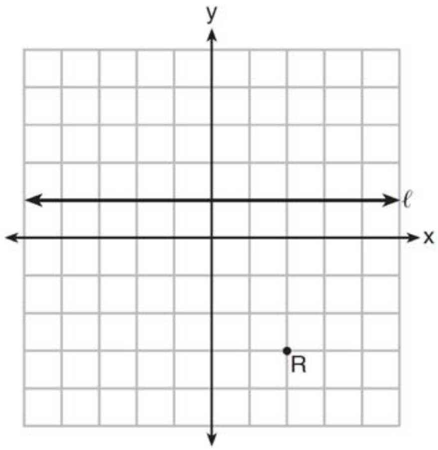
G.GPE.A.2: Graphing Quadratic Functions

1 Which equation represents the set of points equidistant from line ℓ and point R shown on the graph below?



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

2 Which equation represents a parabola with the focus at $(0,-1)$ and the directrix of $y = 1$?

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

3 Which equation represents a parabola with a focus of $(0,4)$ and a directrix of $y = 2$?

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

4 A parabola has its focus at $(1,2)$ and its directrix is $y = -2$. The equation of this parabola could be

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

5 What is the equation of the directrix for the parabola $-8(y-3) = (x+4)^2$?

1) $y = 5$
2) $y = 1$
3) $y = -2$
4) $y = -6$

6 The directrix of the parabola $12(y+3) = (x-4)^2$ has the equation $y = -6$. Find the coordinates of the focus of the parabola.

G.GPE.A.2: Graphing Quadratic Functions
Answer Section

1 ANS: 4

The vertex is $(2,-1)$ and $p=2$. $y=-\frac{1}{4(2)}(x-2)^2-1$

REF: 081619aii

2 ANS: 2

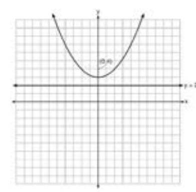
The vertex of the parabola is $(0,0)$. The distance, p, between the vertex and the focus or the vertex and the directrix is 1. $y=\frac{-1}{4p}(x-h)^2+k$

$$y=\frac{-1}{4(1)}(x-0)^2+0$$

$$y=-\frac{1}{4}x^2$$

REF: 081706aii

3 ANS: 4

A parabola with a focus of $(0,4)$ and a directrix of $y=2$ is sketched as follows:  By inspection, it is determined that the vertex of the parabola is $(0,3)$. It is also evident that the distance, p, between the vertex and the focus is 1. It is possible to use the formula $(x-h)^2=4p(y-k)$ to derive the equation of the parabola as follows: $(x-0)^2=4(1)(y-3)$

$$x^2=4y-12$$

$$x^2+12=4y$$

$$\frac{x^2}{4}+3=y$$

or A point (x,y) on the parabola must be the same distance from the focus as it is from the directrix. For any such point (x,y), the distance to the focus is $\sqrt{(x-0)^2+(y-4)^2}$ and the distance to the directrix is $y-2$. Setting this equal leads to: $x^2+y^2-8y+16=y^2-4y+4$

$$x^2+16=4y+4$$

$$\frac{x^2}{4}+3=y$$

REF: spr1502aii

4 ANS: 4

The vertex is $(1,0)$ and $p=2$. $y=\frac{1}{4(2)}(x-1)^2+0$

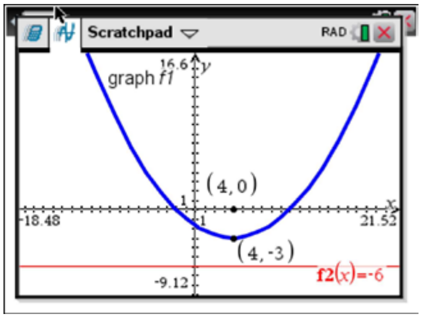
REF: 061717aii

5 ANS: 1

In vertex form, the parabola is $y=-\frac{1}{4(2)}(x+4)^2+3$. The vertex is $(-4,3)$ and $p=2$. $3+2=5$

REF: 011816aii

6 ANS:



The vertex of the parabola is $(4,-3)$. The x-coordinate of the focus and the vertex is the same. Since the distance from the vertex to the directrix is 3, the distance from the vertex to the focus is 3, so the y-coordinate of the focus is 0. The coordinates of the focus are $(4,0)$.

REF: 061630aii