

Unit One Parabolas

Standard Form

$$y + 4 = -3(x+1)^2$$

find:

vertex $(-1, -4)$

domain $(-\infty, \infty)$

range $(-\infty, -4]$

axis of sym $x = -1$

Max or min

y-intercept -7

opens down

slope $\frac{-3}{1}$

sketch



$y+4 = -3(0+1)^2$
 $y+4 = -3$
 $y = -7$

General form

$$y = 3x^2 - 12x + 7$$

vertex $\frac{-b}{2a} = \frac{12}{2 \cdot 3} = 2$, $(2, -5)$

opens up

slope

domain $(-\infty, \infty)$

range $[-5, \infty)$

y int. $\rightarrow 7$

Max/Min $= -5$

axis of sym $x = 2$

sketch



Topic 3 x and y intercept

$$y = x^2 - 8x - 20$$

find the x intercepts $y = 0$
 $0 = x^2 - 8x - 20 = (x+2)(x-10)$

find the y intercept -20 x intercept -2 and 10



Vertex is middle

$$\frac{-2+10}{2} = 4$$

$(4, -36)$

Topic 6 - completing the square to change to standard

$$y = x^2 - 10x + 21$$

move number factor a if necessary complete square $y - 21 = x^2 - 10x$

$$y - 21 = x^2 - 10x + 25$$

$$y + 4 = (x - 5)^2$$

Convert to Standard

$$y = -3x^2 + 24x - 60$$

move number

$$y + 60 = -3x^2 + 24x$$

factor "a" $y + 60 = -3(x^2 - 8x + 16)$

$$y + 12 = -3(x - 4)^2$$

Last Topic Yesterday word problems

- #1) 4000 items sell for 5 dollars
If I lower the price by 1 dollar, I sell 2000 more. Find the best price to sell them for so revenue is maximized.

$$R = \text{Number} \times \text{Price}$$

$$(4000 + 2000x)(5 - 1x)$$

Foil

$$20,000 - 4000x + 10,000x - 2000x^2$$

$$R = -2000x^2 + 6000x + 20,000$$

$$\frac{-b}{2a} = \frac{-6000}{2(-2000)} = 1.5 \quad \text{Sell for } \$3.50$$

Rectangle Question

2 rectangular plots of land along a river. You have 480 metres of fencing

Maximize the area



$$3w + L = 480 \quad A = L \cdot w$$

$$L = (480 - 3w)$$

$$A = (480 - 3w)w$$

$$A = 480w - 3w^2$$
$$= -3w^2 + 480w$$

$$\frac{-b}{2a} = \frac{-480}{2(-3)} = 80$$

$$w = 80$$
$$L = 240$$