

Solve each related rate problem. 1-5 NO CALC 6-9 CALC OK NAME: _____

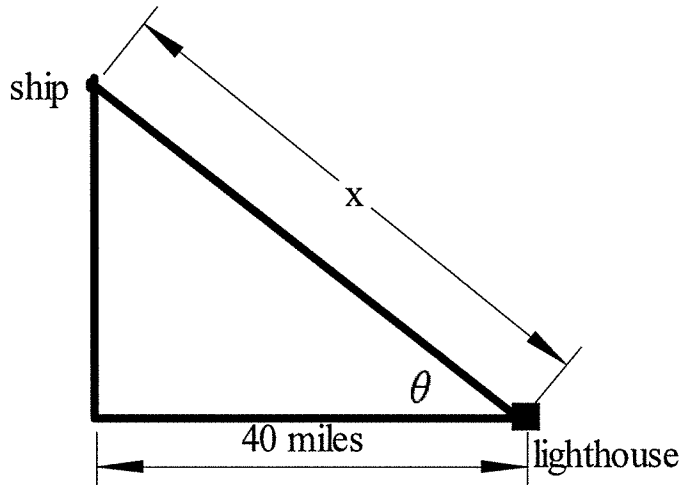
1) Water leaking onto a floor forms a circular pool. The radius of the pool increases at a rate of 4 cm/min. How fast is the area of the pool increasing when the radius is 5 cm?

2) Oil spilling from a ruptured tanker spreads in a circle on the surface of the ocean. The area of the spill increases at a rate of 9π m²/min. How fast is the radius of the spill increasing when the radius is 10 m?

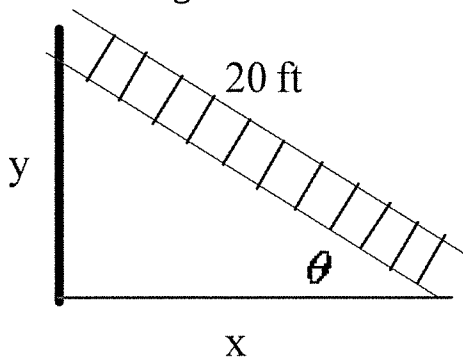
3) A conical paper cup is 10 cm tall with a radius of 10 cm. The cup is being filled with water so that the water level rises at a rate of 2 cm/sec. At what rate is water being poured into the cup when the water level is 8 cm?

- 4) A spherical balloon is inflated so that its radius (r) increases at a rate of $\frac{2}{r}$ cm/sec. How fast is the volume of the balloon increasing when the radius is 4 cm?
- 5) A 7 ft tall person is walking away from a 20 ft tall lamppost at a rate of 5 ft/sec. Assume the scenario can be modeled with right triangles. At what rate is the length of the person's shadow changing when the person is 16 ft from the lamppost?
- 6) An observer stands 700 ft away from a launch pad to observe a rocket launch. The rocket blasts off and maintains a velocity of 900 ft/sec. Assume the scenario can be modeled as a right triangle. How fast is the observer to rocket distance changing when the rocket is 2400 ft from the ground?

7. A ship is 40 miles west of a lighthouse. The ship is heading north at a rate such that the angle θ , shown in the diagram below, is changing at a constant rate of 0.7 radians per hour. At what rate is the distance x between the ship and the lighthouse changing when $\theta = 0.4$ radians?



8. At noon, ship A is 100 km west of ship B. Ship A is sailing south at 35 km/hr and ship B is sailing north at 25 km/hr. How fast is the distance between the ships changing at 4:00 P.M.?
9. An 20 ft long ladder is leaning against a wall. The bottom of the ladder is sliding away from the wall at a rate of 2.5 ft/sec. See the diagram.



- How fast is the top of the ladder sliding down the wall when $x = 12$ ft. Note that this rate is $|dy/dt|$.
- How fast is the angle θ changing when $x = 12$ ft?
- How fast is the area of the triangle changing when $x = 12$ ft?