Today's Plan:

Learning Target (standard): I will solve real-world related rate application problems.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Related Rates Worksheet

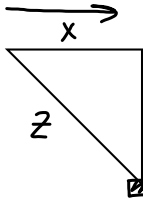
$$1) -\frac{128}{81\pi} in / \min$$

$$2) \frac{7}{36\pi} cm / \sec$$

$$3) 5\sqrt{3}\, ft / \sec$$

$$4) -\frac{\sqrt{3}}{2} ft / \sec$$

A plane is 750 meters in the air flying parallel to the ground at a speed of 100 m/sec and is initially 2.5 km away from a radar station that it is approaching. At what rate is the distance between the plane and radar station changing initially?



$\frac{dx}{dt} = -100 m/sec$

$\frac{dz}{dt} = ?$

initially z is 2.5km = 2500m

$x^2 + 750^2 = z^2$

$2x\frac{dx}{dt} + 0 = 2z\frac{dz}{dt}$

$x\frac{dx}{dt} = z\frac{dz}{dt}$

$x^2 + 750^2 = 2500^2$

$x^2 + 562500 = 6250000$

$x^2 = 5687500$

$x = 250\sqrt{91}, -250\sqrt{91}$

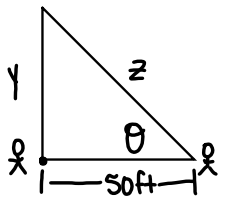
$(250\sqrt{91})(-100) = (2500)\frac{dz}{dt}$

$-25000\sqrt{91} = 2500\frac{dz}{dt}$

$\frac{dz}{dt} = \frac{-25000\sqrt{91}}{2500}$

$\frac{dz}{dt} = -10\sqrt{91}\ m/sec$

Two people are 50 feet apart. One of them starts walking north at a rate so that the angle between the stationary person and the one walking is changing at a constant rate of 0.01 rad/min. At what rate is distance between the two people changing when $\theta = 0.5$ radians?



$\frac{d\theta}{dt} = 0.01\ rad/min$

$\frac{dz}{dt} = ?$ when $\theta = 0.5 rad$

$\cos\theta = \frac{50}{z}$

$\cos\theta = 50z^{-1}$

$-\sin\theta\frac{d\theta}{dt} = -50z^{-2}\frac{dz}{dt}$

$\cos(0.5) = \frac{50}{z}$

$.87758 = \frac{50}{z}$

$.87758z = 50$

$z = 56.975$

$(-\sin 0.5)(0.01) = -50(56.975)^{-2}\frac{dz}{dt}$

$-.00479 = -.0154\frac{dz}{dt}$

$\frac{dz}{dt} = .311\ ft/min$

Assignment:

Related Rates

#5-9