

8.5 Parabolas & Graphing Parabola

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

"readable"
Standard

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

"not readable"
general form

(h, k)

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

$k = \text{plug in } h \text{ for } x \text{ value}$

$|a|$ sign $a > 0 \rightarrow \text{up}$ $a < 0 \rightarrow \text{down}$
 size $0 < |a| < 1 \rightarrow \text{compressed (wide)}$
 $|a| = 1 \rightarrow \text{neutral}$
 $|a| > 1 \rightarrow \text{stretched (narrow)}$

Graph

$$y = 2x^2 - 4x + 7$$

$a = +2$ up stretched

shape ↶ ↷

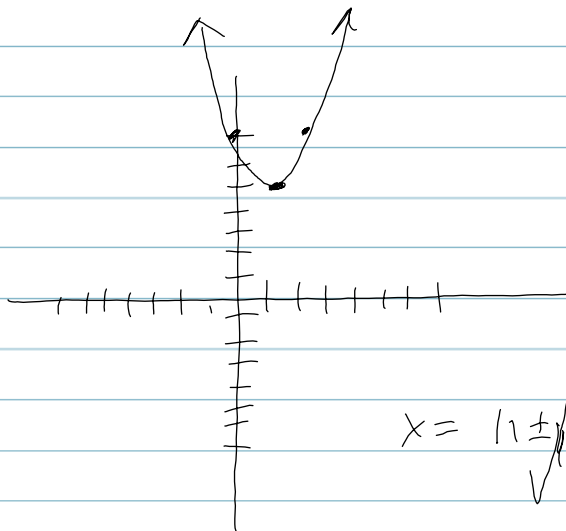
$$(h, k) \otimes h = \frac{-b}{2a} = \frac{-(-4)}{2 \cdot 2} = \frac{4}{4} = 1$$

x	y
1	5

$$\textcircled{y} k = 2(1)^2 - 4(1) + 7 = 2 - 4 + 7 = 5$$

graph

x	y
0	7
1	5
2	7



$$x = 1 \pm \sqrt{\frac{-k}{a}}$$

$$D = (-\infty, \infty)$$

$$R = [5, \infty)$$

8.5 & 8.6

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

$$y = 2x^2 + 4x - 11$$

vertex: $h = \frac{-b}{2a} = \frac{-4}{2(2)} = \frac{-4}{4} = -1$

$$(-1, -13)$$

$$k = 2(-1)^2 + 4(-1) - 11 = 2 - 4 - 11 = -13$$

b) up or down
 $a = 2$ up

c) describe width
stretched

d) x-int. $y = 0$
 $0 = 2x^2 + 4x - 11$

$$x = 11 \pm \sqrt{\frac{-k}{a}} \quad (-1, -13) \quad a = 2$$

$$\begin{aligned} (1.5495, 0) &- \\ (-3.54, 0) &- \end{aligned}$$

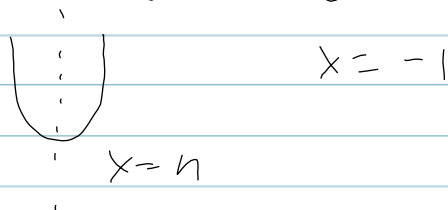
$$-1 \pm \sqrt{\frac{-(-13)}{2}} = -1 \pm \sqrt{\frac{13}{2}}$$

e) y intercept $x = 0$
 $y = 2(0)^2 + 4(0) - 11$
 $y = -11$

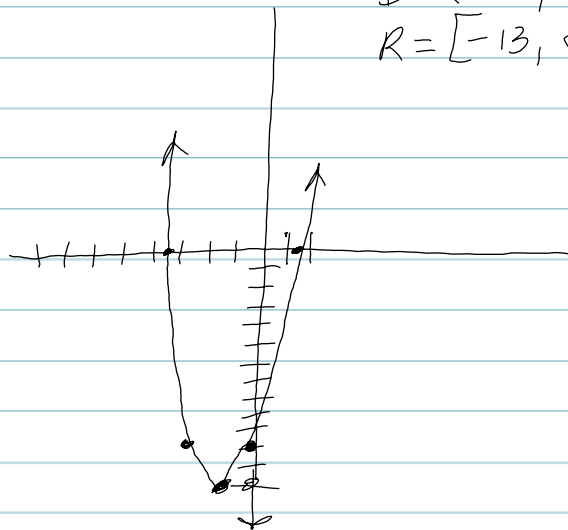
$$(0, -11)$$

f) axis of symmetry

$$\begin{aligned} D &= (-\infty, \infty) \\ R &= [-13, \infty) \end{aligned}$$



x	y
-1	-13
-2	-11
0	-11



$$a(x-h) + k$$
$$y = -2(x-3)^2 + 6$$

a) $(h, k) = (3, 6)$

b) $a = -2$ up/down

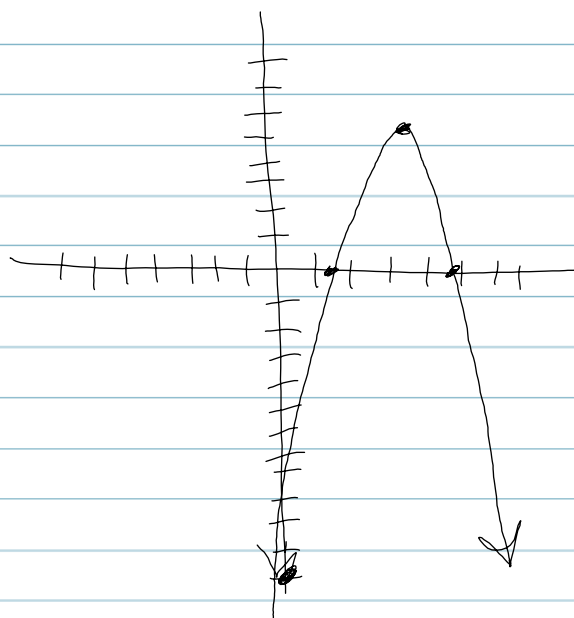
c) 2 stretched

d) x-int. $x = h \pm \sqrt{\frac{-k}{a}}$ $3 \pm \sqrt{\frac{-6}{-2}} \rightarrow 3 \pm \sqrt{3}$
 $y = 0$

$3 + \sqrt{3}$	$3 - \sqrt{3}$	$(4.7, 0)$	$(1.3, 0)$
$3 + 1.7 =$	$3 - 1.7$		
4.7	1.3		

e) y-int $y = -2(0-3)^2 + 6$ $(0, -12)$
 $x = 0$
 $-2(-3)^2 + 6$
 $-2(9) + 6$
 $-18 + 6$
 -12

f) axis of symmetry $x = 3$

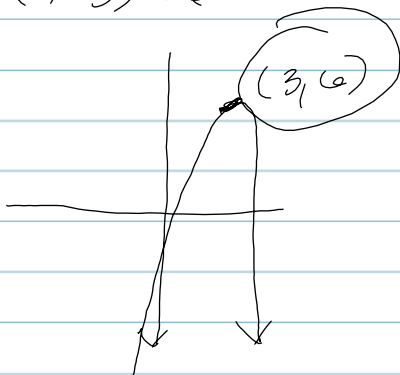


$$D = (-\infty, \infty)$$

$$R = (-\infty, 6]$$

or
 $y \leq 6$

$$-2(y-3)^2 + 6$$



#52

difference 8

8.16

x

x-8

product
 $x(x-8)$

minimize

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



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

$$\frac{-(-8)}{2(1)}$$

$$\frac{8}{2} = 4$$

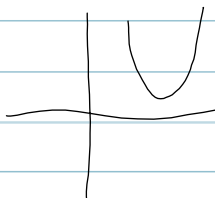
$$K = (4)^2 - 8(4)$$

$$(4, -16)$$

$$16 - 32$$

$$-16$$

when $x = 4$ the minimum product is -16



Over View

Solve by factoring
complete the sq.
quadratic formula → choice

8.6 Solve by any method
word problem (arrow)

find the vertex
graph (pick)
#9 bonus: complete the square
(messy)

4 pts. get it or nothing - complete the square

$$4a^2 + 1 = 3a$$

2 parabolas - 9 questions each

1 readable / 1 not readable