

1. Assume that the number of gallons of water remaining in the bathtub varies quadratically with the number of minutes which have elapsed since you pulled the plug.

If the tub has 38.4, 21.6, and 9.6 gallons remaining at 1, 2, and 3 minutes respectively, since you pulled the plug, write an equation expressing gallons in terms of minutes.

$$y = 2.4x^2 - 24x + 60$$

How much water was in the tub when you pulled the plug?

60 gallons ; when time equals zero

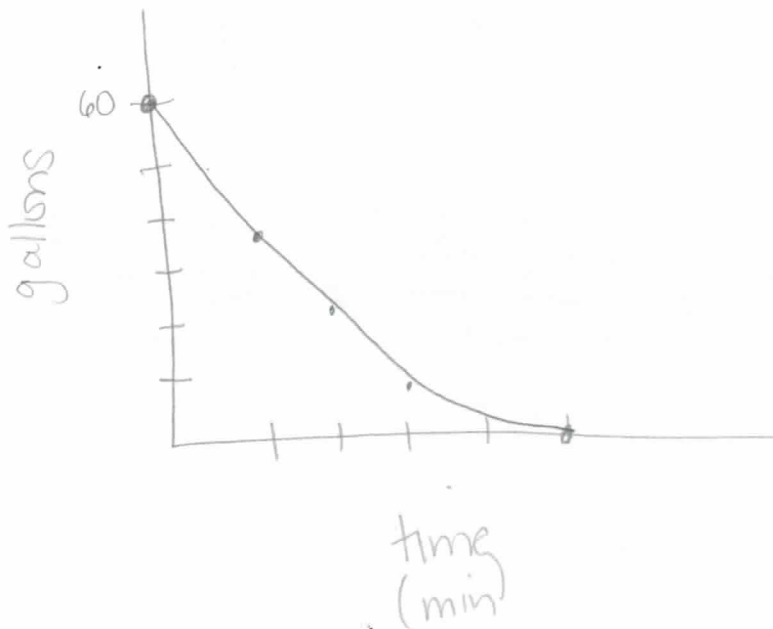
When will the tub be empty?

$$0 = 2.4x^2 - 24x + 60$$

$$x = \frac{24 \pm \sqrt{24^2 - 4(2.4)(60)}}{4.8}$$

$$x = 5 \text{ minutes}$$

Draw a graph of the function in the appropriate domain.



2. Kiera dives off the diving board. Her distance from the surface of the water varies quadratically with the number of seconds that have passed since she left the board.

Her distances at the time of 1, 2, and 3 seconds since she left the diving board are 24, 18, and 2 meters above the water, respectively. Write the particular equation expressing distance in terms of time.

$$y = -5x^2 + 9x + 20$$

How high is the diving board? Justify.

20 meters. This is Kiera's position at time 0.

What is the highest Kiera gets above the water?

$$x = \frac{-9}{2(-5)} = \frac{9}{10}$$

$$y = -5\left(\frac{9}{10}\right)^2 + 9\left(\frac{9}{10}\right) + 20$$
$$= 24.05 \text{ m}$$

When does she hit the water?

$$0 = -5x^2 + 9x + 20$$

$$x = \frac{-9 \pm \sqrt{81 - 4(-5)(20)}}{-10} = \frac{-9 \pm \sqrt{481}}{-10} = \boxed{3.09 \text{ sec}}$$