$\qquad$ Mod: $\qquad$
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 $108 \mathrm{~cm}^{2}$.
2. Find the dimensions of a rectangle whose perimeter is 40 in and whose area is $96 \mathrm{in}^{2}$.
3. The flight of a particular soccer kick can be modeled by the function $y=-0.014 x(x-35)$ 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 $y=-0.005 x^{2}+0.17 x+3$ 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. 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?
