

Name_____

Date_____

Calculus Independent Study Path

Unit 5 Test

1. A long strip of sheet metal 8 inches wide is to be made into a rain gutter by turning up two sides at right angles to the bottom. If the gutter is to have maximum capacity, how many inches should be turned up on the sides?
2. A V-shaped water gutter is to be constructed from two rectangular sheets of metal 10 inches wide. Find the angle between the sheets that will maximize the carrying capacity of the gutter.
3. A ladder 20 feet long leans against a vertical building. If the bottom of the ladder slides away from the building horizontally at a rate of 2 ft/sec, at what rate is the angle between the ladder and the ground changing when the top of the ladder is 12 feet above the ground?
4. A spherical water storage container is coated uniformly with a 2-inch layer of ice. If the volume of ice is melting at a rate which is directly proportional to its surface area, show that the outside diameter is decreasing at a constant rate.
5. The ends of a horizontal trough 10 feet long are isosceles trapezoids with lower base 3 feet, upper base 5 feet, and altitude 2 feet. If the water level is rising at a rate of 0.25 in/min when the depth is 1 foot, how fast is the water entering the trough?