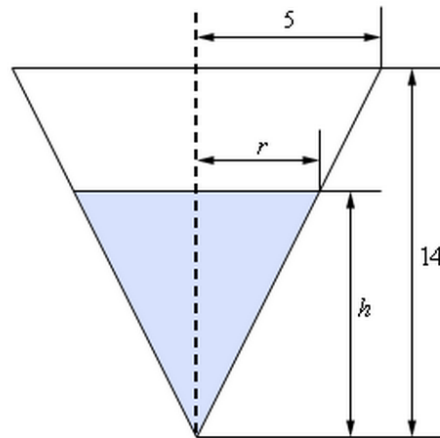


Example 4 A tank of water in the shape of a cone is leaking water at a constant rate of $2\text{ft}^3/\text{hour}$. The base radius of the tank is 5 ft and the height of the tank is 14 ft.

- (a) At what rate is the depth of the water in the tank changing when the depth of the water is 6 ft?
- (b) At what rate is the radius of the top of the water in the tank changing when the depth of the water is 6 ft?

Solution

Okay, we should probably start off with a quick sketch (probably not to scale) of what is going on here.

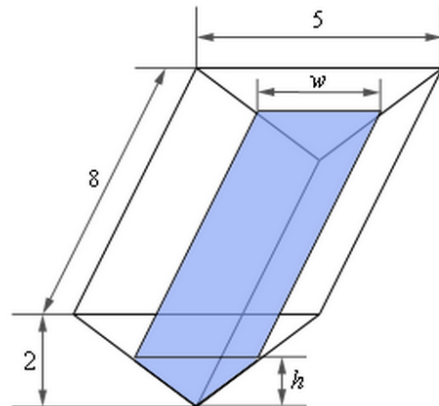


Example 5 A trough of water is 8 meters deep and its ends are in the shape of isosceles triangles whose width is 5 meters and height is 2 meters. If water is being pumped in at a constant rate of $6\text{ m}^3/\text{sec}$. At what rate is the height of the water changing when the water has a height of 120 cm?

Solution

Note that an isosceles triangle is just a triangle in which two of the sides are the same length. In our case sides of the tank have the same length.

We definitely need a sketch of this situation to get us going here so here. A sketch of the trough is shown below.

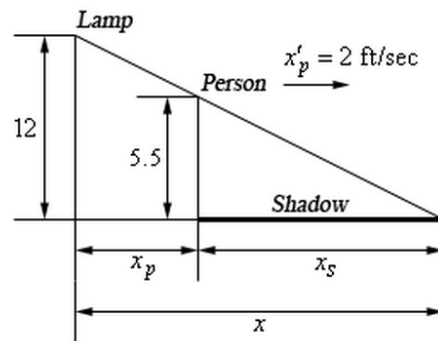


Example 6 A light is on the top of a 12 ft tall pole and a 5ft 6in tall person is walking away from the pole at a rate of 2 ft/sec.

- (a) At what rate is the tip of the shadow moving away from the pole when the person is 25 ft from the pole?
- (b) At what rate is the tip of the shadow moving away from the person when the person is 25 ft from the pole?

Solution

We'll definitely need a sketch of this situation to get us started here. The tip of the shadow is defined by the rays of light just getting past the person and so we can form the following set of similar triangles.



Example 8 Two people on bikes are separated by 350 meters. Person A starts riding north at a rate of 5 m/sec and 7 minutes later Person B starts riding south at 3 m/sec. At what rate is the distance separating the two people changing 25 minutes after Person A starts riding?

Solution

There is a lot to digest here with this problem. Let's start off with a sketch of the situation.

