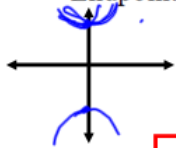Name **Solutions**

## 11.3 Practice - Hyperbolas

Period____

**Use the information provided to write the standard form equation of each hyperbola.**
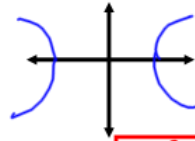
1) Vertices: $(0, 14)$, $(0, -14)$
   Endpoints of Conjugate Axis: $(12, 0)$ $(-12, 0)$
   Center: $(0,0)$
   $a = 14$
   $b = 12$
   $$\frac{y^2}{196} - \frac{x^2}{144} = 1$$

2) Vertices: $(8, 0)$, $(-8, 0)$
   Endpoints of Conjugate Axis: $(0, 10)$
   $(0, -10)$
   Center: $(0,0)$
   $a = 8$
   $b = 10$
   $$\frac{x^2}{64} - \frac{y^2}{100} = 1$$

3) Vertices: $(-1, -2)$, $(-13, -2)$
   Endpoints of Conjugate Axis: $(-7, 2)$
   Center: $(-7, -2)$ $(-7, -6)$
   $a = 6$
   $b = 4$
   $$\frac{(x+7)^2}{36} - \frac{(y+2)^2}{16} = 1$$

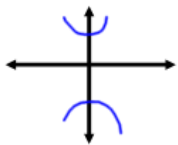4) Center at $(0, 0)$
   Transverse axis is horizontal; central rectangle is 10 units wide and 14 units tall
   Center: $(0,0)$
   $a = 5$
   $b = 7$
   $$\frac{x^2}{25} - \frac{y^2}{49} = 1$$
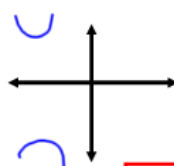
5) Center at $(0, 0)$
   Transverse axis is vertical; central rectangle is 16 units wide and 4 units tall
   Center: $(0,0)$
   $a = 2$
   $b = 8$
   $$\frac{y^2}{4} - \frac{x^2}{64} = 1$$

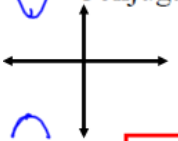6) Center at $(-8, -9)$
   Transverse axis is vertical; central rectangle is 10 units wide and 24 units tall
   Center: $(-8, -9)$
   $a = 12$
   $b = 5$
   $$\frac{(y+9)^2}{144} - \frac{(x+8)^2}{25} = 1$$
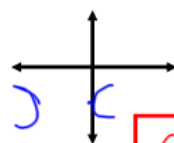
7) Vertices: $(-10, 12)$, $(-10, -14)$
   Conjugate Axis is 20 units long
   Center: $(-10, -1)$
   $a = 13$
   $b = 10$
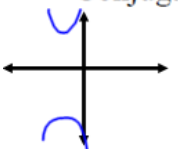   $$\frac{(y+1)^2}{169} - \frac{(x+10)^2}{100} = 1$$

8) Vertices: $(0, -4)$, $(-12, -4)$
   Conjugate Axis is 10 units long
   Center: $(-6, -4)$
   $a = 6$
   $b = 5$
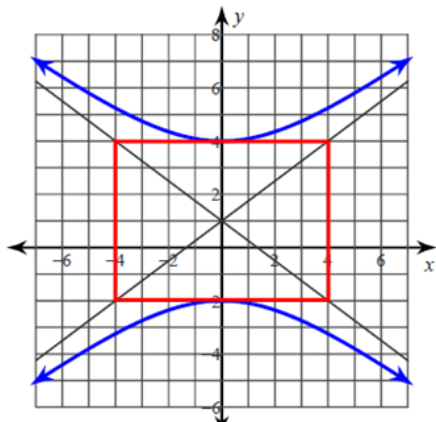   $$\frac{(x+6)^2}{36} - \frac{(y+4)^2}{25} = 1$$

9) Vertices: $(-6, 11)$, $(-6, -9)$
   Conjugate Axis is 22 units long
   Center: $(-6, 1)$
   $a = 10$
   $b = 11$
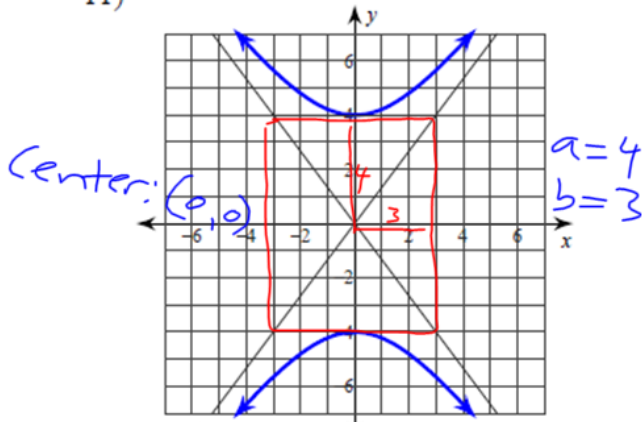   $$\frac{(y-1)^2}{100} - \frac{(x+6)^2}{121} = 1$$

## 10)



Center: $(0, 1)$
$a = 3$
$b = 4$

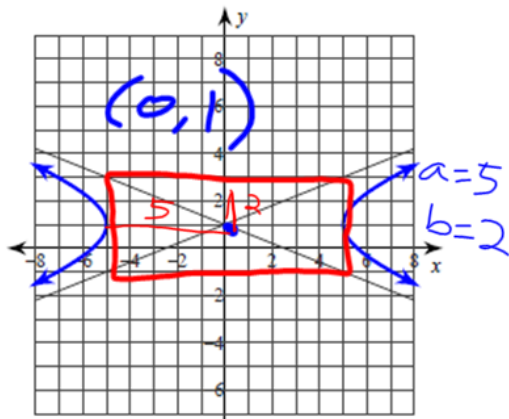$$\frac{(y-1)^2}{9} - \frac{x^2}{16} = 1$$

## 11)



Center: $(0, 0)$
$a = 4$
$b = 3$

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

## 12)



$(0, 1)$
$a = 5$
$b = 2$

$$\frac{x^2}{25} - \frac{(y-1)^2}{4} = 1$$

## 13) Center at $(9, -5)$
Transverse axis is horizontal; central rectangle is 8 units wide and 22 units tall
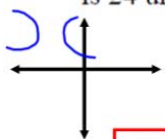
Center: $(9, -5)$
$a = 4$
$b = 11$

$$\frac{(x-9)^2}{16} - \frac{(y+5)^2}{121} = 1$$

## 14) Center at $(-9, 9)$
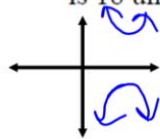Transverse axis is horizontal; central rectangle is 24 units wide and 20 units tall

Center: $(-9, 9)$
$a = 12$
$b = 10$

$$\frac{(x+9)^2}{144} - \frac{(y-9)^2}{100} = 1$$

## 15) Center at $(10, 7)$
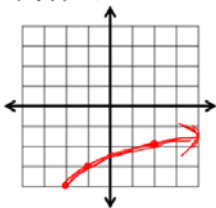Transverse axis is vertical; central rectangle is 18 units wide and 6 units tall

Center: $(10, 7)$
$a = 3$
$b = 9$

$$\frac{(y-7)^2}{9} - \frac{(x-10)^2}{81} = 1$$

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**Algebra Skills:**

1. Graph $f(x) = \sqrt{x+2} - 4$.



Multiply.

2. $(2 - \sqrt{5})(2 - \sqrt{5})$
$4 - 2\sqrt{5} - 2\sqrt{5} + 5$
$9 - 4\sqrt{5}$

3. $(2 + \sqrt{x})(\sqrt{x} - 4)$
$2\sqrt{x} - 8 + x - 4\sqrt{x}$
$x - 2\sqrt{x} - 8$

Solve by factoring.

4. $3x^3 - 27x = 0$
$3x(x^2 - 9) = 0$
$3x(x-3)(x+3) = 0$
$x = 0, \; x = 3, \; x = -3$

5. $6x^2 - 3x - 9 = 0$
$3(2x^2 - x - 3) = 0$
$2x^2 - 3x + 2x - 3 = 0$
$x(2x-3) + 1(2x-3) = 0$
$(2x-3)(x+1) = 0$
$x = \frac{3}{2}, \; x = -1$

**SAT Prep:**

1. Which is the equation of a hyperbola with vertices at $(0, -6)$ and $(0, 6)$ and foci at $(0, -8)$ and $(0, 8)$?

Ⓐ $\frac{x^2}{64} - \frac{y^2}{36} = 1$

Ⓑ $\frac{y^2}{64} - \frac{x^2}{36} = 1$

Ⓒ $\frac{x^2}{36} - \frac{y^2}{28} = 1$

Ⓓ $\frac{y^2}{36} - \frac{x^2}{28} = 1$

$a = 6$

2. The distance between $(1, 1)$ and $(4, y)$ is $\sqrt{13}$. What is a positive value for $y$?

$\sqrt{13} = \sqrt{(4-1)^2 + (y-1)^2}$
$13 = 9 + (y-1)^2$
$4 = (y-1)^2$
$\pm 2 = y - 1$

$y = 3$
or
$y = -1$