

Name: \_\_\_\_\_

Group #: \_\_\_\_\_

1. A 13-ft ladder is leaning against a house when its base is being pushed towards the wall. By the time the base is 12 feet from the house, the base is moving at a rate of 5 ft/sec.

- (a) At what rate is the ladder sliding up the wall at this moment?

- (b) At what rate is the angle  $\theta$  between the ladder and the ground changing at this moment?

2. A basketball is being filled with air at a rate of  $6 \text{ in}^3/\text{sec}$ . (You can assume the basketball is a perfect sphere). How fast is the diameter of the basketball increasing when the radius is 1 in?

3. Suppose that an air-filled cone-shaped balloon has a leak causing air to escape at a rate of  $24 \text{ cm}^3/\text{sec}$ . (You can assume the balloon is a perfect right circular cone.) The height of the balloon is always three times the radius. At what rate is the radius of base of the balloon changing when the radius is 2 cm?

4. A spotlight is on the ground 20 feet away from a wall and a 6-ft tall person is walking towards the wall at a rate of 4 ft/sec. How fast is the height of the shadow on the wall changing when the person is 8 feet from the wall?