Sec 6.7 – Mathematical Modeling
Literal Equations & Situations

Name:

Solve each of the following for the variable suggested.

1. $2y - 4x + 5y + 2 = 4 - 3y + 5x - 8$ **, solve for *y***

$+3y \quad +4x \quad -2 \quad +3y \quad +4x \quad -2$

$5y \quad +5y = 4 \quad +9x \quad -10$

$10y = 9x - 6$

$\frac{10y}{10} = \frac{9x-6}{10}$

$$y = \frac{9x-6}{10}$$

2. $3a - 6b + 2c + 3 = 18 - 2a + 2(3c - b)$ **, solve for a**

$3a - 6b + 2c + 3 = 18 - 2a + 6c - 2b$

$+2a \quad +6b \quad -2c \quad -3 \quad +2a \quad -2c \quad +6b$

$5a = 15 \quad +4c \quad +4b$

$\frac{5a}{5} = \frac{15 - 4c + 4b}{5}$

$$a = \frac{4b - 4c + 15}{5}$$

3. $W = m \cdot a \cdot d$ **, solve for *a***

$md \quad md$

$$\frac{W}{m \cdot d} = a$$

4. $\frac{a \cdot m}{t} = 2$ **, solve for *m***

$t \cdot \frac{am}{t} = 2 \cdot t$

$\frac{a \cdot m}{a} = \frac{2t}{a}$

$$m = \frac{2t}{a}$$

5. $r \cdot a = \frac{4\pi}{p}$ **, solve for *p***

$P \cdot r \cdot a = \frac{4\pi}{p} \cdot P$

$\frac{p \cdot r \cdot a}{r \; a} = \frac{4\pi}{r \cdot a}$

$$P = \frac{4\pi}{ra}$$

6. $\frac{P}{R} = I^2 \cdot R$ **, solve for *I* and assume all variables are positive values**

$\sqrt{\frac{P}{R}} = \sqrt{I^2}$

$$\sqrt{\frac{P}{R}} = I$$

WE COULD ALSO CONSIDER RATIONALIZING THE DENOMINATOR:

$\frac{\sqrt{P}}{\sqrt{R}} \cdot \frac{\sqrt{R}}{\sqrt{R}} = \frac{\sqrt{PR}}{R} = I$

– OR –

$$I = \frac{\sqrt{PR}}{R}$$

7. Consider the function graphed at the right. The graph shows the height of a ball being dropped from 4 feet.

   a. Approximately, how high is the ball 3 seconds after it is dropped?

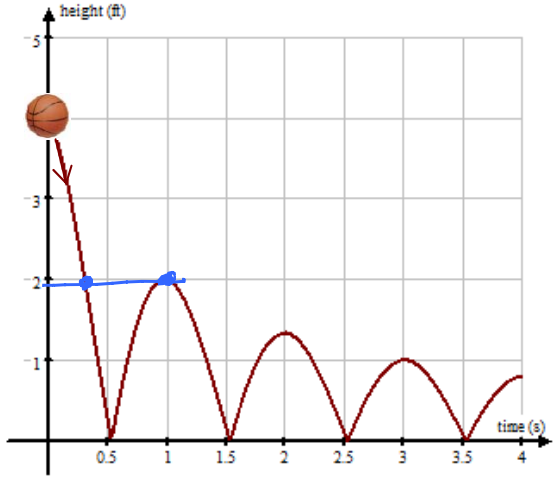
   1 Foot

   b. How approximately what time(s) is the ball at height of 2 feet after it has been dropped?

   ≈ 0.4 seconds & 1 second

   c. How long approximately after the ball is dropped does the ball first hit the ground?

   ≈ 0.5 seconds



8. A city water company charges homeowners based on how much water they use in thousands of gallons. The company progressively charges at a higher rate the more water that is used.

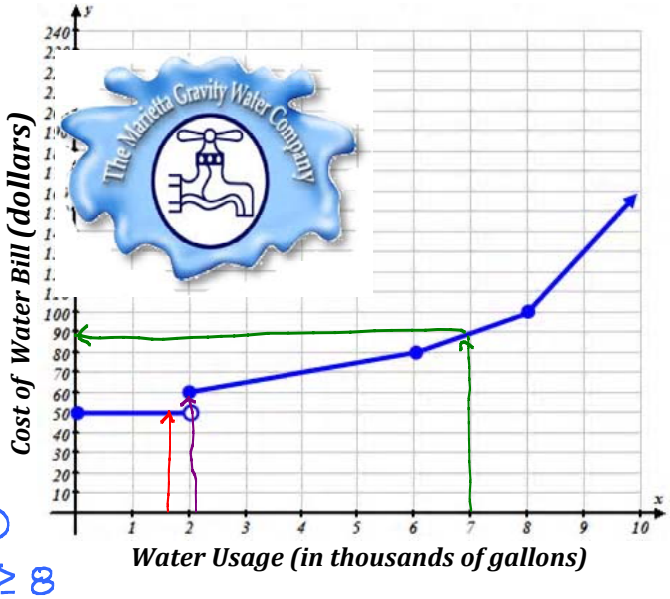
   Based on the graph at the right how much does the city charged when a home owner uses the following number of gallons of water:

   1700 gallons of water costs $50.

   2000 gallons of water costs $60.

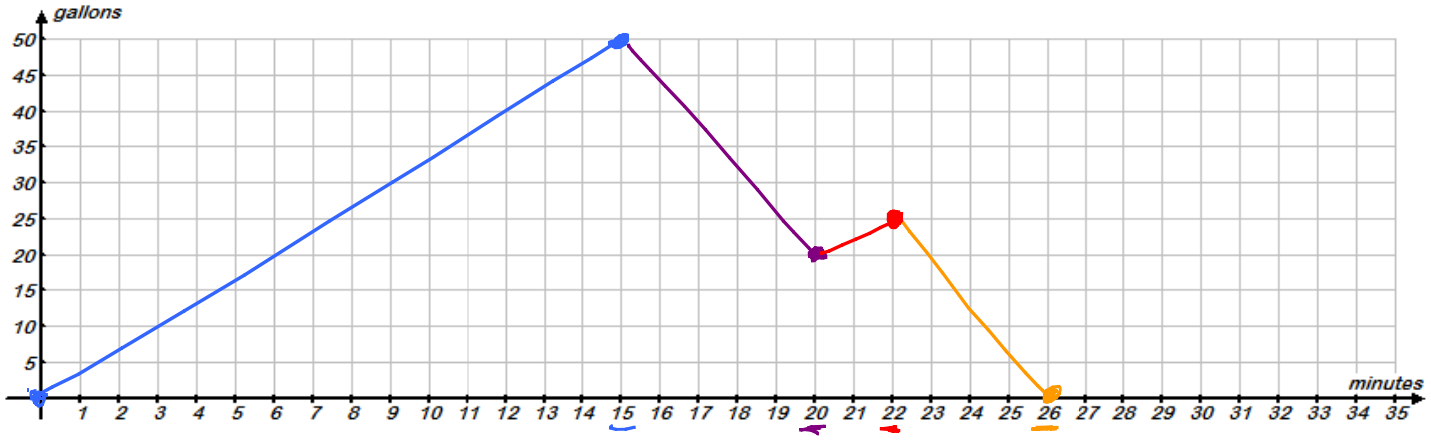
   7000 gallons of water costs $90.

   At what interval is the price increasing the fastest? (8,∞) x ≥ 8



9. At noon, a person begins to fill up a bath tub at a steady rate. The bath tub is completely filled with 50 gallons after 15 minutes. The person filling the tub had to let some water go down the drain because it was too full. After an additional 5 minutes the tub only has 20 gallons in it. The person decided the water got to cold and added 5 more gallons of hot water (for a total of 25 gallons) over the next 2 minutes to warm it up. Then, they decided they didn't have time for a bath and let all the water drain out over the next 4 minutes.

   Create an appropriate graph that shows the volume of water in the bath tub in minutes after 12 noon.
   (You may assume all rates were constant as draining or filling began)



   a. During what intervals is the graph decreasing?

   (15,20) ∪ (22,26)

   b. During what intervals is the graph constant?

   NOT CONSTANT EVER. IF EACH EVENT HAPPENED IMMEDIATELY AFTER THE PREVIOUS.