

Chapter 1 Final Exam Review

1. Use order of operations to simplify the expressions. Show your work! **PEMDAS!**

a) $6 + 2(5 - 1) - 18 \div 9 + 1$

$6 + 2(4) - 18 \div 9 + 1$

$6 + 8 - 2 + 1$

13

b) $2(-4)^2 - 5(2 + 3) + 20$

$2(16) - 5(2 + 3) + 20$

$2(16) - 5(5) + 20$

$32 - 25 + 20$

27

2. Evaluate the following expressions for the given value.

a) $6x - 4 + 2(x + 5)$, $x = 3$

$6(3) - 4 + 2(3 + 5)$

$6(3) - 4 + 2(8)$

$18 - 4 + 16$

30

b) $9 + 2(x - 8) + x^2 - 6$, $x = -5$

$9 + 2(-5 - 8) + (-5)^2 - 6$

$9 + 2(-13) + (25) - 6$

$9 - 26 + 25 - 6$

2

3. Simplify the following expressions.

① distribute

a) $3 - 4(x + 2) + 6x + 8$

$3 - 4x - 8 + 6x + 8$

$2x + 3$

② combine like terms

b) $2a - 5a^2 + 9 - 8a + 4a^2$

$-a^2 - 6a + 9$

4. Solve the following equations. Show your work!

a) $6x - 8 = 2x + 20$

$-2x - 2x$

$4x - 8 = 20$
 $+8 +8$

$4x = 28$
 $\frac{4x}{4} = \frac{28}{4}$

$x = 7$

b) $\frac{2}{3}x + 5 = x - 4$

$\frac{3}{1} \left(\frac{2}{3}x + 5 \right) = (x) 3$

$2x + 27 = 3x$
 $-2x - 2x$

$12 \left(\frac{1}{4}x - \frac{2}{3} \right) = 12 \left(\frac{5}{2} \right)$

multiply both sides by LCD

$x = 27$

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

$2x - 2 - 5 = x + 3$

$2x - 7 = x + 3$
 $-x + 7 - x + 7$

$x = 10$

$3x - 8 = 30$
 $+8 +8$

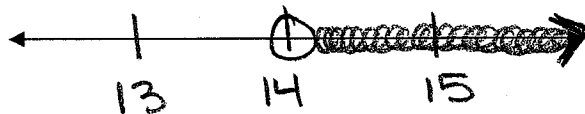
$3x = 38$
 $\frac{3x}{3} = \frac{38}{3}$

$x = \frac{38}{3}$

Solve each inequality and sketch on the number line.

5. $x - 5 > 9$
 $+5 +5$

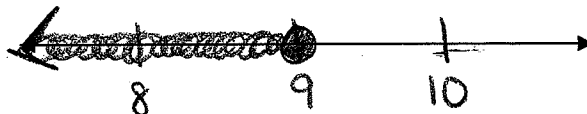
$x > 14$



* flip sign when dividing by a negative

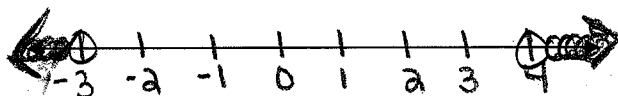
6. $-2x + 8 \geq -10$
 $-8 -8$
 $-2x \geq -18$
 $\frac{-2x}{-2} \geq \frac{-18}{-2}$

$x \leq 9$



7. $x + 7 < -1$ or $x - 7 > 1$
 $-7 -7$ $+7 +7$

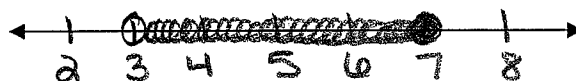
$x < -8$ or $x > 8$



8. $5 < 2x - 1 \leq 13$
 $+1 +1 +1$

$6 < 2x \leq 14$
 $\frac{6}{2} < \frac{2x}{2} \leq \frac{14}{2}$

$3 < x \leq 7$



9. Solve the formulas for the given variables.

3a) $V = \frac{1}{3}l \cdot w \cdot h$ solve for w.

$\frac{3V}{l \cdot h} = \frac{l \cdot w \cdot h}{l \cdot h}$

$w = \frac{3V}{lh}$

b) $P = 2w + 2l$, solve for l.

$P - 2w = 2l$
 $\frac{P - 2w}{2} = \frac{2l}{2}$

$l = \frac{P}{2} - w$

10. Your cable company charges \$89 for basic cable and \$5.95 for each premium channel. If you have budgeted \$110, how many premium channels can you purchase?

bill = $89 + 5.95(p)$ →

$110 > 89 + 5.95(p)$
 $-89 -89$

$21 > \frac{5.95p}{5.95}$ → $p < 3.53$

no more than 3 channels

11. A five-gallon bucket of blacktop sealer can seal 3500 square feet. If the parking lot is 15,000 square feet, how many five-gallon buckets are needed for the job? If each bucket costs \$40, how much would the total job cost?

① $\frac{15,000}{3,500} = 4.29 \rightarrow$ 5 buckets

\$200

Chapter 2 Final Exam Review

1. $(0, 3), (1, 1), (2, 2), (3, 4), (4, 2)$

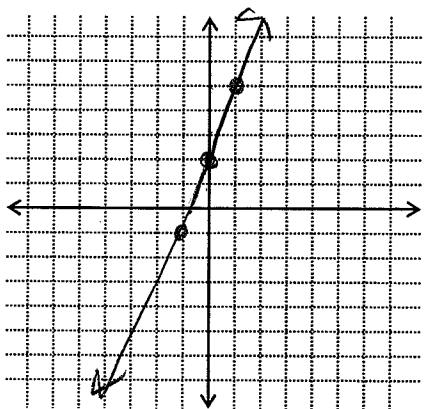
x-values Domain: $\{0, 1, 2, 3, 4\}$

y-values Range: $\{1, 2, 3, 4\}$

Is it a function? **yes!** NO x-values are repeated

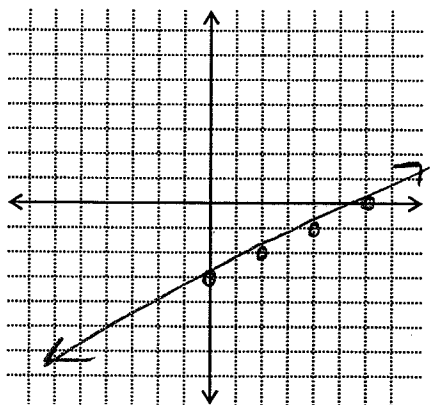
3. Graph the equation: $y = 3x + 2$

$b = 2$
 $m = 3$

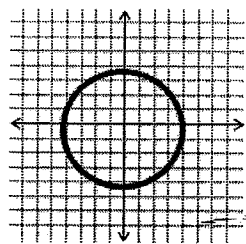


5. Graph the equation: $y = \frac{1}{2}x - 3$

$b = -3$
 $m = \frac{1}{2}$



2.



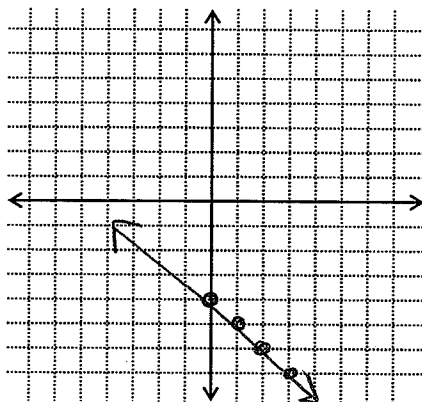
Domain: $[-4, 4]$

Range: $[-4, 3]$

Is it a function? **NO!** Does not pass vertical line test

4. Graph the equation: $y = -x - 4$

$b = -4$
 $m = -1$



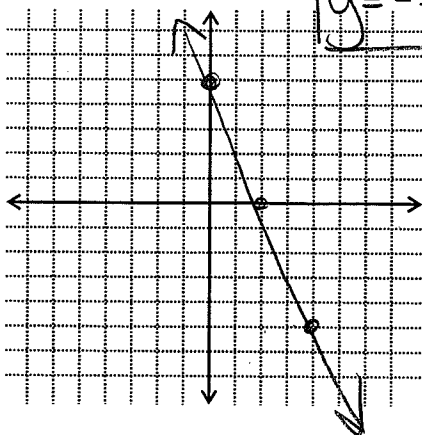
6. Graph the equation: $5x + 2y = 10$

$-5x$ $-5x$

$\frac{2y}{2} = \frac{-5x + 10}{2}$

$y = -\frac{5}{2}x + 5$

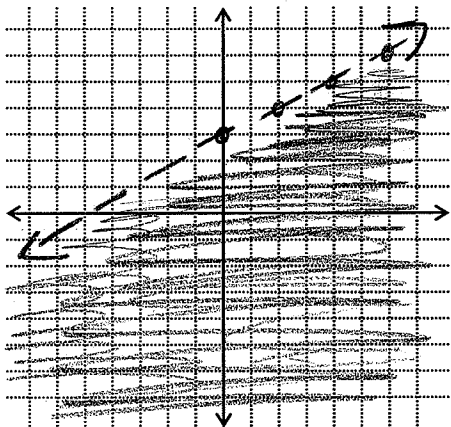
$b = 5$
 $m = -\frac{5}{2}$



Graph each linear inequality. Solid or dashed, remember to shade!

7. $y < \frac{1}{2}x + 3$

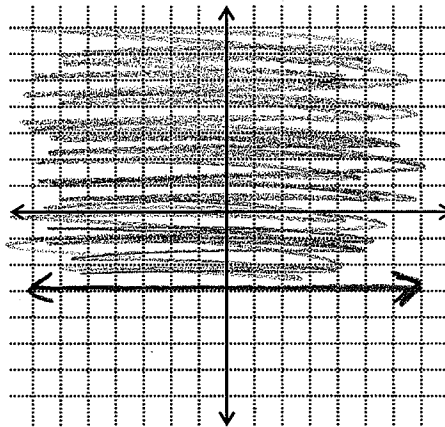
dotted line



8. $y \geq -3$

solid line

horizontal line



9. Evaluate the function for the given values of x , given $g(x) = 2x^2 + 3x + 4$

a) $g(3) = 2(3)^2 + 3(3) + 4$
 $= \boxed{31}$

b) $g(-2) = 2(-2)^2 + 3(-2) + 4$
 $= \boxed{6}$

10. You are saving money to buy a new bike. The bike costs \$300. You have already saved \$100 and you save \$20 each week.

$S = \text{savings}$ $w = \text{week}$

a) Write an equation to model your savings.

$$S(w) = 20w + 100$$

b) What is a reasonable domain and range for the model?

$D: [0, 10] \rightarrow$ after 10 weeks you have enough money
 $R: [100, 300]$

c) How much will you have saved after 6 weeks?

$$S(6) = 20(6) + 100 = 220$$

$\boxed{\$220}$

11. Given two points: (2, 1) and (6, 9)

a) Find the slope of a line passing through the points

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{9 - 1}{6 - 2} = \frac{8}{4} = \boxed{2}$$

b) Write the equation of the line passing through the points

choose 1 pt \rightarrow (2, 1)
x, y

$$\boxed{y = 2x - 3}$$

$$1 = 2(2) + b$$

$$1 = 4 + b$$

$$-4 \quad -4$$

$$-3 = b$$

c) Write the equation of a line parallel to this line which passes through (4, 2)

$$\boxed{y = 2x - 6}$$

same slope

$$2 = 2(4) + b$$

$$2 = 8 + b$$

$$-8 \quad -8$$

$$-6 = b$$

d) Write the equation of a line perpendicular to this line which passes through (4, 2)

$$\boxed{y = -\frac{1}{2}x + 4}$$

opposite, reciprocal slope

$$2 = -\frac{1}{2}(4) + b$$

$$2 = -2 + b$$

$$+2 \quad +2$$

$$4 = b$$

12. Find the x and y intercepts of the following lines.

a) $4x - 3y = 12$

when $x=0$

b) $3x + 2y = 18$

x-int: (3, 0)

y-int: (0, -4)

x-int: (6, 0)

y-int: (0, 9)

$$4x - 3(0) = 12$$

$$4(0) - 3y = 12$$

$$3x + 2(0) = 18$$

$$3(0) + 2y = 18$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$\frac{-3y}{-3} = \frac{12}{-3}$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$\frac{2y}{2} = \frac{18}{2}$$

$$x = 3$$

$$y = -4$$

$$x = 6$$

$$y = 9$$

Chapter 3 Final Exam Review

1. Is (-3, -8) a solution to:

$$2x + y = -14$$

$$-2x + 3y = 22$$

$$2(-3) + (-8) = -14$$

$$-6 - 8 = -14$$

$$-14 = -14 \quad \checkmark$$

$$-2(-3) + 3(-8) = 22$$

$$6 - 24 = 22$$

$$-18 = 22$$

Not a solution

2. Solve using elimination/linear combination.

$$\begin{array}{l} -2(6x-5y=28) \\ 3(4x+9y=-6) \end{array} \quad \textcircled{2} \begin{array}{l} 4x+9(-2)=-6 \\ 4x-18=-6 \end{array}$$

$$\textcircled{1} \begin{array}{r} -12x + 10y = -56 \\ + 12x + 27y = -18 \\ \hline \end{array}$$

$$\frac{37y}{37} = \frac{-74}{37}$$

$$y = -2$$

$$\boxed{(3, -2)}$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

$$\boxed{(-1, 3)}$$

3. Solve by elimination/linear combination.

$$\begin{array}{l} 4x+2y=2 \\ 5x-2y=-11 \end{array}$$

$$\textcircled{1} \begin{array}{r} 4x+2y=2 \\ + 5x-2y=-11 \\ \hline \end{array}$$

$$\frac{9x}{9} = \frac{-9}{9}$$

$$x = -1$$

$$\textcircled{2} \begin{array}{r} 4(-1)+2y=2 \\ -4+2y=2 \\ +4 \quad \quad +4 \end{array}$$

$$\frac{2y}{2} = \frac{6}{2}$$

$$y = 3$$

5. Solve using any algebraic method.

$$\begin{array}{l} 3y-x=0 \rightarrow x=3y \\ 3x+9y=7 \end{array}$$

$$\boxed{\left(\frac{7}{6}, \frac{7}{18}\right)}$$

$$3(3y)+9y=7$$

$$\frac{18y}{18} = \frac{7}{18}$$

$$y = \frac{7}{18}$$

$$x = 3\left(\frac{7}{18}\right)$$

$$x = \frac{7}{6}$$

4. Solve by substitution.

$$\begin{array}{l} x-4y=10 \rightarrow x=4y+10 \\ 2x+2y=-10 \end{array}$$

$$\begin{array}{l} 2(4y+10)+2y=-10 \\ 8y+20+2y=-10 \\ 10y+20=-10 \\ 10y=-30 \\ y=-3 \end{array} \quad \begin{array}{l} x=4(-3)+10 \\ x=-12+10 \\ x=-2 \end{array}$$

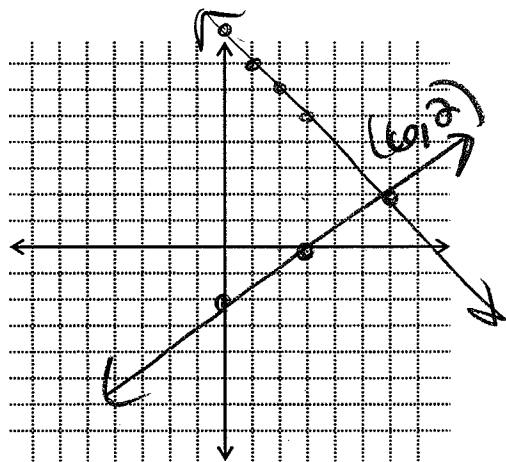
$$\boxed{(-2, -3)}$$

6. Solve by graphing

$$2x-3y=6 \rightarrow y=\frac{2}{3}x-2$$

$$x+y=8 \rightarrow y=-x+8$$

$$\boxed{(6, 2)}$$

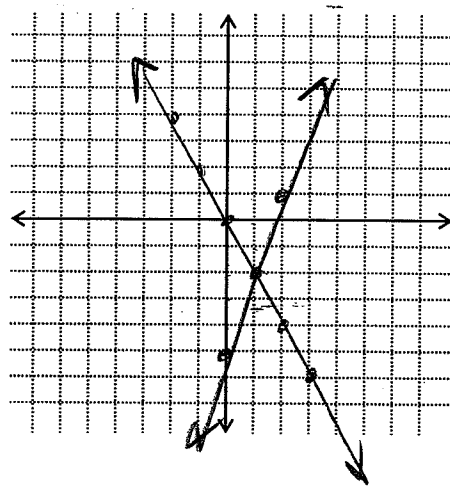


7. Solve by graphing:

$$y = -2x$$

$$3x - y = 5 \rightarrow y = 3x - 5$$

$$(1, -2)$$



Graph each system. Be sure to shade the solution region.

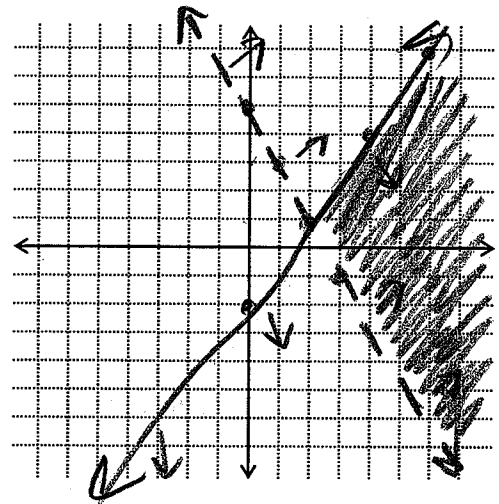
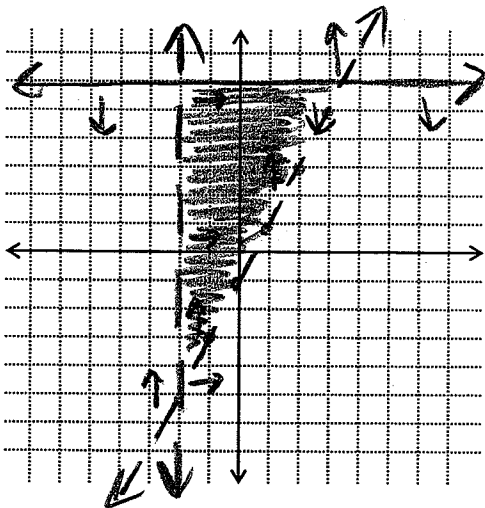
$$x > -2$$

$$8. y \leq 6$$

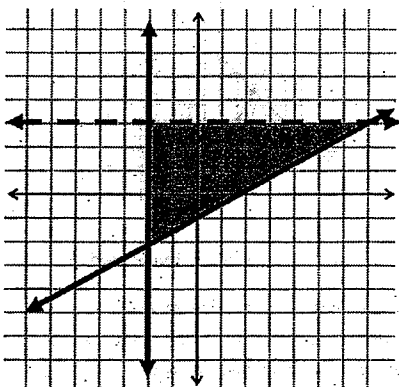
$$y > 2x - 1$$

$$9. y \leq \frac{3}{2}x - 2$$

$$y > -2x + 5$$



10. Write the system of linear inequalities for the given graph.



$$x \geq -2$$

$$y < 3$$

$$y \geq \frac{1}{2}x - 1$$

11. Graph the system on your calculator. Determine an appropriate window and use your calculator to find the point of intersection. Round to three decimal places.

$$y = 5x - 3$$

$$y = -x + 9$$

$$(2, 7)$$

12. A shipment of baseball bats and gloves were delivered today. A total of 125 items were delivered. Baseball bats cost \$8 and gloves cost \$20. If the total cost of the delivery was \$1720, how many of each item were delivered?

b = bats
g = gloves

$$b + g = 125$$

$$8b + 20g = 1720$$

60 gloves 65 bats

$$\begin{array}{r} -8b - 8g = -1000 \\ + 8b + 20g = 1720 \\ \hline 12g = 720 \\ g = 60 \end{array}$$

13. A softball team raised \$528 selling hats and T-shirts. The hats sold for \$10 each, while the T-shirts sold for \$12 each. The team sold a total of 47 items. How many of each item was sold?

h = hats
t = t-shirt

$$h + t = 47$$

$$10h + 12t = 528$$

29 t-shirts 18 hats

$$\begin{array}{r} -10h - 10t = -470 \\ + 10h + 12t = 528 \\ \hline 2t = 58 \\ t = 29 \end{array}$$

14. You offer to mow your neighbors' lawns for \$20 or wash their cars for \$10. Your goal is to earn \$1500.

lawns

Define your variables

$l = \# \text{ of lawns}$ $c = \# \text{ of cars}$

Write the system of inequalities which represents this problem

1. $l \geq 0$

2. $c \geq 0$

3. $20l + 10c \geq 1500$

Give one possible solution to this problem.

many possible answers

ex. 45 lawns and 65 cars

15. Give an ordered pair that is a solution to:

$$x + 2y = 7$$

$$x - 2y = 5$$

$$\boxed{\left(6, \frac{1}{2}\right)}$$

$$\begin{array}{r} x + 2y = 7 \\ + \quad x - 2y = 5 \\ \hline 2x = 12 \\ x = 6 \end{array}$$

$$\begin{array}{r} 6 + 2y = 7 \\ 2y = 1 \\ y = \frac{1}{2} \end{array}$$

16. How many solutions are there to the following systems?

Hint: When does a system have 0 solutions? When does a system have infinite solutions? When does a system have 1 solution?

a. $y = 2x - 12$
 $y = 2x + 3$

no solution,
parallel lines!
↓
do not intersect

b. $\begin{array}{r} 4x - 2y = 6 \\ -2(2x - y = 3) \end{array} \rightarrow \begin{array}{r} 4x - 2y = 6 \\ + \quad -4x + 2y = -6 \\ \hline 0 = 0 \end{array}$

Infinitely many solutions

$$0 = 0$$

↑
true statement

Chapter 5 Final Exam Review

Graph the following quadratic equations. Be sure to plot points!

1. $y = x^2 + 4x + 3$

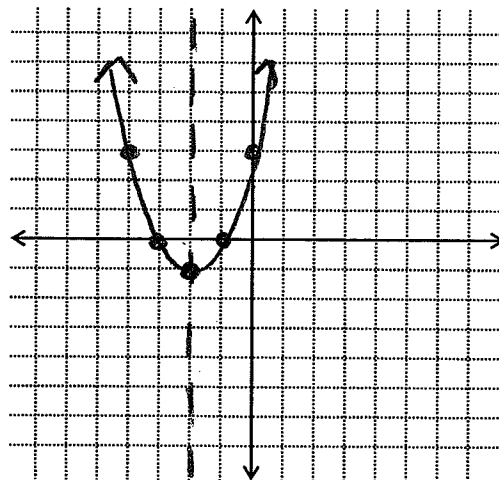
Axis of symmetry: $x = -2$

Vertex: $(-2, -1)$

y-intercept: $(0, 3)$

x-intercepts: $(-3, 0)$ and $(-1, 0)$

D: $(-\infty, \infty)$ R: $[-1, \infty)$



2. $y = (x-2)^2 - 1$

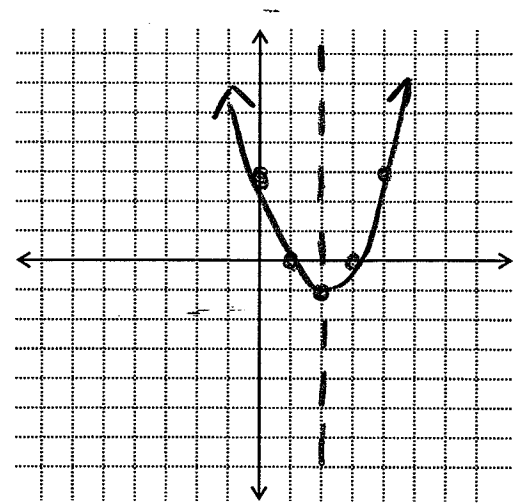
Axis of symmetry: $x = 2$

Vertex: $(2, -1)$

y-intercept: $(0, 3)$

x-intercepts: $(1, 0)$ and $(3, 0)$

D: $(-\infty, \infty)$ R: $[-1, \infty)$



3. $y = -(x+1)(x-3)$

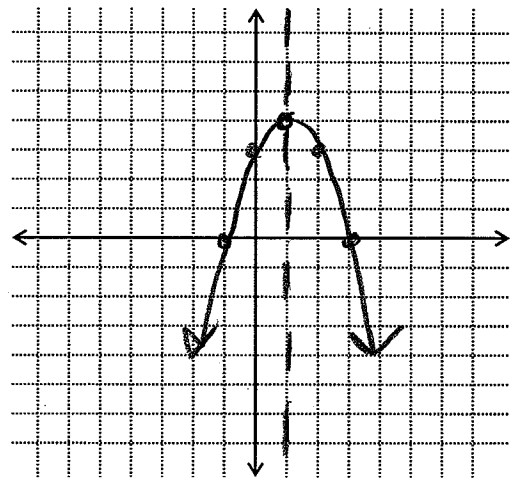
x-intercepts: $(-1, 0)$ and $(3, 0)$

axis of symmetry: $x = 1$

vertex: $(1, 4)$

y-intercept: $(0, 3)$

D: $(-\infty, \infty)$ R: $(-\infty, 4]$



4. Change from standard to factored form (why would you want the function in standard form??):

$y = x^2 + 6x + 5$

to find the x-intercepts

$y = (x+5)(x+1)$

5. Change from factored to standard form:

$y = (x-4)(x+3) \leftarrow \text{FOIL/multiply}$
 $y = x^2 - x - 12$

6. Change from vertex to standard

$y = (x-5)^2 - 6$
 $= (x-5)(x-5) - 6$
 $= x^2 - 10x + 25 - 6$

$y = x^2 - 10x + 19$

Simplify the following radicals.

rationalize

7. $\sqrt{24}$
 $\sqrt{4 \cdot 6}$

$2\sqrt{6}$

8. $\sqrt{\frac{9}{25}} = \frac{\sqrt{9}}{\sqrt{25}} = \frac{3}{5}$

$\frac{3}{5}$

9. $\sqrt{\frac{16}{5}} = \frac{\sqrt{16}}{\sqrt{5}} = \frac{4}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\frac{4\sqrt{5}}{5}$

Solve the following equations using the square root method.

10. $2x^2 - 18 = 0$
 $+18 +18$
 $2x^2 = 18$
 $\frac{2}{2} \frac{x^2}{2} = \frac{18}{2}$
 $x^2 = 9$
 $x = \pm 3$

11. $3(x-1)^2 + 75 = 0$
 $-75 -75$
 $\frac{3(x-1)^2}{3} = \frac{-75}{3}$
 $(x-1)^2 = -25$
 $x-1 = \pm 5i$
 $x = 1 \pm 5i$

Solve the following equations by factoring.

12. $x^2 - 36 = 0$
 $(x-6)(x+6) = 0$
 $x = 6, -6$

13. $x^2 + 4x - 12 = 0$
 $(x+6)(x-2) = 0$
 $x = -6, 2$

14. $2x^2 + 13x + 15 = 0$
 $(2x+3)(x+5) = 0$
 \downarrow
 $2x+3=0$
 $-3 -3$
 $\frac{2x}{2} = \frac{-3}{2}$
 $x = -\frac{3}{2}$
 $x+5=0$
 $x = -5$
 $x = -\frac{3}{2}, -5$

15. $x^2 - 7x = 0$
 $x(x-7) = 0$
 $x = 0, 7$

$b^2 - 4ac$

Solve using the quadratic formula. What is the value of the discriminant? How many solutions will the equation have?

16. $x^2 + 4x - 1 = 0$
 discriminant = 20
 \leftarrow 2 real solutions
 $x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-1)}}{2(1)}$
 $= \frac{-4 \pm \sqrt{20}}{2}$
 $= \frac{-4 \pm 2\sqrt{5}}{2} = -2 \pm \sqrt{5}$

17. $x^2 - 4x + 4 = 0$
 discriminant = 0
 \leftarrow 1 solution
 $x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(4)}}{2(1)}$
 $= \frac{-4 \pm \sqrt{0}}{2}$
 $x = -2$

$a=1$
 $b=4$
 $c=-1$

$$i^2 = -1$$

↓

Perform the operation on the complex numbers.

18. $(2 + 7i) - (5 + 3i)$

$$2 + 7i - 5 - 3i$$

$-3 + 4i$

19. $(2 + 4i)(6 - 5i)$

$$12 - 10i + 24i - 20i^2$$

$$12 + 14i - 20(-1)$$

$$12 + 14i + 20$$

$32 + 14i$

Chapter 6 Final Review

(This is a very short review of chapter 6 since we just covered it. You should go back to your notes from chapter 6 to see all of the different types of problems you might see.)

Add/Subtract the polynomials.

1. $(x^3 - 2x^2 + 1) + 2(x^3 - 5x^2 + 4x + 8)$

$$x^3 - 2x^2 + 1 + 2x^3 - 10x^2 + 8x + 16$$

$3x^3 - 12x^2 + 8x + 17$

2. $(3x^2 - 8x + 2) - (7x^2 - 3x - 5)$

$$3x^2 - 8x + 2 - 7x^2 + 3x + 5$$

$-4x^2 - 5x + 7$

Multiply the polynomials.

3. $(2x + 7)^2$

$$(2x + 7)(2x + 7)$$

$4x^2 + 28x + 49$

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

$2x^3 - 2x^2 - 15x + 9$

5. $(x + 6)(x - 1)(x + 2)$

$x^3 + 7x^2 + 4x - 12$

Factor completely!

GCF 6. $10x^3 - 5x^2$

$$5x^2(2x - 1)$$

GCF 7. $x^3 - 7x^2$

$$x^2(x - 7)$$

GCF 8. $6x^3 + 2x^2 - 12x$

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

9. $x^3 - 125$

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

10. $27x^3 + 8$

$$(3x + 2)(9x^2 - 6x + 4)$$

11. $(x^3 + 5x^2)(-2x - 10)$

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

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

12. $x^3 + 7x^2 - 3x - 21$

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

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

13. $6x^6 - 6x^4 - 12x^2$

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

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

14. $x^4 + 3x^2 - 28$

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

$(x^2 + 7)(x - 2)(x + 2)$