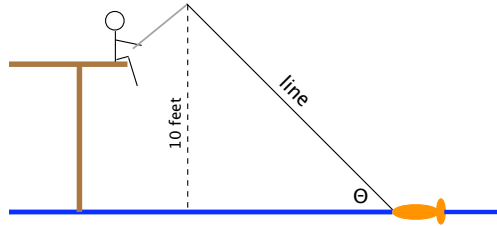


Related Rates Problems

1. If a spherical snowball melts so that its volume decreases at a rate of $2 \text{ in}^3/\text{min}$, find the rate at which the radius decreases when the snowball is 10 inches in radius.
2. A plane is flying at an elevation of 6 miles over an observer. If the plane is flying at a constant speed of 450 mph, how fast is the distance between the observer and the plane changing when the distance between the plane and observer is 10 miles?
3. A fish is reeled in at a rate of 1 foot per second from a point 10 feet above the water (See figure). At what rate is the angle between the line and the water changing when there is a total of 25 feet of line out?



4. A 5 foot tall woman is walking towards a 20 foot tall lamppost at a rate of 4 feet/second. The light at the top is casting the woman's shadow on the ground. At what rate is the tip of her shadow moving when she is 10 feet from the base of the post?
5. Water is being pumped out of an inverted conical tank at a rate of $9 \text{ ft}^3/\text{min}$. The tank has a height of 10 feet and a diameter of 12 feet at the top. How fast is the water level sinking when the water is 6 feet deep?

Method for Related Rates Problems:

1. Assign variables to the quantities that vary with time. Identify the given rates of change and the unknown rate of change.
2. Write an equation relating the quantities. (A diagram may help.)
3. Differentiate both sides of your equation with respect to time. (This new equation will relate the rates of change.)
4. Input values to solve for the unknown rate of change.