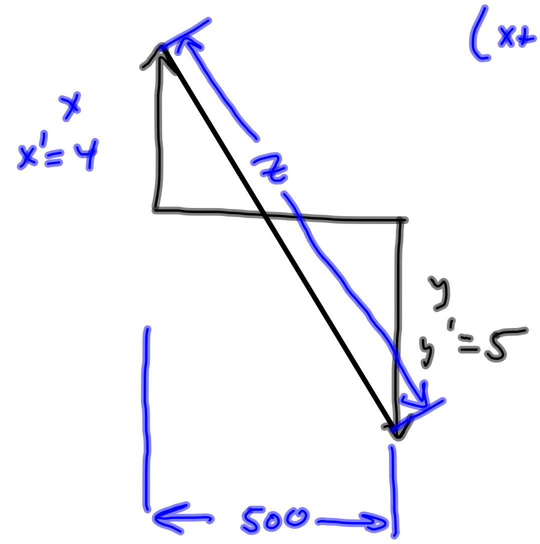
2.8 # 17



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

want $\left.\frac{dz}{dt}\right|_{t=20}$

$y = 5(t-300)$

$x = 4t$

speed is ft/s, so t is time, in seconds.

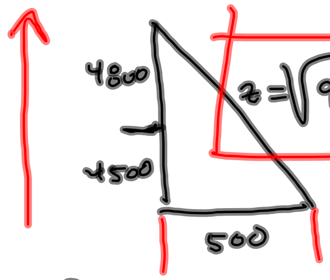
In 15 minutes, she walks

$(15)(5)(60) = 4500$ ft

$(15\,\text{min})\left(\frac{5\,\text{ft}}{\text{s}}\right)\left(\frac{60\,\text{s}}{1\,\text{min}}\right)$

he walks $(20\,\text{min})\left(\frac{60\,\text{s}}{1\,\text{min}}\right)\left(\frac{4\,\text{ft}}{\text{s}}\right) = 4800$ ft

$(x+y)' = 9\text{ ft/s}$



$$\boxed{z = \sqrt{9300^2 + 500^2}}$$

$z^2 = (x+y)^2 + 500^2$

$2zz' = 2(x+y)(x'+y')$

$= 2(9300)(9)$

If you brain-fart and use $z = 4800+4500$, the final answer is EXACTLY 9.

```
       8.987020846
9300²+500²
          86740000
Ans^.5
       9313.431162
9*9300/Ans
       8.987020846
```

$2zz'$

$z' = \dfrac{9(9300)}{z}$

THIS is correct, not what's on website sol'ns.

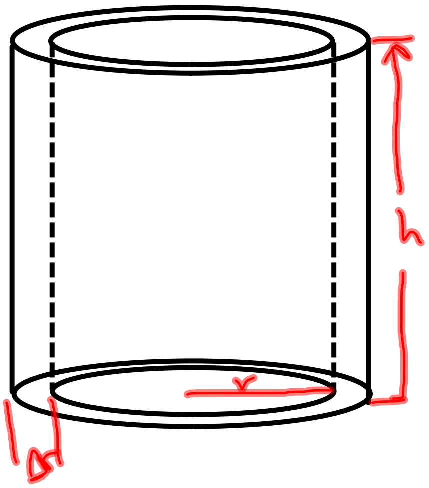
$$\boxed{\sqrt{x^2+y^2} = x+y}$$

$\sqrt{3^2+4^2} = 3+4$?

$\sqrt{25} = 7$?

$5 = 7$

§2.9 #35



(a) $V = \pi r^2 h$

$\frac{dV}{dr} = 2\pi r h$

$dV = 2\pi r h \, dr$

$$\boxed{\Delta V \approx 2\pi r h \Delta r}$$

Convention:

$dr = \Delta r$

$\Delta V \approx dV$

Sep 27-12:29 PM

(b) What's the error involved in using dV as an estimate on ΔV?

$$\Delta V = \pi (r+\Delta r)^2 h - \pi r^2 h$$

$$= \pi(r^2 + 2r\Delta r + (\Delta r)^2) h - \pi r^2 h$$

$$= \pi r^2 h + 2\pi r \Delta r h + \pi (\Delta r)^2 h - \pi r^2 h$$

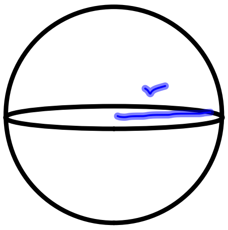
$$= 2\pi r \Delta r h + \pi (\Delta r)^2 h \longrightarrow$$

$$\Delta V - dV = 2\pi r \Delta r h + \pi (\Delta r)^2 h - 2\pi r h \Delta r$$

$$= \boxed{\pi (\Delta r)^2 h \text{ is the error}}$$

Can make the error as small as you want, just by making Δr sufficiently small.

Sep 27-12:57 PM



circumference = C is
84 cm ± .5 cm.

(a) Use differentials to estimate the max error in surface area.
What's the relative error?

$$S.A. = S = 4\pi r^2$$

$$dS = 8\pi r\, dr$$

$$= (8\pi)(84)(.5)(\pm 1)$$

$$\approx \pm$$

Total gahbidge.

```
8π*84*.5
     1055.575132
```

$$C = 2\pi r \implies r = \frac{C}{2\pi} \implies$$

$$S.A. = 4\pi\left(\frac{c}{2\pi}\right)^2$$

$$= \frac{c^2}{\pi} = \frac{1}{\pi}c^2 = S$$

$$\implies dS = \frac{2}{\pi}c\,dc$$

$$\boxed{= \frac{2}{\pi}(84)(\pm .5)} \approx \Delta S$$

and Relative Error

$$\approx \frac{dS}{S} = \frac{\frac{2}{\pi}(84)(\pm .5)}{4\pi\left(\frac{c}{2\pi}\right)^2} = \boxed{\frac{\frac{2}{\pi}(84)(\pm .5)}{4\pi\left(\frac{84^2}{4\pi^2}\right)}}$$

$$= \frac{(84)(\pm .5)(2)}{\cancel{4}\cdot\frac{84^2}{\cancel{4}}}\cdot\frac{\frac{2}{\pi}}{\frac{1}{\pi}} = \frac{\pm 2(.5)}{84} \approx \boxed{.0119047619}$$

$$\approx 1.2\%$$

```
8π*84*.5
        1055.575132
2*.5/84
        .0119047619
```