

**9.4-9.5 Word Problems
Vertical Motion
&
Area Problems**

Vertical Motion Problems: Use the vertical motion model to answer the question being asked for each situation. Be sure to start by writing the formula and substituting in appropriate values, if necessary. (Some problems have already been setup and factored for you).

$$h = -16t^2 + vt + s$$

1. Hot Air Balloon An object is dropped from a hot-air balloon 1296 feet above the ground. The height of the object is given by: $h = -16(t-9)(t+9)$ where the height h is measured in feet, and the time t is measured in seconds. After how many seconds will the object hit the ground?



2. Kickball A kickball is kicked upward with an initial vertical velocity of 3.2 meters per second. The height of the ball is given by: $h = -9.8t^2 + 3.2t$ where the height h is measured in feet, and the time t is measured in seconds. After how many seconds does the ball land?

3. Diving Board A diver jumps from a diving board that is 24 feet above the water. The height of the diver is given by: $h = -16(t - 1.5)(t + 1)$ where the height h is measured in feet, and the time t is measured in seconds. When will the diver hit the water?



4. Dog To catch a frisbee, a dog leaps into the air with an initial velocity of 14 feet per second.

a. Write a model for the height of the dog above the ground.

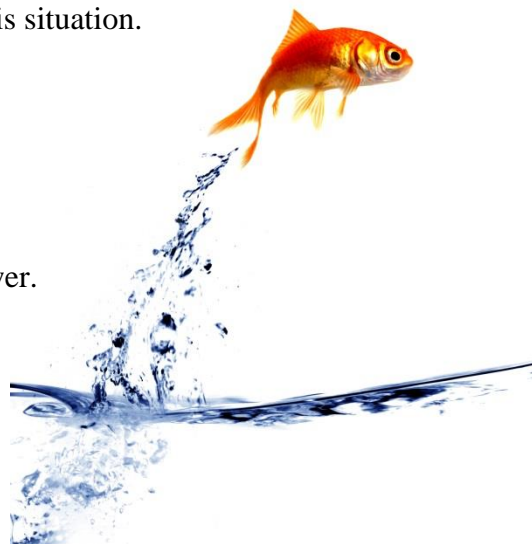
b. After how many seconds does the dog land on the ground?



5. Fish A fish jumps out of the water while swimming. The height h (in feet) of the fish can be modeled by: $h = -16t^2 + 3.5t$ where t is the time (in seconds) since the fish jumped out of the water.

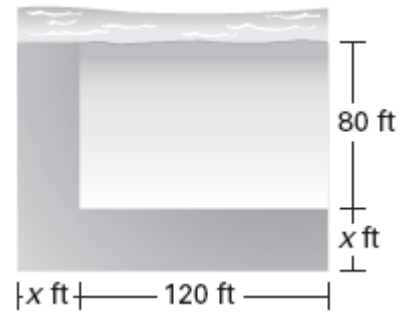
a. Find the zeros of the function. Explain what the zeros mean in this situation.

b. What is a reasonable domain for the function? Explain your answer.



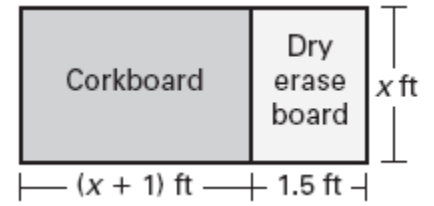
Area Problems: For each problem set up an equation using the information provided to answer the question being asked.

6. Boardwalk A boardwalk is being built along two sides of a beach area. The beach area is rectangular with a width of 80 feet and a length of 120 feet. The boardwalk will have the same width on each side of the beach area. If the combined area of the beach and the boardwalk is 16,500 square feet, then the area can be modeled by $(x + 80)(x + 120) = 16,500$. How wide should the boardwalk be?



7. Note Board Design You are designing a note board that is made of corkboard and dry erase board. The area of the corkboard is 6 square feet.

a. Write an equation for the area of the corkboard.



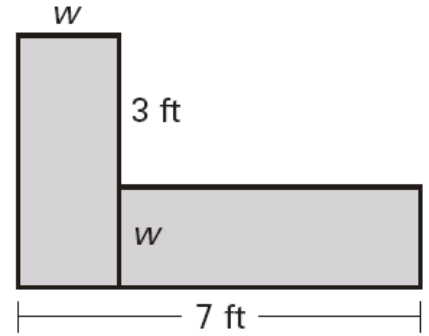
b. Find the dimensions of the corkboard.

c. Find the area of the dry erase board.

8. Desktop Areas You have two components to the desktop where you do your homework that fit together into an L shape. The two components have the same area.

a. Write an equation that relates the areas of the desktop components.

b. Find the value of w .

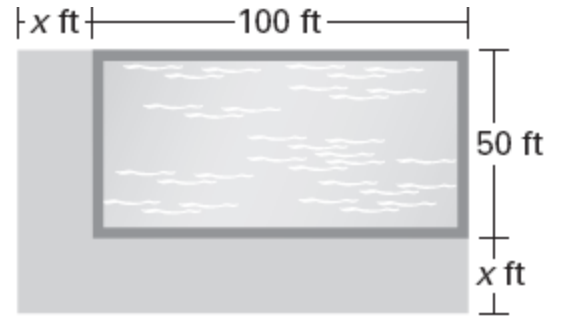


c. What is the combined area of the desktop components?

9. Patio Area A community center is building a patio area along two sides of its pool. The pool is rectangular with a width of 50 feet and a length of 100 feet. The patio area will have the same width on each side of the pool.

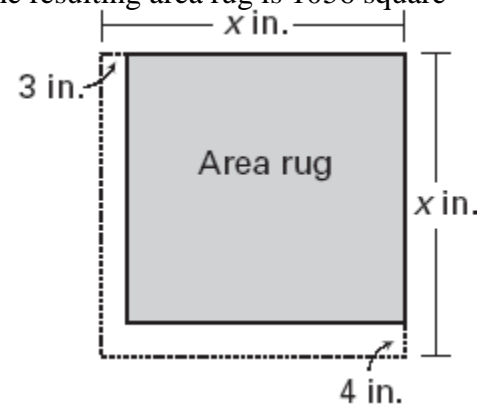
a. Write a polynomial that represents the combined area of the pool and the patio area.

b. The combined area of the pool and patio area should be 8400 square feet. How wide should the patio area be?



10. Area Rug You are creating your own area rug from a square piece of remnant carpeting. You plan on cutting 4 inches from the length and 3 inches from the width. The area of the resulting area rug is 1056 square inches.

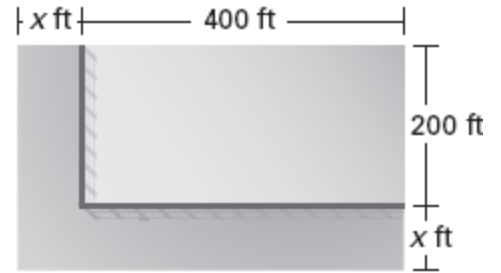
a. Write a polynomial that represents the area of your area rug.



b. What is the *perimeter* of the original piece of remnant carpeting?

11. Zoo Exhibit A zoo is building a walkway along two sides of an exhibit. The exhibit is rectangular with a width of 400 feet and a length of 200 feet. The walkway will have the same width on each side of the exhibit.

a. Write a polynomial that represents the combined area of the exhibit and the walkway.

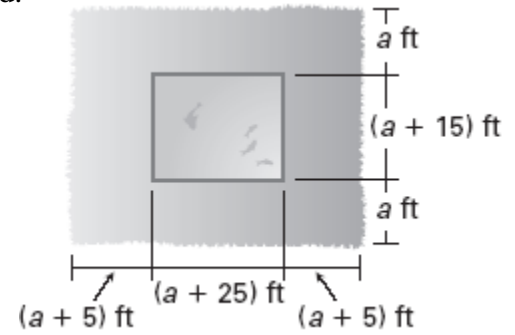


b. The combined area of the exhibit and walkway should be 95,625 square feet. How wide should the walkway be?

c. If concrete costs \$15 per square foot, how much will it cost to pave the walkway?

12. Fish Pond A rectangular fish pond is positioned in the center of a rectangular grassy area, as shown. The area of the pond is 2000 square feet.

a. Use the dimensions given in the diagram to find the dimensions of the pond.



b. The combined area of the pond and the surrounding grassy area is 9900 square feet. Find the length and width of the grassy area.