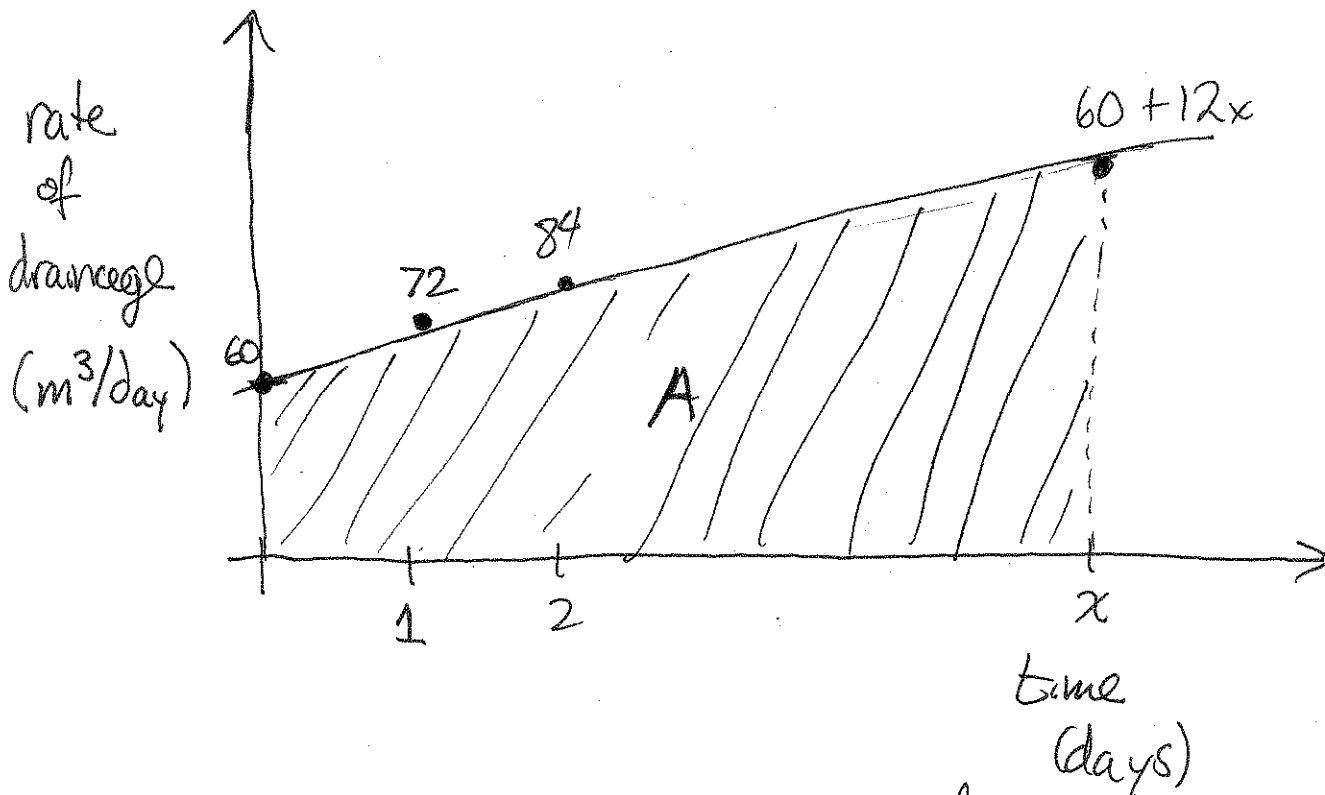Name: _Answer Key_

1. [**10 points**] At time $t = 0$ days, a water reservoir holds 240 cubic meters (m^3) of water, and the water is draining at a rate of 60 cubic meters per day. The rate at which the water drains from the reservoir is observed to increase steadily. With each passing day, the rate of drainage increases by 12 cubic meters per day. When will the reservoir be empty? Round your answer to 2 decimal places.

- After x days, A m^3 have left, where

$$A = \frac{h}{2}(L_1 + L_2) = \frac{x}{2}\left(60 + (60 + 12x)\right)$$

$$= \frac{x}{2}(120 + 12x) = 60x + 6x^2$$

- Solve for x in $\quad 60x + 6x^2 = 240$

$$6x^2 + 60x - 240 = 0$$

$$x^2 + 10x - 40 = 0$$

- $x = \dfrac{-10 \pm \sqrt{10^2 - 4(1)(-40)}}{2(1)} = \dfrac{-10 \pm \sqrt{260}}{2}$

so $x = 3.06$ or $x = -13.06$.
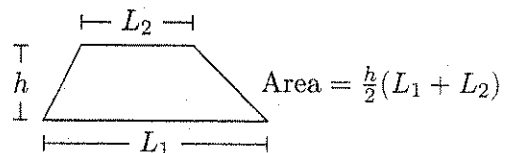
So after $\boxed{3.06}$ days, the reservoir is empty.

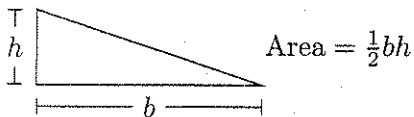## Do not turn the page until instructed.

Directions:

1. Write your name on this page and, after the quiz begins, <u>on the other side of the quiz.</u>

2. <u>Show your work</u> unless you are instructed otherwise. No credit for answers without work.

3. You may use a calculator provided it is not equipped with a Computer Algebra System (CAS).

4. Turn off and put away all other electronic equipment (especially cell phones), notes, and books.

5. Good luck!

$$\text{Area} = \tfrac{1}{2}bh$$

$$\text{Area} = \tfrac{h}{2}(L_1 + L_2)$$

If $ax^2 + bx + c = 0$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.