1) $h(t) = -5t^2 + 40t + 3$

$t = \frac{-b}{2a} = \frac{-40}{2(-5)} = \frac{40}{10} = 4\text{sec}$

$h(4) = -5(4)^2 + 40(4) + 3$

$= -80 + 160 + 3$

$= 83\text{m}$

∴ The cannonball reaches a max. height of 83m at 4sec.

2) $h(t) = -5t^2 + 30t$

$t = \frac{-b}{2a} = \frac{-30}{2(-5)} = 3\text{ sec}$

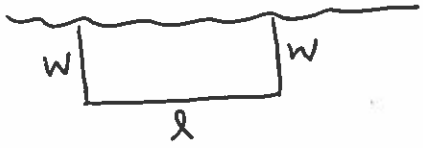
$h(3) = -5(3)^2 + 30(3)$

$= -45 + 90$

$= 45\text{m}$

∴ The ball reaches a max. height of 45m at 3sec.

3)



$P = w + l + w$

$100 = 2w + l$

$l = 100 - 2w$

$A = l \times w$

$A = (100 - 2w)(w)$

$A = 100w - 2w^2$

$A = -2w^2 + 100w$

$w = \frac{-b}{2a}$

$= \frac{-100}{2(-2)} = \frac{-100}{-4} = 25$

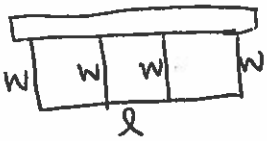
$l = 100 - 2w$

$l = 100 - 2(25)$

$l = 50\text{m}.$

∴ Dimensions 25m x 50m

4)



$P = 4w + l$

$120 = 4w + l$

$l = 120 - 4w$

$A = l \cdot w$

$A = (120 - 4w)(w)$

$A = -4w^2 + 120w$

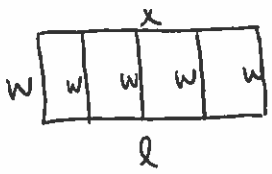
$w = \frac{-b}{2a} = \frac{-120}{2(-4)} = 15$

$A(15) = -4(15)^2 + 120(15)$

$= 900$

∴ Dimensions 15m x 60m

$\text{Area}_{\text{Max}} = 900\text{m}$

5) 

$A = (200 - 2.5w)(w)$

$A = -2.5w^2 + 200w$

$P = 5w + 2l$

$400 = 5w + 2l$

$2l = 400 - 5w$

$l = 200 - \frac{5}{2}w$

$w = \frac{-b}{2a} = \frac{-200}{2(-2.5)} = \frac{200}{5} = 40$

$l = 200 - \frac{5}{2}(40)$

$l = 200 - 100$

$l = 100$

∴ Dimensions 40m x 100m

6) $x + y = 60$

$y = 60 - x$

$P = x \cdot y$

$P = x(60 - x)$

$P = 60x - x^2$

$P = -x^2 + 60x$

$x = \frac{-b}{2a} = \frac{-60}{2(-1)} = 30$

$y = 60 - x$

$y = 60 - 30$

$y = 30$

∴ Two numbers are 30 & 30.

7) $x + 3y = 18$

$x = 18 - 3y$

$P = x \cdot y$

$P = (18 - 3y)(y)$

$P = -3y^2 + 18y$

$y = \frac{-b}{2a} = \frac{-18}{2(-3)} = \frac{18}{6} = 3$

$x = 18 - 3(3)$

$x = 18 - 9$

$x = 9$

∴ Two numbers are 3 & 9.

8) $R = (400 - 25x)(10 + x)$

$R = 4000 + 400x - 250x - 25x^2$

$R = -25x^2 + 150x + 4000$

$x = \frac{-b}{2a} = \frac{-150}{2(-25)} = 3$

∴ ticket price $= 10 + 3 = 13$.

$R_{max} = -25(3)^2 + 150(3) + 4000$

$R_{max} = -225 + 450 + 400$

$R_{max} = 4225$

9) $R = (400 + 2x)(60 - 2x)$

$R = 24000 - 800x + 1200x - 40x^2$

$R = -40x^2 + 400x + 24000$

$x = \frac{-b}{2a} = \frac{-400}{2(-40)} = 5$

$R_{max} = -40(5)^2 + 400(5) + 24000$

$R_{max} = -1000 + 2000 + 24000$

$R_{max} = \$25{,}000$