Alg. 2 Warm Up # 5-4

1) Describe all the transformations to $y = x^2$ needed to get: $y = -5(x + 6)^2 - 3$

2. Quickly sketch the following graphs:

a) $y = \sqrt{x}$ b) $y = |x|$ c) $y = \frac{1}{x}$

Preview

HW Questions:

2-50. For each quadratic function below use the method of completing the square or averaging the intercepts to rewrite it in graphing form. Then, state the axis of symmetry and give the vertex of each parabola. Try to use each method at least once.

a. $f(x) = x^2 + 6x + 15$

b. $y = x^2 - 4x + 9$

c. $f(x) = x^2 - 8x$

d. $y = x^2 + 7x - 2$

$f(x) = x^2 - 8x + 16 - 16$

$f(x) = (x-4)^2 - 16$

vertex $(4, -16)$

axis of sym: $x = 4$

$y = x^2 + 7x + \frac{49}{4} - 2 - \frac{49}{4}$

$y = \left(x + \frac{7}{2}\right)^2 - \frac{57}{4}$

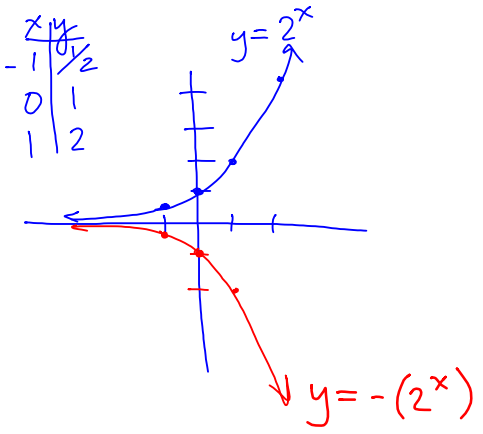
$-2\frac{4}{1}\frac{4}{4} - \frac{49}{4}$

$\frac{-8-49}{4} \quad \frac{-57}{4}$

2-51. Represent the number you would have to add to an expression of the form $x^2 + bx$ to make a complete square.

$x^2 + bx + \underline{?}$ $\left(\frac{b}{2}\right)^2$

2-52. How is $y = 2^x$ different from $y = -(2^x)$? Sketch the graph of $y = -(2^x)$.



x	y
-1	-½
0	-1
1	-2

$y = -(2^{-1})$

$y = -\frac{1}{2}$

2-53. Throughout this book, key problems have been selected as "checkpoints." Each checkpoint problem is marked with an icon like the one at left. These checkpoint problems are provided so that you can check to be sure you are building skills at the expected level. When you have trouble with checkpoint problems, refer to the review materials and practice problems that are available in the Checkpoint Materials section at the back of your book.

This problem is a checkpoint for finding the distance between two points and finding the equation of a line. It will be referred to as Checkpoint 2A.

For each pair of points, determine the distance between them. Then find the equation for a line through them.

a. $(-2, 4)$ and $(4, 7)$

b. $(3, 4)$ and $(3, -1)$

c. $(-7, 20)$ and $(3, -5)$

d. $(1, -2)$ and $(5, -2)$

$$d = \sqrt{(x - x)^2 + (y - y)^2}$$

$$\sqrt{(1-5)^2 + (-2+2)^2}$$

$$\sqrt{16}$$

$$4$$

2-54. The Quadratic Formula can be used to help solve $4x^3 + 23x^2 - 2x = 0$. Show or explain how.

$x(4x^2 + 23x - 2) = 0$

$x = 0$ $\quad 4x^2 + 23x - 2 = 0$

$x = \dfrac{-23 \pm \sqrt{(23)^2 - 4(4)(-2)}}{2(4)}$

$x =$

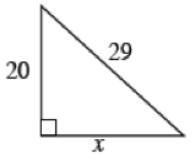
Standard

$0 = ax^2 + bx + c$

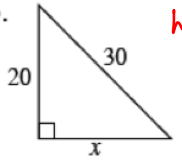
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2-55. Find the value of x.

a.

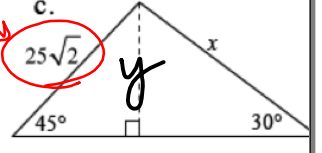


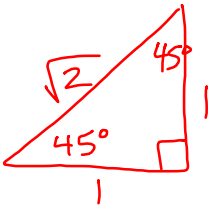
b.

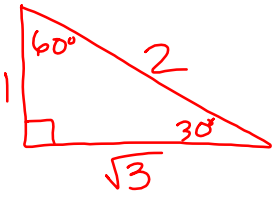


Start here

c.

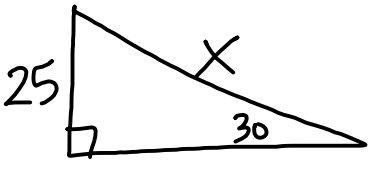




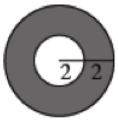


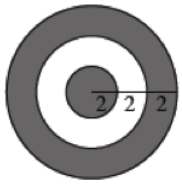
hyp = leg(√2)

$\dfrac{25\sqrt{2}}{\sqrt{2}} = \dfrac{\text{leg}\sqrt{2}}{\sqrt{2}}$



2-56. A dart hits each of these dartboards at random. What is the probability that the dart will land in the unshaded area?

a. 

b. 

$\frac{\text{Area unshaded}}{\text{Total Area}}$

$\frac{\pi(4)^2 - \pi(2)^2}{\pi(6)^2}$

$\frac{16\pi - 4\pi}{36\pi}$

$\frac{12\pi}{36\pi}$

$\boxed{\frac{1}{3}}$

2-34. Rewrite each equation in graphing form and then sketch a graph. Label each sketch so that it is possible to connect it to the equation. $y = a(x-h)^2 + k$

a. $p(x) = x^2 - 10x + 16$

b. $f(x) = x^2 + 3x - 10$

c. $g(x) = x^2 - 4x - 2$

d. $h(x) = -4x^2 + 4x + 8$

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

$x = \frac{4 \pm \sqrt{16 - 4(1)(-2)}}{2(1)}$

$x = \frac{4 \pm \sqrt{24}}{2}$ → $\sqrt{4}\sqrt{6}$, $2\sqrt{6}$

$x = \frac{4}{2} \pm \frac{2\sqrt{6}}{2}$

$x = 2 \pm \sqrt{6}$

Now by completing the square:

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

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

Vertex halfway between:

$x = \frac{2+\sqrt{6} + 2-\sqrt{6}}{2}$

$x = 2$ $\boxed{(2, -6)}$

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

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

2-34. Rewrite each equation in graphing form and then sketch a graph. Label each sketch so that it is possible to connect it to the equation.

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b. $f(x) = x^2 + 3x - 10$

c. $g(x) = x^2 - 4x - 2$

d. $h(x) = -4x^2 + 4x + 8$

$0 = -4(x^2 - x - 2)$

d)

$y = -4\left(\frac{1}{2}\right)^2 + 4\left(\frac{1}{2}\right) + 8$

$= -4\left(\frac{1}{4}\right) + 2 + 8$

$= -1 + 10$

$= 9$

$0 = -4(x+1)(x-2)$

$(-1, 0)$ & $(2, 0)$

vertex:

$x = \frac{-1+2}{2}$

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

Show your process for part b and skip part c

2-47. How can you use a quadratic equation in graphing form to make a quick sketch of the parabola?

a. What is the vertex and y-intercept of the graph of $y = (x-3)^2 - 25$? Explain how you found the y-intercept.

$(0, -16)$

V: $(3, -25)$

b. Find the x intercepts of $y = (x-3)^2 - 25$ algebraically. Explain how you found the x-intercepts.

c. Obtain the Lesson 2.1.4 Resource Page and justify each step in solving the equation in part (b) for x when $y = 0$.

d. Find the exact vertex, y-intercept, and x-intercepts of $y = (x+5)^2 - 8 = 0$. Make a sketch of the parabola, then check your sketch with your graphing calculator.

$0 = (x-3)^2 - 25$

$\pm\sqrt{25} = \sqrt{(x-3)^2}$

$\pm 5 = x - 3$

$+3 \quad +3$

$x = 8, -2$

x-int:

$(8, 0)$ & $(-2, 0)$

January 16, 2020

Show your process for part b and skip part c

2-47. How can you use a quadratic equation in graphing form to make a quick sketch of the parabola?

a. What is the vertex and y-intercept of the graph of $y=(x-3)^2-25$? Explain how you found the y-intercept.

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c. Obtain the Lesson 2.1.4 Resource Page and justify each step in solving the equation in part (b) for x when $y=0$.

d. Find the exact vertex, y-intercept, and x-intercepts of $y=(x+5)^2-8$. Make a sketch of the parabola, then check your sketch with your graphing calculator.

Vertex: $(-5,-8)$

y-int: $(0,17)$

$y=(0+5)^2-8$

$y=17$

x-int:

$(-5+2\sqrt{2},0)$

$(-5-2\sqrt{2},0)$

$0=(x+5)^2-8$

$+8 \quad +8$

$\pm\sqrt{8}=\sqrt{(x+5)^2}$

$\pm 2\sqrt{2}=x+5$

$-5 \quad -5$

$\sqrt{8}=\sqrt{4}\sqrt{2}$

$=2\sqrt{2}$

Staple Up:

Week 5 Classwork:

Warm up

2- # 11, 13, 14

2- # 31 ---> 34

2- # 42, 46, 47

Today:

2- # 64

CP's: 2- #64

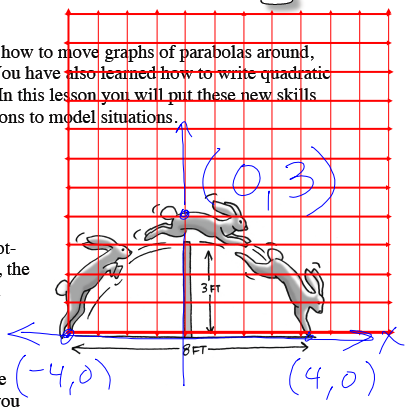
2.1.5 How can I model the data?

Mathematical Modeling with Parabolas

In the past few lessons, you have determined how to move graphs of parabolas around, that is, to transform them, on a set of axes. You have also learned how to write quadratic equations in graphing and in standard form. In this lesson you will put these new skills to work as you use parabolas and their equations to model situations.

2-64. JUMPING JACKRABBITS

The diagram at right shows a jackrabbit jumping over a three-foot-high fence. To just clear the fence, the rabbit must start its jump at a point four feet from the fence.



Sketch the situation and write an equation that models the path of the jackrabbit. Show or explain how you know your sketch and equation fit the situation.

$y = a(x+4)(x-4)$

plug in (0,3) to find a

$y = a(x-0)^2 + 3$

$y = ax^2 + 3$

plug in (4,0) to find a

Discussion Points

How can we make a graph fit this situation?

What information do we need in order to find an equation?

How can we be sure that our equation fits the situation?

HW: 2- # 69 ---> 75

and complete your classwork.

Friday's Quiz:

Solve for x (in denominator)
Find all special points of a parabola