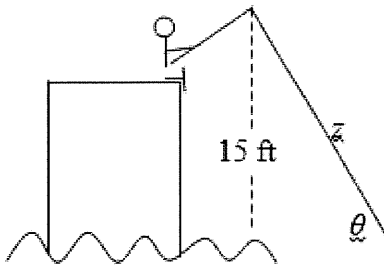


**AP Calculus Ch. 2.6 Trig Related Rates Notes**

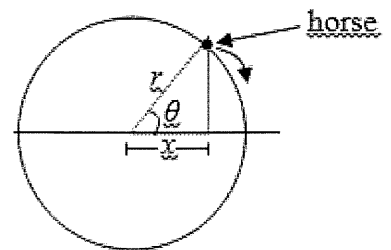
Steps for Related Rates:

**Example 1:** A fish is reeled in at a rate of 1 foot per second from a point 15 feet above the water (see figure below). At what rate is the angle between the line and the water changing when there is a total of 25 feet of line out?



**Example 2:** A carousel has a radius of 20 feet and completes one rotation every 30 seconds

a) Determine the angular velocity of the carousel in radians per second. Call this  $d\theta/dt$ .



b) If you were to ride on the carousel for 10 seconds, what angle would you be at compared to where you started?

c) Find  $dx/dt$  as a function of  $\theta$ .

d) Find  $dx/dt$  when  $t = 10$  seconds.

**Example 3:** A ladder, 50 ft long, is being pushed against the wall at a rate of 5 ft / sec. When the bottom of the ladder is 30 ft from the wall:

- What is the velocity at the top of the ladder?
- At what rate is the area of the triangle enclosed by the ladder, wall, and floor changing?
- At what rate is the angle formed by the ladder and the floor changing at that time?

**Example 4:** A television camera at ground level is filming the lift-off of a space shuttle that is rising vertically according to  $s(t) = 50t^2$ , where  $s$  is in feet and  $t$  is in seconds. Find the rate of change in the angle of elevation of the camera shown below at 10 seconds after lift-off.

