

1. Solve each of the following equations. If there is no real solution, say so. **Do not use the quadratic formula unless absolutely necessary.**

a. $(x - 3)^2 = 2x - 6$

b. $(x - 3)^2 - 6 = 0$

c. $(x - 3)^2 + 6 = 0$

d. $3x - 1 = x^2$

e. $700 + 100x - 100x^2 = 100$

f. $8x - x^2 = 0$

g. $x^2 = 4x + 5$

h. $x^2 = 4x - 5$

i. $2x^2 - 3 = 47$

2. Make a rough sketch of each of the following parabolas by plotting the vertex, axis of symmetry, and intercepts. State the range of each function.

a. $y = x^2 - 6x - 7$

b. $y = x^2 - 6x + 5$

c. $y = 10x - x^2$

d. $y = -2x^2 + 10x + 12$

3. The gas mileage $G(s)$ (in miles/gallon) of a Ford Taurus when driven at a speed of S mph can be approximated by the function

$$G(s) = -0.02s^2 + 2s - 25 \quad , \quad 25 \leq s \leq 75$$

a. Find the gas mileage if the car is driven at a speed of 60 mph.

b. At what speed(s) does the car get 17 mpg?

4. You throw a rock straight up with an initial speed of 48 ft/sec. The height (in feet), $H(t)$, of the rock above the ground t seconds after being released is given by the function

$$H(t) = -16t^2 + 48t + 5$$

a. Find all times when the rock is 25 feet above the ground.

b. Find the height of the rock one second before it is 37 feet high and on its way down.

c. When does the rock hit the ground?

d. How high above the ground is the rock at its highest point?

5. The stopping distance $d(m)$ (in feet) of a small cars travelling at m miles per hour may be approximated by the function

$$d(m) = m + \frac{m^2}{20}.$$

a. Find the stopping distance for a car travelling 10 mph.

b. At what speed will the stopping distance be 120 feet?

c. A Toyota is traveling twice as fast as a Honda. The Honda takes 75 feet to stop. How far will the Toyota travel before it stops.

6. A ball is thrown straight up from the ground with an initial speed of 80 ft/sec. The height $h(t)$ of the ball (in feet) above the ground t seconds after being released is given by the function

$$h(t) = -16t^2 + 80t.$$

a. Find the height of the ball 1 second before it hits the ground.

b. When is the ball the same height as it is 1 second after being released?

7. A ball is thrown straight up from the ground with an initial speed of 80 ft/sec. The height $h(t)$ of the ball (in feet) above the ground t seconds after being released is given by the function

$$h(t) = -16t^2 + 90t + 5.$$

Is the ball on its way up or on its way down two seconds after being released?