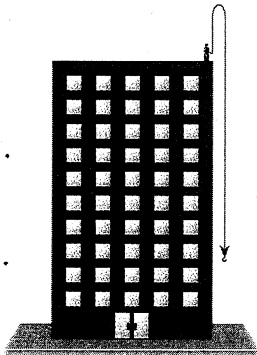


49. Using calculus it can be shown that if a ball is thrown upward with an initial velocity of 16 ft/s from the top of a building 128 ft high, then its height h above the ground



t seconds later will be

$$h = 128 + 16t - 16t^2$$

During what time interval will the ball be at least 32 ft above the ground?

50. The gravitational force F exerted by the earth on an object having a mass of 100 kg is given by the equation

$$F = \frac{4,000,000}{d^2}$$

where d is the distance (in km) of the object from the center of the earth, and the force F is measured in newtons (N). For what distances will the gravitational force exerted by the earth on this object be between 0.0004 N and 0.01 N?

51. In the vicinity of a bonfire, the temperature T in $^{\circ}\text{C}$ at a distance of x meters from the center of the fire was given by

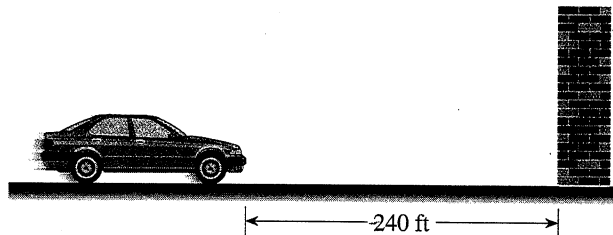
$$T = \frac{600,000}{x^2 + 300}$$

At what range of distances from the fire center was the temperature less than 500°C ?

52. The gas mileage g (measured in mi/gal) for a particular vehicle, driven at v mi/h, is given by the formula $g = 10 + 0.9v - 0.01v^2$, as long as v is between 10 mi/h and 75 mi/h. For what range of speeds is the vehicle's mileage 30 mi/gal or better?
53. For a certain model of car the distance d required to stop the vehicle if it is traveling at v mi/h is given by the following formula:

$$d = v + \frac{v^2}{20}$$

where d is measured in feet. Kerry wants her stopping distance not to exceed 240 ft. At what range of speeds can she travel?



54. If a manufacturer sells x units of a certain product, his revenue R and cost C (in dollars) are given by:

$$R = 20x$$

$$C = 2000 + 8x + 0.0025x^2$$

Use the fact that

$$\text{profit} = \text{revenue} - \text{cost}$$

to determine how many units he should sell to enjoy a profit of at least \$2400.

55. A gardener has 120 ft of deer-resistant fence. She wants to enclose a rectangular vegetable garden in her backyard, and she wants the area enclosed to be at least 800 ft^2 . What range of values is possible for the length of her garden?
56. A riverboat theater offers bus tours to groups on the following basis. Hiring the bus costs the group \$360, to be shared equally by the group members. Theater tickets, normally \$30 each, are discounted by 25¢ times the number of people in the group. How many members must be in the group so that the cost of the theater tour (bus fare plus theater ticket) is less than \$39 per person?