

PROBLEM SOLVING

EXAMPLE 5

on p. 295
for Exs. 68–69

68. **FOOTBALL** In a football game, a defensive player jumps up to block a pass by the opposing team's quarterback. The player bats the ball downward with his hand at an initial vertical velocity of -50 feet per second when the ball is 7 feet above the ground. How long do the defensive player's teammates have to intercept the ball before it hits the ground?

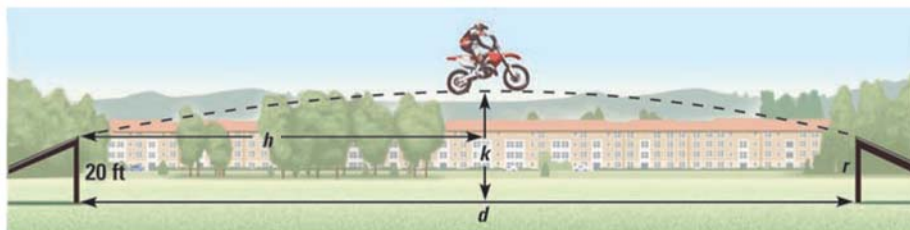
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69. **TAKS REASONING** For the period 1990–2002, the number S (in thousands) of cellular telephone subscribers in the United States can be modeled by $S = 858t^2 + 1412t + 4982$ where t is the number of years since 1990. In what year did the number of subscribers reach 50 million?

- (A) 1991 (B) 1992 (C) 1996 (D) 2000

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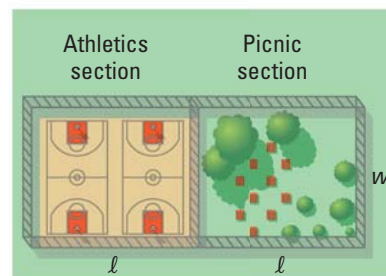
70. **MULTI-STEP PROBLEM** A stunt motorcyclist makes a jump from one ramp 20 feet off the ground to another ramp 20 feet off the ground. The jump between the ramps can be modeled by $y = -\frac{1}{640}x^2 + \frac{1}{4}x + 20$ where x is the horizontal distance (in feet) and y is the height above the ground (in feet).



- What is the motorcycle's height r when it lands on the ramp?
- What is the distance d between the ramps?
- What is the horizontal distance h the motorcycle has traveled when it reaches its maximum height?
- What is the motorcycle's maximum height k above the ground?

71. **BIOLOGY** The number S of ant species in Kyle Canyon, Nevada, can be modeled by the function $S = -0.000013E^2 + 0.042E - 21$ where E is the elevation (in meters). Predict the elevation(s) at which you would expect to find 10 species of ants.

72. **TAKS REASONING** A city planner wants to create adjacent sections for athletics and picnics in the yard of a youth center. The sections will be rectangular and will be surrounded by fencing as shown. There is 900 feet of fencing available. Each section should have an area of 12,000 square feet.



- Show that $w = 300 - \frac{4}{3}l$.
- Find the possible dimensions of each section.