Unit 3 Intro to Trigonometry

ESSENTIAL QUESTIONS
• How do I think of an angle as the rotation of a ray about its endpoint?
• What is meant by the radian measure of an angle?
• What is the connection between the radian measure of an angle and the length of the arc on the unit circle the angle intercepts?
• What does the unit circle have to do with trigonometric functions?

KEY STANDARDS - **Interpret functions that arise in applications in terms of the context**
• MGSE9-12.F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
• MGSE9-12.F.TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Date	Topic(s)	Assignment/HW	Credit
Thurs. 8/26	Degrees		
Fri. 8/27	Radians		
Mon. 8/30	Degrees & Radians		
Tues. 8/31	Right Triangle Trigonometry		
Wed. 9/1	Review		
Thurs. 9/2	**Quiz**		
Fri. 9/3	Build the Unit Circle		
Tues. 9/7	**Unit Circle Memorization Quiz** Exact Values of Trig Functions		
Wed. 9/8	**Unit Circle Memorization Quiz** Exact Values of Trig Functions		
Thurs. 9/9	Review		
Fri. 9/10	**Unit 3 Intro to Trig Test**		

Name _____

WS #1 Angles in Degrees

Determine the quadrant in which each angle lies.

1 a. $\theta = 130^\circ$ _____ b. $\theta = 285^\circ$ _____

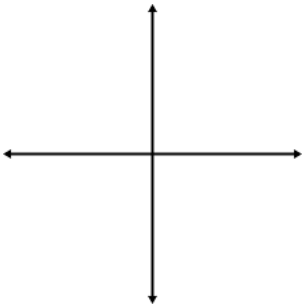
2. a. $\theta = 8.3^\circ$ _____ b. $\theta = 257^\circ 30'$ _____

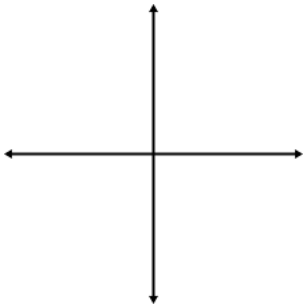
3. a. $\theta = -132^\circ 50'$ ___ b. $\theta = -336^\circ$ _____

4. a. $\theta = -260^\circ$ _____ b. $\theta = -3.4^\circ$ _____

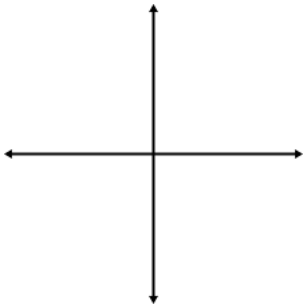
Sketch each angle in standard position.

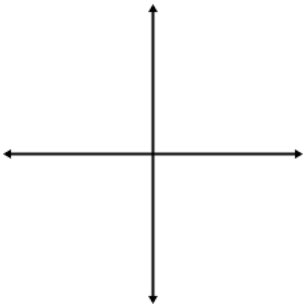
5. a. 30° b. 150°



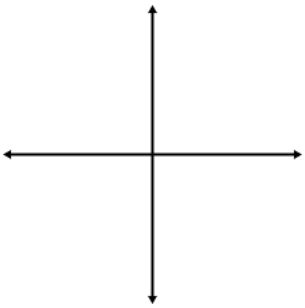


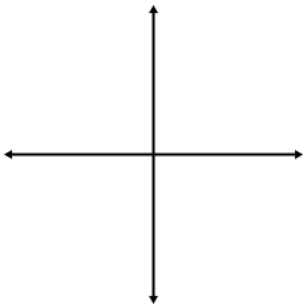
6. a. -270° b. -120°



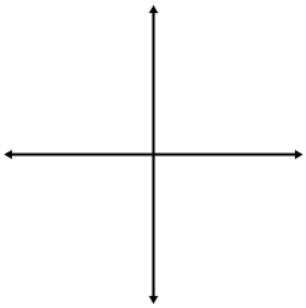


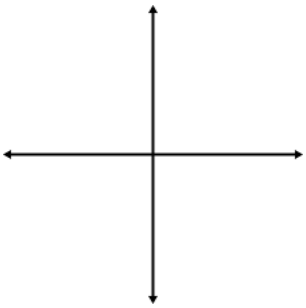
7. a. 405° b. 480°





8. a. -750° b. -600°





Determine two coterminal angles (one positive and one negative) for each angle.

9. a. $\theta = 45^\circ$ _____ _____ b. $\theta = -36^\circ$ _____ _____

10. a. $\theta = 120^\circ$ _____ _____ b. $\theta = -420^\circ$ _____ _____

11. a. $\theta = 300^\circ$ _____ _____ b. $\theta = 740^\circ$ _____ _____

12. a. $\theta = -520^\circ$ _____ _____ b. $\theta = 230^\circ$ _____ _____

Convert each angle measure to decimal degree form.

13. a. $54^0 45'$ _____ b. $-128^0 30'$ _____ 14. a. $245^0 10'$ _____ b. $2^0 12'$ _____

15. a. $85^0 18' 30''$ _____ b. $330^0 25''$ _____ 16. a. $-135^0 36''$ _____ b. $-408^0 16' 20''$ _____

Convert each angle to DMS form.

17. a. 240.6° _____ b. -145.8° _____

18. a. -345.12° _____ b. 0.45° _____

19. a. 2.5° _____ b. -3.58° _____

20. a. $-.355^\circ$ _____ b. 0.7865° _____

Find the complement and supplement for each, if possible. If not, write NA.

21. a. 18° C=_____ S=_____ b. 115° C=_____ S=_____

22. a. 79° C=_____ S=_____ b. 150° C=_____ S=_____

23. a. 3° C=_____ S=_____ b. 64° C=_____ S=_____

24. a. 130° C=_____ S=_____ b. 170° C=_____ S=_____

WS #2 Angles in Radians

Determine the quadrant in which each angle lies for #1-6. Then find the reference angle for each.

1. a. $\frac{\pi}{5}$ b. $\frac{7\pi}{5}$

2. a. $\frac{11\pi}{8}$ b. $\frac{9\pi}{8}$

3. a. $\frac{-\pi}{12}$ b. $\frac{-11\pi}{9}$

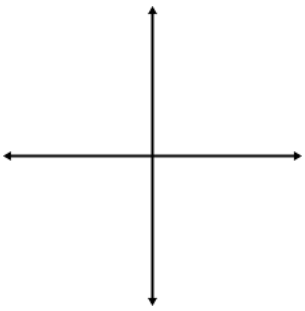
4. a. -1 b. -2

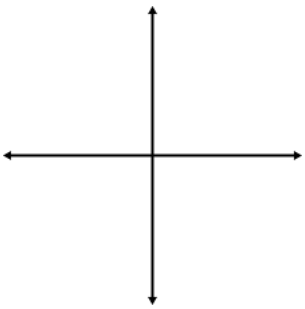
5. a. 3.5 b. 2.25

6. a. 6.02 b. -4.25

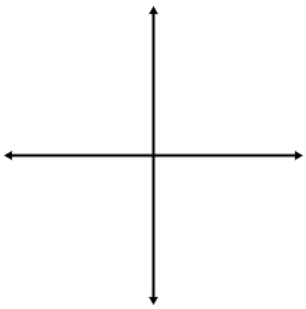
Sketch each angle in standard position.

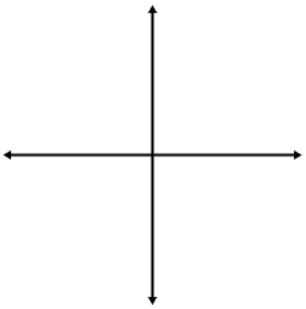
7. a. $\frac{5\pi}{4}$ b. $\frac{2\pi}{3}$



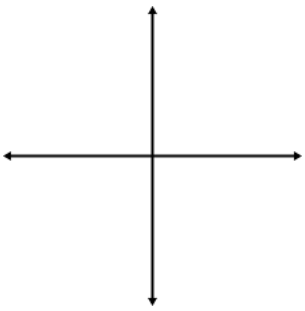


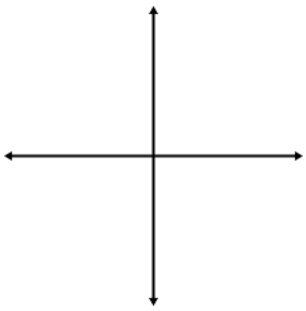
8. a. $\frac{-7\pi}{4}$ b. $\frac{-5\pi}{2}$



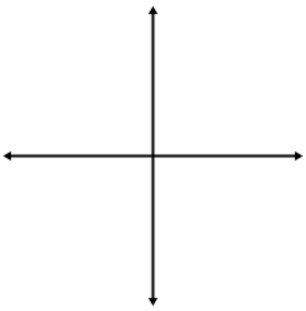


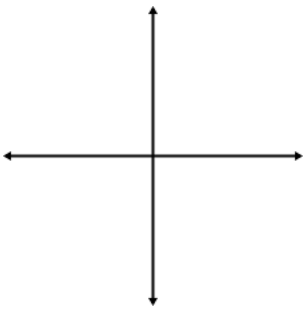
9. a. $\frac{11\pi}{6}$ b. 7π





10. a. 4 b. -3





Determine two coterminal angles (one positive and one negative) for each angle. Give all answers in radian measure.

11. a. $\frac{\pi}{6}$ b. $\frac{5\pi}{6}$

12. a. $\frac{7\pi}{6}$ b. $\frac{-11\pi}{6}$

13. a. $\frac{-9\pi}{4}$ b. $\frac{-2\pi}{15}$

14. a. $\frac{8\pi}{9}$ b. $\frac{8\pi}{45}$

Determine the reference angle for each angle. Sketch if necessary.

15. a. $\frac{\pi}{6}$ b. $\frac{5\pi}{6}$

16. a. $\frac{7\pi}{6}$ b. $\frac{-11\pi}{6}$

17. a. $\frac{-9\pi}{4}$ b. $\frac{-2\pi}{15}$

18. a. $\frac{8\pi}{9}$ b. $\frac{8\pi}{45}$

Express each angle in radian measure. Leave in terms of π. Round to 3 decimal places.

19. a. 30^0 b. 150^0

20. a. 315^0 b. 120^0

21. a. -20^0 b. -240^0

22. a. -270^0 b. 144^0

Express each angle in degree measure. Leave answers in terms of π and round to 3 decimal places.

23. a. $\frac{3\pi}{2}$ b. $\frac{7\pi}{6}$

24. a. $\frac{-7\pi}{12}$ b. $\frac{\pi}{9}$

25. a. $\frac{7\pi}{3}$ b. $\frac{-11\pi}{30}$

26. a. $\frac{11\pi}{6}$ b. $\frac{34\pi}{15}$

Convert the measure from degree to radians. Round to 3 decimal places. Calculators!

27. 115^0

28. 87.4^0

29. -216.35^0

30. -48.27^0

31. 532^0

32. 345^0

33. -0.83^0

34. 0.54^0

Convert the measure from radians to degrees. Round to 3 decimal places. Calculators!

35. $\frac{\pi}{7}$

36. $\frac{5\pi}{11}$

37. $\frac{15\pi}{8}$

38. $\frac{13\pi}{2}$

39. -4.2π

40. 4.8π

41. -2

42. -0.57

Find the radian measure of the central angle of a circle of radius, r, that intercepts an arc of length, s. Leave all answers in terms of π.

43. Radius: 27 inches Arc Length: 6 inches

44. Radius: 14 feet, Arc length: 8 feet

45. Radius: 14.5 cm Arc Length: 25 cm

46. Radius: 80 km, Arc length: 160 km

Find the length of the arc on a circle of radius, r, intercepted by a central angle, θ. Write in terms of π and then as a decimals rounded to 3 decimal places.

47. Radius: 15 inches, Central angle: 180^0

48. Radius: 9 feet, Central angle: 60^0

49. Radius: 3 meters, Central angle: 1 radian

50. Radius: 20 cm, Central angle: $\frac{\pi}{4}$ radians

WS #3 Right Triangle Trig

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1. Find $\csc\theta$, when the terminal side of θ passes through (4, 3).	2. Find $\sec\theta$, when the terminal side of θ passes through (-8, 15).	3. Find $\tan\theta$, when the terminal side of θ passes through (-12, -5).
4. All of the sets of side lengths in #1-3 are examples of _____.		
5. Find $\sin\theta$, when the terminal side of θ passes through (1, -1).	6. Find $\cos\theta$, when the terminal side of θ passes through ($-\sqrt{3}$, -1).	7. Find $\cot\theta$, when the terminal side of θ passes through (4, -4).
8. All of the angles in #5-7 are _____ angles on the _____ _____ but on a circle with a different _____.		

State the quadrant in which θ lies.

9. $\sin\theta > 0$ and $\cos\theta > 0$

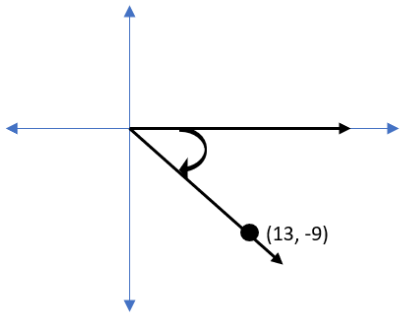
10. $\sin\theta < 0$ and $\cos\theta < 0$

11. $\sin\theta > 0$ and $\cos\theta < 0$

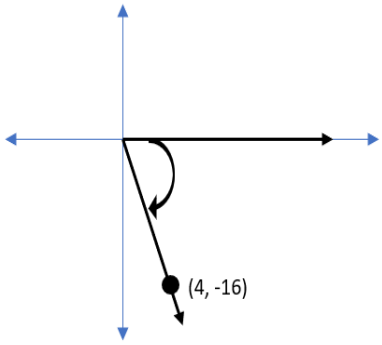
12. $\sec\theta > 0$ and $\cot\theta < 0$

Find the exact value of the trig ratio given the information on each graph.

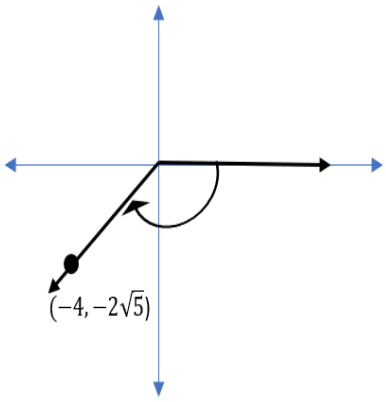
13. $\tan\theta =$



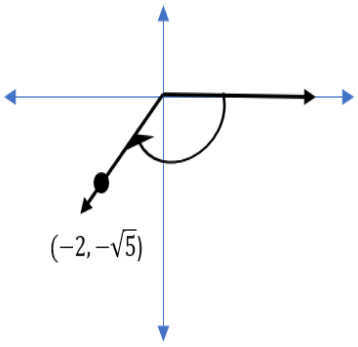
14. $\cot\theta =$



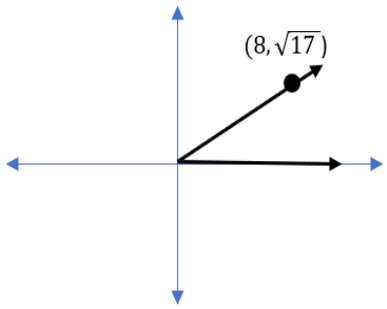
15. $\sin\theta =$



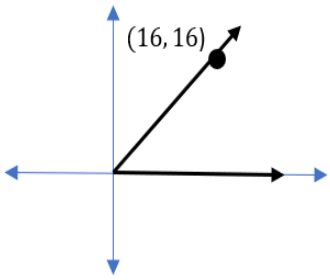
16. $\csc\theta =$



17. $\cos\theta =$



18. $\sec\theta =$



Find the indicated trig ratio in the specified quadrant.

19. $\sin\theta = -\frac{3}{5}$ and θ is in quadrant IV. Find $\cos\theta$.

20. $\csc\theta = -2$ and θ is in quadrant IV. Find $\cot\theta$.

21. $\sec\theta = -\frac{9}{4}$ and θ is in quadrant III. Find $\tan\theta$.

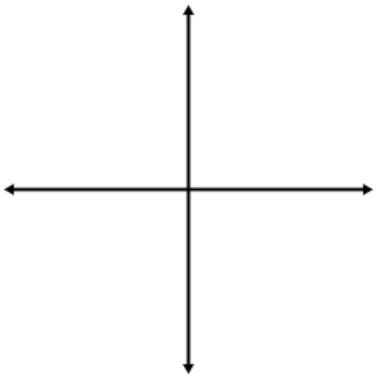
22. $\cot\theta = -3$ and θ is in quadrant II. Find $\sin\theta$.

23. $\tan\theta = \frac{3}{2}$ and θ is in quadrant III. Find $\sec\theta$.

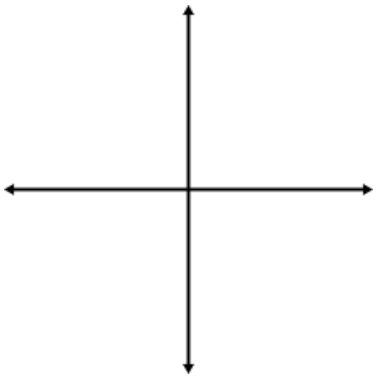
WS #4 Quiz Review

Sketch each angle on coordinate axes. Find the reference angle.

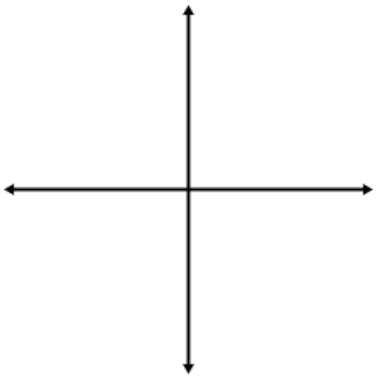
1. $99°$



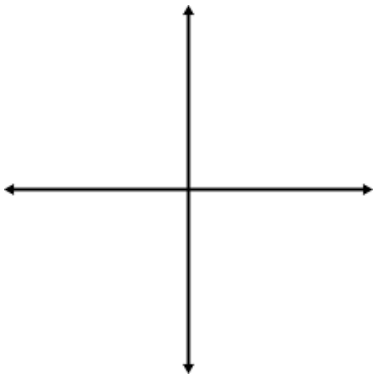
2. $345°$



3. $-137°$



4. $-615°$



Name the quadrant and reference angle of the given angle

5. $\frac{37\pi}{20}$

6. $-\frac{27\pi}{20}$

Name the coterminal angle of the given angle. (One positive and one negative)

7. $298°$

8. $-591°$

9. $\frac{9\pi}{5}$

10. $-\frac{21\pi}{8}$

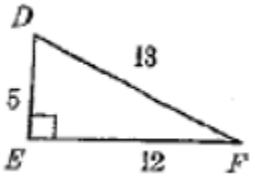
11. A circle has a radius of 16.4 centimeters. Find the length of the arc intercepted by a central angle with measure $\frac{3\pi}{8}$ radians.

12. Find the length of an arc intercepted by a central angle of 0.745 radians on a circle of radius 11.2 centimeters.

13. A circle has a radius of 8.978 centimeters. Find the length of the arc intercepted by a central angle of measure $47.26°$.

14. A circle has a radius of 12 inches. Find the length of the arc intercepted by a central angle of measure $144°$.

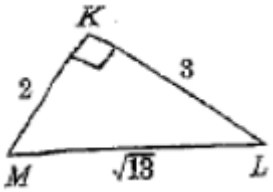
Given the triangle DEF, find the following.



15. $\sin \angle D$

16. $\tan \angle D$

Given the triangle KLM, find the following.



17. $\sin \angle M$

18. $\cos \angle M$

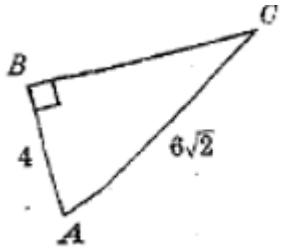
19. $\tan \angle M$

20. $\csc \angle M$

21. $\sec \angle M$

22. $\cot \angle M$

Given the triangle ABC, find the following.



23. $\sin \angle A$

24. $\cos \angle A$

25. $\tan \angle A$

26. $\csc \angle A$

27. $\sec \angle A$

28. $\cot \angle A$

Find the indicated trigonometric function.

29. If $\sin \angle A = \frac{3}{5}$, find $\cos \angle A$

30. If $\sin \theta = \frac{11}{61}$, find $\tan \theta$

31. If $\tan \angle H = \frac{4}{3}$, find $\sin \angle H$

32. If $\sin \angle J = \frac{1}{2}$, find $\cos \angle J$

33. If $\tan \angle R = \frac{5}{3}$, find $\sin \angle R$

32. If $\cos \theta = \frac{5}{9}$, find $\tan \theta$

35. If $\sin \angle L = \frac{2}{5}$, find $\cos \angle L$

36. If $\tan \theta = 3$, find $\cos \theta$

WS #5 Exact Values

Evaluate each expression.

1. $\sin\left(\frac{\pi}{4}\right)$
2. $\cos\left(\frac{\pi}{4}\right)$
3. $\tan\left(\frac{\pi}{4}\right)$
4. $\cos(210°)$
5. $\sin(300°)$
6. $\tan 330°$
7. $\sin\left(\frac{3\pi}{4}\right)$
8. $\cos\frac{3\pi}{4}$
9. $\sin 90°$
10. $\csc 270°$
11. $\tan(-45°)$
12. $\cos\left(\frac{3\pi}{2}\right)$
13. $\tan\left(\frac{3\pi}{2}\right)$
14. $\sin(-135°)$
15. $\cos\left(-\frac{\pi}{2}\right)$
16. $\tan\left(\frac{5\pi}{4}\right)$
17. $\csc\left(\frac{\pi}{3}\right)$
18. $\tan(-225°)$
19. $\csc(2\pi)$
20. $\sin\left(\frac{14\pi}{6}\right)$
21. $\tan\left(\frac{21\pi}{4}\right)$
22. $\sec 150°$
23. $\tan\left(-\frac{10\pi}{3}\right)$
24. $\sin 3\pi$
25. $\sin 2\pi$
26. $\cot(-\frac{17\pi}{6})$
27. $\cos(-120°)$
28. $\cot 600°$
29. $\sec\left(-\frac{\pi}{3}\right)$
30. $\cos\left(-\frac{\pi}{3}\right)$
31. $\csc(-510°)$
32. $\tan(-3\pi)$
33. $\sin 4\pi$
34. $\cos\frac{11\pi}{4}$
35. $\tan(-120°)$
36. $\sin(-\pi)$
37. $\cot(-150°)$
38. $\sin(60°)$
39. $\csc(60°)$

WS #6 Unit 3 Test Review

Change to a decimal degree.

1. 34° 29' 10"
2. 75° 35' 12"

Change to degrees/minutes/seconds.

3. 16.32°
4. 45.95°

Change to a radian measure in terms of π.

5. 157.5°
6. 32°
7. 45°
8. 180°

Change to a degree measure.

9. $\frac{7\pi}{8}$
10. $\frac{-4\pi}{3}$
11. 4.76
12. 4

Convert to a radian measure.

13. Convert the 262°43'48" to a radian measure. Round to 3 decimal places.

Find one positive and one negative coterminal angle for the given angle.

14. $\frac{13\pi}{4}$
15. $\frac{-11\pi}{6}$
16. 240°
17. -135°

Determine the quadrant in which the terminal side lies for the given angles.

18. -150°
19. 405°
20. $\frac{4\pi}{3}$
21. $\frac{-7\pi}{12}$

22. 3.2
23. 1.5

Given the radian measure of a central angle, find the measure of its intercepted arc in a circle of radius 5 inches.

24. $\frac{4\pi}{3}$
25. 2.4

Given the measure of a central angle, find the measure of its intercepted arc in a circle of radius 30 cm.

26. 42°

27. 120°

Given the measure of an arc, find the radian measure of its central angle in a circle whose radius is 10 cm.

28. 12 cm

29. 45 cm

Find the value of the six trig functions of an angle in standard position if the given point lies on its terminal side.

30. $(-\sqrt{3}, -1)$

31. (7, 24)

32. (-8, 15)

33. (5, 0)

Suppose θ is an angle in standard position whose terminal side lies in the given quadrant. Find the value of the remaining five trig functions of θ.

34. sin θ = $-\frac{3}{5}$, quadrant III

35. cos θ = $-\frac{1}{2}$, quadrant II

36. cot θ = $\frac{1}{2}$, quadrant I

37. cos θ = $\frac{\sqrt{3}}{3}$, quadrant IV

Find the exact value of each trigonometric function.

38. cot - 30°

39. sin 240°

40. sec 135°

41. cos 135°

42. sec $\frac{4\pi}{3}$

43. sec $\frac{2\pi}{3}$

44. sec 60°

45. tan $\frac{5\pi}{4}$

46. tan 120°

47. cos -270°

48. sin - 45°

49. cot $\frac{-4\pi}{3}$

50. csc 150°