

2.4: More Synthetic Division

° Before starting synthetic division:

1) terms must be in order from highest exponent to lowest exponent.

2) must have every exponent down from the highest exponent

° Ex 1) $(x^4 + 4x^3 + \underline{36x} - \underline{4x^2} - 45) \div (x-3)$
 $(x^4 + 4x^3 - 4x^2 + 36x - 45) \div (\underline{x-3})$

$x-3=0$
 $+3 \quad +3$
 $x=3$

3		1	4	-4	36	-45
	↓	3	21	51	261	
1		7	17	87		216

$\leftarrow R$

$$x^3 + 7x^2 + 17x + 87 + \frac{216}{x-3}$$

Ex 2) $(10h^3 + 4h^2 - 26) \div (h+2)$
 $(10h^3 + 4h^2 + 0h - 26) \div (h+2)$

$h+2=0$
 $-2 \quad -2$

$h = -2$

$$\begin{array}{r|rrrr} -2 & 10 & 4 & 0 & -26 \\ & \downarrow & -20 & 32 & -64 \\ \hline & 10 & -16 & 32 & -90 \end{array}$$

$$\boxed{10h^2 - 16h + 32 - \frac{90}{h+2}}$$

Ex 3) $(-9r^2 + 18r + 9r^5 - 18r^4 + 8) \div (r-2)$
 $(9r^5 - 18r^4 - 9r^2 + 18r + 8) \div (r-2)$
 $(9r^5 - 18r^4 + 0r^3 - 9r^2 + 18r + 8) \div (r-2)$

$r-2=0$
 $+2 \quad +2$
 $r=2$

$$\begin{array}{r|rrrrrr} 2 & 9 & -18 & 0 & -9 & 18 & 8 \\ & \downarrow & 18 & 0 & 0 & -18 & 0 \\ \hline & 9 & 0 & 0 & -9 & 0 & 18 \end{array}$$

$$9r^4 + \cancel{0r^3} + \cancel{0r^2} - 9r + \cancel{0} + \frac{8}{r-2}$$

$$\boxed{9r^4 - 9r + \frac{8}{r-2}}$$

You try:

$$1) (4x^4 + 10x^3 + 2x^2 - 20) \div (x+2)$$

$$2) (3x^4 - 5x + 2x^3 + 4) \div (x+1)$$

$$3) (m^5 + 10m^4 + 2) \div (m-7)$$

$$4) (7 + 8x + 3x^2 - 6x^4) \div (x-2)$$

$$1) -28$$

$$2) 10$$

$$3) 40819$$

$$4) -61$$