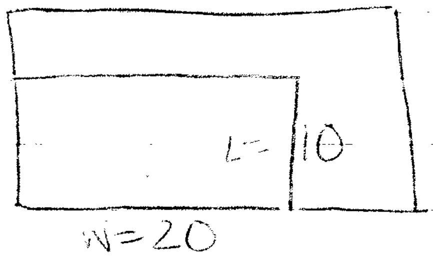
Team Kickass

3.9

#4



$A = L \cdot W$

Find: $\frac{dA}{dt} =$ $\quad \frac{dW}{dt} = 3 \quad \frac{dL}{dt} = 8$

product Rule

$$\frac{dA}{dt} \overset{?}{=} L\frac{dw}{dt} + \frac{dL}{dt}$$

$10(3) + 20(8)$

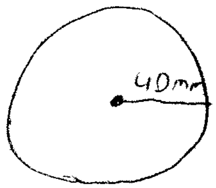
$30 + 160 = 190$ cm/s

$$\frac{dA}{dT} = 190 \text{ cm/s}$$

3.9
#6

6

Pythagorus



$\frac{dr}{dt} = 4mm/s$ $\quad d = 80mm \quad r = 40mm$

$$\frac{dv}{dt} = 4\pi r^2 \frac{dr}{dt}$$
$$= 4\pi (40)^2 \cdot 4$$
$$= 25,600\pi$$
$$= 80424.77 \, mm^3/s$$

3.9
#12

MAT151... Team α

3/7/10

3.9) #12

12.) given: the rate of decrease in surface area: ($\frac{dA}{dt} = -1\ cm^2/min$

unknown: ($\frac{dr}{dt}$ when $r = 5cm$

[**equation for surface area:** ($4\pi r^2$)]

* chain rule: $\frac{dA}{dt} = \frac{dA}{dt}\frac{dr}{dt} = 8\pi r \frac{dr}{dt}$: $\frac{dr}{dt} = \frac{-1}{8\pi r}\frac{dA}{dt}$

$= \frac{-1}{8\pi(5)}(1)$

$= \frac{-1}{40\pi}$

★ ans: the radius of the snowball is decreasing at the rate of $-1/40\pi \approx 0.00796$ cm/min.

Jon Chen

Guan Zheng

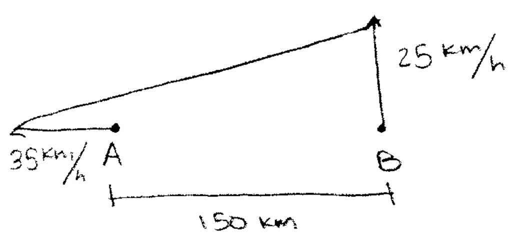
Mike Gank

CIWARC / Save the Polar Bears

3.9 #14

- @ 12 pm Ship A is 150 km west of Ship B
- Ship A is moving east @ 35 km/h
- Ship B is moving north @ 25 km/h

How fast is the distance between the ships changing at 4 pm?



$$x^2 + y^2 = z^2$$

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

$$\frac{dz}{dt} = \frac{1}{z}\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right)$$

$$\frac{1}{306.8}\left(290(35) + 100(25)\right)$$

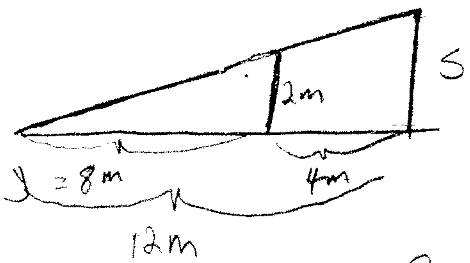
$$= 41.2 \text{ km/h}$$

3.9
#16

Team Diesel

Stanley Tuchez

3/8/10



$$\frac{dy}{dt} = 1.6$$

$$\frac{2}{8} = \frac{S}{12} \Rightarrow \frac{24}{8} = S$$

so $S = 3$

$$= S \cdot \frac{dy}{dt} + y \frac{ds}{dt}$$

$$= 3(1.6) + 8 \frac{ds}{dt}$$

$$= 4.8 + 8 \frac{ds}{dt}$$

Help me finish this! :)

3.9 #17

3.9 #17   We Love [illegible]

17. $\frac{dx}{dt} = 4$ ft/s

$\frac{dy}{dt} = 5$ ft/s

$z^2 = (x+y)^2 + 500^2 \rightarrow 2z\frac{dz}{dt} = 2(x+y)\left(\frac{dx}{dt} + \frac{dy}{dt}\right)$

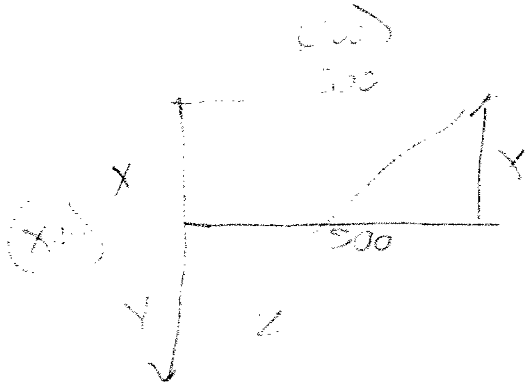
After 15 min:

$x = 4 \cdot 20\text{ min}\,(\ldots) = 4800$ ft

$y = 5 \cdot 15 \cdot 60 = 4500 \rightarrow z = \sqrt{(4800+4500)^2 + 500^2} = \sqrt{86{,}740{,}000}$

$\frac{dz}{dt} = \frac{x+y}{z}\left(\frac{dx}{dt} + \frac{dy}{dt}\right) = \frac{4800+4500}{\sqrt{86{,}740{,}000}}(4+5) = \frac{837}{\sqrt{8674}} \approx 8.99$ ft/s

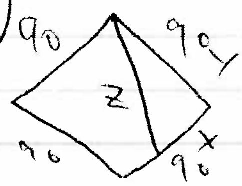
Jessica
diagram
[illegible]



Ryan ZHAO

BA IS BS.

3.9 #18



$x^2 + y^2 = z^2$

$\frac{\partial x}{\partial t} = 24 \quad x = 45$

$\frac{\partial y}{\partial t} = 0 \quad y = 90$

$\frac{\partial z}{\partial t} = ? \quad z = ?$

a) $x^2 + y^2 = z^2$

$z = \sqrt{x^2 + y^2}$

$= \sqrt{45^2 + 90^2}$

$= 101$

b) $2x \frac{\partial x}{\partial t} + 2y \frac{\partial y}{\partial t} = 2z \frac{\partial z}{\partial t}$

$2 \times 45 \times 24 + 2 \times 90 \times 0 = 2 \times 101 \times \frac{\partial z}{\partial t}$

$2160 + 0 = 202 \frac{\partial z}{\partial t}$

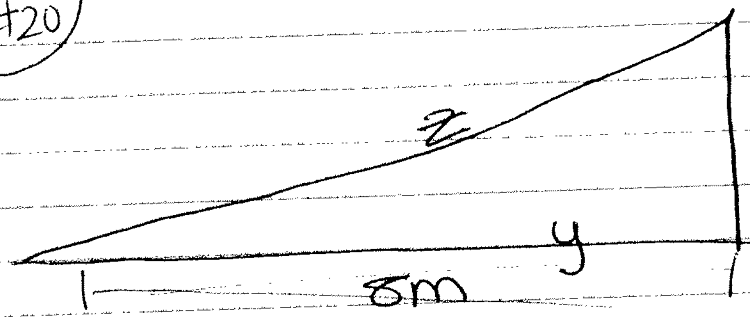
$2160 = 202 \frac{\partial z}{\partial t}$

$\frac{\partial z}{\partial t} = 10.75$

New Group

3.9 #20 — #20

$dx/dt = 0$



1m

$\frac{dz}{dt} = 1 m/s$

$dy/dt = ?$

$x^2 + y^2 = z^2$

$2x\, dx/dt + 2y\, dy/dt = 2z\, dz/dt$

$1^2 + 8^2 = \sqrt{65} = 8.06225$

$2(8)\, dy/dz = 2(8.06225)(1)$

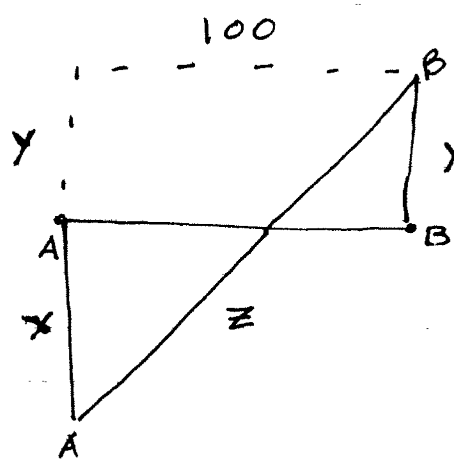
$\frac{16\, dy/dz}{16} = \frac{16.12}{16} = 1.0077$

The boat is approaching the dock at 1.0077 m/s

3.9
#21

TEAM: C.A.M.

3.9 # 21



$25\ km/h$ $\frac{dy}{dt}$

$\frac{dx}{dt}$ $35\ km/h$

$$z^2 = (x+y)^2 + 100^2$$

$$dz \frac{dz}{dt} = 2(x+y)\left(\frac{dx}{dt} + \frac{dy}{dt}\right)$$

$$x = 4(35) = 140$$
$$y = 4(25) = 100$$
$$z = \sqrt{(140+100)^2 + 100^2} = \sqrt{67{,}600} = 260$$

$$\frac{dz}{dt} = \frac{x+y}{dz}\left(\frac{dx}{dt} + \frac{dy}{dt}\right)$$

$$= \frac{140+100}{260}(35+25) = \frac{720}{13} \approx 55.4\ km/h$$

CASANDRA LUCERO
Augustin Ciocotisan
(MAYA) Mandukhai Khosbayar

FR3CH

$$y = \sqrt{x}$$

Given: $\frac{dx}{dt} = 3$ cm/s, Find: $\frac{dy}{dt}$ at point (4, 2)

Solution:

- Take derivative both side with respect to t:

$$\frac{dy}{dt} = \frac{1}{2\sqrt{x}} \frac{dx}{dt}$$

- We have $\frac{dx}{dt} = 3$ cm/s and $x = 4$

Thus: $\frac{dy}{dt} = \frac{1}{2\sqrt{4}} \cdot 3$ cm/s $= \frac{3}{4}$ cm/s

At point (4, 2). The particle's y-coordinate increases at a rate $\frac{3}{4}$ cm/s.

3.4 #27

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

TIEJUN WEN

Pablo

SAM

GRUNDLE

PUMPKINS

$r/h = 5/10 \quad r = h/2$

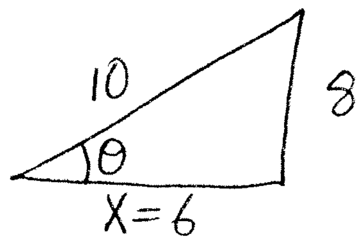
$V = \frac{1}{3}\pi\left(\frac{5}{2}\right)^2$

$\frac{10}{12}\pi = \frac{5}{6}\pi$

$dh/dt = \frac{4}{\pi(10)^2} \cdot 30 = .38197 \text{ m/sec}^2$

(3.9)

#30



Science Buddies

Given

$$\frac{dx}{dt} = 1 \frac{ft}{sec}$$

$$x = 6$$

$$\cos\theta = \frac{x}{10}$$

$$\frac{d}{dt}(\cos\theta) = \frac{d}{dt}\left(\frac{x}{10}\right)$$

$$-\sin\theta \frac{d\theta}{dt} = \frac{1}{10}\frac{dx}{dt}$$

Replace $\frac{dx}{dt} = 1$

$$-\left(\frac{8}{10}\right)\frac{d\theta}{dt} = \frac{1}{10}(1)$$

$$(-.8)\frac{d\theta}{dt} = (.1)(1)$$

$$\frac{d\theta}{dt} = -\frac{.1}{.8} = .125 = \boxed{-\frac{1}{8}} \frac{ft}{sec}$$

= Answer

3.9
#34

THE GROUP:

Section 3.10 - Linear App.

Abe Espar

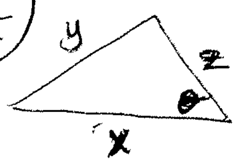
Pg. 247 #34

$$B = 0.007W^{2/3}$$
$$= 0.007\left(0.12L^{2.53}\right)^{2/3}$$
$$= 0.007\left(0.12^{\wedge 2/3} \cdot L^{2.53 \times 2/3}\right)$$
$$\frac{dB}{dt} = \left(0.007 \times 0.12^{\wedge 2/3}\right)\left(2.53 \times 2/3\right)L^{\wedge(2.53 \times 2/3)-1} \times \frac{dL}{dt}$$
$$= (.001703)(1.6866)L^{\wedge 103/150} \times \frac{dL}{dt}$$
$$= .00287L^{\wedge 103/150} \times \frac{dL}{dt}$$

LWV
Letrice
Wilgens
Viviene

5/08/2010

3-9
~~#25~~



??

#42 60min = 1hr

15min = $\frac{15}{60}$

= 1/4 hr

.25hr

y = 2x.25

= .5 miles

x = 3x.25

= .75 miles

$z^2 = x^2 + y^2 - 2xy\cos\theta$

$z^2 = (.5)^2 + (.75)^2 - 2(.5)(.75)\cos 45$

$2z = .25 + .5625 - .75\cos 45$

$2z = .8125 - .75(-\sin 45)$

$2z = -.75\sin 45$

$z = \frac{.75\sin 45}{2}$

$z = \frac{.75 \times \sqrt{2}/2}{2}$

z = .2651 miles/hr