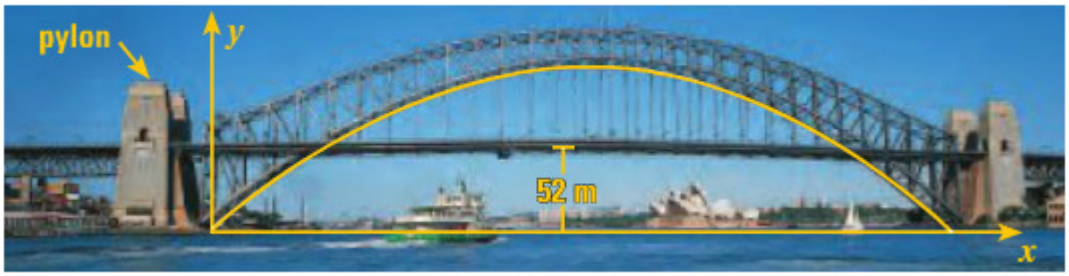
Name_____ **Quadratic Applications**

1. A computer desk with a solid glass top can safely support a weight W (in pounds) provided $W \leq 250x^2$, where x is the thickness of the desktop (in inches). What weights can be supported by glass that is 1.5 inches thick?

2. A wire rope can safely support a weight W (in pounds) provided $W \leq 8000d^2$, where d is the rope's diameter (in inches). What is the minimum thickness of wire needed to support 50,000 pounds?

3. The arch of the Sydney Harbor Bridge in Sydney, Australia, can be modeled by $y = -0.00211x^2 + 1.06x$ where x is the distance (in meters) from the left pylons and y is the height (in meters) of the arch above the water. For what distances x is the arch above the road?



4. A study found that a driver's reaction time A(x) to audio stimuli and his or her reaction time V(x) to visual stimuli (both in milliseconds) can be modeled by

$A(x) = 0.0051x^2 - 0.319x + 15 \quad 16 \leq x \leq 70 \qquad V(x) = 0.005x^2 - 0.23x + 22 \quad 16 \leq x \leq 70$

where x is the driver's age in years.

a. How long does it take a 16-year-old to react to audio stimuli? How long for a 46-year-old?

b. How long does it take a 30-year-old to react to visual stimuli? How long for a 70-year-old?

b. Complete the table to find the solution of the inequality from part (a).

x	16	22	28	34	40	46	52	58	64	70
A(x)										
V(x)										

Circle the statement which best describes the reaction times.

a. Reaction to audio is always faster than reaction to visual.
b. Reaction to visual is always faster than reaction to audio.
c. Older drivers react faster to audio than visual stimuli.
d. Younger drivers react faster to audio than visual stimuli.

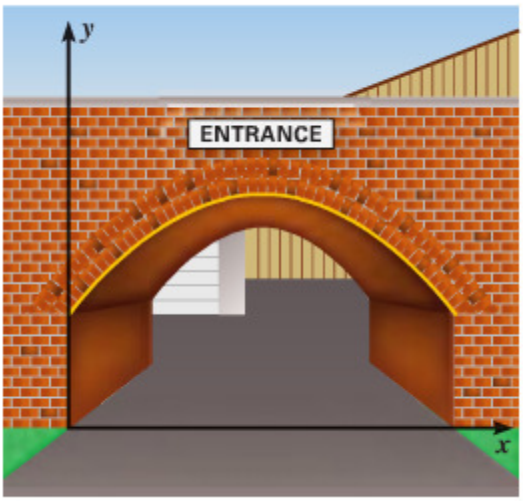
5. The path of a soccer ball kicked from the ground can be modeled by $y = -0.0540x^2 + 1.43x$ where x is the horizontal distance (in feet) from where the ball was kicked and y is the corresponding height (in feet).

a. Graph the equation and sketch and label a diagram showing the path of the ball. Assume the ball is kicked from (0,0).

b. A soccer goal is 8 feet high. Add this detail to your sketch. Write and solve an inequality to find at what values of x the ball is low enough to go into the goal.

c. A soccer player kicks the ball toward the goal. The goal is 15 feet away. No one is blocking the goal. Will the player score a goal? Explain.

6. A truck that is 11 feet tall and 7 feet wide is traveling under an arch.
The arch can be modeled by $y = -0.0625x^2 + 1.25x + 5.75$
where x and y are measured in feet.



a. Will the truck fit under the arch? Explain.

b. What is the maximum width that a truck 11 feet tall can have And still make it under the arch?

c. What is the maximum height that a truck 7 feet wide can have and still make it under the arch?

CHALLENGE For clear blue ice on lakes and ponds, the maximum weight w (in tons) that the ice can support is given by

$$w(x) = 0.1x^2 - 0.5x - 5$$

where x is the thickness of the ice (in inches).

a. Calculate What thicknesses of ice can support a weight of 20 tons?

b. Interpret *Explain* how you can use the graph of $w(x)$ to determine the minimum x-value in the domain for which the function gives meaningful results.