

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: \_\_\_\_\_

### Polynomial Review

Monday, March 30

Simplify

1.  $x^3 + 5x^5 - 2x^3 + 3x^6 - x^6 + x^2 + 4$   
 $2x^6 + 6x^5 - x^3 + x^2 + 4$

2.  $4(x^2 + 3x^4) - 2(x^2 + x^3 - 4x^4) + x^3$   
 $4x^2 + 12x^4 - 2x^2 - 2x^3 + 8x^4 + x^3$   
 $20x^4 - x^3 + 2x^2$

Multiply

3.  $(2x - 3)(5x^2 + 4x - 7)$

	$5x^2$	$4x$	$-7$
$2x$	$10x^3$	$8x$	$-14x$
$-3$	$-15x^2$	$-12x$	$21$

$10x^3 - 7x^2 - 26x + 21$

4.  $(-x^2 + 3x + 4)(3x^2 - 5x + 6)$

	$3x^2$	$-5x$	$6$
$-x^2$	$-3x^4$	$5x^3$	$-6x^2$
$3x$	$9x^3$	$-15x^2$	$18x$
$4$	$12x^2$	$-20x$	$24$

Synthetic

Divide

5.  $(x^4 + 8x^3 + 21x^2 + 22x + 11) \div (x + 3)$

6.  $(x^5 - 91x^3 + 91x^2 + 6x - 37) \div (x + 10)$

$-3 \overline{) 1 \ 8 \ 21 \ 22 \ 11}$

$\downarrow -3 \ -15 \ -18 \ -12$

$1x^3 + 5x^2 + 6x + 4 \leftarrow \div (x+3)$

$-10 \overline{) 1 \ 0 \ 0 \ -91 \ 91 \ 6 \ -37}$

$\downarrow -10 \ 10 \ -10 \ 91 \ -91 \ 96 \ -96$

$1 \ 10 \ 0 \ 0 \ 0 \ 6 \ -37$

$(-81x^4 + 17x^3 - 64x^2 + 39x - 28) \div (-8x + 7)$   
 $(2x^4 - 9x^3 + 21x^2 - 26x + 12) \div (2x - 3)$

$2x \overline{) 2x^4 - 6x^3 + 12x^2 - 8x + 0}$

$-3 \overline{) -3x^3 + 9x^2 - 18x + 12}$

$x^3 - 3x^2 + 6x - 4$

$-3x^3 + 6x^3 = -9x^3$

$9x^2 + 12x^2 = 21x^2$

$-18x + 8x = -26x$

$12 + 0 = 12$

Graph without calculator

9.  $y = \frac{1}{2}(x-6)(x-2)(x+3)$

a) Identify the degree of the polynomial

3

b) Determine the end behavior and orientation

$x \rightarrow \infty, f(x) \rightarrow \infty$   
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$

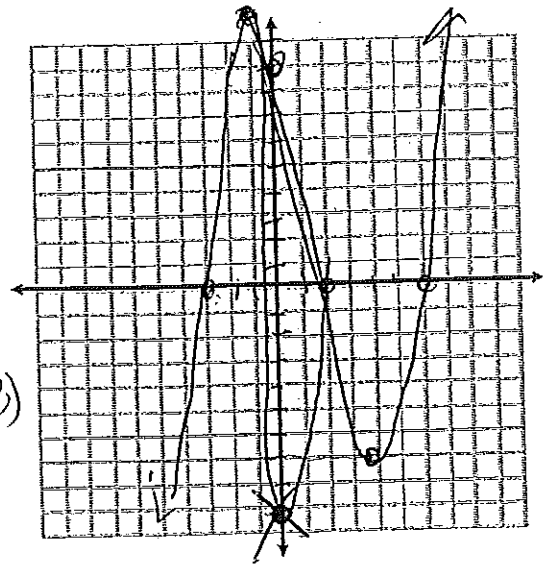
c) Identify the root(s)

$(6,0)(2,0)(-3,0)$

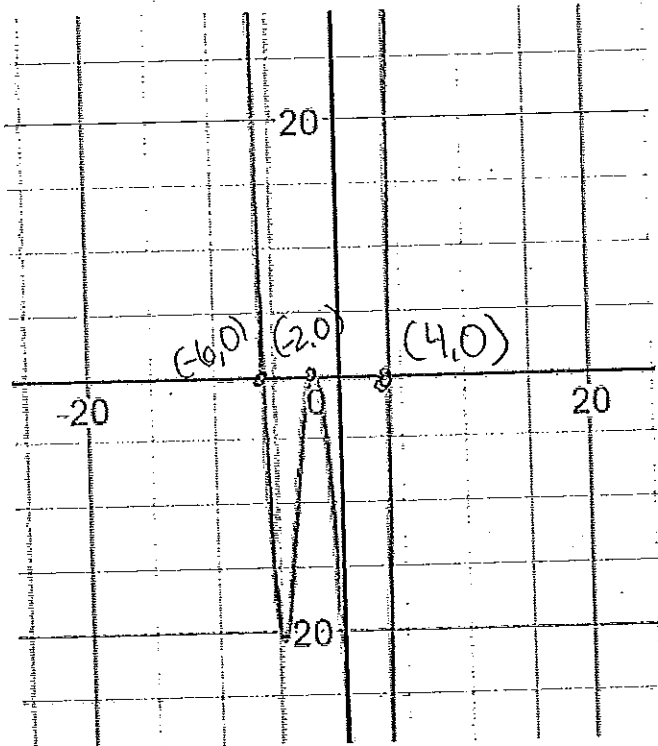
d) Identify the y-intercept

$\frac{1}{2}(0-6)(0-2)(0+3) = -18 \quad (0,-18)$

e) Sketch a graph the function



10.) Write the equation for the graph below that goes through  $(2, -64)$ .



$$y = a(x+6)(x+2)^2(x-4)$$

$$-64 = a(2+6)(2+2)^2(2-4)$$

$$-64 = a(8)(16)(-2)$$

$$-64 = -256a$$

$$\frac{-64}{-256} = \frac{-256a}{-256}$$

$$.25 = a$$

$$y = .25(x+6)(x+2)^2(x-4)$$

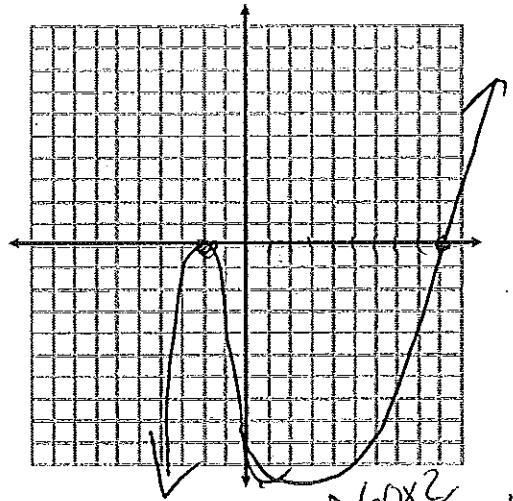
11. The function  $y = x^3 - 5x^2 - 32x - 36$  crosses the x-axis at  $x = 9$ . Graph the function without using a calculator

$$\frac{x^3 - 5x^2 - 32x - 36}{x - 9}$$

$$\begin{array}{r|rrrr} 9 & 1 & -5 & -32 & -36 \\ & \downarrow & 9 & 36 & 36 \\ \hline & 1 & 4 & 4 & 0 \end{array}$$

$$(x-9)(x^2+4x+4)$$

$$(x-9)(x+2)(x+2)$$



$$\begin{array}{|c|c|} \hline 3x & 5 \\ \hline 3x^2 & 15x \\ \hline 4 & 4x \\ \hline & 20 \\ \hline \end{array}$$

~~15x~~ ~~60x^2~~ ~~4x~~ ~~19x~~ ~~3x~~

12.) Simplify:  $\frac{x^2}{x+15} - \frac{225}{x+15}$

$$\frac{x^2 - 225}{x+15} = \frac{(x+15)(x-15)}{(x+15)}$$

$$= (x-15)$$

13.) Simplify:  $\frac{2x+3}{3x^2+19x+20} + \frac{x+1}{3x^2+19x+20}$

$$\frac{3x+4}{3x^2+19x+20}$$

$$= \frac{3x+4}{(3x+4)(x+5)} = \frac{1}{x+5}$$

14.) Divide:  $\frac{2x+10}{x^2+5x+6} \div \frac{3x+15}{x^2+2x}$

$$\frac{2x+10}{2} \cdot \frac{2}{2}$$

$$2(x+5)$$

$$\frac{2x+10}{x^2+5x+6} \cdot \frac{x(x+2)}{3x+15}$$

$$\frac{2(x+5) \cdot x(x+2)}{(x+2)(x+3) \cdot 3(x+5)}$$

$$\boxed{\frac{2x}{3(x+3)}}$$

$$\frac{3x}{3} \cdot \frac{15}{3}$$

$$3(x+5)$$

$$\frac{x^2}{x} + \frac{2x}{x}$$

$$x(x+2)$$

$$\frac{6x^2}{3x} \cdot \frac{2x}{5x}$$

$$(x+3)(x+2)$$