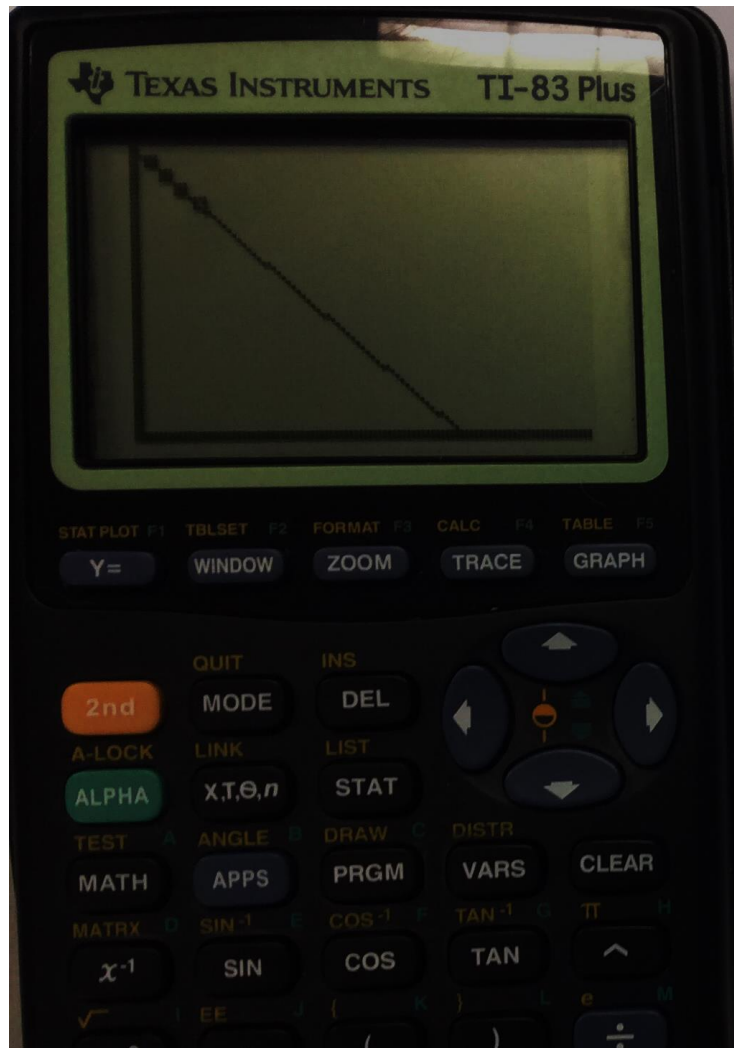


Student 1 Work



The Water Tower Problem

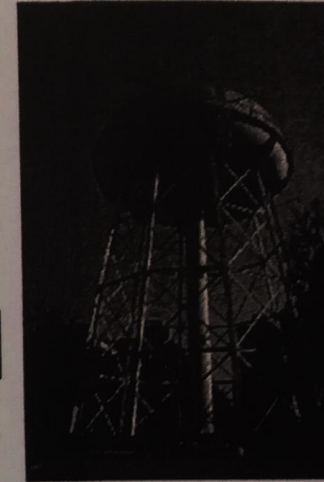
A valve on the side of one of the Rockingham County Water towers failed a little over 2 hours ago. A gauge has been reporting the rate of gallons of water lost per minute since the valve failed. The readings are included in the table below. Engineers have been alerted to the failure but only have equipment to repair the valve when the water is flowing less than 475 gallons per minute. Furthermore, their equipment must be calibrated to the rate of the water leaking from the tank in order to repair the valve.

Time Leaking (minutes)	0	39	76	111	144
Flow Rate (gallons per minute)	1000	950	900	850	800

Emily, the head engineer, recalls that the last time her team had to repair this particular water valve, it took 400 minutes to drain to the bottom of the valve.

- a) At what time can they use their equipment to stop the leak? Confirm your answer using a representation (table, graph, equation, etc.) of your choosing.

- b) Devise a way for Emily and her engineer's to predict how many minutes the tower has been leaking given the readings from the flow rate gauge. How can you show this using the information from part (a)?



$$y = -1.39x + 1002.66$$

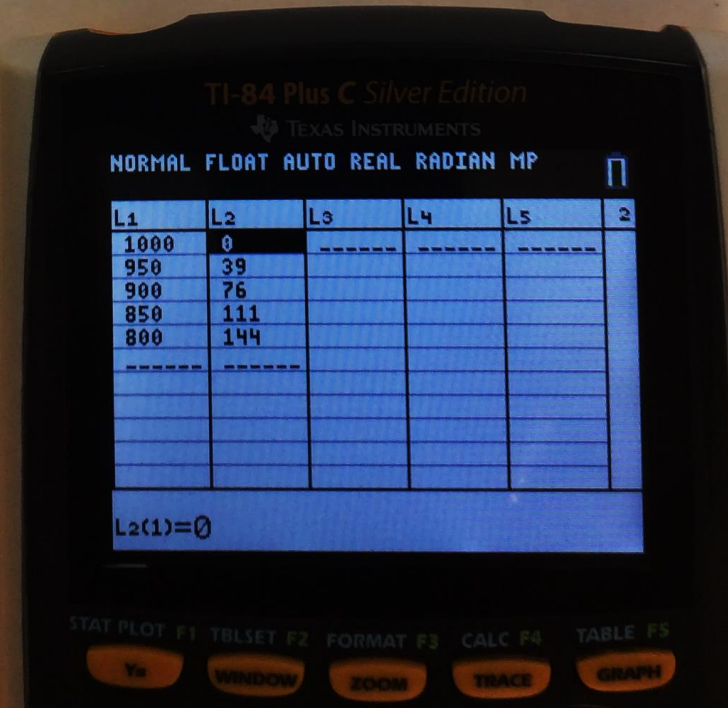
Student 2 Work

the bottom of the valve.

- At what time can they use their equipment to stop the leak? Confirm your answer with a representation (table, graph, equation, etc.) of your choosing.
- Devise a way for Emily and her engineer's to predict how many minutes the tower has been leaking given the readings from the flow rate gauge. How can you show this using the information from part (a)?

a) About 380.65 minutes

$$-0.72x + 722$$



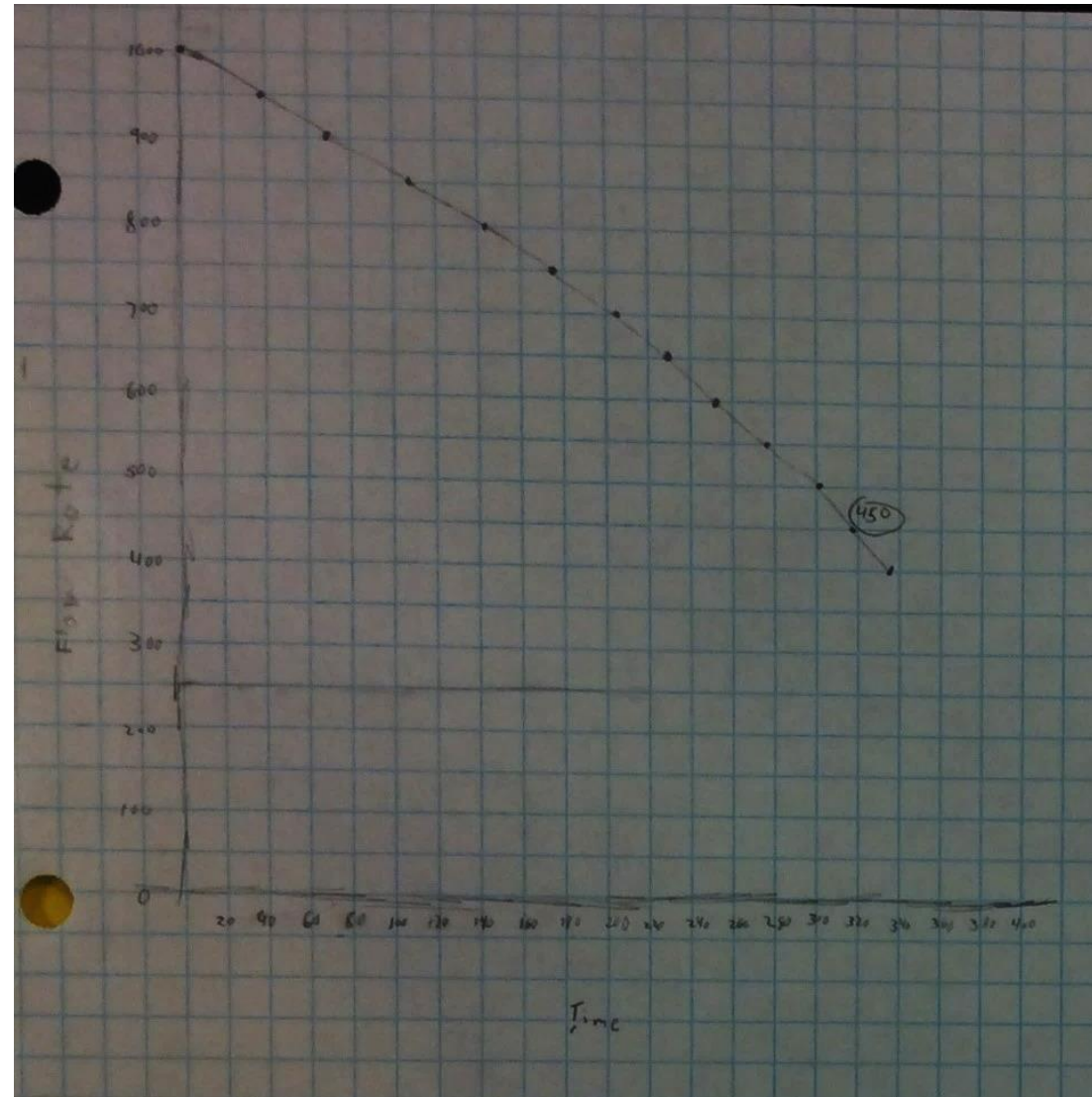
Student 3 Work

been leaking given the readings from the flow rate gauge. How can you show this using the information from part (a)?

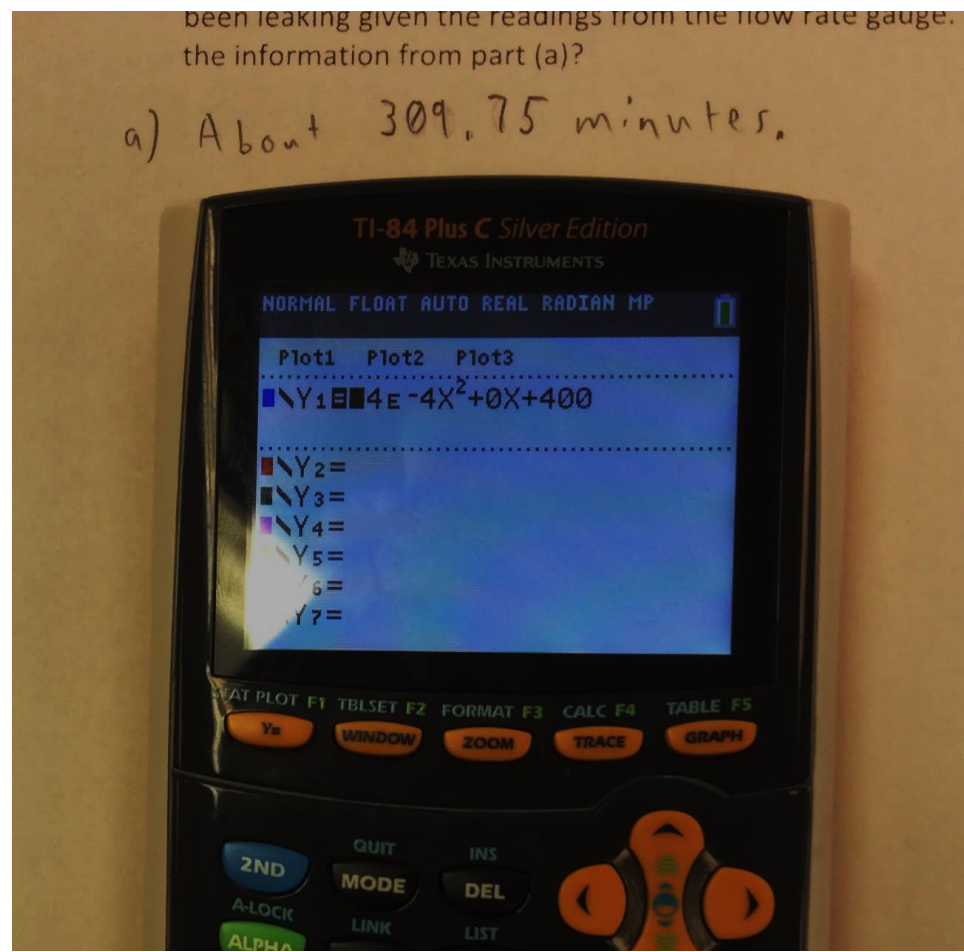
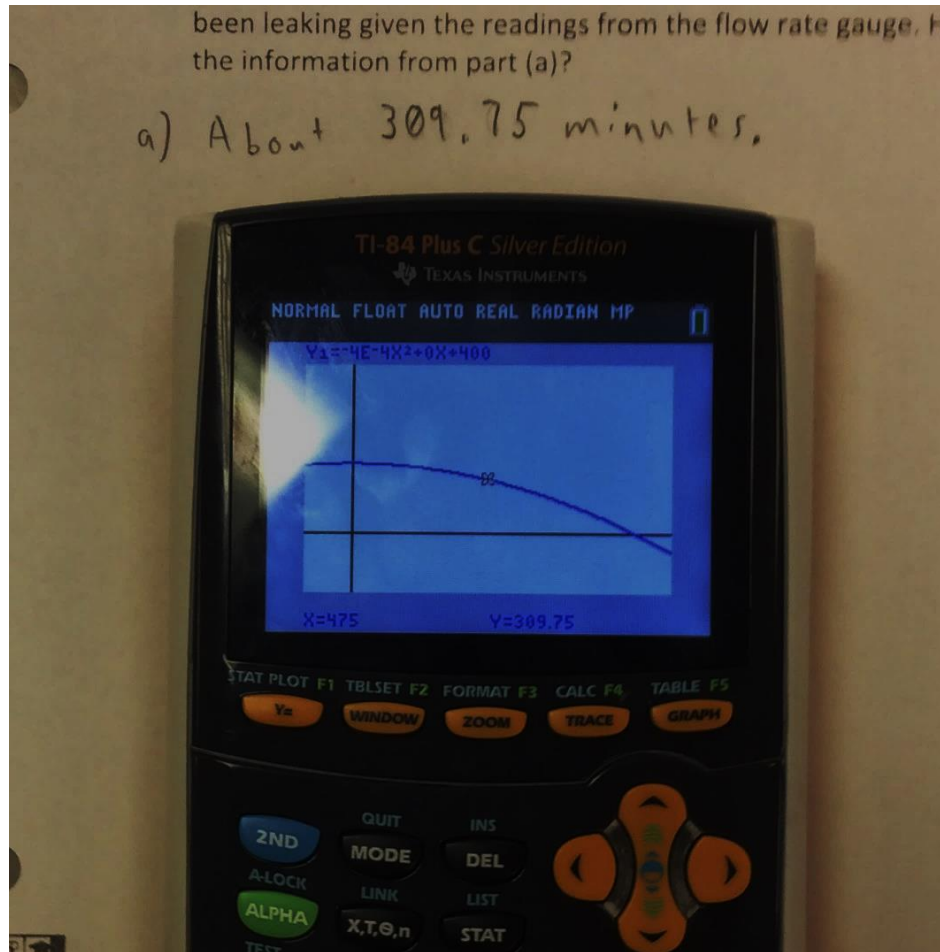
		39	37	35	33	31	29	27	25	23	21	19	17
Time Leaking	0	39	76	111	144	175	204	231	256	279	300	319	334
Flow Rate	1000	950	900	850	800	750	700	650	600	550	500	450	400

They can repair the leak after
ap. 309.5 minutes.

Student 4 Work – Part 1



Student 4 Work – Part 2



Student 5 Work

$$V = -4E - 4x^2 + 0x + 400$$

$$V = -0.0004x^2 + 0x + 400$$

$$-4 \cdot 10^{-4}$$

$$-0.0004 \times 10^{-4}$$

$$t =$$

$$V = -0.0004x^2 + 400$$

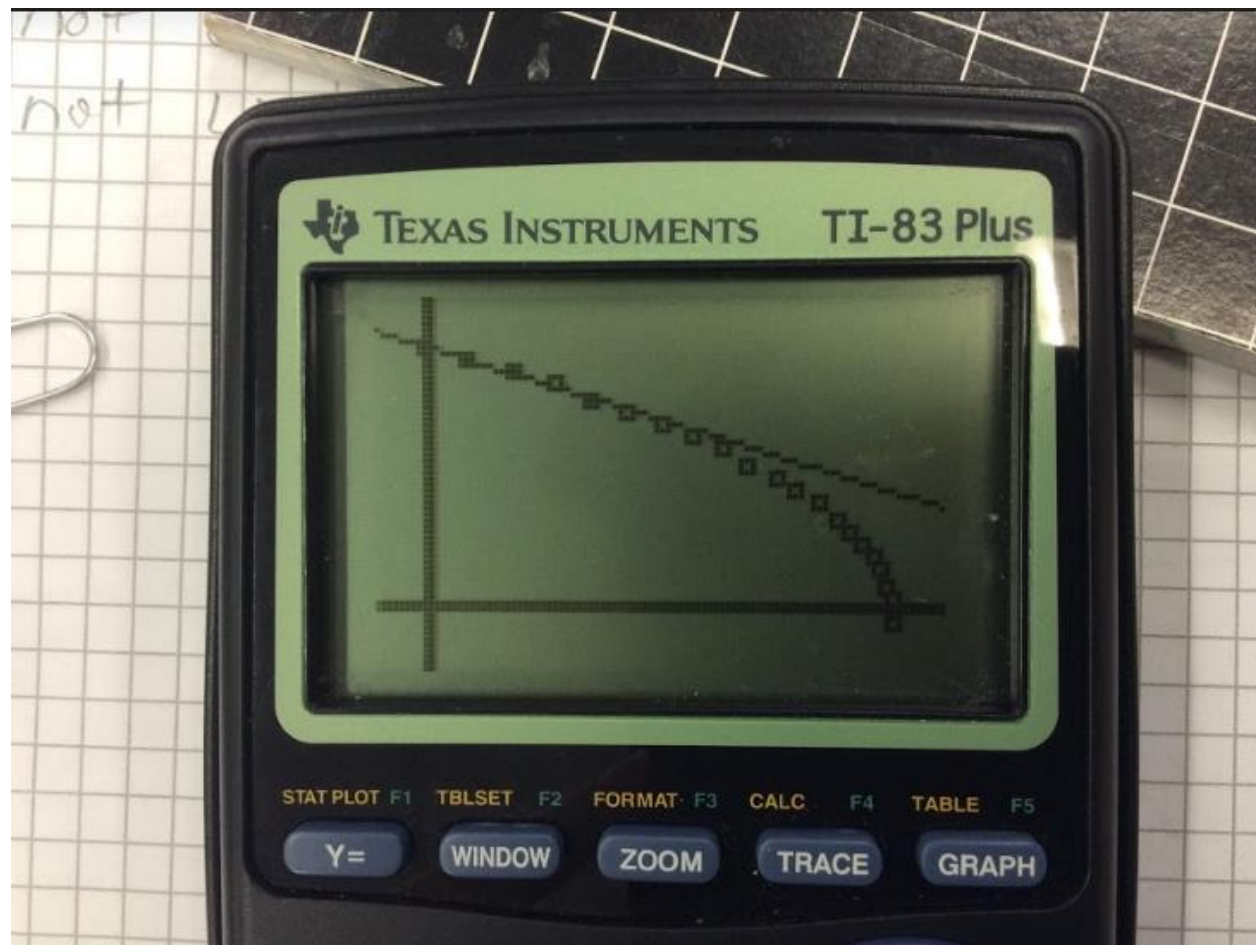
$$-400 \quad -400$$

$$\frac{V - 400}{-0.0004} = \frac{-0.0004x^2}{-0.0004}$$

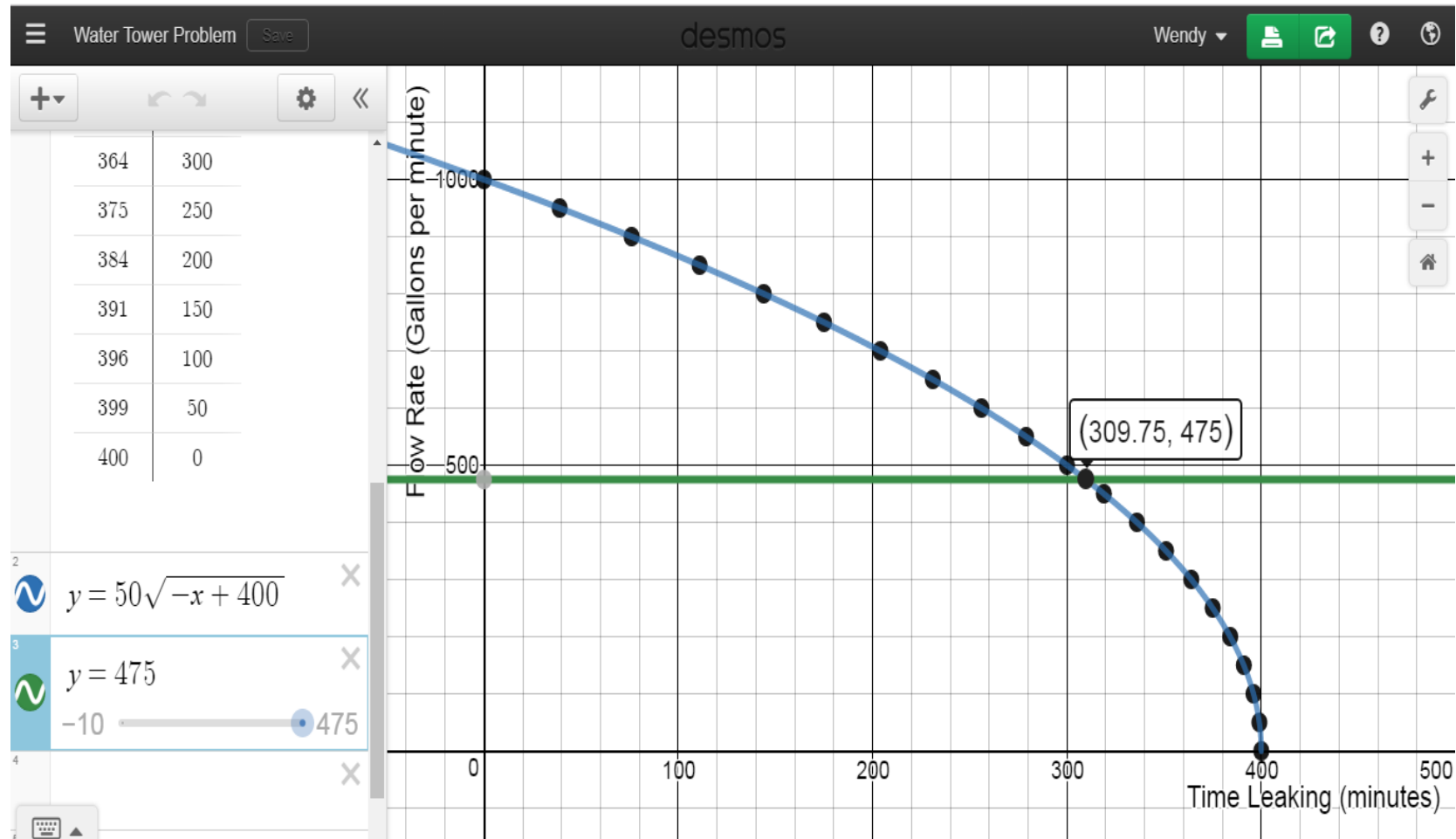
$$\sqrt{\frac{V - 400}{-0.0004}} = \sqrt{x^2}$$

$$\boxed{\frac{\sqrt{V - 400}}{-0.0004} = x}$$

Student 6 Work – Part 1



Student 6 – Part 2



Using transformations to find the equation.

Student 7 Work

Gallons	Time
1000	0
950	39
900	76
850	111
800	144
750	175
700	204
650	231
600	256
550	279
500	299
450	300

Emily, the head engineer, recalls that the last time her team had to repair this particular water valve, it took 400 minutes to drain to the bottom of the valve.



- a) At what time can they use their equipment to stop the leak? Confirm your answer using a representation (table, graph, equation, etc.) of your choosing. 309.75 min (about 5 hours)
- b) Devise a way for Emily and her engineer's to predict how many minutes the tower has been leaking given the readings from the flow rate gauge. How can you show this using the information from part (a)?

$$\left[\frac{(10.5)}{2} \cdot (2(39) + (10.5 - 1) - 2) \right] = 309.75$$

31	29	27	25	23	21	19
175	204	231	256	279	300	319
750	700	650	600	550	500	450

$$\begin{aligned} 309.5 &= 475 \\ 309.5 &= 475 \text{ gallons per minute} \end{aligned}$$