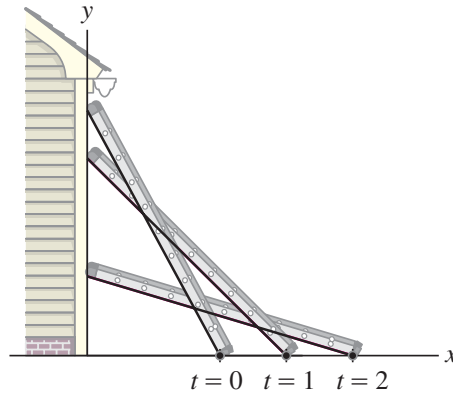
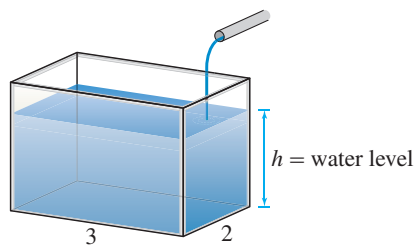


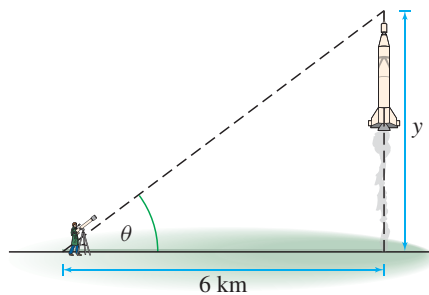
1. **Sliding Ladder Problem** A 5-meter ladder leans against a wall. The bottom of the ladder is 1.5 meters from the wall at time $t = 0$ and slides away from the wall at a rate of 0.8 m/s. Find the velocity of the top of the ladder at time $t = 1$.



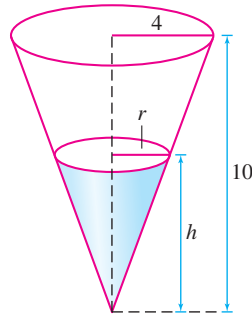
2. **Filling a Rectangular Tank** Water pours into a fish tank at a rate of $0.3 \text{ m}^3/\text{min}$. How fast is the water level rising if the base of the tank is a rectangle of dimensions 2×3 meters?



3. **Tracking a Rocket** A spy uses a telescope to track a rocket launched vertically from a launching pad 6 km away, as in the following Figure. At a certain moment, the angle θ between the telescope and the ground is equal to $\frac{\pi}{3}$ and is changing at a rate of 0.9 rad/min. What is the rocket's velocity at that moment?



4. **Filling a Conical Tank** Water pours into a conical tank of height 10 m and radius 4 m at a rate of $6 \text{ m}^3/\text{min}$.



By similar triangles,

$$\frac{r}{h} = \frac{4}{10}$$

- (a) At what rate is the water level rising when the level is 5 m high?
 (b) As time passes, what happens to the rate at which the water level rises?
5. Farmer John's tractor, traveling at 3 m/s, pulls a rope attached to a bale of hay through a pulley. With dimensions as indicated in the figure, how fast is the bale rising when the tractor is 5 m from the bale?

