

5 – common related rates problems

1. A 6-m. ladder is against a wall. If its bottom is pulled/pushed at a constant $\frac{1}{2}$ m/sec, how fast is the ladder top sliding when it reaches 5m, 3m, 1m up the wall?
2. A winch (alt. 20 ft) reels in a rope at 2 ft/sec. How fast is the boat moving when the rope = 45, 30, 22, 20.05 ft?
3. Water is flowing into a cone (ht = 16cm, r = 4cm) at $2 \text{ cm}^3/\text{min}$. How fast is the water level rising when it is 5, 10, 15 cm deep?

4. A man (6 ft) walks away from a lamp post (15 ft) at 5 ft/sec. How fast is his shadow lengthening?
How fast is the shadow's tip moving?

5. A plane (alt. 4000 ft) is flying west at 700 ft/s. A searchlight, under its path, tracks it. How fast is the light pivoting when the plane is 1000 ft east, overhead, 5000 ft west?

Answers: Ladder: $-.332$ m/s, $-.866$ m/s, -2.958 m/s
Winch: -2.23 ft/s, -2.68 ft/s, -4.80 ft/s, -28.34 ft/s
H2O Cone: $.407$ cm/min, $.102$ cm/min, $.045$ cm/min
Shadow: shadow grows at 3.333 ft/s, Tip of shadow moves at 8.333 ft/s
Plane: $-.165$ rads/s, $-.175$ rads/s, $-.068$ rads/s