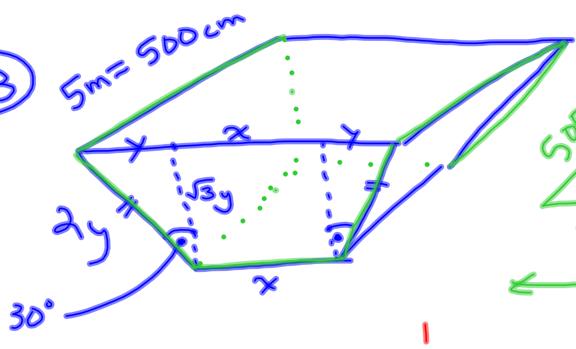
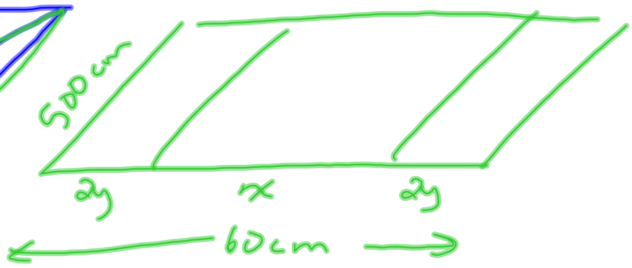
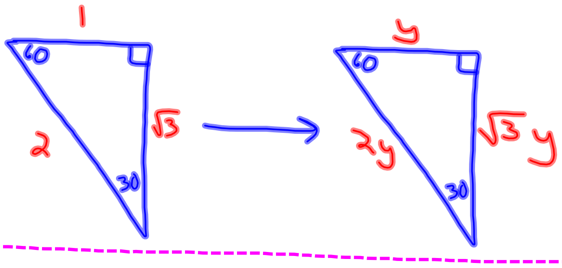
3.3

Q13





$$x + 4y = 60$$
$$x = 60 - 4y$$



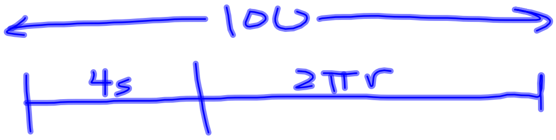
$$A = \frac{(a+b)h}{2}$$
$$= \frac{[x + (x+2y)](\sqrt{3}y)}{2}$$
$$= \frac{\cancel{2}(x+y)(\sqrt{3}y)}{\cancel{2}}$$
$$= (60 - 4y + y)(\sqrt{3}y)$$
$$= 60\sqrt{3}y - 3\sqrt{3}y^2$$

$$\therefore \frac{dA}{dy} = 60\sqrt{3} - 6\sqrt{3}y = 0$$
$$\therefore 60\sqrt{3} = 6\sqrt{3}y$$
$$y = 10\text{ cm}$$

Thus $x = 60 - 4(10)$
$= 20\text{ cm}$

(b) Max V = Max Area × 500
$$= \frac{(20 + (20+20))(\sqrt{3}(10))}{2} \times 500$$
$$= 150000\sqrt{3}\text{ cm}^3$$

Q19



So, $4s + 2\pi r = 100$

$2s + \pi r = 50$

$s = \dfrac{50 - \pi r}{2}$

Thus $s = 25 - \frac{\pi}{2} r$

Well, $A = \left(25 - \frac{\pi}{2} r\right)^2 + \pi r^2$

$\dfrac{dA}{dr} = \cancel{2}\left(25 - \frac{\pi}{2} r\right)^1 \left(-\frac{\pi}{\cancel{2}}\right) + 2\pi r = 0$

$\therefore \quad -25\pi + \frac{\pi^2}{2} r + 2\pi r = 0$

$-25 + \frac{\pi}{2} r + 2r = 0$

$-50 + \pi r + 4r = 0$

$(\pi + 4) r = 50$

$r = \dfrac{50}{\pi + 4}$

$r \doteq 7.00 \text{ cm}$

$s = 14.00 \text{ cm}$

Thus MIN AREA

$= 14^2 + \pi(7)^2$

$= 349.9 \text{ cm}^2$

and MAX AREA occurs

when $2\pi r = 100$

$r = \dfrac{50}{\pi}$

$\therefore$ MAX AREA $= \pi\left(\dfrac{50}{\pi}\right)^2$

$= \dfrac{2500}{\pi}$

$\doteq 795.8 \text{ cm}^2$

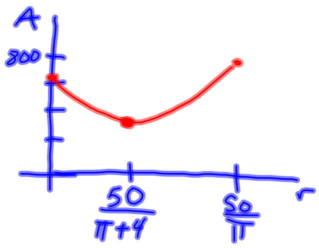
Note:

When $4s = 100$

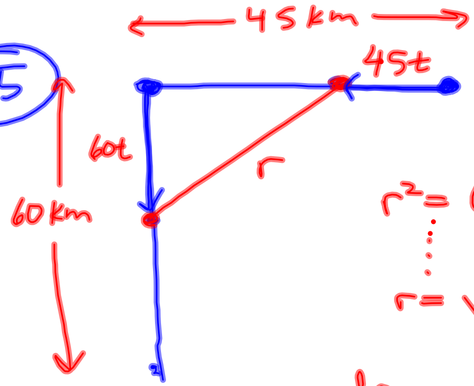
$s = 25$

$A = 25^2$

$= 625 \text{ cm}^2$



Q15



Time = 1h
@ time t

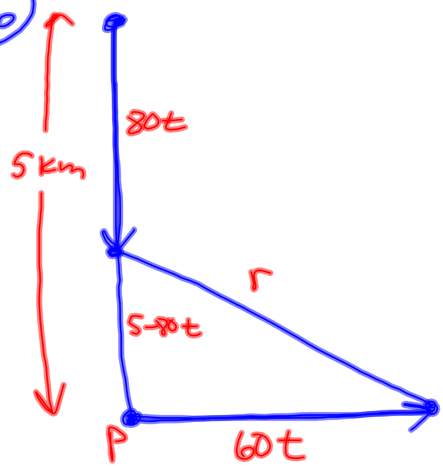
$$r^2 = (60t)^2 + (45-45t)^2$$

$$\vdots$$

$$r = \sqrt{5625t^2 - 4050t + 2025}$$

$$\frac{dr}{dt} = \frac{11250t - 4050}{\sqrt{}}$$

Q16



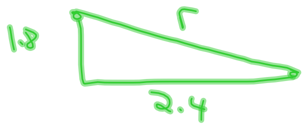
$$r^2 = (5-80t)^2 + (60t)^2$$

$$r = \sqrt{10000t^2 - 800t + 25}$$

$$\frac{dr}{dt} = \frac{20000t - 800}{\sqrt{}} = 0$$

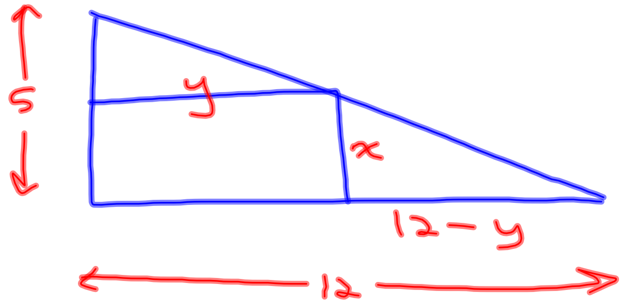
$\therefore$ $t = 0.04h$

Thus,



$r = \underline{\underline{3 \text{ km}}}$

Q12



$$\frac{x}{12-y} = \frac{5}{12}$$

$$\vdots$$

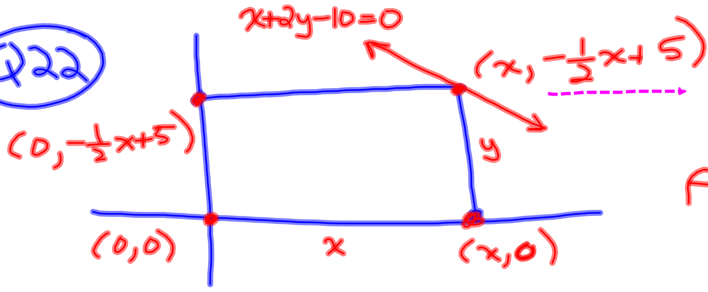
$$x = 5 - \frac{5}{12}y$$

$A = xy$

$= (\quad)y$

$\therefore \frac{dA}{dy} =$

Q22



$x + 2y - 10 = 0$

$\therefore y = -\frac{1}{2}x + 5$

$A = xy$

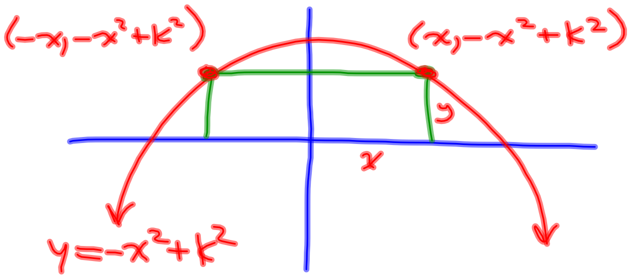
$= x\left(-\frac{1}{2}x + 5\right)$

$= -\frac{1}{2}x^2 + 5x$

$\therefore \frac{dA}{dx} = \vdots$

$\vdots$

Q23



$A = 2xy$

$= 2x(-x^2 + k^2)$

$= (-x^3 + k^2x)(2)$

$\frac{dA}{dx} = (-3x^2 + k^2)(2) = 0$

$x^2 = \frac{k^2}{3}$

$x = \frac{\pm k}{\sqrt{3}}$

Thus $l = \frac{2k}{\sqrt{3}}$, $w = -\left(\frac{k}{\sqrt{3}}\right)^2 + k^2$

$= -\frac{k^2}{3} + \frac{3k^2}{3}$

$= \frac{2k^2}{3}$