Homework Answers

Pg 227

# 1
sin \( \theta = \frac{4\sqrt{2}}{9} \) \quad \text{csc} \( \theta = \frac{9\sqrt{2}}{8} \)

\[ \cos \theta = \frac{7}{9} \quad \text{sec} \theta = \frac{9}{7} \]

\[ \tan \theta = \frac{4\sqrt{2}}{7} \quad \text{cot} \theta = \frac{7\sqrt{2}}{8} \]

#9

\[ \sin \theta = \frac{4}{5} \quad \text{csc} \theta = \frac{5}{4} \]

\[ \cos \theta = \frac{3}{5} \quad \text{sec} \theta = \frac{5}{3} \]

\[ \tan \theta = \frac{4}{3} \quad \text{cot} \theta = \frac{3}{4} \]

#103 G

#83 See me
Bellwork

Find the values of the 6 trig functions of $\theta$. 

![Diagram of a right triangle with sides 3 and 4 and angle $\theta$.]
Section 4.2: Angles in Degrees and Radians

Objective: SWBAT identify positive and negative angle measures in degrees and radians.
Angles and Their Measures:

**Standard Position**

An angle with a vertex at the origin and initial side on positive x-axis.

An angle can be formed by rotating a ray about its endpoint (the origin).

The measure of the angle describes the amount and direction of rotation.
Angles and Their Measures:

Positive Angle

Counterclockwise rotation.
Angles and Their Measures:

Negative Angle

Clockwise rotation.
Coterminal Angles:

Same angle, different measures. 
Examples: One is positive, one is negative

Same angle, different measures. 
Examples: One adds a full rotation.
Paper Plate

Mark the center
Diagram showing the quadrants of a circle with degree markings at 0°, 90°, 180°, 270°, 360°.
Use the circle to estimate the number of degrees in the angle: consider both positive and negative measures.
In which quadrant would you find the angle?

176°  -218°

-365°  408°
Complementary Angles

• Two angles that add to 90°

  – To find a complement:
    
    90° – \textit{ANGLE}
Supplementary Angles

• Two angles that add to 180°

  – To find a supplement:
  
  \[180° – \text{ANGLE}\]
Find (if possible) the complement and supplement of the angles.

32°

158°

−25°
Coterminal angles are two angles in standard position that have the same terminal side.

Basically, the same angle, but different measure.

How could we find a coterminal angle for $60^\circ$?

Objective: SWBAT identify co-terminal angles.
There are **infinitely many** angles that are coterminal with a given angle.

You can rotate around the circle infinitely many times clockwise or counterclockwise and you still end up in the same spot.

**Objective:** SWBAT identify co-terminal angles.
Find two coterminal angles (one positive and one negative) for the given angle

a) 390°
   - 750° or 30°
   - -330°

b) -120°
   - 240°
   - -480°

more than one correct answer

Objective: SWBAT identify co-terminal angles.
Degrees, Minutes, Seconds

- Another way to express fractional parts of degrees.
  - The other option would be decimals.

- Minutes – notation is prime ( ’ )
- Seconds – notation is double prime ( ” )

Example: 125° 15’ 41”
Converting DMS → DD

15° 22’ 30”

• Type into calculator.
  – [2\text{nd}] [Apps] [1] for degree
  – [2\text{nd}] [Apps] [2] for minutes
  – [\text{Alpha}][+] for seconds

\[
\begin{array}{c|c}
15°22'30'' & 15.375 \\
\end{array}
\]

• Hit enter. Answer in decimal degrees.

If you have the TI-30X IIS you should have a [° ’ ”] button that will give you a menu for what you need!
Converting DD → DMS

15.375°

• Type into calculator.
  – [2^{nd}] [Apps] [4] for DMS

• Hit enter. Answer in degrees, minutes, seconds.

If you have the TI-30X IIS push [° ’ ”] and scroll all the way to the right...you don’t see DMS right away!
Summary...

In one complete sentence answer the following question....

What does “coterminal angles” mean?
Find a complementary angle and a supplementary angle, if possible, for the following angles:

a) 78°  
b) 115°  
c) -50°
Look at the worksheet:
Try #1 with your shoulder buddy
Bellwork

Find two coterminal angles (one positive and one negative) for the given angles.

\[275^\circ + 360^\circ = 635^\circ\]
\[-360^\circ = -85^\circ\]

\[-32^\circ + 360^\circ = 328^\circ\]
\[-360 = -392^\circ\]
Homework Answers

#Plus Complement

78°  a. 12°

115°  b. No Comp

-50°  c. -40°

Supplement°

a. 102°

b. 65°

c. -130°

Pg227 #2

\[ \sin \theta = \frac{2\sqrt{14}}{15} \quad \csc \theta = \frac{15\sqrt{14}}{28} \]

\[ \cos \theta = \frac{13}{15} \quad \sec \theta = \frac{15}{13} \]

\[ \cot \theta = \frac{2\sqrt{14}}{13} \quad \cot \theta = \frac{13\sqrt{14}}{28} \]

#10.

\[ \csc \theta = \frac{7\sqrt{13}}{13} \]

\[ \sin \theta = \frac{\sqrt{13}}{7} \quad \sec \theta = \frac{7}{6} \]

\[ \tan \theta = \frac{\sqrt{13}}{6} \quad \cot \theta = \frac{6\sqrt{13}}{13} \]

#20. 6.5

#27. 17.5 feet
Discovering Radians

1. Mark the center of your plate AND put a hash mark where the 0° would be – you don’t need to label it.
Discovering Radians

2. Check to make sure the small piece of paper handed to you is the length of the RADIUS of your paper plate.
3. Starting at the hashmark for 0° angle, wrap the radius around the edge of the paper plate. Put another hashmark at the end of the radius – *this represents an angle with measure of 1 radian.*
Discovering Radians

4. Starting at the hashmark for the first radian, wrap the radius around the edge of the paper plate again. Put another hashmark at the end of the radius – *this represents an angle with measure of 2 radians.*

Continue this process until you’ve made it all the way around the paper plate.
Discovering Radians

• How many radians fit in the whole circle? \(6 + \text{small amount}\)

• Distance around the circle \(\approx 2\pi\) radians.

• How many radians fit in half of the circle? \(3 + \text{smaller amount}\)

• Distance around half the circle \(\approx \frac{\pi}{2}\) radians
Why Radians???

• Measuring an angle in degrees has no relationship to any linear measure.

• Using radians allows us to measure the angle $\theta$ as a distance on the circle.
Estimate the angle to the nearest one-half radian:

- $30^\circ$ is close to $\frac{\pi}{6}$ radians.
- $300^\circ$ is close to $\frac{5\pi}{3}$ radians.
- $225^\circ$ is close to $\frac{5\pi}{4}$ radians.
- $165^\circ$ is close to $\frac{11\pi}{12}$ radians.
In which quadrant would you find the angle:

\[ \frac{\pi}{7} \quad \text{Q I} \]

\[ -\frac{2\pi}{3} \quad \text{Q III} \]

\[ -\frac{5\pi}{8} \]

\[ \frac{7\pi}{3} \quad +\frac{\pi}{3} \]
Converting Deg\(\rightarrow\)Rad and Rad\(\rightarrow\)Deg

- \(180^\circ = \pi\)

- Convert Deg\(\rightarrow\)Rad:
  \[
  \text{Multiply by } \frac{\pi}{180}
  \]

- Convert Rad\(\rightarrow\)Deg:
  \[
  \text{Multiply by } \frac{180}{\pi}
  \]

Objective: SWBAT convert angle measure from degrees to radians and vice versa.
Convert From Degrees to Radians
Express the angle in radian measure as a multiple (fraction) of \( \pi \).

a) \( 135° \)
\[ \frac{135}{180} \times \frac{\pi}{180} = \frac{3\pi}{4} \]

b) \( 540° \)
\[ \frac{540}{180} \times \frac{\pi}{180} = \frac{3\pi}{2} \]

c) \( -270° \)
\[ \frac{-270}{180} \times \frac{\pi}{180} = -\frac{3\pi}{2} \]

Convert From Radians to Degrees

a) \( -\frac{5\pi}{16} \)
\[ -\frac{5\pi}{16} \times \frac{180}{\pi} = -150° \]

b) \( \frac{7\pi}{14} \)
\[ \frac{7\pi}{14} \times \frac{180}{\pi} = 315° \]

Objective: SWBAT convert angle measure from degrees to radians and vice versa.
Convert From Degrees to Radians

Express the angle in radian measure as a multiple (fraction) of $\pi$.

-20°

$144° \times \frac{\pi}{180} = \frac{4\pi}{5}$

Convert From Radians to Degrees

$\frac{3\pi}{5} \times \frac{180}{\pi} = 108°$

b) -1.5

-85.94°

Objective: SWBAT convert angle measure from degrees to radians and vice versa.
Convert
Express the angle in radian measure as a multiple (fraction) of $\pi$.

$150^\circ$ \hspace{1cm} $-30^\circ$

Express the angle in degree measure.

$\frac{7\pi}{6}$ \hspace{1cm} $\frac{2\pi}{5}$
Complementary Angles

• Two angles that add to 90° or ___ radians.
  – To find a complement:

  \[90° - \text{ANGLE} \quad \text{or} \quad \frac{\pi}{2} - \text{ANGLE}\]

Find (if possible) the complement of each angle

\[
\begin{align*}
\frac{\pi}{8} \\
3\pi/5
\end{align*}
\]
Supplementary Angles

• Two angles that add to $180^\circ$ or ___ radians.

  – To find a complement:

    $180^\circ - \text{ANGLE}$ or $\pi - \text{ANGLE}$

Find (if possible) the supplement of each angle

\[
\begin{array}{c}
\pi \\
8 \\
3\pi \\
5
\end{array}
\]
What is a coterminal angle?

• Review vocab with your shoulder buddy.
  – What does it mean to be coterminal?
  – What are some ways to find coterminal angles?

Objective: SWBAT identify co-terminal angles.
Find two coterminal angles (one positive and one negative) for the given angle

\[
\frac{\pi}{12} + 2\pi = \frac{25\pi}{12}
\]

\[
\frac{\pi}{12} - 2\pi = -\frac{23\pi}{12}
\]

more than one correct answer

Objective: SWBAT identify co-terminal angles.
Find two coterminal angles (one positive and one negative) for the given angle

\[ \frac{2\pi}{3} + 2\pi = \frac{8\pi}{3} \]

\[ \frac{2\pi}{3} - 2\pi = -\frac{4\pi}{3} \]

more than one correct answer

Objective: SWBAT identify co-terminal angles.
Find two coterminal angles (one positive and one negative) for the given angle

\[
\frac{\pi}{5} \quad 128^\circ
\]

Objective: SWBAT identify co-terminal angles.
Summary:

How do you convert a radian measure to a degree?

Homework:
Page 228 #47, 48, 51, 53
Page 238 #10-17
Page 240 68-71

Homework Quiz Next Class!!
Radians Day 2

Homework:
Page 238  #2, 4, 6, 8, 22-25
Page 240 68-71
Look at the worksheet:
Try #1 with your shoulder buddy
(on the radian side!!)