Quiz 7.1 – Related Rates

1. (1 point) —alfredLibrary/AUCI/chapter7/lesson1/quiz/Leibnizpet1jsmath.pg—

For this problem, time is given by the variable t, position by s, area by A, and volume by V. Numerical answers require **units**.

Translate the following sentences into Leibniz notation:

(a) The position of an object is increasing at a rate of 15 meters per second.

____________-___ = ___

(b) The area of an object is increasing by 35 square meters every minute.

____________-___ = ___

(c) The volume of an object is decreasing by 34 cubic meters for every square meter increase in area.

____________-___ = ___

2. (1 point) —alfredLibrary/AUCI/chapter7/lesson1/quiz/relatedrates1pet.pg—

A 16-ft ladder is leaning against a wall, and the top of the ladder is sliding down the wall at a constant rate of 1.75 ft/s. How fast is the bottom of the ladder sliding away from the wall when the top of the ladder is 4 ft above the ground?

Solution:

Let x be the distance from the bottom of the ladder to the wall, and let y be the distance from the top of the ladder to the ground. Draw a labeled sketch!

The related variables equation is

Related Variables Equation: __________ = 256

Implicitly differentiate both sides of the related variables equation with respect to t, using x' for $\frac{dx}{dt}$ and y' for $\frac{dy}{dt}$. Without simplifying further, the related rates equation is

Related Rates Equation: __________ = ___

BEFORE plugging in the given information, solve the Related Rates Equation for x' to get a formula for the rate at which the bottom of the ladder is sliding away from the wall:

$x' = \frac{dx}{dt} =$ __________

Finally, when the top of the ladder is 4 ft above the ground, the rate at which the bottom of the ladder is sliding away from the wall is

$\frac{dx}{dt} =$ __________ ft/s

3. (1 point) —alfredLibrary/AUCI/chapter7/lesson1/quiz/relatedrates1

The volume of an inflating spherical balloon is increasing by $\frac{dV}{dt} = 7028\ \frac{\text{in}^3}{\text{min}}$. How fast is the radius increasing when the radius is $r = 16$ in? Recall, the volume V of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.

Answer: ____________ (Your answer requires units. **units**.)