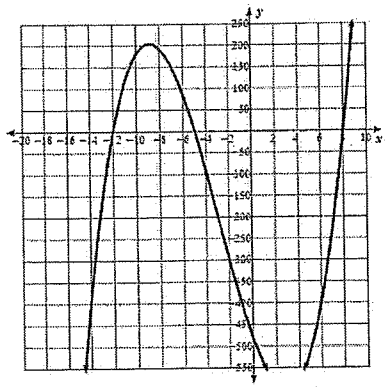
Name _____ Period _____

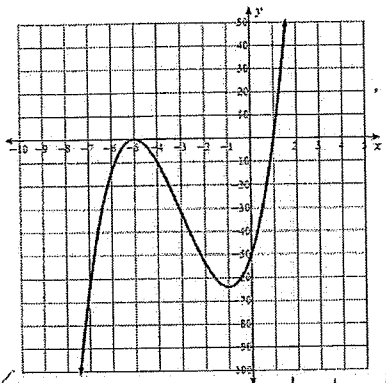
6.2E *Polynomial Division – Part II*

1. Look at each equation and its graph. What does the factored form of a polynomial tell us about the graph of that polynomial?

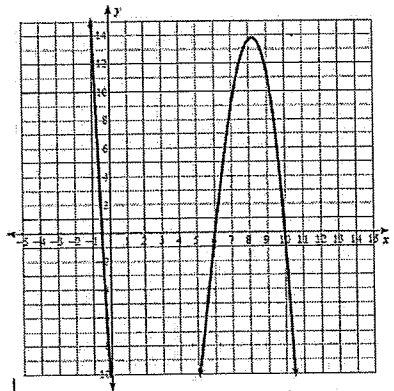
a) $f(x)=(x+5)(x-8)(x+12)$ **b)** $f(x)=2(x+5)^2(x-1)$ **c)** $f(x)=-\frac{1}{5}(2x+1)(x-10)(x-6)$



There are 3 distinct linear factors, which yield 3 x-intercepts at -12, -5, and 8



There is one duplicate linear factor which gives a double root at $x=-5$ (but only one x-int here), and the other linear factor yields the x-intercept at $x=1$



There are 3 distinct linear factors, which yield 3 x-intercepts at $x=-\frac{1}{2}$, $x=10$, $x=6$

2. Name 2 other ways to say "x-intercept".

zero, root, solution

3. Explain how to find the zero of a polynomial function $f(x)$ both algebraically and graphically?

algebraically: Set the function equal to 0 and solve for x

graphically: Look for the x-intercept(s) and/or use a graphing calculator to calculate the zeros".

4. Is $3x^3-4x^2+x+2$ divisible by $x-1$? Explain your thinking.

No; there is a remainder.

$$\begin{array}{r|rrrr} 1 & 3 & -4 & 1 & 2 \\ & & 3 & -1 & 0 \\ \hline & 3 & -1 & 0 & 2 \end{array}$$

$3x^2-x+\frac{2}{x-1}$

5. Is $x-1$ a factor of $x^{200}+1$? Explain your thinking.

No, there is a remainder of 2. If $(x-1)$ was a factor, there would be a zero remainder.

$$\begin{array}{r|llllll} 1 & 1 & 0 & 0 & 0 & \cdots & 1 \\ & & 1 & 1 & 1 & \cdots & 1 \\ \hline & 1 & 1 & 1 & 1 & \cdots & 1\ (2) \end{array}$$

Name _____ Period _____

6.2E *Polynomial Division – Part II*

6. Is $x=-4$ a root (zero/solution) of $P(x)=x^3+14x^2+5x-140$? Explain your thinking.

Yes

$$\begin{array}{r|rrrr} -4 & 1 & 14 & 5 & -140 \\ & & -4 & -40 & 140 \\ \hline & 1 & 10 & -35 & (0) \end{array}$$

Yes, a zero remainder means $(x+4)$ is a factor of the polynomial, which means $x=-4$ is a zero or solution!

7. Is $x=3$ a zero of $P(x)=2x^3-7x^2+5x-1$?

$$\begin{array}{r|rrrr} 3 & 2 & -7 & 5 & -1 \\ & & 6 & -3 & 6 \\ \hline & 2 & -1 & 2 & (5) \end{array}$$

No

8. Find k so that $x-3$ is a factor of $3x^3+2kx^2+(k+2)x-3$.

$$\begin{array}{r|rrrr} 3 & 3 & 2k & k+2 & -3 \\ & & 9 & 6k+27 & 3 \\ \hline & 3 & 2k+9 & 1 & 0 \end{array}$$

must be "0" because x-3 is a factor. Therefore, value must be 3 to create that 0 remainder, which means value mult. by (outside) 3 must be 1.

$(k+2)+(6k+27)=1$

$7k+29=1$

$7k=-28$

$k=-4$

9. Find k so that $x-2$ is a factor of $f(x)=3x^3+4x^2+kx-19x-2$.

$$\begin{array}{r|rrrr} 2 & 3 & 4 & (k-19) & -2 \\ & & 6 & 20 & 2** \\ \hline & 3 & 10 & 1*** & 0* \end{array}$$

* must be zero

** must be 2 to create 0 value

*** must be 1 to be able to mult & create value of 2

$k-19+20=1$

$k+1=1$

$k=0$

10. Write a 3rd degree equation of a polynomial function with the zeroes: 0, 2, and –5. Write your answer in factored form.

$f(x)=2x(x-2)(x+5)$

check:

$3x^3+2kx^2+(k+2)x-3$

(believe $k=-4$)

$3x^3+2(-4)x^2+(-4+2)x-3$

$3x^3-8x^2-2x-3$ is $(x-3)$ a factor?

$$\begin{array}{r|rrrr} 3 & 3 & -8 & -2 & -3 \\ & & 9 & 3 & 3 \\ \hline & 3 & 1 & 1 & 0 \end{array}$$

yes, $k=-4$

11. Write a 3rd degree polynomial function with the zeroes: –2, 2, and 6. Write your answer in standard form.

$p(x)=(x+2)(x-2)(x-6)$

$=(x^2-4)(x-6)$

$p(x)=x^3-6x^2-4x+24$