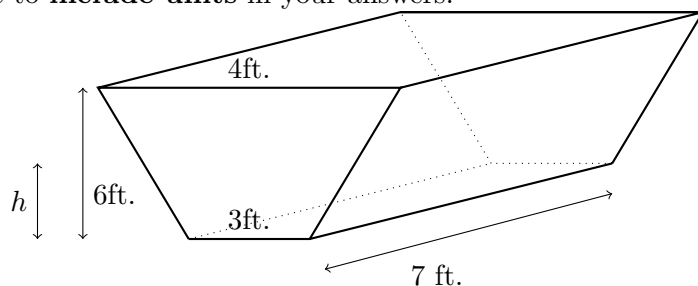


4. [14 points] Franklin, your robot, has been digging a ditch in the backyard. The ditch is a trapezoidal prism with length 7 feet, width at the bottom 3 feet and width at the top 4 feet. The ditch descends 6 feet underground. You may assume that each cubic foot of dirt weighs 94 pounds. Be sure to **include units** in your answers.



- a. [5 points] Write an expression that approximates the work that Franklin does lifting a slice of dirt Δh feet thick from h feet below the top of the ditch, to the top of the ditch.
- b. [3 points] Using your answer to part (a), write an integral that computes the total work required to move all of the dirt out over the top of the ditch.
- c. [3 points] To lift the dirt, Franklin uses your old rusty bucket. For Franklin's last bucket-full of dirt, the bucket starts with 30 pounds of dirt and loses 10 pounds of dirt at a constant rate over the 6 feet that it travels vertically. When the bucket is x feet above the bottom of the ditch, what is the weight of the dirt in the bucket?
- d. [3 points] Using your answer from part (c), find the work required to lift the bucket-full of dirt from the bottom of the ditch to the top.