **a** ≠ 0

Example #2: Determine the remainder when $k(x) = 2x^3 + 7x^2 - 44x + 16$ is divided by:

a) $x - 2$

i) Using the remainder theorem

Find: $K(2) = 2(2)^3 + 7(2)^2 - 44(2) + 16$

$= -28$

So the remainder when $K(x)$ is divided by $x-2$ is -28.

ii) verify using long division

$$\begin{array}{r} 2x^2 + 11x - 22 \\ x-2 \overline{) 2x^3 + 7x^2 - 44x + 16} \\ 2x^3 - 4x^2 \\ \hline 11x^2 - 44x \\ 11x^2 - 22x \\ \hline -22x + 16 \\ -22x + 44 \\ \hline -28 \end{array}$$

b) $2x - 3$ (method of choice)

$K\left(\frac{3}{2}\right) = -27.5$

Example #3: Determine the value of **c** such that when $f(x) = x^4 - cx^3 + 7x - 6$ is divided by $x - 2$ the remainder is 8.

$f(2) = 2^4 - c(2)^3 + 7(2) - 6$

$f(2) = -8c + 24$

the remainder is 8, so $f(2) = 8$

So

$8 = -8c + 24$

$-16 = -8c$

$2 = c$

Homework: pg 91; #3odd, 4odd, 5, 9, 10, 12, 14a, 16, 18