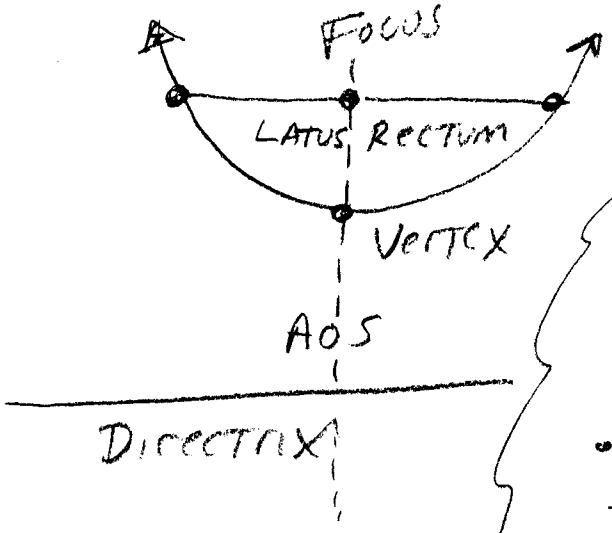
BE-Alg. 2 | Friday 3-11-11

Copy one more parabola property from Ch. 8-2 for notes.

Definition:

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



Latus Rectum

$\leftarrow \left|\frac{1}{a}\right| \rightarrow$

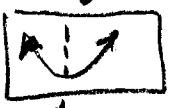
∴ the distance from the parabola to focus is $\left|\frac{1}{2} \cdot \frac{1}{a}\right| = \left|\frac{1}{2a}\right|$

Homework review.

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

⑤ $y = (x-3)^2 - 4$

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



AOS $\Rightarrow x=3$

$V(3,-4)$

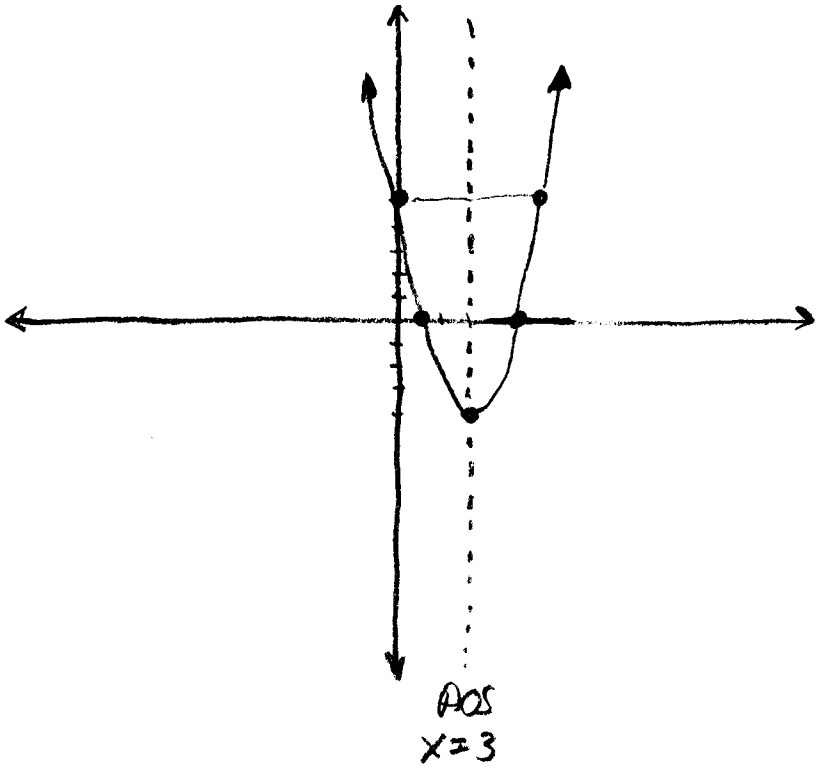
$F\left(3, -4+\frac{1}{4(1)}\right)$

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

Directrix $\Rightarrow$

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

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



X	Y
0	5
1	0

(7.) $y = -3x^2 - 8x - 6$ → $\frac{8}{3} \cdot \frac{1}{2} = \frac{8}{6} = \frac{4}{3}$

$y = -3\left(x^2 + \frac{8}{3} + \left(\frac{4}{3}\right)^2\right) - 6 \oplus \left(3^1 \cdot \frac{16}{9}_{3}\right)$ Why A ⊕ ??

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

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

$a = -3$ 

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

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

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

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

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

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

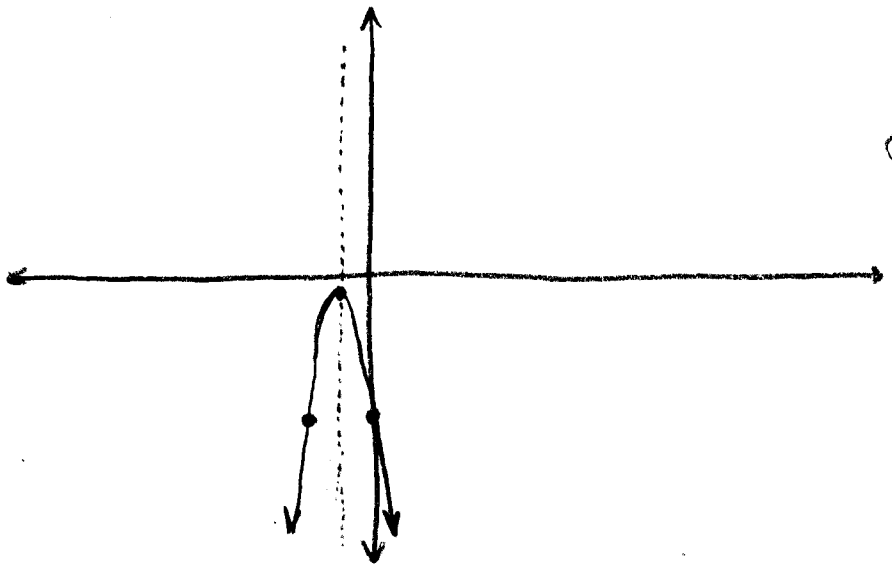
Directric ⇒

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

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

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

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

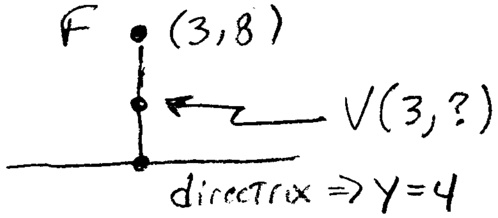


X	Y
V $-\frac{4}{3}$	$-\frac{2}{3}$
$\frac{5}{3}$	$-27\frac{2}{3}$
0	$-\frac{18}{3} = -6$
1	$-\frac{51}{3} = -17$

(9.) Focus (3, 8) directrix $y = 4$

AOS ⇒ $x = 3$

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



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

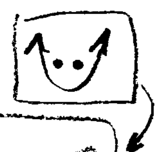
∴ Vertex = (3, 6)
h k

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

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

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

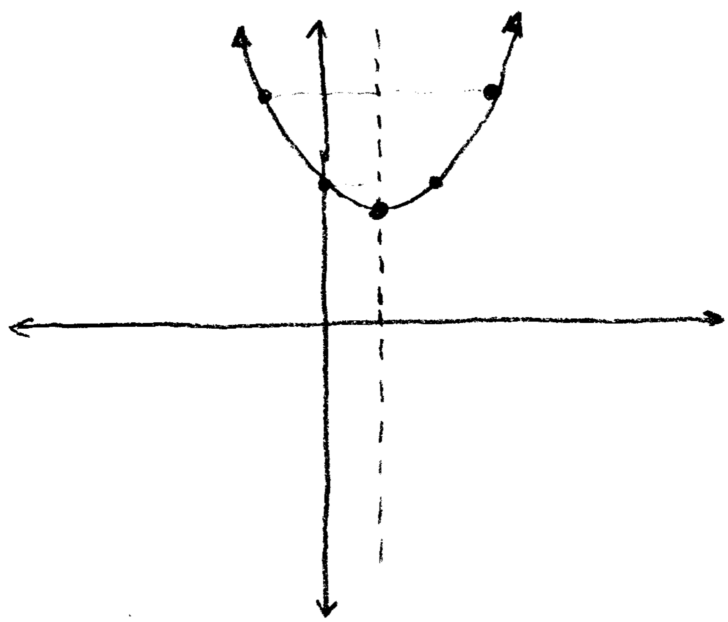
$a \cdot 2 = \frac{1}{4a} \cdot a$



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

∴ *

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



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 3 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

* NEW STUFF
Ch 8-1 Midpoint & Dist. Formulas
Ch 8-2 Parabolas

Key points – Parabolas

$ax^2+bx+c=y$ "General" Form

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

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

$a>0$ ☺ $a<0$ ☹

$a(x-h)^2+k=y$ "Standard" or "h,k" form

$V(h,k)$

AOS $\Rightarrow x=h$

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

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

$a>0$ ☺ $a<0$ ☹

(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 $\Rightarrow x=-\frac{4}{3}$ (h) (k)

BECAREFUL

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

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

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

$3\left(\frac{16}{9}\right)=\frac{16}{3}$

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

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

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

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

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

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

Algebra 2 Name_____

Practice for Exam 2

Date_____ Period____

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

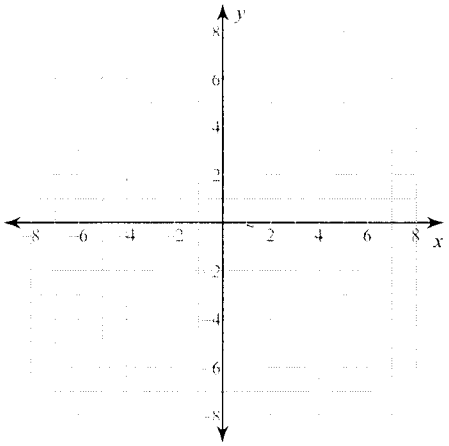
Use the information provided to write the ax^2 + bx +c = y form of the equation of each parabola.

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

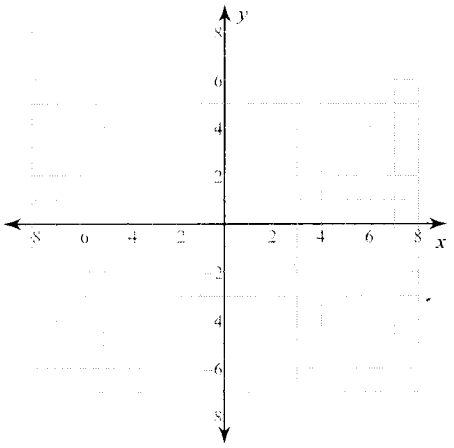
6) $y = -2(x - 6)^2 - 2$

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

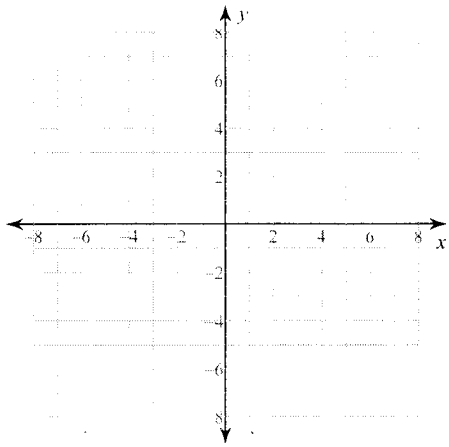
7) $y = -x^2 - 12x - 40$



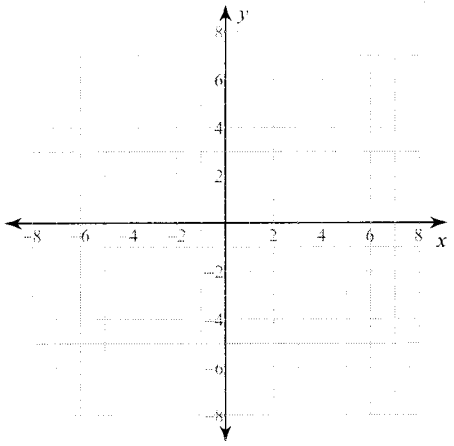
8) $y = -\frac{1}{3}x^2 + 2$



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

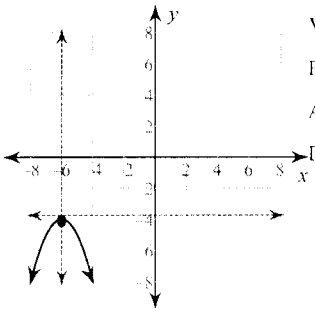
3) $y = 4(x-5)^2 + 6$

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

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

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

7)



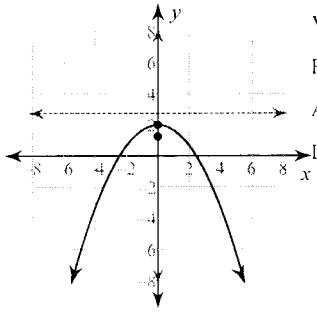
Vertex: $(-6, -4)$

Focus: $\left(-6, -\frac{17}{4}\right)$

Axis of Sym.: $x = -6$

Directrix: $y = -\frac{15}{4}$

8)



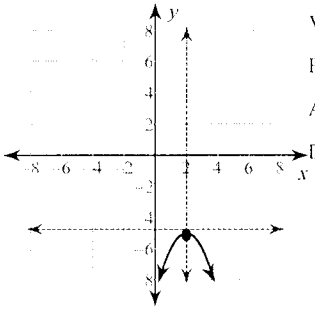
Vertex: $(0, 2)$

Focus: $\left(0, \frac{5}{4}\right)$

Axis of Sym.: $x = 0$

Directrix: $y = \frac{11}{4}$

9)



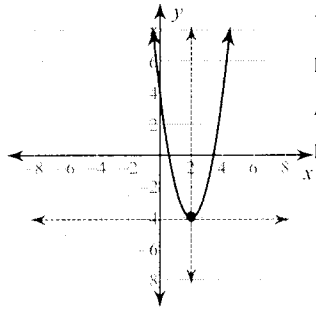
Vertex: $(2, -5)$

Focus: $\left(2, -\frac{21}{4}\right)$

Axis of Sym.: $x = 2$

Directrix: $y = -\frac{19}{4}$

10)



Vertex: $(2, -4)$

Focus: $\left(2, -\frac{31}{8}\right)$

Axis of Sym.: $x = 2$

Directrix: $y = -\frac{33}{8}$