2.4	#s 3 – 25,31, 33, 35, 39, 43, 52B
2.5	#s 1 – 31, 55, 70, 73
2.6	#s 1 – 27, 45, 47
2.7	~~[illegible]~~
2.8	#s 3 – 17, 23
2.9	#s 3 - 35

2.7 #8,

5, 6, 8, 11, 15 $\underline{\text{is}}$ the 2.7 assignment.

2.8 #s

~~nt~~ $s(t) = -16t^2 + 80t \quad = -16t(t-5)$

(a) Max height: $s'(t) = -32t + 80 \ \underset{=}{\text{SET}} \ 0$

$\Rightarrow \quad -32t = -80$

$t = +\frac{80}{32} = \frac{10}{4} = \frac{5}{2}$ s.

$s(2.5)$:

$(-16)\left(\frac{5}{2}\right)$

$= -8(5) = -40$

$(+40)\left(\frac{5}{2}\right) = +20(5) = +100$

$$\begin{array}{r|rrr} 2.5 & -16 & 80 & 0 \\ & & -40 & 100 \\ \hline & -16 & 40 & \boxed{100 = s(2.5)} \end{array}$$

$-16(2.5)^2 + 80(2.5) = 100.$

To find $s(2.5)$, Divide $-16t^2 + 80t$ by $t - 2.5$. The remainder is $s(2.5)$

find velocity when it's 96 ft up on its way up? way down?

$$-16t^2+80t=96$$

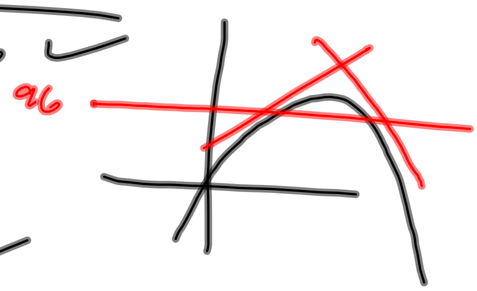
$$-16t^2+80t-96=0$$

$$-16(t^2-5t+6)=0$$

$$(t-3)(t-2)=0$$

$$t=2,3$$

$$\begin{array}{r|rrr} 2 & -16 & 80 & 0 \\ & & -32 & 96 \\ \hline & -16 & 48 & 96 \end{array} \checkmark$$



$$\begin{array}{r|rrr} 3 & -16 & 80 & 0 \\ & & -48 & 96 \\ \hline & -16 & 32 & 96 \end{array} \checkmark$$

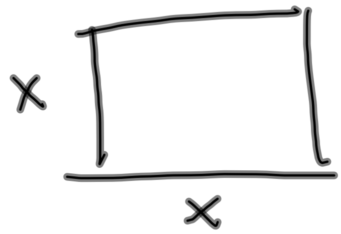
$$s'(2)=-32(2)+80=-64+80=16\ ft/s$$

$$s'(3)=-32(3)+80=-16\ ft/s$$

(11) Want $x \approx 15$ mm

Want to know ΔA for given Δx

where $A =$ Area of wafer



Find $A'(15)$ & explain its meaning.

$A = x^2$

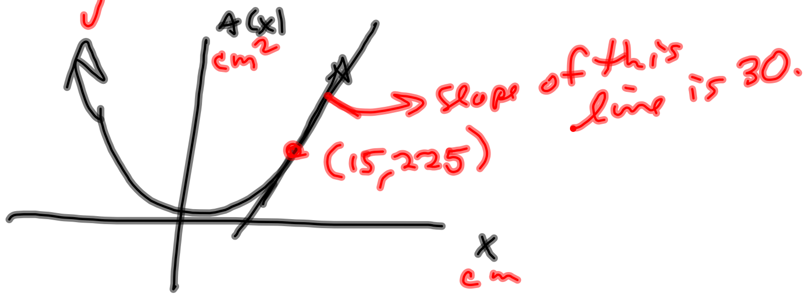
$A'(x) = \boxed{2x = \frac{dA}{dx}} \Longrightarrow dA = 2x\,dx$

$\Delta A \approx 2x\,\Delta x$

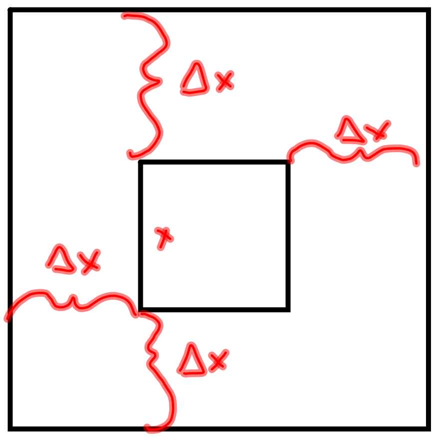
So $A'(15) = 2(15)$
$= 30 \ \text{cm}^2/\text{cm}$

$$\frac{30 \text{ cm}^2 \text{ change in Area}}{1 \text{ cm change in length}}$$

It's saying
Area's increasing @ a rate of 30 cm² per cm change in length of a side.



(b)
From this $A'(x) = 2x$, we see that rate of change of Area wrt side length is half its perimeter $= \frac{1}{2}(4x) = 2x$.



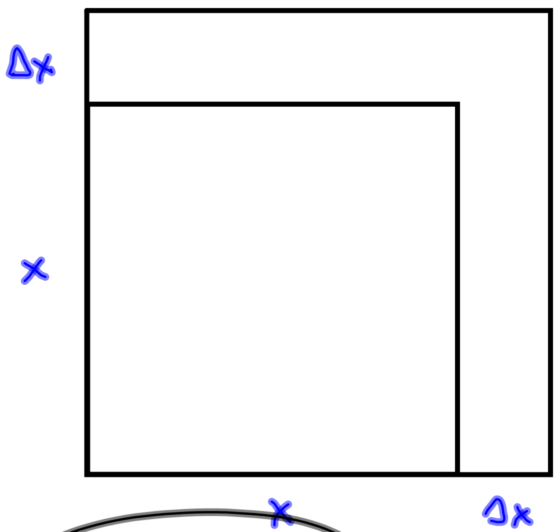
Area $= A(x) = x^2$

$A(x+\Delta x) = (x+\Delta x)^2$

$= x^2 + 2x\Delta x + (\Delta x)^2$

What's wrong with this picture?

Increased by $2\Delta x$ on each side.



$A'(x) = 2x$

$A(x+\Delta x) = x^2 + 2x\Delta x + \Delta x^2$

$\Delta A = x^2 + 2x\Delta x + \Delta x^2 - x^2$

$= 2x\Delta x + \Delta x^2$

For Δx small, it's

$\Delta x(2x + \Delta x)$

$\approx \Delta x(2x)$

So approximate area change is $\left(\frac{1}{2}\text{ perimeter}\right)$(change in x)

$dA = 2x\,dx$

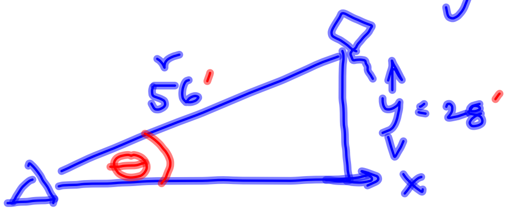
$\Delta A \approx 2x\Delta x$

$$\frac{dA}{dx} = 2x \Longrightarrow dA = 2x\,dx \approx \Delta A$$

When Δx was small, I neglected Δx in $(2x+\Delta x)$, i.e. $2x+\Delta x \approx 2x$

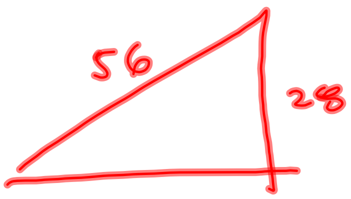
$$\Delta x(2x+\Delta x) \approx \Delta x\, 2x = 2x\Delta x$$

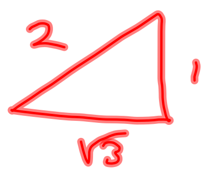
A kite is flying 28 feet above the ground at 15 ft per second. How fast is it moving away from you when it's 56 ft away?



$\frac{dx}{dt} = 15$

Want $\left.\frac{dr}{dt}\right|_{r=56}$





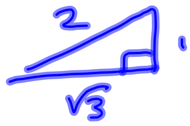
$$r^2 = x^2 + 28^2$$

$$2r r' = 2x x'$$

$$r' = \frac{2x}{2r} x' = \frac{x}{r} x' = \frac{28\sqrt{3}\,x'}{56} = \frac{\sqrt{3}}{2} x' = \frac{\sqrt{3}}{2} \cdot 15$$

$$= \boxed{\frac{15\sqrt{3}}{2}\ \frac{ft}{sec}}$$

$$= \frac{x}{r} x'$$



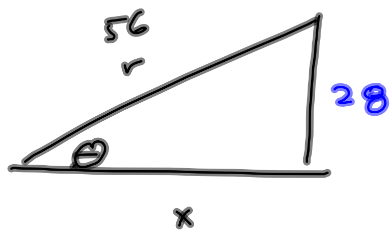
$$\frac{28}{r} = \sin \theta$$

$$r \sin \theta = 28$$

$$r = 28 \csc \theta$$

$$\frac{x}{56} = \frac{\sqrt{3}}{2}$$

$$x = 28\sqrt{3}$$



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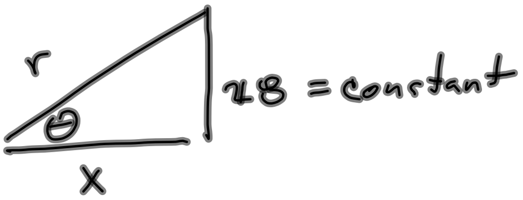

$$\frac{x}{r} = \cos\theta$$

$$x = r\cos\theta$$

$$r = x\sec\theta$$

$$\frac{dr}{dt} = \frac{dx}{dt}\sec\theta + x\cdot\sec\theta\tan\theta\frac{d\theta}{dt}$$

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