

Name: LEM

Date: _____

Period: _____

Test Review: Unit 9 PolynomialsAdding and Subtracting Polynomials

Simplify each expression.

1) $(3 + 6x - 7x^4) + (2x^4 + 4 + 6x)$

$$\boxed{-9x^4 + 7}$$

2) $(8n + 7n^4 - 2n^3) + (n^4 - 6n^3 + n)$

$$\boxed{8n^4 - 8n^3 + 9n}$$

3) $(6x^2 - 6x^3 + 6x) + (6x^2 + 5x + 7x^3)$

$$\boxed{-13x^3 + 11x}$$

4) $(4 + 2x^3 + 4x) + (6x + 8 + x^3)$

$$\boxed{x^3 - 2x + 12}$$

5) $(1 - 8x^3 - 2x) + (5 + 5x) + (8x^3 - 8 + 2x)$

$$\boxed{5x - 2}$$

6) $(2x - 7x^4 + 6) + (2x^4 + 6) + (7x^4 + 5 + 4x)$

$$\boxed{-16x^4 - 2x + 17}$$

7) $(p + 5 + p^3) + (2p^4 + 7p^3) + (3 - 2p^4 + p)$

$$\boxed{8p^3 + 2}$$

8) $(8v + 6v^4 + 2v^3) + (4 + 3v) + (2 - 4v + 5v^2)$

$$\boxed{6v^4 + 2v^3 + 5v^2 + v - 2}$$

Dividing Polynomials (Long and Synthetic Division)

↪ Be able to use both methods.

Divide.

1) $(m^3 - 7m^2 - 13m + 10) \div (m + 2)$

$$\begin{array}{r} -2 \overline{) 1 \quad -7 \quad -13 \quad 10} \\ \underline{-2 \quad 18 \quad -10} \\ 1 \quad -9 \quad 5 \quad 0 \end{array}$$

$$\boxed{m^2 - 9m + 5}$$

2) $(5x^3 + 25x^2 + 11x - 36) \div (x + 4)$

$$\begin{array}{r} -4 \overline{) 5 \quad 25 \quad 11 \quad -36} \\ \underline{-20 \quad -20 \quad 36} \\ 5 \quad 5 \quad -9 \quad 0 \end{array}$$

$$\boxed{5x^2 + 5x - 9}$$

3) $(r^3 + 10r^2 + 19r - 14) \div (r + 7)$

$$\begin{array}{r} -7 \overline{) 1 \quad 10 \quad 19 \quad -14} \\ \underline{-7 \quad -21 \quad 14} \\ 1 \quad 3 \quad -2 \quad 0 \end{array}$$

$$\boxed{r^2 + 3r - 2}$$

4) $(5b^3 + 24b^2 - 3b + 10) \div (b + 5)$

$$\begin{array}{r} -5 \overline{) 5 \quad 24 \quad -3 \quad 10} \\ \underline{-25 \quad 5 \quad -10} \\ 5 \quad -1 \quad 2 \quad 0 \end{array}$$

$$\boxed{5b^2 - 1b + 2}$$

$$5) (x^3 + 2x^2 - 12x - 28) \div (x + 3)$$

$$\begin{array}{r} x^2 - x + 9 \\ x+3 \overline{) x^3 + 2x^2 - 12x - 28} \\ \underline{-x^3 + 3x^2} \\ -x^2 - 12x - 28 \\ \underline{+x^2 + 3x} \\ -9x - 28 \\ \underline{+9x + 27} \\ -1 \end{array}$$

$$x^2 - x - 9 \text{ R: } -1$$

$$6) (7m^3 + 53m^2 - 28m - 42) \div (m + 8)$$

$$7m^2 - 3m - 7 \frac{-10}{m+8}$$

$$7) (x^3 + 10x^2 + 31x + 38) \div (x + 6)$$

$$x^2 + 4x + 7 \text{ R: } -4$$

$$8) (p^3 + 6p^2 + 5p - 15) \div (p + 3)$$

$$p^2 + 3p - 4 - \frac{3}{p+3}$$

$$9) (10p^3 + 40p^2 + 50p + 19) \div (5p + 5)$$

$$\begin{array}{r} 2p^2 + 6p + 4 \\ 5p+5 \overline{) 10p^3 + 40p^2 + 50p + 19} \\ \underline{-10p^3 + 10p^2} \\ 30p^2 + 50p + 19 \\ \underline{-30p^2 + 30p} \\ 20p + 19 \\ \underline{-20p + 20} \\ -1 \end{array}$$

$$2p^2 + 6p + 4 - \frac{1}{5p+5}$$

$$10) (8n^3 + 39n^2 + 35n + 5) \div (8n - 1)$$

$$n^2 + 5n + 5 \text{ R: } 10$$

$$11) (10x^3 + 3x^2 - 33x + 28) \div (5x - 6)$$

$$2x^2 + 3x - 3 + \frac{10}{5x-6}$$

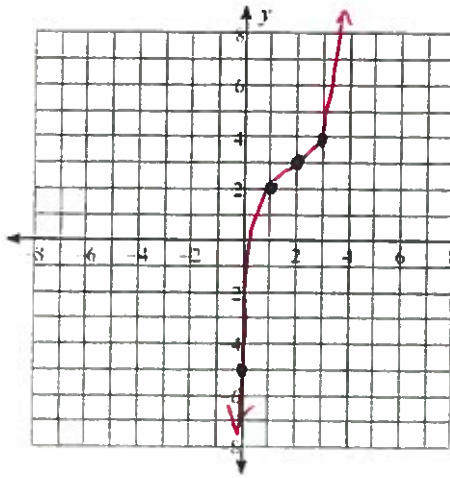
$$12) (9a^3 - 21a^2 + 96a - 32) \div (9a - 3)$$

$$a^2 - 2x + 10 \text{ R: } -2$$

Graphing Cubic Functions

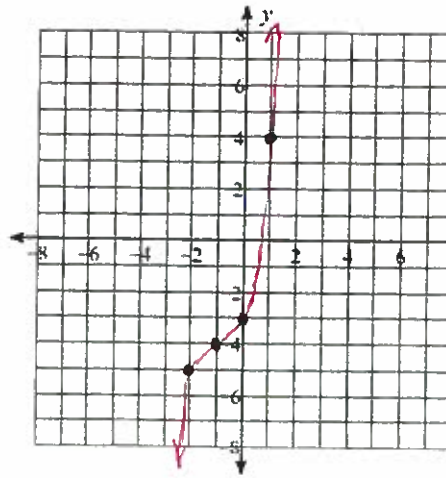
Graph the following functions. Then state the vertex, domain, range, and intercepts of the graph.

1. $f(x) = (x - 2)^3 + 3$



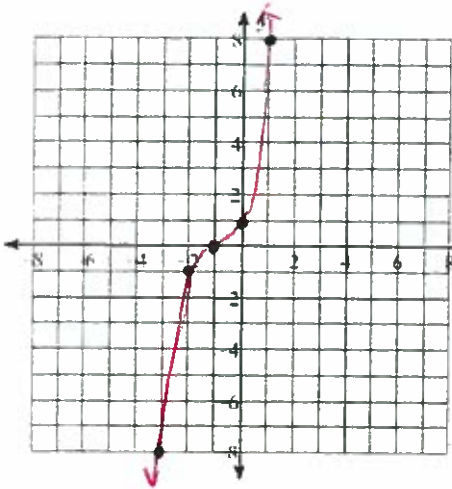
Vertex
(2, 3)
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
x-int: —
y-int: (0, -5)

2. $f(x) = (x + 1)^3 - 4$



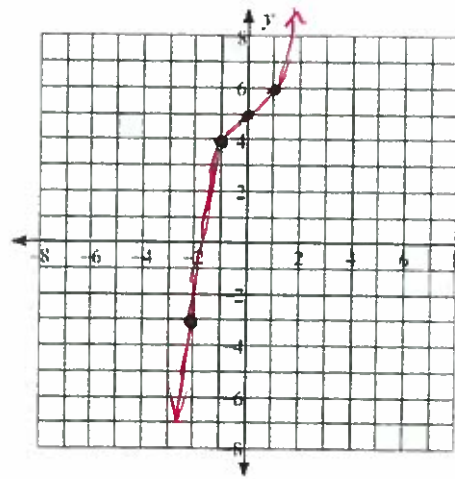
Vertex: (-1, -4)
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
x-int: —
y-int: (0, -3)

3. $f(x) = (x + 1)^3$



Vertex: (-1, 0)
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
x-int: (-1, 0)
y-int: (0, 1)

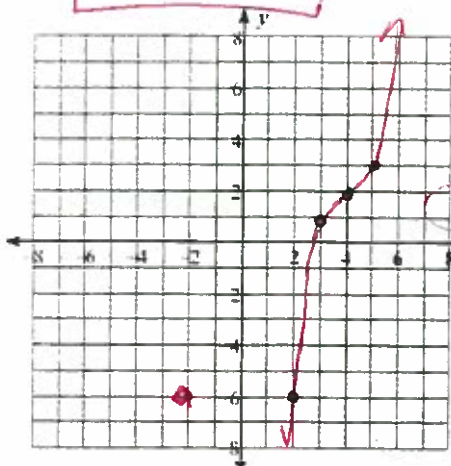
4. $f(x) = x^3 + 5$



Vertex (0, 5)
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
x-int: —
y-int: (0, 5)

State the equation of the cubic functions.

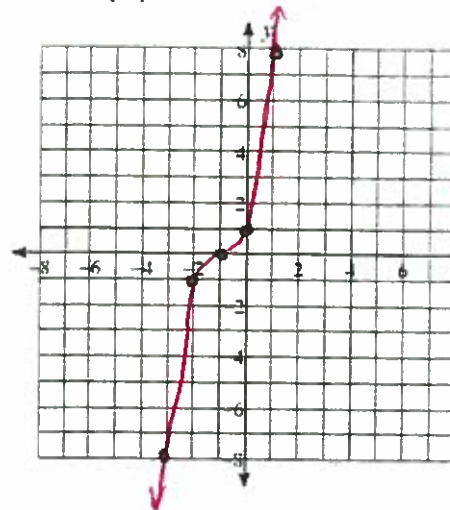
5. $f(x) = (x - 4)^3 + 2$



x	y
2	-6
3	1
4	2
5	3

Vertex

6. $f(x) = (x + 1)^3 + 0$



x	y
-3	-8
-2	-1
-1	0
0	1
1	8

Vertex

Factoring Higher Powers

Factor each. One factor has been given.

1) $x^3 - 4x^2 + x + 6 = 0; x - 2$

2	1	-4	1	6
	2	-4	-6	
	1	-2	-3	0

$x^2 - 2x - 3$
 $(x-3)(x+1)$

add *mult*

$$(x-2)(x-3)(x+1)$$

2) $x^3 + x^2 - 10x + 8 = 0; x - 2$

$$(x-2)(x+4)(x-1)$$

3) $x^3 + 6x^2 + 11x + 6 = 0; x + 2$

$$(x+2)(x+3)(x+1)$$

4) $x^3 - 5x^2 - 2x + 24 = 0; x + 2$

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

5) $3x^3 - 20x^2 + 23x + 10 = 0; x - 5$

5	3	-20	23	10
	15	-25	-10	
	3	-5	-2	0

$3x^2 - 5x - 2$

$\frac{-2}{1}$ $\frac{-6}{3}$ $\frac{1}{3}$

~~$\frac{3(-2)}{-6}$~~

$$(3x+1)(x-2)(x-5)$$

6) $4x^3 + 8x^2 - 17x - 30 = 0; 2x + 5$

$$(2x+5)(x+1)(2x-3)$$

7) $2x^3 - 5x^2 - 28x + 15 = 0; x + 3$

$$(2x-1)(x-5)(x+3)$$

8) $10x^3 - 21x^2 + 5x + 6 = 0; 5x + 2$

$$(x-1)(2x-3)(5x+2)$$

Sum/Differences of Cubes

Factor each completely.

1) $x^3 - 125$

$a = x \quad b = 5$

$(x - 5) \left((x)^2 + (5)(x) + (5)^2 \right)$ AP

$(x - 5)(x^2 + 5x + 25)$

2) $216 + x^3$

$(6 + x)(36 - 6x + x^2)$

3) $m^3 - 216$

$(m - 6)(m^2 + 6m + 36)$

4) $a^3 + 1$

$(a + 1)(a^2 - a + 1)$

5) $x^3 + 8$

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

6) $u^3 - 64$

$(u - 4)(u^2 + 4u + 16)$

7) $216x^3 + 1$

$(6x + 1)(36x^2 - 6x + 1)$

8) $1 + 64x^3$

$(1 + 4x)(1 + 4x + 16x^2)$

9) $8a^3 - 125$

$(2a - 5)(4a^2 + 10a + 25)$

10) $m^3 - 216$

$(m - 6)(m^2 + 6m + 36)$

Find the product = "multiply"

$$(2x+8)(8x^2+2x-6)$$

$$\underline{16x^3} + \underline{4x^2} - \underline{12x} + \underline{64x^2} + \underline{16x} - \underline{48}$$

$$\boxed{16x^3 + 68x^2 + 4x - 48}$$

$$(n^2+2n+5)(6n^2-3n-3)$$

same process with all

$$\boxed{6n^4 + 9n^3 + 21n^2 - 21n - 15}$$

$$16x^3 + 68x^2 + 4x - 48$$

$$6n^4 + 9n^3 + 21n^2 - 21n - 15$$