

Answers to Semester Exam - Algebra II

1) $-3x^2 - 12x$

2) $8 + 31x$

3) $\{0\}$

4) $\left\{-\frac{5}{3}\right\}$

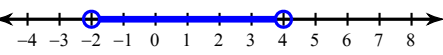
5) $\{-20\}$

6) $g = \frac{2t}{r}$

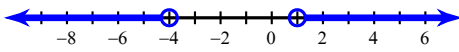
7) $\{-5, 5\}$

8) No solution.

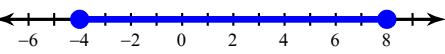
9) $-2 < m < 4$:



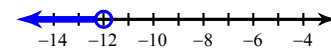
10) $r < -4$ or $r > 1$:



11) $-4 \leq m \leq 8$:



12) $r < -12$:



13) $b = k - a$

14) $y = \frac{4}{5}x - \frac{9}{5}$

15) $y = \frac{4}{5}x - \frac{9}{5}$

16) ALL REAL NUMBERS

17) $y \leq 4$

18) 1.25 houses per week.

19) maximum of 20

20) $-x^2 - 8x - 28$

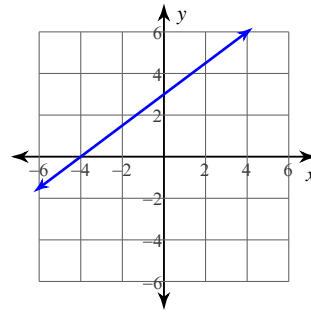
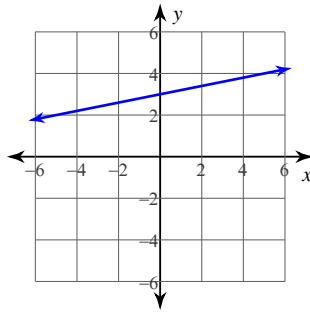
21) 23 or 3

22) 44

23) 80

24)

25)

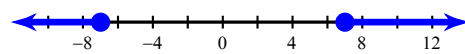


26) $y = -\frac{8}{3}x + 5$

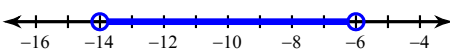
27) $y = \frac{4}{3}x - 1$

28) $y = -4x - 18$

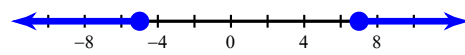
29) $a \geq 7$ or $a \leq -7$:



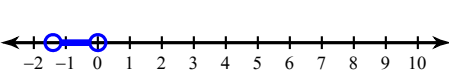
30) $-14 < x < -6$:



31) $a \geq 7$ or $a \leq -5$:



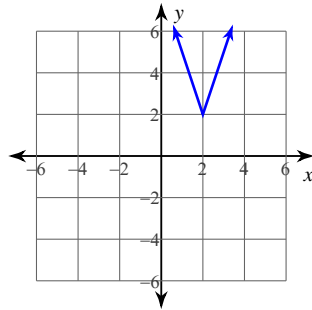
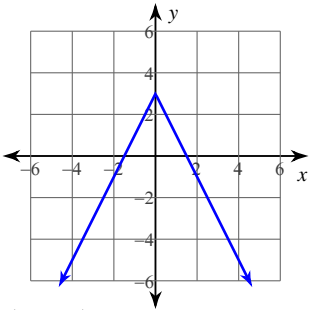
32) $-\frac{7}{5} < n < 0$:



33)

34)

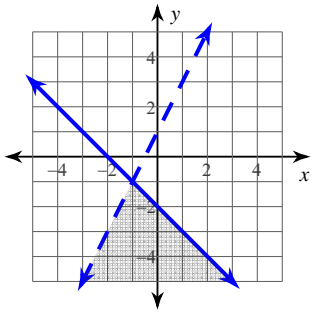
35) Infinite number of solutions



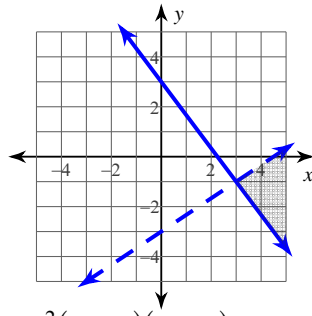
36) $(-1, 3)$

37) $(-3, -4)$

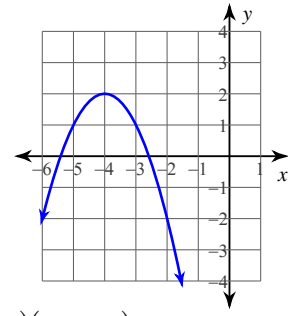
38)



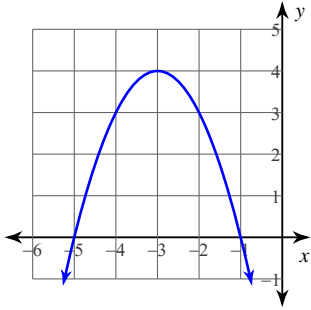
39)



40)



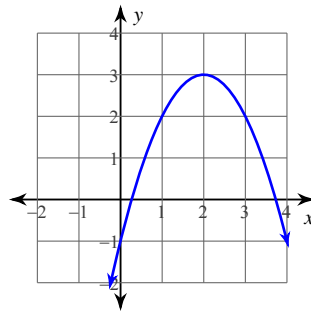
41)

42) $3b^2(b - 3)(b + 4)$ 43) $2x(3x + 8)(2x - 3)$ 44) $(v - 3)^2$ 45) $3(2m + 3)(2m - 3)$ 46) $\frac{-2 + 5\sqrt{2}}{23}$ 47) $-2 + 6i$ 48) $12 - 8i$ 49) $99 - 16i$ 50) $-50i$ 51) $\frac{7i + 9}{65}$ 52) $-1 + i$ 53) $\{8 + \sqrt{130}, 8 - \sqrt{130}\}$ 54) $\left\{\frac{3 + i\sqrt{47}}{3}, \frac{3 - i\sqrt{47}}{3}\right\}$ 55) $\left\{\frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$ 56) $\left\{\frac{3 + \sqrt{89}}{10}, \frac{3 - \sqrt{89}}{10}\right\}$

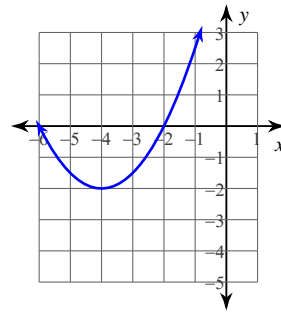
57) 121; two real solutions

58) 1; two real solutions

59)



60)



Application and Extension

UNIT 1: Algebro shirts are all the rage! To make an Algebro new shirt, a company charges \$60 for a design set-up (one time fee), and then \$22 per shirt. You plan on ordering several shirts for your Algebro fan-club.

- a. Write an expression that models the total cost for the number of shirts you order including the design-set-up fee.

$$y = 22x + 60$$

- b. Use your expression to find the total cost of ordering 20 shirts for your fan-club.

$$y = 22(20) + 60$$

$$y = 440 + 60 = \boxed{\$500}$$

UNIT 2: Timmykat's BARBIE FANPAGE website is BOOMING! A big company offers to come in and pay him to advertise on their page because he is getting so many hits. The CEO of the company says that at 10 hits he'll get \$4 and that when he gets to 100 hits he'll get \$22.

$$(10, 4) \quad (100, 22)$$

- a) What is the average rate of change of dollars per hit that the CEO is offering?

$$\frac{22 - 4}{100 - 10} = \frac{18}{90} = \boxed{\$0.20 \text{ per hit}}$$

- b) What's the equation of the line for this situation?

$$y = mx + b$$

$$4 = .20(10) + b$$

$$4 = .2 + b$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$2 = b$$

$$\boxed{y = 0.20x + 2}$$

- c) If Timmykat had 1000 hits in one day how much money would the company give him?

$$y = .20(1000) + 2$$

$$= 200 + 2$$

$$\boxed{= \$202}$$

- d) How many hits would it take for Timmykat to make \$1000 from the company?

$$1000 = 0.20x + 2$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$998 = .20x$$

$$\boxed{4990 \text{ hits} = x}$$

UNIT 3: Given the piecewise function

$$f(x) \begin{cases} -\frac{1}{2}x + 3 & x < 0 \\ 3x - 1 & x \geq 0 \end{cases}$$

Find...

a. $f(4) = 3(4) - 1$
 $12 - 1$

$$\boxed{11}$$

b. $f(-5) = -\frac{1}{2}(-5) + 3$

$$= \frac{5}{2} + 3$$

$$= \frac{11}{2}$$

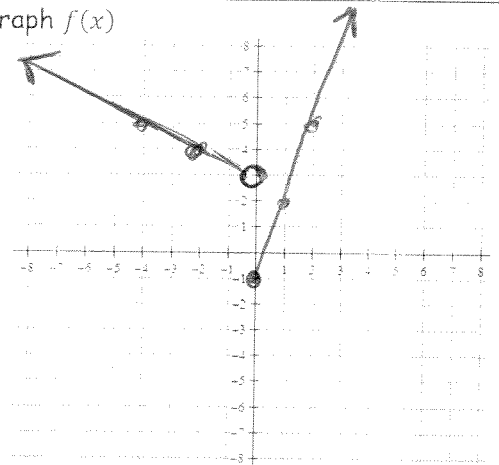
c. $f(0) =$

$$3(0) - 1$$

$$0 - 1$$

$$\boxed{-1}$$

Graph $f(x)$



UNIT 4: Sully loves to travel in style... so he invests in an Alge-Blimp! Sully charges tickets to ride in his Alge-Blimp as either an "Adult" or "Child" ticket. Bean shows up with 7 adults and 7 children and it costs him \$196. He had so much fun, he took his whole 3rd period class (14 children and 1 adult) to travel on the Alge-Blimp again and paid \$210 (true story... no hot air here!). Find the cost of 1 adult and 1 child ticket.

$$\begin{array}{r} -2(7a + 7c = 196) \\ a + 14c = 210 \\ \hline -14a - 14c = -392 \\ \hline -13a = -182 \\ a = \$14 \end{array}$$

$$\begin{array}{r} 14 + 14c = 210 \\ 14c = 196 \\ c = \$14 \end{array}$$

UNIT 5: Bean realizes that he's going to need more room at his house for his ever expanding family. He decides to give his kids more room in their play room. Currently the room is 15 feet by 20 feet and he decides that he'll add 450 square feet to that by adding the same distance, x , to both the length and width of the room.

a) Find the current area of the room.



$$15 \times 20 = 300$$

b) Write an equation that models adding 450 square feet to the area by adding the same distance x to both the length and the width.

$$300 + 450 = (x+15)(x+20)$$

$$750 = x^2 + 35x + 300$$

$$0 = x^2 + 35x - 450$$

c) Solve the equation and find the new dimensions of the room that Bean is going to build.

$$0 = (x+45)(x-10)$$

$$x+45=0$$

$$x = -45$$

$$x-10=0$$

$$x = 10$$

SO $\begin{array}{l} 10+15 \\ 10+20 \end{array}$

$$25 \times 30 \text{ ft}$$

UNIT 6: An object that travels up and down is modeled by the quadratic function below:

$$h(t) = -16t^2 + v_0t + h_0$$

h = height of object (feet), t = time (seconds), v_0 = initial velocity of object (ft/sec), h_0 = initial height of object (feet)

Bob fires a gun straight up from 7 feet. The bullet is shot straight into air with a velocity of 240 ft/sec.

a. Write the equation that models this.

$$h(t) = -16t^2 + 240t + 7$$

b. What does $h(3)$ mean? Find it.

The height after 3 seconds

c. Find the maximum height of the bullet.

$$* = \frac{-b}{2a} = \frac{-240}{2(-16)} = \frac{-240}{-32}$$

$$* = 7.5$$

$$-16(7.5)^2 + 240(7.5) + 7$$

$$907 \text{ feet}$$

d. When does the rocket hit the ground?

$$0 = -16t^2 + 240t + 7$$

$$a = -16$$

$$b = 240$$

$$c = 7$$

$$\frac{-240 \pm \sqrt{240^2 - 4(-16)(7)}}{2(-16)} = \frac{-240 \pm \sqrt{57600 + 448}}{-32}$$

$$\frac{-240 \pm \sqrt{58048}}{-32} = 7.029 \text{ or } 15.03 \text{ sec}$$