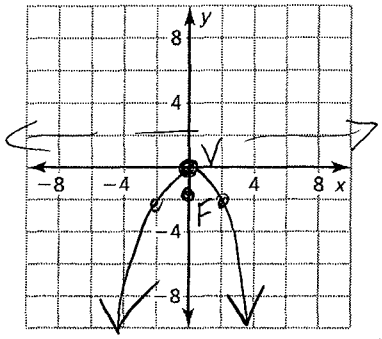
Name Key Date $a = \frac{1}{4p}$

2.3 Notetaking with Vocabulary (continued)

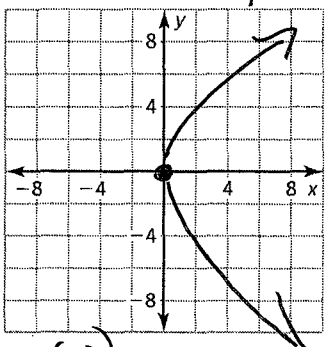
In Exercises 3–5, identify the focus, directrix, and axis of symmetry of the parabola. Graph the equation.

$-\frac{2}{1} = \frac{1}{4p}$

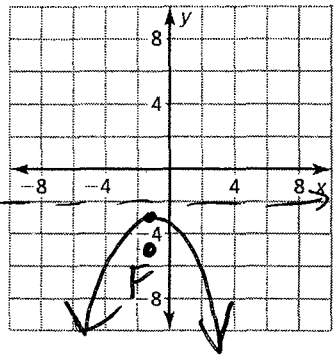
3. $x^2 = -2y$ $y = -\frac{1}{2}x^2$ $p = -.5$ $F(0,-.5)$ $V(0,0)$ D: $y = .5$



4. $-5x + \frac{1}{3}y^2 = 0$ $x = \frac{1}{15}y^2$ $F(3.75,0)$ D: $x = -3.75$ $p = 3.75$

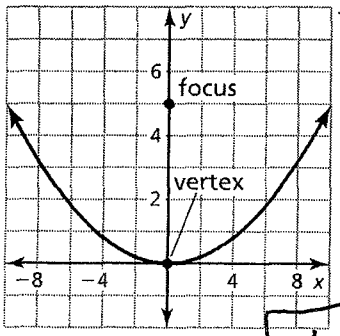


5. $y = -2(x+1)^2 - 3$ $V(-1,-3)$ $p = -\frac{1}{8}$ $F\left(-1,-3\frac{1}{4}\right)$ D: $y = -2\frac{7}{8}$



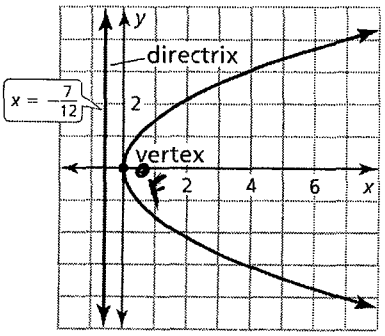
In Exercises 6–8, write an equation of the parabola shown.

6.



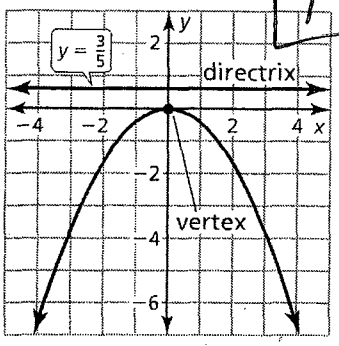
$F(0,5)$ $V(0,0)$ $p = 5$ D: $y = -5$ $y = \frac{1}{20}x^2$

7.



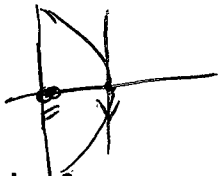
$V(0,0)$ $p = +\frac{7}{12}$ $F\left(\frac{7}{12},0\right)$ $x = \frac{1}{4\left(+\frac{7}{12}\right)}y^2$ $x = \frac{3}{7}y^2$

8.



$p = \frac{3}{5}$ $F\left(0,\frac{-3}{5}\right)$ $V(0,0)$ $y = \frac{1}{4(3/5)}x^2$ $y = \frac{5}{12}x^2$

9. The cross section of a parabolic sound reflector at the Olympics has a diameter of 20 inches and is 25 inches deep. Write an equation that represents the cross section of the reflector with its vertex at (0, 0) and its focus to the left of the vertex.



$F(-25,0)$ $p = 25$ D: $x = 25$ $V(0,0)$ $x = \frac{-1}{100}y^2$

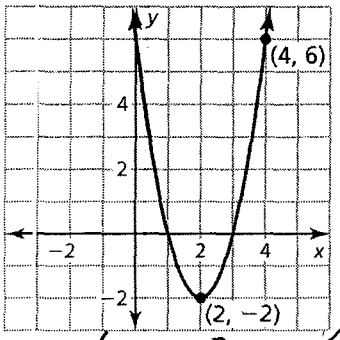
65
2-2

Name _____ Key _____ Date _____

2.4 Notetaking with Vocabulary (continued)

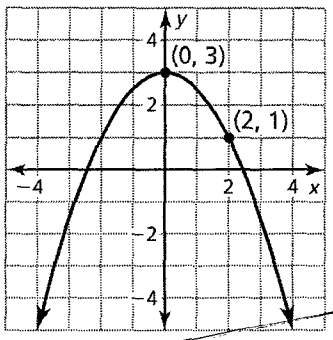
Extra Practice

In Exercises 1–4, write an equation of the parabola in vertex form.

1. 

$6 = a(-1)^2 - 2$
$6 = a - 2$
$8 = a$
$2 = 2$

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

2. 

$y = ax^2 + 3$
$1 = 2^2a + 3$
$1 = 4a + 3$
$-2 = 4a$
$-\frac{1}{2} = a$

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

3. passes through (−3, 0) and has vertex (−1, −8)

$y = a(x+1)^2 - 8$
$0 = a(-3+1)^2 - 8$
$y = 2(x+1)^2 - 8$

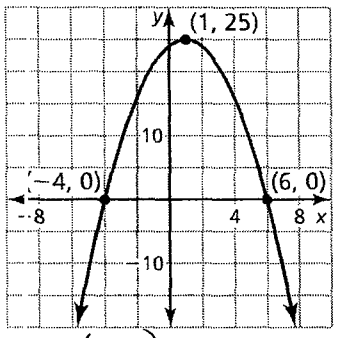
4. passes through (−4, 7) and has vertex (−2, 5)

$y = a(x+2)^2 + 5$
$7 = a(-4+2)^2 + 5$
$7 = 4a + 5$
$2 = 4a$
$\frac{1}{2} = a$

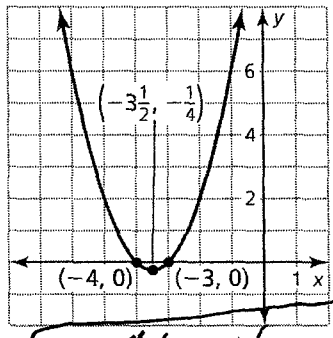
$y = \frac{1}{2}(x+2)^2 + 5$

$0 = 4a - 8$
$8 = 4a$
$2 = a$

In Exercises 5–8, write an equation of the parabola in intercept form.

5. 

$y = a(x+4)(x-6)$
$25 = a(5)(-5)$
$a = -1$
$y = -(x+4)(x-6)$

6. 

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

7. x-intercepts of −5 and 8; passes through (1, 84)

$y = a(x+5)(x-8)$
$84 = a(1+5)(1-8)$
$84 = -42a$
$-2 = a$
$y = -2(x+5)(x-8)$

8. x-intercepts of 7 and 10; passes through (−2, 27)

$y = a(x-7)(x-10)$
$27 = a(-2-7)(-2-10)$
$27 = a(-9)(-12)$
$27 = 108a$
$a = \frac{1}{4}$
$y = \frac{1}{4}(x-7)(x-10)$

Name Use StatCalc. Key Date

2.4 Notetaking with Vocabulary (continued)

① Make Sure X value are equally spaced

② Find Difference between Y values.

In Exercises 9–11, analyze the differences in the outputs to determine whether the data are *linear*, *quadratic* or *neither*. If linear or quadratic, write an equation that fits the data.

Q

9.

Time (seconds), x	1	2	3	4	5	6
Distance (feet), y	424	416	376	304	200	64

8 40 72 104 136

-32 -32 -32 -32

Quadratic 2nd Differences are constant.

L

10.

Time (days), x	0	3	6	9	12	15
Height (inches), y	36	30	24	18	12	6

6 6 6 6 6

Linear (1st differences are constant)

N

11.

Time (years), x	1	2	3	4	5	6
Profit (dollars), y	5	15	45	135	405	1215

-10 -30 -90

Neither

---

12. The table shows a university's budget (in millions of dollars) over a 10-year period, where $x = 0$ represents the first year in the 10-year period.

Years, x	0	1	2	3	4	5	6	7	8	9
Budget, y	65	32	22	40	65	92	114	128	140	150

-14 -12 -10

a. Use a graphing calculator to create a scatter plot. Which better represents the data, a line or a parabola? Explain.

Parabola – b/c Data appears to Curve.

Neither model is perfect → R^2 for Quadratic is higher.

b. Use the *regression* feature of your calculator to find the model that best fits the data.

$1{,}000{,}000 = 10^6$

$y = 1.492x^2 + .508x + 39.982$

c. Use the model in part (b) to predict when the budget of the university is \$500,000,000.00.

10^6

put $y_2 = 500$ into model.

2nd Calc intersect

$x = 17.387$

Somewhere between the 17th and 18th year.