

Show all of your work as you solve each.

1. The length of a rectangle is 6 cm less than twice its width. Find the dimensions of the rectangle if its area is 108 cm^2 .

2. Find the dimensions of a rectangle whose perimeter is 40 in and whose area is 96 in^2 .

3. The flight of a particular soccer kick can be modeled by the function $y = -0.014x(x - 35)$ where x is the horizontal distance in yards and y is the height in yards.

a. How many yards away from the player does the soccer ball land?

b. What is the maximum height in yards of the soccer ball?

4. A basketball player passes the ball to a teammate. The ball leaves the player's hand 5 feet above the ground and has an initial vertical velocity of 55 feet per second. The teammate catches the ball when it returns to a height of 5 feet. How long is the ball in the air?

5. You are playing tennis with a friend. The path of the tennis ball after you hit the ball can be modeled by the graph of the equation $y = -0.005x^2 + 0.17x + 3$ where x is the horizontal distance (in feet) from where you hit the ball and y is the height of the ball (in feet) above the court.

- a. What is the maximum height reached by the tennis ball? Round to the nearest tenth of a foot.
- b. Suppose you are standing 30 feet from the net, which has a height of 3 feet. Will the ball clear the net? Explain.
- c. If your friend does not hit the ball back to you, how far from you does the ball strike the ground?

6. Find 5 consecutive integers such that the square of the third decreased by the square of the second is equal to the product of the first and last.

7. A bottle rocket travels along a parabolic path modeled by $y = -\frac{3}{7}(x - 7)^2 + 21$ where x is the horizontal distance in yards from the impact point and y is the height in yards.

- a. How far did the bottle rocket travel?
- b. What was the maximum height of the bottle rocket?