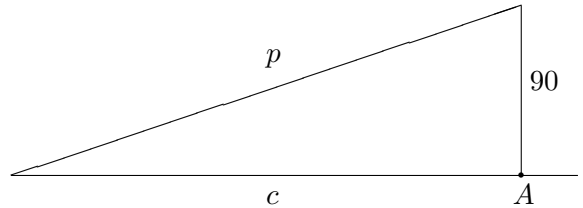


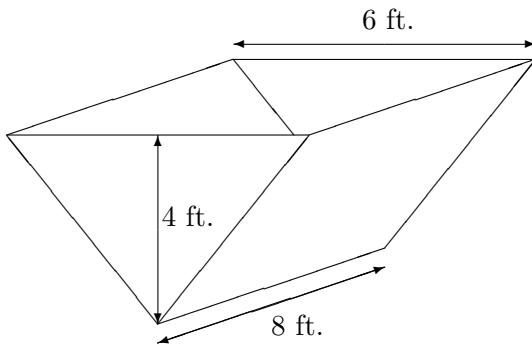
## Math 30 – Workshop #16

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1. A car is traveling west on the highway. A highway patrol officer is parked 90 feet north of the highway. Below is a picture to represent this scenario. We let  $c$  represent the distance the car has traveled (in miles) from point  $A$  and  $p$  represent the distance (in miles) between the car and the officer.



- (a) What is  $c$  when  $p = 150$ ?
- (b) What is  $p$  when  $c = 216$ ?
- (c) Let  $t$  represent time in hours since the car passed point  $A$ . Suppose you find that  $\frac{dc}{dt}$  equals 50 when  $t = 2$ . Write a sentence explaining what you know about the car 2 hours after it passes point  $A$ .
- (d) In the context of the problem, what does  $\frac{dp}{dt}$  measure?
- (e) The officer takes a radar reading and finds that the car is 150 ft from her position and that the distance separating them is increasing at the rate of 72 miles per hour. Find the speed of the car at that moment.
2. A tank is made from two identical isosceles triangles at opposite ends. (The triangles have a vertical axis of symmetry, and side lengths 5, 5, and 6.)



Water is filling the tank at the rate of  $24 \text{ ft}^3/\text{hour}$ . How fast is the water level rising when it is 3 feet deep in the tank?

3. An angler has hooked a fish. The fish is traveling in an east-west direction along a line 30 ft north of the angler. If the fishing line is leaving the reel at the rate of 6 ft/sec when the fish is 50 feet from the angler, how fast is the fish traveling?
4. A balloon rises vertically at a rate of 10 ft/sec. A person watches the balloon ascend from a point on the ground 100 feet away from the spot below the rising balloon. At what rate (radians/sec) is the observer's eye rotating upward to follow the balloon when the balloon is 50 feet above the level of the observer's eye?
5. Two cars are traveling eastward, driving on parallel streets that are 2 miles apart. They start out at the same time and are 2 miles apart at the start. At one point in time, the first car is 8 miles from where it started, and traveling at 40 mph. At that same time, the second car is 11 miles from where it started and traveling at 55 mph. At that time, at what rate is the distance between the two cars changing?