

For each problem ON A SEPARATE PIECE OF PAPER FOR EACH PROBLEM

Draw and label the related figure, define each of your variables and the related given information, state the related equation, show your work in a clear coherent manner

- (1) One car leaves a given point and travels north at 30 mph. Another car leaves 1 HOUR LATER, and travels west at 40 mph. At what rate is the distance between the cars changing at the instant the second car has been traveling for 1 hour?
- (2) A 50ft ladder is placed against a large building. The base of the ladder is resting on an oil spill, and it slips at the rate of 3 ft. per minute. Find the rate of change of the height of the top of the ladder above the ground at the instant when the base of the ladder is 30 ft. from the base of the building.
- (3) A stone dropped in a pond sends out a circular ripple whose radius increases at a constant rate of 4 ft/sec. After 12 seconds, how rapidly is the area enclosed by the ripple increasing?
- (4) A spherical balloon is being inflated so that its diameter is increasing at a rate of 2 *cm/min*. How quickly is the volume of the balloon increasing when the diameter is 10 *cm*?
- (5) The radius of a cylinder is **increasing** at a rate of 1 meter per hour, and the height of the cylinder is **decreasing** at a rate of 4 meters per hour. At a certain instant, the base radius is 5 meters and the height is 8 meters. What is the rate of change of the volume of the cylinder at the instant?
- (6) A person who is 6 feet tall is walking away from a lamp post at the rate of 40 feet per minute. When the person is 10 feet from the lamp post, his shadow is 20 feet long. Find the rate at which the length of the shadow is increasing when he is 30 feet from the lamp post.

- 1.) Read the problem slowly and carefully.
- 2.) Draw an appropriate sketch.
- 3.) Introduce and define appropriate variables. Use variables if quantities are changing. Use constants if quantities are not changing.
- 4.) Read the problem again.
- 5.) Clearly label the sketch using your variables.
- 6.) State what information is given in the problem.
- 7.) State what information is to be determined or found.
- 8.) Use a given equation or create an appropriate equation relating the given variables.
- 9.) Differentiate this equation with respect to the time variable t .
- 10.) Plug in the given rates and numbers to the differentiated equation.
- 11.) Solve for the unknown rate.
- 12.) Put proper units on your final answer.