Teacher/User Name: E. Young
Practice Problems

Name:_____
Period: _____ Date: _____

Form #37192618234
Step-By-Step
Answers
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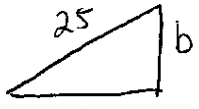
Solve:

1) A 25 ft ladder leans against a wall. When the bottom of the ladder is 5 feet from the wall, the ladder slides away from the wall at a rate of 1.4 ft/s. Find the velocity of the ladder as it's sliding down the wall at this moment.



$a = 5$, $\frac{da}{dt} = -1.4$, $\frac{db}{dt} = ?$

$a^2 + b^2 = 25^2$

$2a\frac{da}{dt} + 2b\frac{db}{dt} = 0$

$b^2 = 25^2 - 5^2$

$b = 24.5$

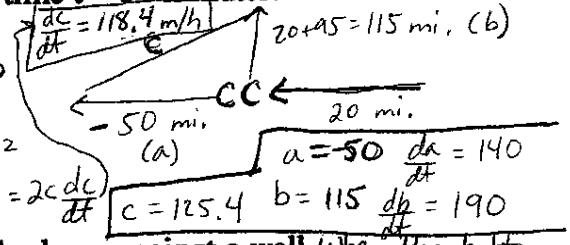
$\frac{db}{dt} = -.286$ ft./sec.

2) One train travels west at 140 mph towards Computer City, while a second train travels north at 190 mph away from Computer City. At time t = 0, the first train is 20 miles east and the second train is 20 miles north. Find the rate at which the distance between the trains is changing at time t = 30 minutes.

$d = rt$

$d = 140 \cdot \frac{1}{2} = 70$

$d = 190 \cdot \frac{1}{2} = 95$



$a^2 + b^2 = c^2$

$2a\frac{da}{dt} + 2b\frac{db}{dt} = 2c\frac{dc}{dt}$

$a = -50$ $\frac{da}{dt} = 140$

$c = 125.4$ $b = 115$ $\frac{db}{dt} = 190$

3) Water pours into a conical tank of height 6 ft and radius 3 ft at a rate of 2.8 ft^3/min. How fast is the water level rising when it is 1 ft high?

$V = \frac{1}{3} \cdot \pi \left(\frac{h}{2}\right)^2 \cdot h$

$V = \frac{1}{3} \cdot \pi \cdot \frac{h^2}{4} \cdot h$

$V = \frac{1}{12}\pi h^3$

$\frac{dV}{dt} = \frac{1}{4}\pi h^2 \cdot \frac{dh}{dt}$

$r = \frac{h}{2}$

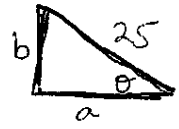
$\frac{dV}{dt} = 2.8$

$h = 1$

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

$\frac{dh}{dt} = 3.565$ ft./min.

4) A 25 ft ladder leans against a wall. When the bottom of the ladder is 5 feet from the wall, the ladder slides away from the wall at a rate of 2.6 ft/s. Find the rate of change of the angle θ between the ladder and the ground at that moment.



$a = 5$

$\frac{da}{dt} = 2.6$

$\frac{d\theta}{dt} = ?$

$\cos\theta = \frac{a}{25}$

$-\sin\theta\frac{d\theta}{dt} = \frac{1}{25}\frac{da}{dt}$

$\frac{d\theta}{dt} = -.106$ rad./sec

$\cos\theta = \frac{5}{25}$

$\theta = 1.37$

5) Water pours into a fishtank at a rate of 2.8 ft^3/min. How fast is the water level rising if the base of the tank is a rectangle with dimensions 5 ft by 7 ft?

$V = 35 \cdot h$

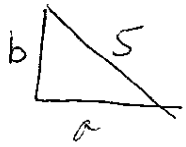
$\frac{dV}{dt} = 35 \cdot \frac{dh}{dt}$

$\frac{dV}{dt} = 2.8$

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

$\frac{dh}{dt} = 0.08$ ft./min.

6.) A 5 meter ladder leaning against a wall has its lower part moving away from the wall at the rate of 1 meter/second. At what speed is the top of the ladder moving down when the lower part of the ladder is 2 meters away from the wall?



$\frac{da}{dt} = 1$ $\frac{db}{dt} = ?$

$a = 2$ $b = 4.58$

$a^2 + b^2 = 5^2$

$2a \cdot \frac{da}{dt} + 2b \cdot \frac{db}{dt} = 0$

$\frac{db}{dt} = -.437$ m/sec.