11.1 Practice – Parabolas

Name: Solutions

In exercises 1-4, Sketch the graph of the given equation and fill in the blanks for the given information.

1. $(x+2)^2 = -12(y+1)$

$4p = -12$

$p = -3$

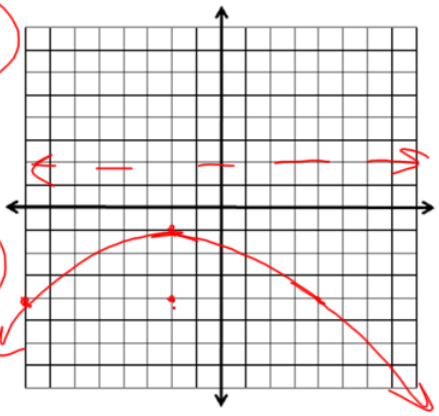
Coordinate of vertex: $(-2, -1)$

Direction it opens: down

Axis of symmetry: $x = -2$

Coordinate of focus: $(-2, -4)$

Equation for directrix: $y = 2$



2. $(y+2)^2 = 16(x+3)$

$4p = 16$

$p = 4$

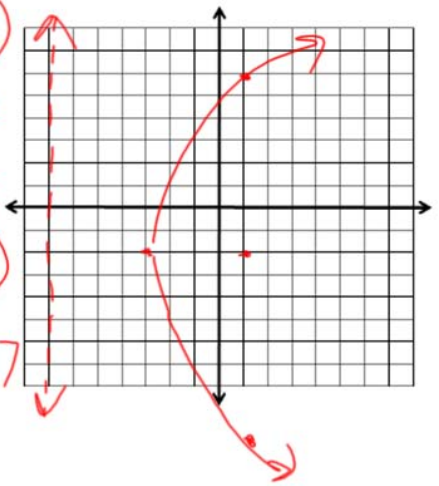
Coordinate of vertex: $(-3, -2)$

Direction it opens: right

Axis of symmetry: $y = -2$

Coordinate of focus: $(1, -2)$

Equation for directrix: $x = -7$



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

$4p = 8$

$p = 2$

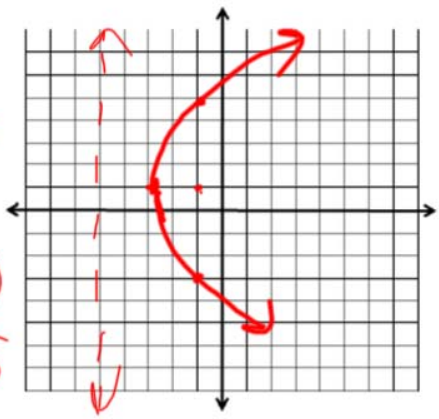
Coordinate of vertex: $(-3, 1)$

Direction it opens: right

Axis of symmetry: $y = 1$

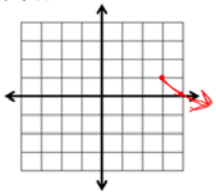
Coordinate of focus: $(-1, 1)$

Equation for directrix: $x = -5$



Algebra Skills:

1. Graph $f(x) = -\sqrt{x-3} + 1$



Multiply.

2. $(2+\sqrt{3})(3-\sqrt{3})$

$6 - 2\sqrt{3} + 3\sqrt{3} - 3$

$3 + \sqrt{3}$

3. $(2+\sqrt{x})(3-\sqrt{3})$

$6 - 2\sqrt{3} + 3\sqrt{x} - \sqrt{3x}$

Solve by factoring.

4. $x^2 + 16x = 0$

$x(x+16) = 0$

$x = 0, \; x = -16$

5. $x^4 - 5x^2 + 4 = 0$

$(x^2-4)(x^2-1) = 0$

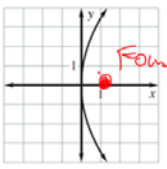
$(x-2)(x+2)(x-1)(x+1) = 0$

$x = 2, -2, 1, -1$

SAT Prep:

1. What is the focus of the graph shown?

(A) (0, −3)
(B) (0, 3)
(C) (−3, 0)
(D) (3, 0)



2. The distance between $(3, -1)$ and $(-3, y)$ is $2\sqrt{10}$. What is a positive value for y?

$2\sqrt{10} = \sqrt{(3-(-3))^2 + (-1-y)^2}$

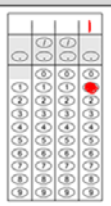
$4(10) = 36 + (-1-y)^2$

$4 = (-1-y)^2$

$\pm 2 = -1-y$

$-2 = -1-y$

$1 = y$



4. $(x-1)^2 = -2(y-4)$

$4p = -2$

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

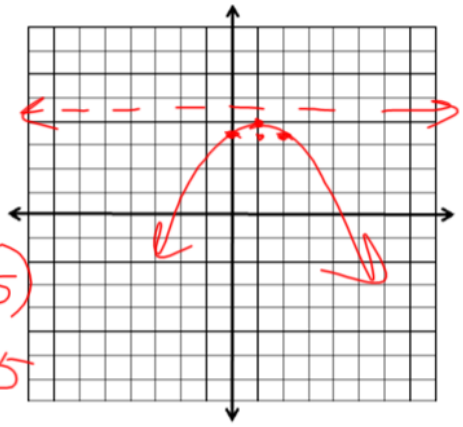
Coordinate of vertex: $(1,4)$

Direction it opens: down

Axis of symmetry: $x = 1$

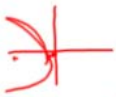
Coordinate of focus: $(1, 3.5)$

Equation for directrix: $y = 4.5$



In exercises 5-12, find an equation for the parabola that satisfies the given condition. Use the same form we used in our notes. (The quantity squared will be isolated.)

5. Vertex $(0,0)$, focus $(-3,0)$



$p = -3$

$4p = -12$

$y^2 = -12x$

6. Vertex $(-4,-4)$, focus $(-2,-4)$

$p = 2$

$4p = 8$

$(y+4)^2 = 8(x+4)$

7. Vertex $(-5,6)$, focus $(-5,3)$

$p = -3$

$4p = -12$

$(x+5)^2 = -12(y-6)$

8. Vertex $(4,3)$, directrix $x = 6$

$p = -2$

$4p = -8$

$(y-3)^2 = -8(x-4)$

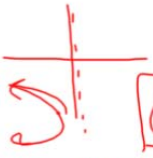
9. Vertex $(1,-5)$, directrix $y = -9$

$p = 4$

$4p = 16$

$(x-1)^2 = 16(y+5)$

10. Vertex $(-2,-8)$, directrix $x = 0$



$p = -2$

$4p = -8$

$(y+8)^2 = -8(x+2)$

11. Focus $(0,1)$, directrix $x = 10$

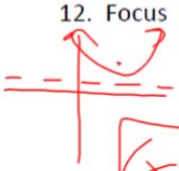
Vertex: $(5,1)$

$p = -5$

$4p = -20$

$(y-1)^2 = -20(x-5)$

12. Focus $(3,4)$, directrix $y = 1$



Vertex: $(3, 2.5)$

$p = 1.5$

$4p = 6$

$(x-3)^2 = 6(y-2.5)$

13. Focus: $(-4,9)$, directrix: $x = -6$

Vertex: $(-5,9)$

$p = 1$

$4p = 4$

$(y-9)^2 = 4(x+5)$

14. Focus: $\left(8, -\frac{23}{12}\right)$, directrix: $y = -\frac{25}{12}$

$-\frac{23}{12} + -\frac{25}{12} = -\frac{48}{12} \div 2 = -2$

Vertex: $(8,-2)$

$p = \frac{1}{12}$

$4p = \frac{1}{3}$

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