

RELATED RATES PROBLEMS

Be sure to read each problem carefully before proceeding. Draw a diagram if possible. Assign symbols to the quantities involved and identify the relationships between them. Express this information as an equation, differentiate that equation with respect to t , and solve for the unknown rate.

1. Air is being pumped into a spherical balloon so that its volume increases at a rate of $100 \text{ cm}^3/\text{s}$. How fast is the radius of the balloon increasing when the diameter is 50 cm?
2. A man starts walking north at 4 ft/s from a point P . Five minutes later a woman starts walking south at 5 ft/s from a point 500 ft due east of P . At what rate are the people moving apart 15 min after the woman starts walking?

EXTREME-VALUE PROBLEMS

Read each problem carefully before proceeding. Draw a diagram if possible. Express the quantity to be optimized as a function of one variable, and determine the allowed range of the variable in question. Find the absolute minimum/maximum of the function over the given interval.

1. A rectangular storage container with an open top is to have a volume of 10 m^3 . The length of its base is twice the width. Material for the base costs \$ 10 per square meter. Material for the sides costs \$ 6 per square meter. Find the cost of materials for the cheapest such container.
2. Find the point on the hyperbola $y^2 - x^2 = 4$ that is closest to the point $(2, 0)$.