Related Rates Problems

EXERCISES

1) A circular ripple is spreading out over a pond. The radius r is increasing at a rate of $\frac{1}{4}\pi$ m/s at the moment when r = 5 m. How fast is the disturbed area increasing at that moment?

2) Two variable quantities Q and R are related by the equations:

$$Q^2 + R^2 = 9$$

What is the rate of change $\frac{dQ}{dt}$ at the moment when Q = 2, if $\frac{dR}{dt} = 3$ at that moment?

3) A ladder 26 m long leans against a vertical wall. The foot of the ladder slips. If the lower end is moving away from the wall at the rate of 3 m/s, how fast would someone standing at the top of the ladder be moving when the foot is 10 m away from the wall?

4) A rope 32 m long is attached to a weight and passed over a pulley 16 m above the ground. The other end of the rope is pulled away horizontally along the ground at the rate of 3 m/s. At what rate does the weight rise at the instant that it's 4 m above the ground?

5) A woman 1.8 m tall walks away from a streetlight that is 4.5 m high at a rate of 1.2 m/s.

a) How fast is the tip of her shadow moving when she is 9 m from the pole?
b) How fast is her shadow lengthening?

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