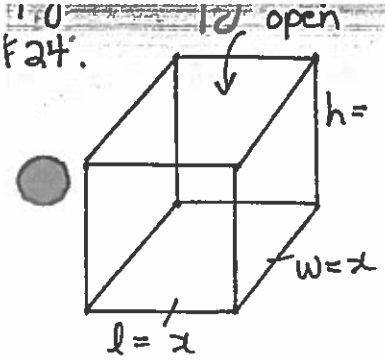
1.0

#24.



Find h in terms of x

$V = 10000\ cm^3$

$x \cdot x \cdot h = 10000$

$h = \frac{10000}{x^2}$

Minimize the surface area, S.A in cm^2

$S.A = x^2 + 4xh$

$S.A = x^2 + 4x \cdot \frac{10000}{x^2}$

$S.A = x^2 + 40000x^{-1}$

$\frac{dS.A}{dx} = ?$

For min. S.A

$\frac{dS.A}{dx} = 0$

x	S.A
5	
≈44.7	

#25.

Find l in terms of w

$A = 2400\ m^2$

$lw = 2400$

$l = \frac{2400}{w}$

minimize the amount of fencing, F, in m.

$F = 6l + 10w$

$F = 6\left(\frac{2400}{w}\right) + 10w$

$F = 14\,400w^{-1} + 10w$

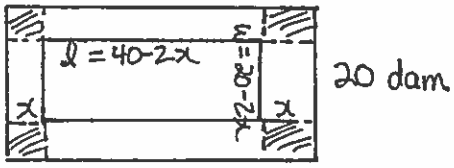
$\frac{dF}{dw} = ?$

For min. fencing

$\frac{dF}{dw} = 0$

w	F
10	
240	

#26



maximize the volume, V in decametres cubed. "dam^3".

$V = lwh$

$V = (40-2x)(20-2x) \cdot x$

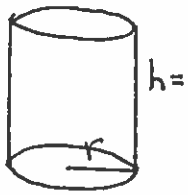
$V = 4x^3 - 120x^2 + 800x$

$\frac{dV}{dx} = ?$

For max. volume

$\frac{dV}{dx} = 0$

#27.



Find h in terms of r

$V = 500\ cm^3$

$\pi r^2 h = 500$

$h = \frac{500}{\pi r^2}$

Note: $6 \leq h \leq 15$

$r^2 = \frac{500}{\pi h}$ $\therefore$ $5.15 \leq r \leq 3.26$

minimize the surface area, SA. in cm^2

$S.A = 2\pi r^2 + 2\pi rh$

$S.A = 2\pi r^2 + 2\pi r \cdot \frac{500}{\pi r^2}$

$S.A = 2\pi r^2 + 1000r^{-1}$

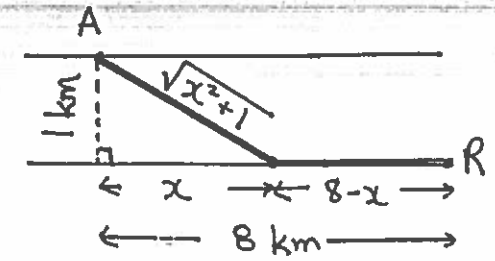
$\frac{dS.A}{dr} = ?$

For min. S.A

$\frac{dS.A}{dr} = 0$

r	S.A
≈5.15	
≈3.26	

28.



Minimize the total cost, C in $

Let \$ k/m be the cost of pipe on land.

Let \$ 1.6k/m be the cost of pipe under water.

$C = 1.6k\sqrt{x^2+1} + k(8-x)$

$C = 1.6k(x^2+1)^{\frac{1}{2}} + 8k - kx$

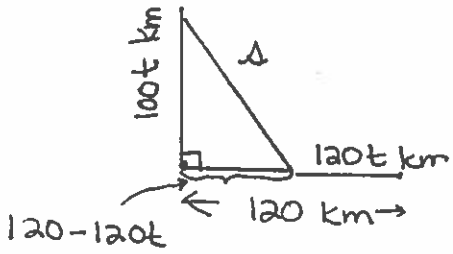
$\frac{dC}{dx} = ?$

x	C
0	
8	

For min. cost

$\frac{dC}{dx} = 0$ ↓

29.



Let t (hrs) represent the time after 10:00.

∴ One train travels 100t km north.

Another train travels 120t km west.

Minimize the distance between the trains, s, in km.

$s^2 = (100t)^2 + (120-120t)^2$

$s^2 = 10000t^2 - 28800t + 14400$

diff. w.r.t t

$2s\frac{ds}{dt} = ?$

For min. distance

$\frac{ds}{dt} = 0$ ↓

30.

Maximize profit, P in \$, every month.

Profit per CD = 100 − 70 = 30

let x represent the number of \$2 increases in price.

P = profit/CD × number of CDs sold

$P = (30+2x)(120-1x)$

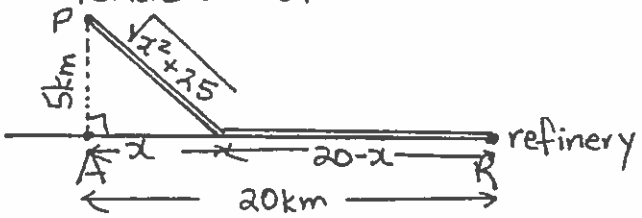
$P = -2x^2 + 210x + 3600$

$\frac{dP}{dx} = ?$

For max profit,

$\frac{dP}{dx} = 0$ ↓

31.



minimize cost C, in \$

$C = 100\,000\sqrt{x^2+25} + 75000(20-x)$

$C = 100\,000(x^2+25)^{\frac{1}{2}} + 1\,500\,000 - 75000x$

$\frac{dC}{dx} = ?$

x	C
0	
20	

For min. cost,

$\frac{dC}{dx} = 0$ ↓