

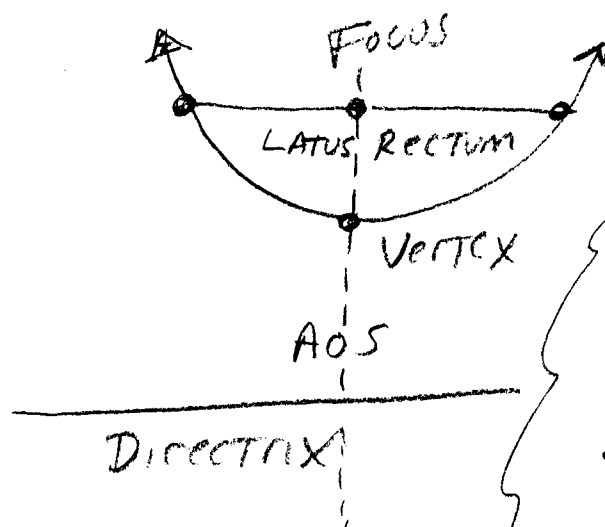
BE - Alg. 2 | Friday

3-2-12

Copy ONE MORE parabola properly  
from Ch. 8-2 for NOTES:

Definition:

"latus rectum"  $\Rightarrow$  the line segment  
through the focus of  
a parabola and  
perpendicular to the  
axis of symmetry.



LATUS RECTUM

$\leftarrow \frac{1}{a} \rightarrow$

$\therefore$  the distance from  
the parabola to focus  
is  $\left| \frac{1}{2} \cdot \frac{1}{a} \right| = \left| \frac{1}{2a} \right|$

Homework review.

Alg. 2 ~ Homework Review ~ Pg 423 #5, 7, 9.

⑤  $y = (x-3)^2 - 4$

$a=1 \quad h=3 \quad k=-4$



$\boxed{AOS \Rightarrow x=3}$

$\boxed{V(3, -4)}$

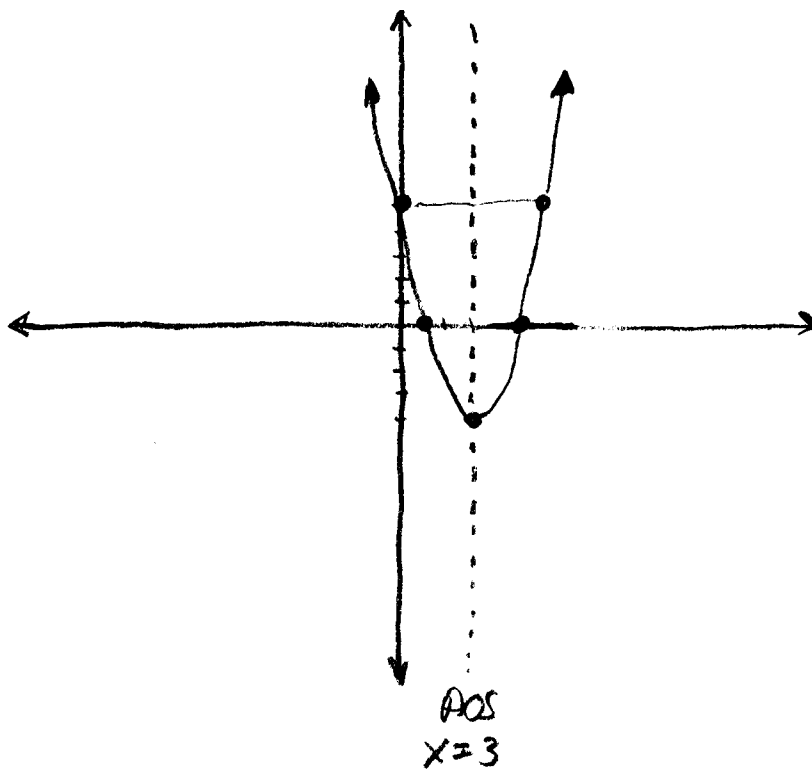
$F(3, -4 + \frac{1}{4(1)})$

$\boxed{F(3, -3\frac{3}{4})}$

Directrix  $\Rightarrow$

$y = -4 - \frac{1}{4} \Rightarrow \boxed{y = -4\frac{1}{4}}$

$\text{L.R.} \Rightarrow \left| \frac{1}{a} \right| = \left| \frac{1}{1} \right| = \boxed{1 = \text{L.R.}}$



| x | y |
|---|---|
| 0 | 5 |
| 1 | 0 |

$$⑦ \quad y = -3x^2 - 8x - 6 \rightarrow \left\{ \frac{8}{3} \cdot \frac{1}{2} = \frac{8}{6} = \frac{4}{3} \right\}$$

$$y = -3 \left( x^2 + \frac{8}{3} + \left( \frac{4}{3} \right)^2 \right) - 6 + \left( 3 \cdot \frac{16}{9} \right) \quad \text{Why A?}$$

$$y = -3 \left[ \left( x + \frac{4}{3} \right)^2 \right] - \frac{18}{3} + \frac{16}{3}$$

$$* \quad y = -3 \left( x + \frac{4}{3} \right)^2 - \frac{2}{3}$$



$$V = \left( -\frac{4}{3}, -\frac{2}{3} \right)$$

$$F = \left( -\frac{4}{3}, K + \frac{1}{4a} \right)$$

$$= \left( -\frac{4}{3}, -\frac{2}{3} + \frac{1}{4(-3)} \right)$$

$$= \left( -\frac{4}{3}, -\frac{8}{12} - \frac{1}{12} \right)$$

$$F = \left( -\frac{4}{3}, -\frac{9}{12} \right) = \left( -\frac{4}{3}, -\frac{3}{4} \right) = F$$

$$\text{Aos} \Rightarrow x = -\frac{4}{3}$$

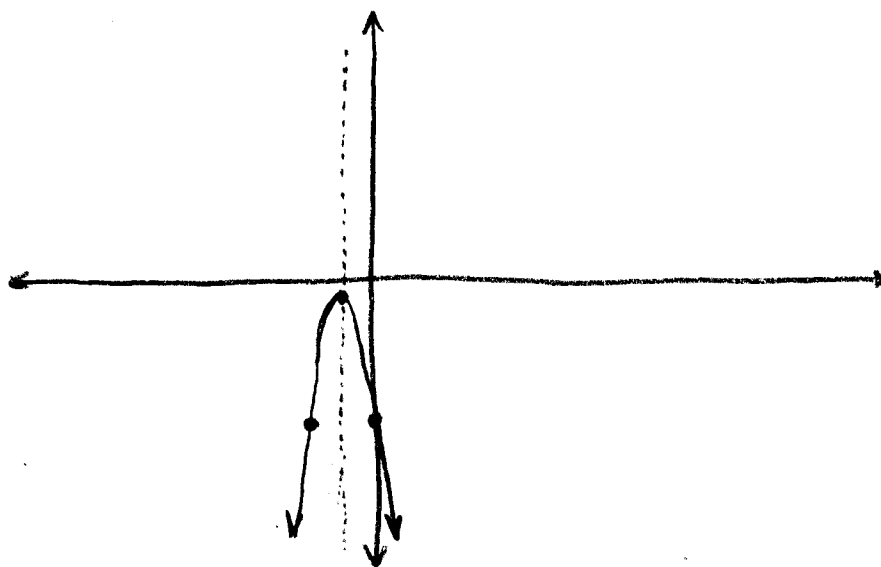
Directrix  $\Rightarrow$

$$y = K - \frac{1}{4a}$$

$$y = -\frac{2}{3} - \frac{1}{4(-3)}$$

$$y = -\frac{8}{12} + \frac{1}{12} = -\frac{7}{12} = y \quad \text{Directrix.}$$

$$LR = \left| \frac{1}{-3} \right| = \frac{1}{3}$$



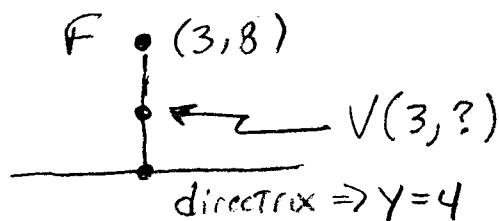
| x                | y                     |
|------------------|-----------------------|
| $V -\frac{4}{3}$ | $-\frac{2}{3}$        |
| $\frac{5}{3}$    | $-27\frac{2}{3}$      |
| 0                | $-\frac{18}{3} = -6$  |
| 1                | $-\frac{51}{3} = -17$ |

⑨ Focus (3, 8) directrix  $y = 4$

$\boxed{AOS \Rightarrow x = 3}$

$8 = k + \frac{1}{4a}$

$4 = k - \frac{1}{4a}$



The y coordinate of the vertex must be half-way between  $y = 8$  and  $y = 4$

$\therefore \boxed{\text{Vertex} = (3, 6)}$   
 $\uparrow \quad \uparrow$   
 $h \quad k$

Solve  $8 = k + \frac{1}{4a}$  for  $a$  since  $k = 6$

$8 = 6 + \frac{1}{4a}$

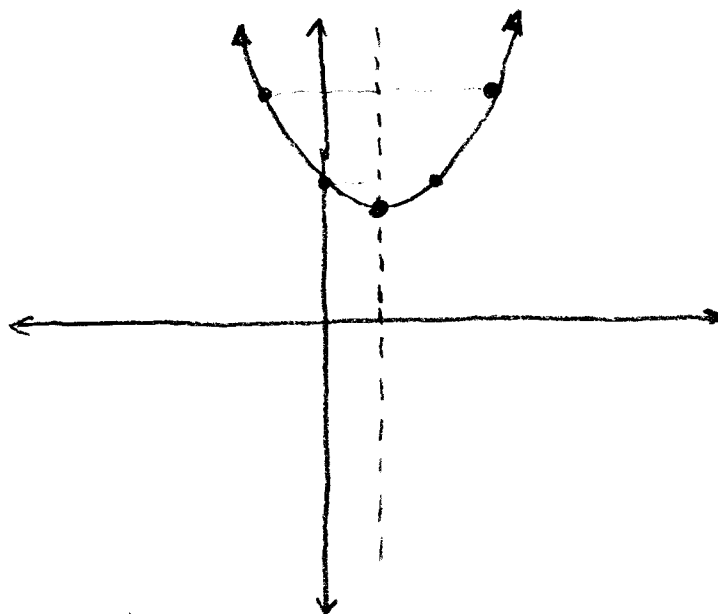
$2 = \frac{1}{4a}$

$a \cdot 2 = \frac{1}{4a} \cdot a$

$a = \frac{\frac{1}{4}}{2} = \frac{1}{8} = a$



$\therefore \boxed{y = \frac{1}{8}(x-3)^2 + 6}$



| x  | y                                           |
|----|---------------------------------------------|
| 0  | $\frac{9}{8} + 6$                           |
|    | $\frac{9}{8} + \frac{48}{8} = \frac{57}{8}$ |
|    | $7\frac{1}{8}$                              |
| -3 | $\frac{48}{8} + 6$                          |
|    | $6 + 6 = 12$                                |

Example

① Put the following "general" form of a parabola into "standard" also called "vertex" or "h-k" form. Then find the coordinates of the vertex, focus, and the equation of the directrix (a horizontal line) and Axis - of Symmetry (a vertical line).

$$-3x^2 - 8x - 6 = y$$

• Exam 3 topics =>

STUDY  
GUIDE

QUIZ

1 to 5

plus

EXAM 1

Ch 13-2 Angles & Angle Measure

13-3 Trig. Functions of Any Angle

13-4 Law of Sines

13-5 Law of Cosines

13-6 Graphs of Sin & Cos

13-7 Inverse Trig. Functions

14-3 Trig. Identities

14-4 Verifying Trig Identities

14-1 Graphing Trig. Functions

14-2 TRANSLATIONS OF Trig Functions

\* NEWSTUFF

Ch 8-1

Midpoint &

DIST. FORMULA

Ch 8-2

Parabolas

# Key points - Parabolas

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

"GENERAL" Form

$a > 0 \nearrow$   $a < 0 \searrow$

$$V\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$$

$\uparrow$   
AOS  $\Rightarrow x = -\frac{b}{2a}$

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

"Standard" or "h,k" form

$a > 0 \nearrow$   $a < 0 \searrow$

$$V(h, k)$$

$\uparrow$   
AOS  $\Rightarrow x = h$

Focus  $(h, k + \frac{1}{4a})$

Directrix  $\Rightarrow y = k - \frac{1}{4a} \Rightarrow \longleftrightarrow$

Ex  $-3x^2 - 8x - 6 = y$

CHANGE TO "h,k" form  
By Completing Square

$$V\left(-\frac{8}{6}, f\left(-\frac{8}{6}\right)\right)$$

$$V\left[-\frac{4}{3}, f\left(-\frac{4}{3}\right)\right] = \left(-\frac{4}{3}, -\frac{2}{3}\right)$$

AOS  $\Rightarrow x = -\frac{4}{3}$

$\uparrow$   $\uparrow$   
h k

BE CAREFUL

$$-3x^2 - 8x - 6 = y$$

$$-3\left(x^2 + \frac{8}{3}x + \left(\frac{8}{6}\right)^2\right) - 6 - \text{cloud} = y$$

$$-3\left(x + \frac{4}{3}\right)^2 - 6 + \left[3\left(\frac{4}{3}\right)^2\right] = y \quad \rightarrow \quad 3\left(\frac{16}{9}\right) = \frac{16}{3}$$

$$-3\left(x + \frac{4}{3}\right)^2 - \frac{18}{3} + \frac{16}{3} = y$$

$$-3\left(x + \frac{4}{3}\right)^2 - \frac{2}{3} = y$$

$$V\left(-\frac{4}{3}, -\frac{2}{3}\right) \checkmark$$

Focus  $= \left(-\frac{4}{3}, k + \frac{1}{4a}\right) = \left(-\frac{4}{3}, -\frac{3}{4}\right)$

Directrix  $\Rightarrow y = k - \frac{1}{4a} = -\frac{7}{12}$

## Practice for Exam 2

Use the information provided to write the vertex form equation of each parabola.

1)  $y = -2x^2 - 20x - 47$

2)  $y = -x^2 + 10x - 18$

3)  $y = 4x^2 - 40x + 106$

4)  $y = \frac{1}{18}x^2 + \frac{2}{9}x - \frac{16}{9}$

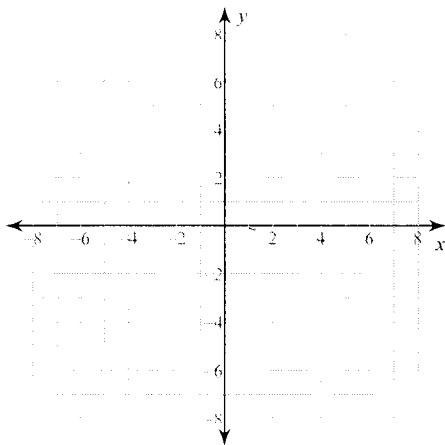
Use the information provided to write the  $ax^2 + bx + c = y$  form of the equation of each parabola.

5)  $y = -7(x + 6)^2 + 9$

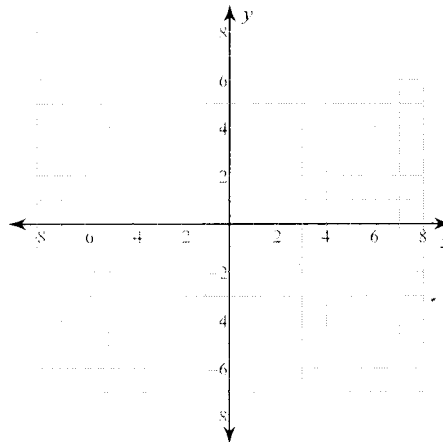
6)  $y = -2(x - 6)^2 - 2$

Identify the vertex, focus, axis of symmetry, and directrix of each. Then sketch the graph.

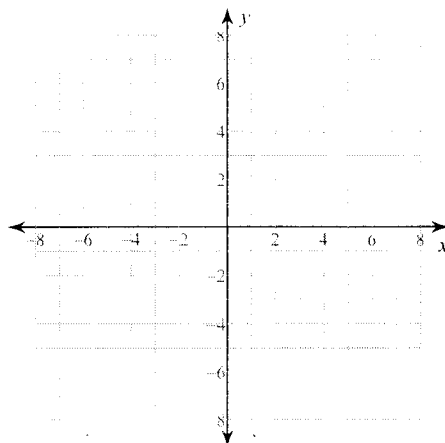
7)  $y = -x^2 - 12x - 40$



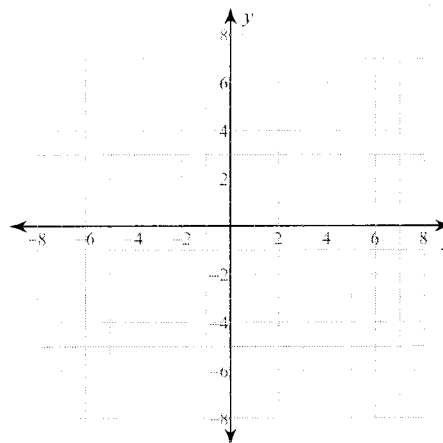
8)  $y = -\frac{1}{3}x^2 + 2$



9)  $y = -(x - 2)^2 - 5$



10)  $y = 2(x - 2)^2 - 4$



## Answers to Practice for Exam 2

1)  $y = -2(x + 5)^2 + 3$

2)  $y = -(x - 5)^2 + 7$

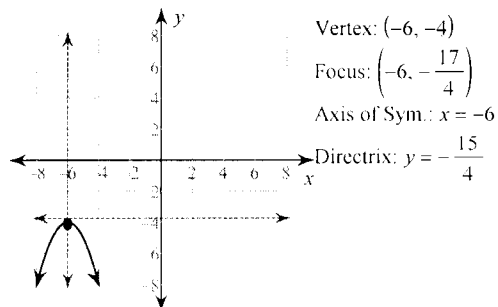
3)  $y = 4(x - 5)^2 + 6$

4)  $y = \frac{1}{18}(x + 2)^2 - 2$

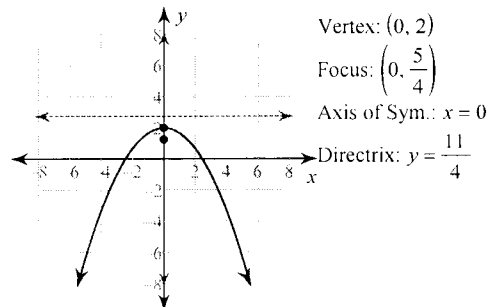
5)  $y = -7x^2 - 84x - 243$

6)  $y = -2x^2 + 24x - 74$

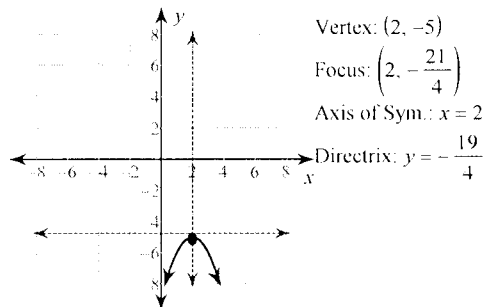
7)



8)



9)



10)

