

PC30S Max/Min Problems (Number & Area)

$$y = ax^2 + bx + c$$

1.) Two numbers differ by 20. Their product is a minimum. Determine the numbers.

Vertex formula
 $x = -\frac{b}{2a}$

x is one number
 x + 20 is the other #

product
 $P = x(x + 20)$
 $P = x^2 + 20x$
 other # $x + 20$
 $-10 + 20$
 10

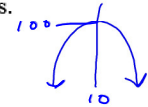
x-coord
 $x = -\frac{b}{2a}$
 $x = -\frac{20}{2(1)}$
 $x = -10$

∴ the two numbers are 10 and -10

2.) The sum of two numbers is 20. Their product is a maximum. Find the numbers.

x is one number
 20 - x is the other #

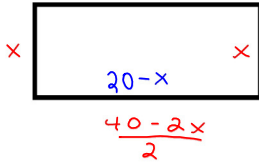
product
 $P = x(20 - x)$
 $P = 20x - x^2$
 $= -x^2 + 20x$
 other # $20 - x$
 $20 - 10$
 10



$x = -\frac{b}{2a}$
 $= -\frac{20}{2(-1)}$
 $x = 10$

∴ the numbers are 10 and 10

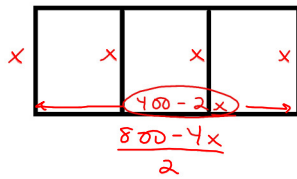
3.) Find the dimensions of a rectangular lot with a maximum area using 40 m of fencing.



$A = l \cdot w$
 $= x(20 - x)$
 $= 20x - x^2$
 $A = -x^2 + 20x$

same as #2
 ∴ dimensions are 10m by 10m

4.) A rectangular lot is fenced in and divided into 3 sections using 800 m of fencing. Find the dimensions that will create a lot of maximum area.

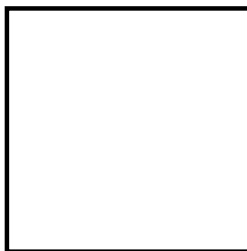


$A = l \cdot w$
 $= x(400 - 2x)$
 $= 400x - 2x^2$
 $A = -2x^2 + 400x$

$x = -\frac{b}{2a}$
 $= -\frac{400}{2(-2)}$
 $x = 100$

$400 - 2x$
 $400 - 2(100)$
 200

∴ dimensions are 100m x 200m



worksheet # 1, 2, 3, 4, 9, 11

- 1) \$2000, \$2000000
- 2) 4500000 m²
- 3) 9cm x 9cm, 81cm²
- 4) 4, -4
- 9) 5, 5
- 11) 200m x 300m

$$y = a(x-h)^2 + k$$

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vertex

$$y = a\left(x + \frac{b}{2a}\right)^2 + k$$

$$y = ax^2 + bx + c$$

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

$$y = -x^2 + 20x$$

$$y = -(10)^2 + 20(10)$$
$$= 100$$

$$x = 10$$

↳ x-coord of vertex

$$y = 100$$

↳ y-coord of vertex

max value