

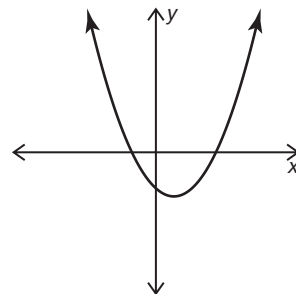
LESSON 4.1 Assignment

Name _____ Date _____

Shape and Structure Forms of Quadratic Functions

1. Analyze the graph of the quadratic function.

- a. The standard form of a quadratic function is $f(x) = ax^2 + bx + c$. What possible values can a and c have for the given quadratic function? Explain your reasoning.



- b. The vertex form of a quadratic function is $f(x) = a(x - h)^2 + k$. What possible values can a , h , and k have for the given quadratic function? Explain your reasoning.

- c. The factored form of a quadratic function is $f(x) = a(x - r_1)(x - r_2)$. What possible values can a , r_1 , and r_2 have? Explain your reasoning.

2. Write a quadratic function for the parabola that passes through the point $(2, -3)$ with roots $(-6, 0)$ and $(4, 0)$.

3. Mitzu shoots an arrow from an initial height of 2 meters. The arrow reaches its maximum height of 20 meters after it has flown a distance of 60 meters.

a. Write a quadratic function to represent the height of the arrow as a function of its distance.

b. Determine the height of the arrow after it has flown a distance of 100 meters.

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4. Charlie kicks a soccer ball from the ground through a hoop that is 80 feet away at a height of 20 feet. The ball hits the ground 100 feet from where Charlie kicked it.

a. Write a quadratic function to represent the height of the ball as a function of its distance.

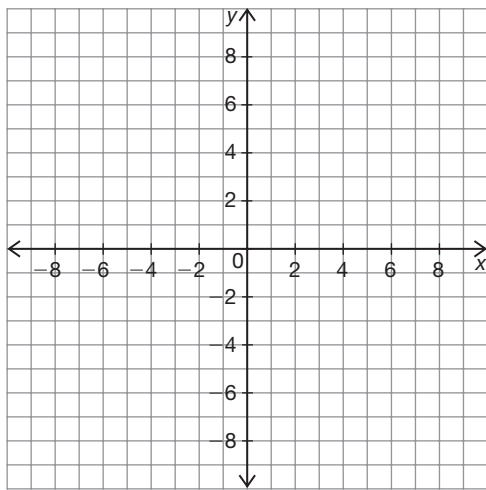
b. Determine the maximum height of the ball during its flight.

LESSON 4.2 Assignment

Name _____ Date _____

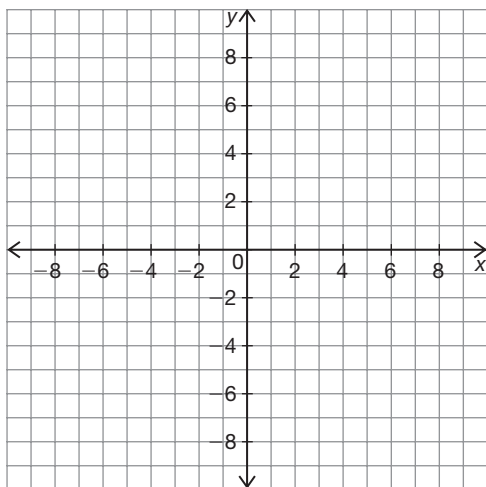
Function Sense Translating Functions

1. Graph $d(x) = (x + 3)^2 - 1$ without a calculator. Explain each of your steps.

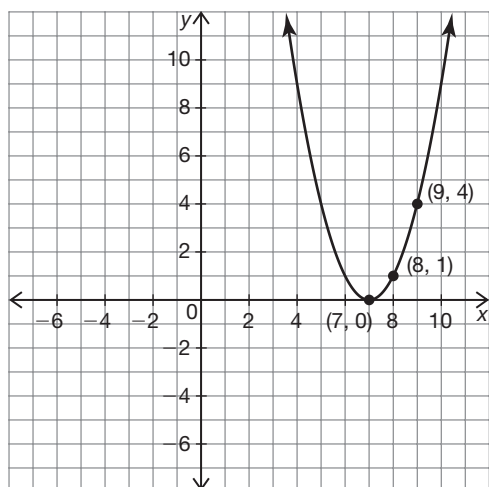


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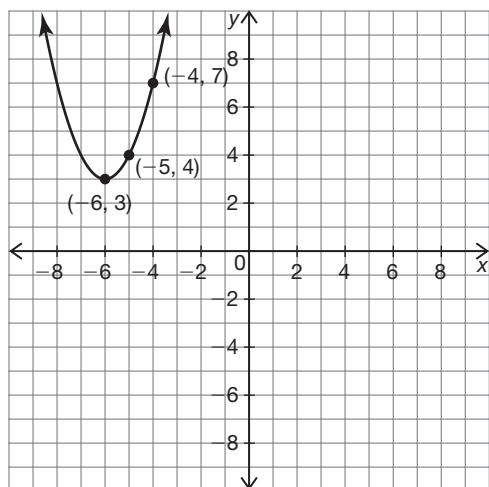
2. Graph $g(x) = (x - 5)^2 - 4$ without a calculator. Explain each of your steps.



3. The function $h(x)$ is shown. If $f(x) = x^2$, write $h(x)$ in terms of $f(x)$.



4. The function $p(x)$ is shown. If $f(x) = x^2$, write $p(x)$ in terms of $f(x)$.



5. The function $t(x)$ is a translation of $f(x) = x^2$, and $t(x)$ has a vertex at $(25, -9)$. Write the function $t(x)$. Explain your reasoning.

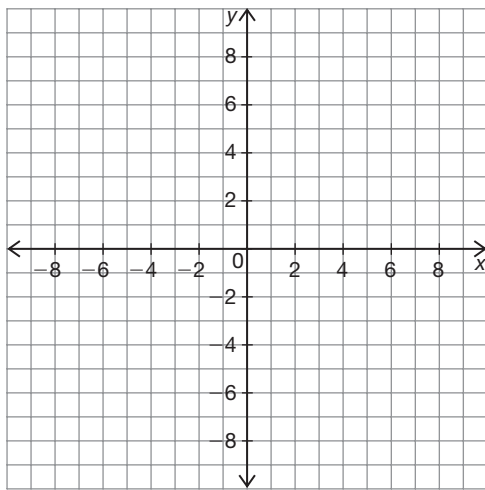
LESSON 4.3 Assignment

Name _____ Date _____

Up and Down

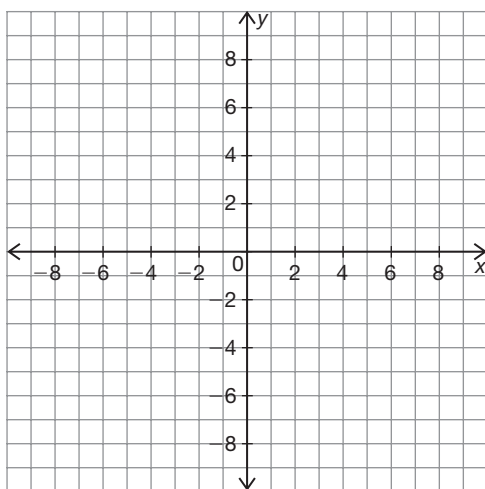
Vertical Dilations of Quadratic Functions

1. Graph $d(x) = -\frac{1}{2}(x + 5)^2 - 3$ without a calculator. Explain each of your steps.

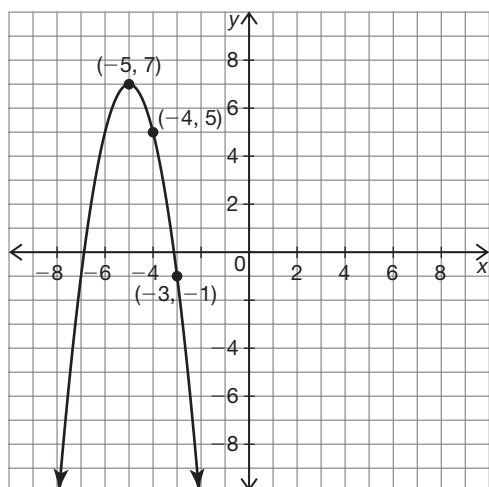


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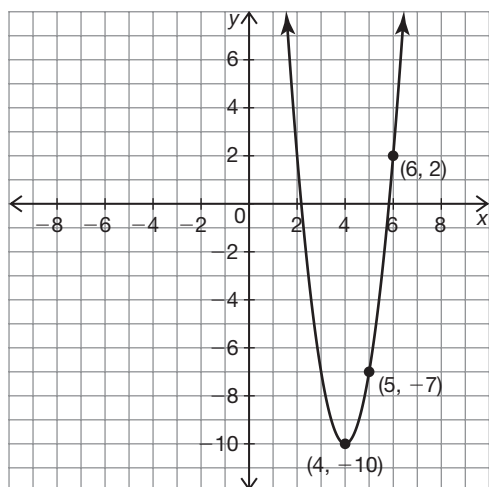
2. Graph $g(x) = 3(x - 2)^2 - 6$ without a calculator. Explain each of your steps.



3. Write the function $h(x)$ that represents the given graph. Explain your reasoning.



4. Write the function $p(x)$ that represents the given graph. Explain your reasoning.



5. The function $t(x)$ is a transformation of $f(x) = x^2$. The function $t(x)$ has a vertex at $(-12, 15)$ and has been vertically compressed by a factor of $\frac{1}{4}$. Write the function $t(x)$. Explain your reasoning.

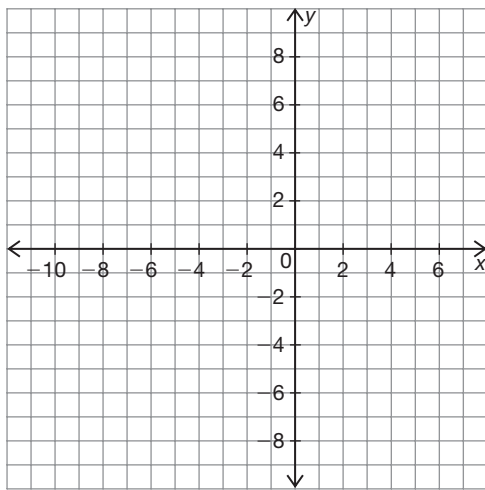
LESSON 4.4 Assignment

Name _____ Date _____

Side to Side

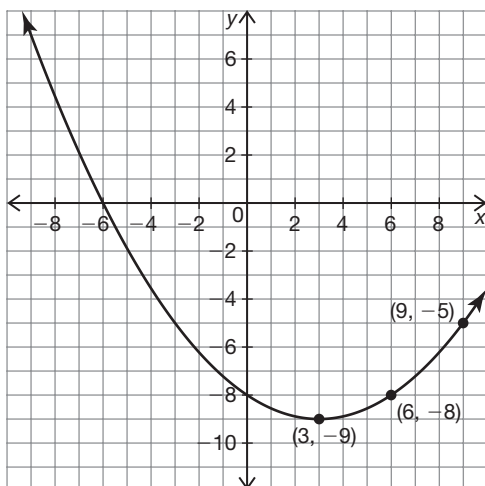
Horizontal Dilations of Quadratic Functions

1. Graph $m(x) = \left(\frac{1}{2}x + 3\right)^2 + 2$ without a calculator. Explain each of your steps.

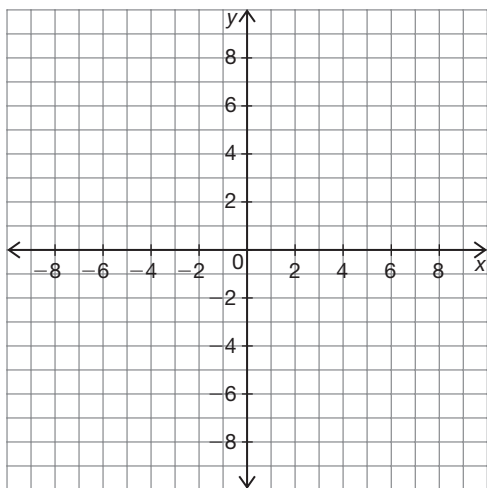


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2. Write the function $p(x)$ that represents the given graph. Explain your reasoning.

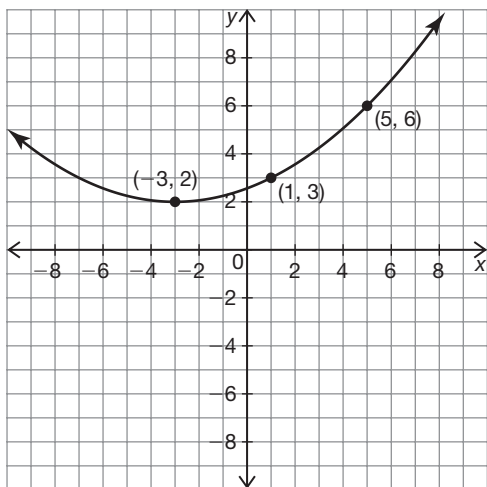


3. Graph $g(x) = (2x - 8)^2 - 4$ without a calculator. Explain each of your steps.



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4. The graph of the quadratic function $t(x)$ is shown. If $f(x) = x^2$, write $t(x)$ in terms of $f(x)$. Explain your reasoning.



Name _____ Date _____

What's the Point?**Deriving Quadratic Functions**

1. Use your knowledge of reference points to write an equation for the quadratic function that has x -intercepts at $(-1, 0)$ and $(1, 0)$ and a y -intercept at $(0, -3)$.
2. Use your knowledge of reference points to write an equation for the quadratic function that has a vertex at $(4, -3)$ and passes through $(6, -1)$.
3. Use your knowledge of reference points to write an equation for the quadratic function that has one x -intercept at $(-7, 0)$ and passes through $(-4, -18)$.

4. Create a system of equations and use algebra to write a quadratic function that passes through the points $(-2, 8)$, $(1, 14)$, and $(0, 10)$.

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5. Victoria competes in a discus throwing competition. She needs to throw her discus at least 200 feet to win the event. The discus has an initial height of 5 feet when she releases it. The discus reaches a height of 25 feet after traveling 75 feet and a height of 20 feet after traveling 150 feet.
- Write a quadratic function to model the height of the discus as a function of the distance traveled.
 - Does Victoria win the competition? Explain your reasoning.
 - What was the maximum height of the discus?

LESSON 4.6 Assignment

Name _____ Date _____

Now It's Getting Complex . . . But It's Really Not Difficult!
Complex Number Operations

1. Calculate each power of i .

a. i^{44}

b. i^{4003}

c. i^{730}

d. i^{-20}

2. Simplify each expression. Identify the real and imaginary parts of your answer.

a. $\sqrt{-18}$

b. $\frac{\sqrt{-72} - 2}{6}$

3. Solve each equation for x . Identify the real and imaginary parts of your answer.

a. $-7 + 3i + x = 10 - 2i$

b. $\frac{x}{5 + 4i} = -2 - i$

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4. Multiply each number by its complex conjugate. Identify the real and imaginary parts of your answer.

a. $4 - 6i$

b. $5 + i$

5. Simplify the expression $(3 + i)(2 + 4i)(3 - i)(2 - 4i)$. Identify the real and imaginary parts of your answer.

Name _____ Date _____

You Can't Spell "Fundamental Theorem of Algebra" without F-U-N!**Quadratics and Complex Numbers**

1. The Internet Bargains Company models their profit during different 20-day periods throughout the year. The function $p(x)$ represents the daily profit (in thousands of dollars) on the x th day of each period. When $p(x) > 0$, the company has a daily profit. When $p(x) < 0$, the company has a daily loss.
 - a. The model for one 20-day period is $p(x) = 0.04(x - 10)^2 + 2$. Determine which of the days in the 20-day period the company made a profit without using a calculator. Explain your reasoning.
 - b. The model for one 20-day period is $p(x) = -0.1(x - 3)(x - 15)$. Determine which of the days in the 20-day period the company made a profit without using a calculator. Explain your reasoning.
 - c. The model for one 20-day period is $p(x) = -0.06(x - 9)^2$. Determine which of the days in the 20-day period the company made a profit without using a calculator. Explain your reasoning.
2. Determine the number of roots for each given equation and whether the roots are real or imaginary.
 - a. $0 = 9x^2 - 6x + 1$

b. $0 = 2x^2 + 9x + 10$

c. $0 = x^2 - 3x + 5$

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3. Write a quadratic equation in standard form with the given roots.

a. Write a quadratic equation with a double root of -5 .

b. Write a quadratic equation with a root of $-3 + 2i$.