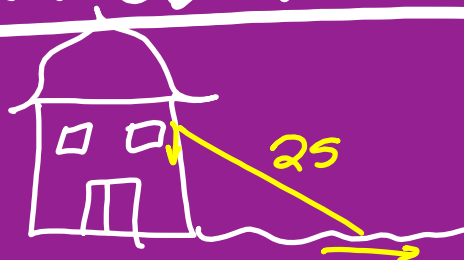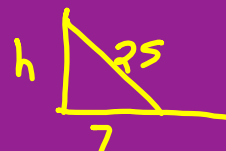# RELATED RATES 2

5/

$\downarrow 0.3 \text{ ft/s} = \frac{dh}{dt}$

moment - 7 ft from barn

25

$A = \frac{1}{2} b h$

$\frac{dA}{dt} = \frac{1}{2} \left[b \cdot \frac{dh}{dt} + h \cdot \frac{db}{dt} \right]$

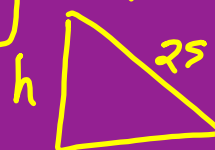$\frac{dA}{dt} = \frac{1}{2} \left[7 \cdot (-0.3) + 24 \cdot \left(\frac{36}{35} \right) \right]$

$\approx 11.29 \text{ ft/sec}$

h 25
7

$h^2 + 49 = 625$

$\sqrt{h^2} = \sqrt{576}$

$h = 24$

h 25
b

$h^2 + b^2 = 25^2$

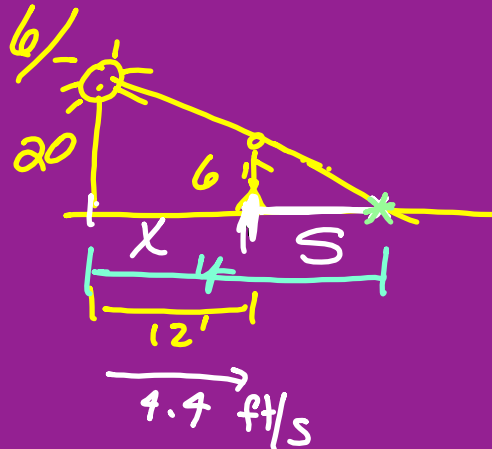$2h \frac{dh}{dt} + 2b \frac{db}{dt} = 0$

$2(24)(-0.3) + 2(7) \frac{db}{dk} = 0$

$-14.4 + 14 \frac{db}{dt} = 0$

$\frac{14 \frac{db}{dt}}{14} = \frac{14.4}{14.0}$

$= \frac{1444}{140} = \frac{72}{70}$

$= \frac{36}{35}$

$\frac{6}{}$

20

6

X S

14

12'

$\xrightarrow{\hspace{2cm}}$
4.4 ft/s

$y = X + S$

$\frac{dy}{dt} = \frac{dx}{dt} + \frac{ds}{dt}$

$\frac{dy}{dt} = 4.4 + 1.89$

$= 6.29 \text{ ft/s}$

$\frac{20}{6} = \frac{X+S}{S}$

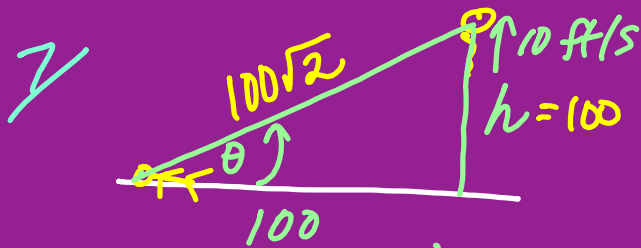$20S = 6X + 6S$
$6S \qquad -6S$

$14S = 6X$

$14 \frac{ds}{dt} = 6 \frac{dx}{dt}$

$14 \frac{ds}{dt} = 6 \cdot (4.4)$
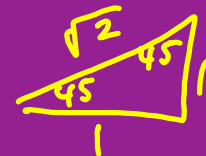
$\frac{14 \frac{ds}{dt}}{14} = \frac{26.4}{14}$

$\frac{ds}{dt} = \frac{66}{35} \approx 1.89 \frac{\text{ft}}{\text{s}}$

2/

$100\sqrt{2}$

↑10 ft/s

h=100

θ ↗

100

$h = 100$ ft

$\sec \theta = \dfrac{hyp}{adj}$

$\sqrt{2}$ 45   1

45

1

$\tan \theta = \dfrac{h}{100}$

$\dfrac{1}{100} h$

$\sec^2 \theta \dfrac{d\theta}{dt} = \dfrac{1}{100} \dfrac{dh}{dt}$

$\left(\dfrac{100\sqrt{2}}{100}\right)^2 \dfrac{d\theta}{dt} = \dfrac{1}{100}(10)$

$\dfrac{1}{\cancel{2}} \cdot \cancel{2} \dfrac{d\theta}{dt} = \dfrac{1}{10} \cdot \dfrac{1}{2}$

$\dfrac{d\theta}{dt} = \boxed{\dfrac{1}{20} \dfrac{rad}{sec}}$