

Midterm Review

Date _____ Period _____

Simplify.

1) $\begin{bmatrix} -3 & 4 \\ 2 & 3 \\ 2 & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & -2 \\ 6 & -3 \end{bmatrix}$

2) $2 \begin{bmatrix} 5 & 3 & 0 \\ 2 & -2 & 6 \end{bmatrix} + \begin{bmatrix} 6 & 6 & -3 \\ 1 & 2 & 1 \end{bmatrix}$

Evaluate each determinant.

3) $\begin{vmatrix} -3 & -4 \\ 5 & -1 \end{vmatrix}$

4) $\begin{vmatrix} 4 & -5 & -4 \\ -2 & -1 & -2 \\ 5 & 0 & -5 \end{vmatrix}$

Find the inverse of each matrix.

5) $\begin{bmatrix} 2 & 4 \\ -7 & -10 \end{bmatrix}$

6) $\begin{bmatrix} 6 & 2 & 6 \\ 6 & -4 & 6 \\ 0 & 0 & -4 \end{bmatrix}$

Solve each equation.

7) $\begin{bmatrix} 8 & -5 \\ -6 & 3 \end{bmatrix} X = \begin{bmatrix} 7 \\ 3 \end{bmatrix}$

Identify the center and radius of each.

8) $(x + 8)^2 + (y - 13)^2 = 30$

Use the information provided to write the standard form equation of each circle.

9) Center: $(-3, 6)$
Point on Circle: $(-5, -4)$

Use the information provided to write the standard form equation of each ellipse.

10) $9x^2 + 4y^2 - 72x + 48y - 36 = 0$

Use the information provided to write the transformational form equation of each parabola.

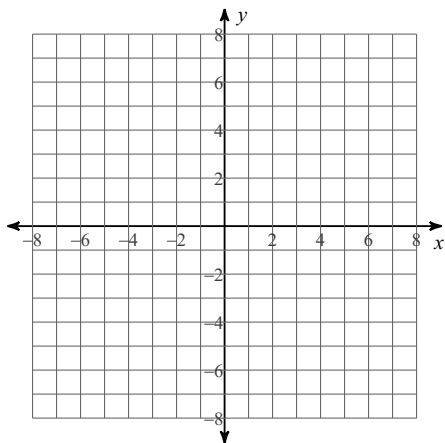
11) Vertex: $(1, -3)$, Focus: $(2, -3)$

Use the information provided to write the standard form equation of each hyperbola.

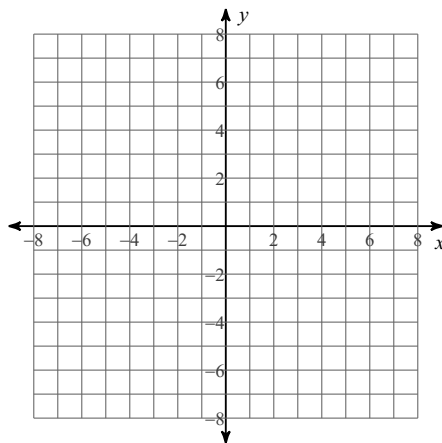
12) $16x^2 - y^2 + 96x - 16y - 64 = 0$

Identify the center, vertices, co-vertices, and foci of each. Then sketch the graph.

13) $(x + 2)^2 + \frac{y^2}{49} = 1$

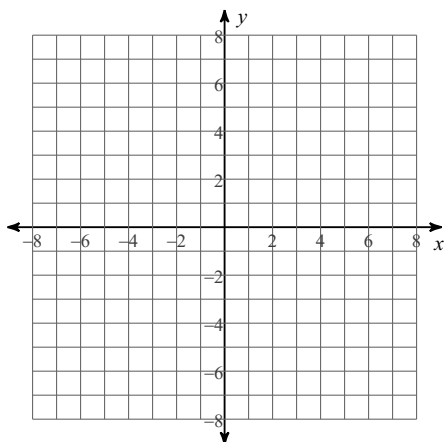


14) $\frac{(x - 1)^2}{25} + \frac{y^2}{4} = 1$

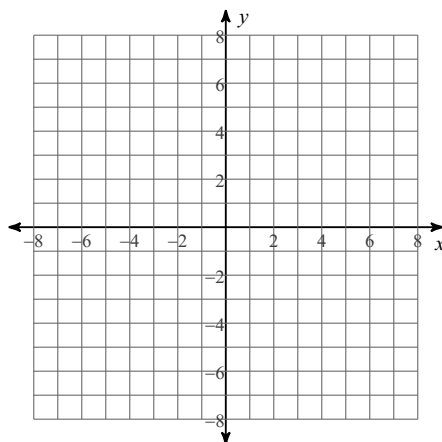


Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

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

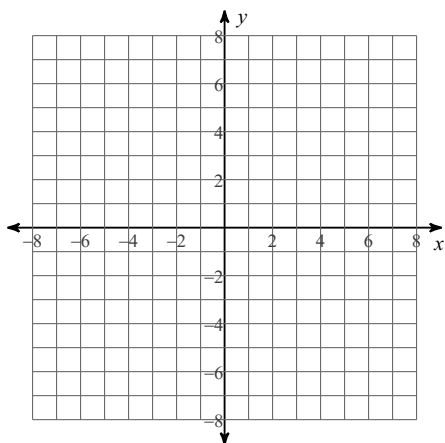


16) $\frac{(x - 2)^2}{4} - \frac{y^2}{25} = 1$

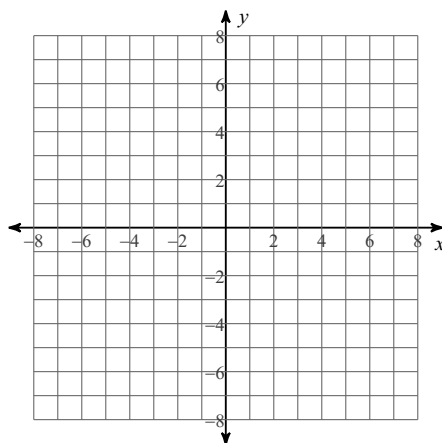


Identify the vertex, focus, directrix, and direction of opening of each. Then sketch the graph.

17) $-4(y + 1) = (x - 1)^2$

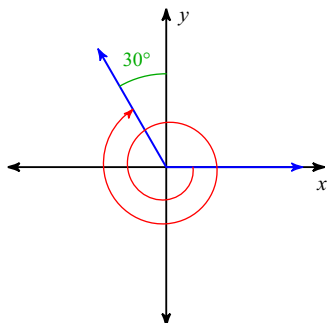


18) $-2x = (y + 2)^2$

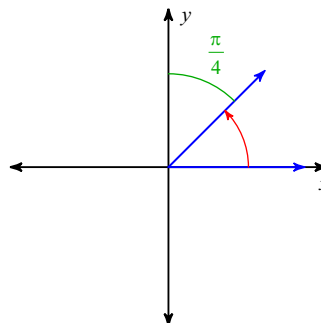


Find the measure of each angle.

19)

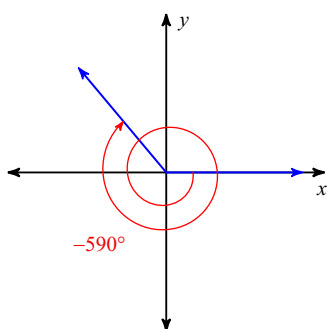


20)

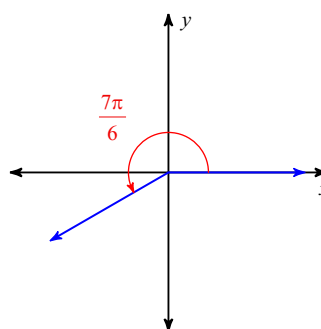


Find the reference angle.

21)



22)



Convert each degree measure into radians.

23) -600°

24) 405°

Convert each radian measure into degrees.

25) $\frac{4\pi}{9}$

26) $-\frac{31\pi}{6}$

Find the exact value of each trigonometric function.

27) $\sin(-120^\circ)$

28) $\cos\left(-\frac{5\pi}{6}\right)$

29) $\csc(-480^\circ)$

30) $\cot\left(-\frac{15\pi}{4}\right)$

Use the given point on the terminal side of angle θ to find the value of the trigonometric function indicated.

31) $\sec \theta; (3, -4)$

32) $\sin \theta; (-5, \sqrt{11})$

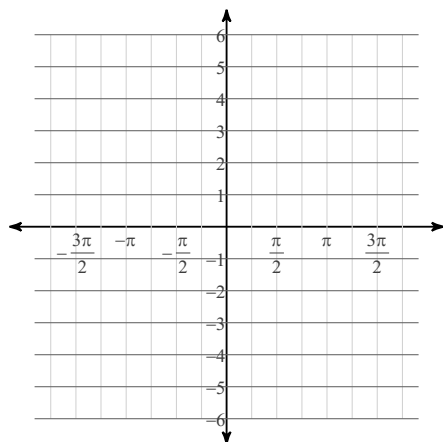
Find the exact values of the five trigonometric ratios not given.

33) $\cot \theta = \frac{4}{3}$ and $\sin \theta > 0$

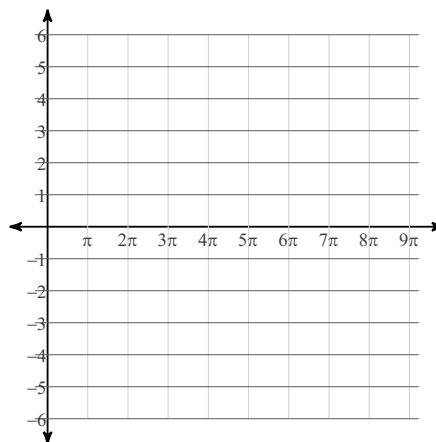
34) $\tan \theta = \frac{3}{4}$ and $\sin \theta < 0$

Graph each function using radians.

35) $y = 4\sin\left(\theta + \frac{\pi}{2}\right) - 2$



36) $y = 3\cos\frac{\theta}{3} - 2$



Find the amplitude, the period in radians, the phase shift in radians, and the vertical shift.

37) $y = 2 + 9\csc\left(\frac{\theta}{3} + \frac{3\pi}{4}\right)$

38) $y = 3\tan 6\theta - 5$

Find the exact value of each expression.

39) $\sin^{-1} \frac{\sqrt{2}}{2}$

40) $\sin^{-1} 0$

Find the arc length. (arc=radius*radians)

41) $r = 8 \text{ km}, \theta = 60^\circ$

Midterm Review

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Simplify.

$$1) \begin{bmatrix} -3 & 4 \\ 2 & 3 \\ 2 & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & -2 \\ 6 & -3 \end{bmatrix} = \begin{bmatrix} 24 & -6 \\ 18 & -13 \\ 0 & -4 \end{bmatrix}$$

$$2) 2 \begin{bmatrix} 5 & 3 & 0 \\ 2 & -2 & 6 \end{bmatrix} + \begin{bmatrix} 6 & 6 & -3 \\ 1 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 16 & 12 & -3 \\ 5 & -2 & 13 \end{bmatrix}$$

Evaluate each determinant.

$$3) \begin{vmatrix} -3 & -4 \\ 5 & -1 \end{vmatrix} = 23$$

$$4) \begin{vmatrix} 4 & -5 & -4 \\ -2 & -1 & -2 \\ 5 & 0 & -5 \end{vmatrix} = 100$$

Find the inverse of each matrix.

$$5) \begin{bmatrix} 2 & 4 \\ -7 & -10 \end{bmatrix}^{-1} = \begin{bmatrix} -\frac{5}{4} & \frac{1}{2} \\ \frac{7}{8} & \frac{1}{4} \end{bmatrix}$$

$$6) \begin{bmatrix} 6 & 2 & 6 \\ 6 & -4 & 6 \\ 0 & 0 & -4 \end{bmatrix}^{-1} = \begin{bmatrix} \frac{1}{9} & \frac{1}{18} & \frac{1}{4} \\ \frac{1}{6} & -\frac{1}{6} & 0 \\ 0 & 0 & -\frac{1}{4} \end{bmatrix}$$

Solve each equation.

$$7) \begin{bmatrix} 8 & -5 \\ -6 & 3 \end{bmatrix} X = \begin{bmatrix} 7 \\ 3 \end{bmatrix} \Rightarrow X = \begin{bmatrix} -6 \\ -11 \end{bmatrix}$$

Identify the center and radius of each.

$$8) (x+8)^2 + (y-13)^2 = 30 \quad \text{Center: } (-8, 13) \\ \text{Radius: } \sqrt{30}$$

Use the information provided to write the standard form equation of each circle.

$$9) \text{Center: } (-3, 6) \\ \text{Point on Circle: } (-5, -4) \\ (x+3)^2 + (y-6)^2 = 104$$

Use the information provided to write the standard form equation of each ellipse.

$$10) 9x^2 + 4y^2 - 72x + 48y - 36 = 0 \quad \frac{(x-4)^2}{36} + \frac{(y+6)^2}{81} = 1$$

Use the information provided to write the transformational form equation of each parabola.

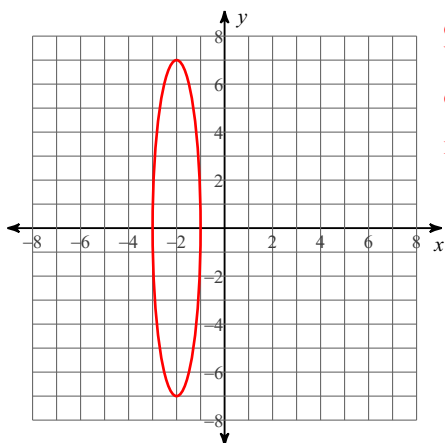
$$11) \text{Vertex: } (1, -3), \text{Focus: } (2, -3) \\ 4(x-1) = (y+3)^2$$

Use the information provided to write the standard form equation of each hyperbola.

$$12) 16x^2 - y^2 + 96x - 16y - 64 = 0 \quad \frac{(x+3)^2}{9} - \frac{(y+8)^2}{144} = 1$$

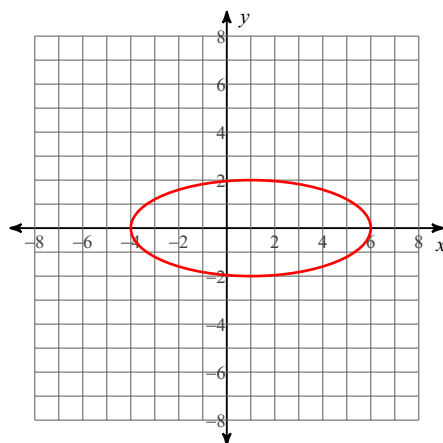
Identify the center, vertices, co-vertices, and foci of each. Then sketch the graph.

13) $(x + 2)^2 + \frac{y^2}{49} = 1$



Center: $(-2, 0)$
 Vertices: $(-2, 7)$
 $(-2, -7)$
 Co-vertices: $(-1, 0)$
 $(-3, 0)$
 Foci: $(-2, 4\sqrt{3})$
 $(-2, -4\sqrt{3})$

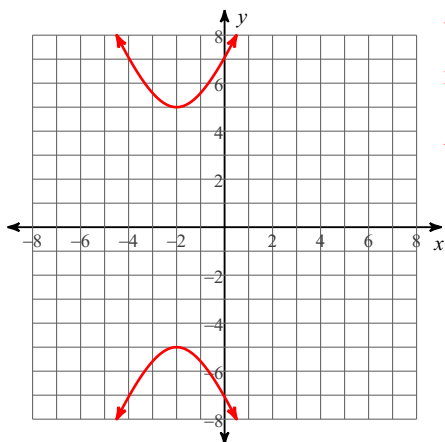
14) $\frac{(x - 1)^2}{25} + \frac{y^2}{4} = 1$



Center: $(1, 0)$
 Vertices: $(6, 0)$
 $(-4, 0)$
 Co-vertices: $(1, 2)$
 $(1, -2)$
 Foci: $(1 + \sqrt{21}, 0)$
 $(1 - \sqrt{21}, 0)$

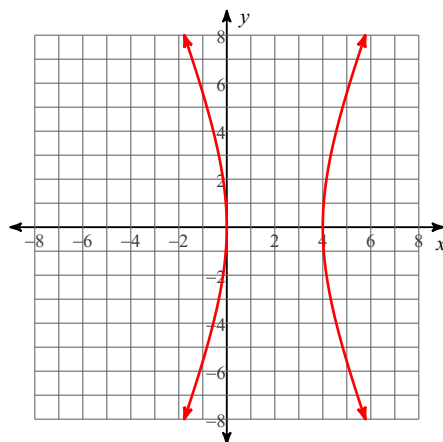
Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

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



Vertices: $(-2, 5)$
 $(-2, -5)$
 Foci: $(-2, \sqrt{29})$
 $(-2, -\sqrt{29})$
 Asym.: $y = \frac{5}{2}x + 5$
 $y = -\frac{5}{2}x - 5$

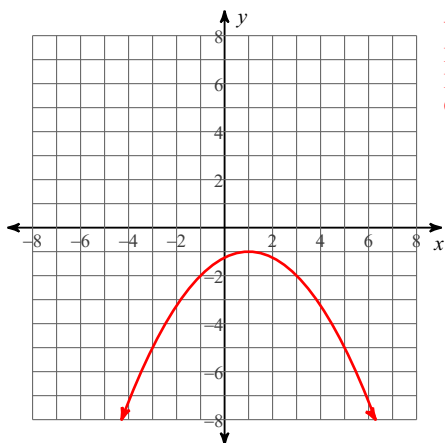
16) $\frac{(x - 2)^2}{4} - \frac{y^2}{25} = 1$



Vertices: $(4, 0)$
 $(0, 0)$
 Foci: $(2 + \sqrt{29}, 0)$
 $(2 - \sqrt{29}, 0)$
 Asym.: $y = \frac{5}{2}x - 5$
 $y = -\frac{5}{2}x + 5$

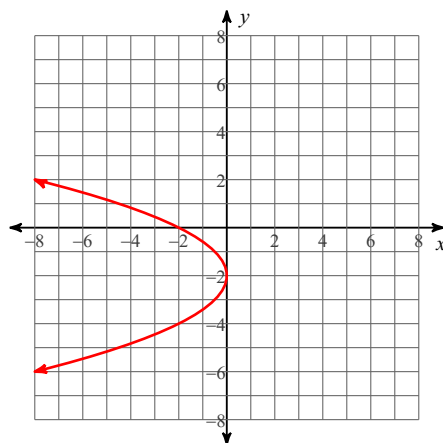
Identify the vertex, focus, directrix, and direction of opening of each. Then sketch the graph.

17) $-4(y + 1) = (x - 1)^2$



Vertex: $(1, -1)$
 Focus: $(1, -2)$
 Directrix: $y = 0$
 Opens: Down

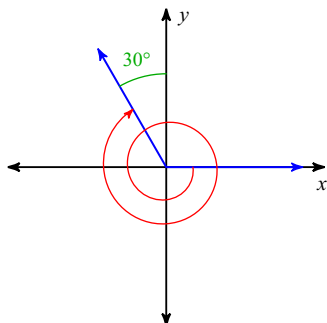
18) $-2x = (y + 2)^2$



Vertex: $(0, -2)$
 Focus: $(-\frac{1}{2}, -2)$
 Directrix: $x = \frac{1}{2}$
 Opens: Left

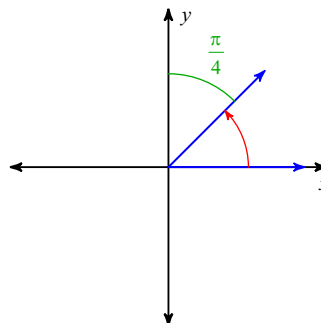
Find the measure of each angle.

19)



-600°

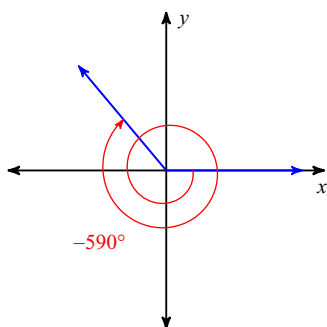
20)



$\frac{\pi}{4}$

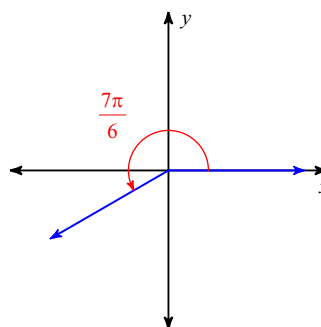
Find the reference angle.

21)



50°

22)



$\frac{\pi}{6}$

Convert each degree measure into radians.

23) $-600^\circ - \frac{10\pi}{3}$

24) $405^\circ \frac{9\pi}{4}$

Convert each radian measure into degrees.

25) $\frac{4\pi}{9}$
 80°

26) $-\frac{31\pi}{6}$
 -930°

Find the exact value of each trigonometric function.

27) $\sin(-120^\circ) - \frac{\sqrt{3}}{2}$

28) $\cos(-\frac{5\pi}{6}) - \frac{\sqrt{3}}{2}$

29) $\csc(-480^\circ) - \frac{2\sqrt{3}}{3}$

30) $\cot(-\frac{15\pi}{4})$

1

Use the given point on the terminal side of angle θ to find the value of the trigonometric function indicated.

31) $\sec \theta; (3, -4) \frac{5}{3}$

32) $\sin \theta; (-5, \sqrt{11}) \frac{\sqrt{11}}{6}$

Find the exact values of the five trigonometric ratios not given.

33) $\cot \theta = \frac{4}{3}$ and $\sin \theta > 0$

$\sin \theta = \frac{3}{5}, \cos \theta = \frac{4}{5}, \tan \theta = \frac{3}{4}$

$\csc \theta = \frac{5}{3}, \sec \theta = \frac{5}{4}$

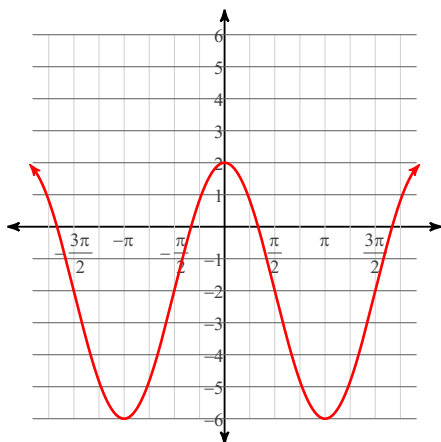
34) $\tan \theta = \frac{3}{4}$ and $\sin \theta < 0$

$\sin \theta = -\frac{3}{5}, \cos \theta = -\frac{4}{5}$

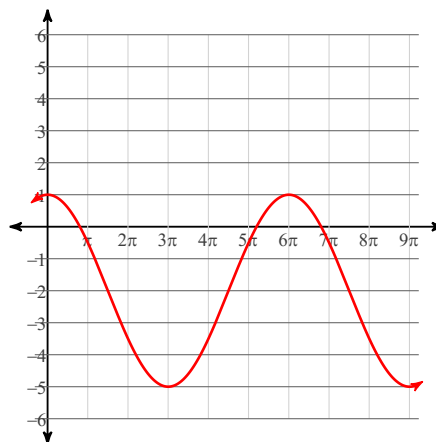
$\csc \theta = -\frac{5}{3}, \sec \theta = -\frac{5}{4}, \cot \theta = \frac{4}{3}$

Graph each function using radians.

35) $y = 4\sin\left(\theta + \frac{\pi}{2}\right) - 2$



36) $y = 3\cos\frac{\theta}{3} - 2$



Find the amplitude, the period in radians, the phase shift in radians, and the vertical shift.

37) $y = 2 + 9\csc\left(\frac{\theta}{3} + \frac{3\pi}{4}\right)$ Amplitude: None
Period: 6π

Phase shift: Left $\frac{9\pi}{4}$

Vert. shift: Up 2

38) $y = 3\tan 6\theta - 5$ Amplitude: None

Period: $\frac{\pi}{6}$

Phase shift: None

Vert. shift: Down 5

Find the exact value of each expression.

39) $\sin^{-1} \frac{\sqrt{2}}{2}$

$-\frac{\pi}{4}$

40) $\sin^{-1} 0$

0

Find the arc length. (arc=radius*radians)

41) $r = 8 \text{ km}, \theta = 60^\circ$

$\frac{8\pi}{3} \text{ km}$