Homework Answers

Pg 227  \[ \sin \theta = \frac{4\sqrt{2}}{9} \quad \csc \theta = \frac{9\sqrt{2}}{8} \]

# 1  \[ \cos \theta = \frac{7}{9} \quad \sec \theta = \frac{9}{7} \]
\[ \tan \theta = \frac{4\sqrt{2}}{7} \quad \cot \theta = \frac{7\sqrt{2}}{8} \]

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

#9  \[ \cos \theta = \frac{3}{5} \quad \sec \theta = \frac{5}{3} \]
\[ \tan \theta = \frac{4}{3} \quad \cot \theta = \frac{3}{4} \]

#103  \[ \text{G} \]

#83  See me
Bellwork

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

Given:

- $a^2 + b^2 = c^2$
- $3^2 + 4^2 = c^2$
- $25 = c^2$
- $c = 5$

Using Pythagorean Theorem:

- Hypotenuse $= 5$

$\sin \theta = \frac{3}{5}$

$\cos \theta = \frac{4}{5}$

$\tan \theta = \frac{3}{4}$

$\csc \theta = \frac{5}{3}$

$\sec \theta = \frac{5}{4}$

$\cot \theta = \frac{4}{3}$
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.

45°
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
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°  QII

-218°  Q II

-365°  QIV

408°  Q I
Complementary Angles

• Two angles that add to 90°

  – To find a complement:

    $90° - \text{ANGLE}$
Supplementary Angles

• Two angles that add to $180^\circ$

  – To find a supplement:

    $180^\circ – \text{ANGLE}$
Find (if possible) the complement and supplement of the angles.

\[ 90^\circ \quad 32^\circ \quad 90^\circ \quad \text{comp} \quad 90^\circ \quad 148^\circ \quad 180^\circ \quad 180^\circ \quad \text{Supp} \quad 148^\circ \quad \frac{180}{32} \quad \frac{180}{148} \]

\[ 90^\circ \quad 158^\circ \quad 290^\circ \quad \text{none} \quad 220^\circ \quad 180^\circ \quad \frac{180}{158} \quad \frac{180}{25} \quad \frac{155}{155} \]

\[ -25^\circ \quad -65^\circ \quad -155^\circ \]
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°?

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) $390^\circ$

- $330^\circ$
- $750^\circ$ or $30^\circ$

b) $-120^\circ$

- $-480^\circ$
- $240^\circ$

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^{nd}] [Apps] [1] for degree
  – [2^{nd}] [Apps] [2] for minutes
  – [Alpha][+] for seconds

| 15° 22' 30" | 15.375 |

• 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

  \[
  \begin{array}{c}
  15.375° \text{DMS} \\
  15°22'30"
  \end{array}
  \]

• 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?
Homework

Page 227  #2, 10, 20, 27

Page 238  2, 4, 6, 8, 18, 19, 20, 21

Plus:

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°

-32°
Homework Answers

#2  A. 486°, -234°  #3 A. 324°, -396°
    B. No Comp  B. -54°
    C. 54°  C. -144°
    D. QII  D. QIV

Pg227 #2

#20. 6.5

#10.
\[
\sin \theta = \frac{\sqrt{13}}{7} \quad \sec \theta = \frac{7}{6}
\]
\[
\tan \theta = \frac{\sqrt{13}}{6} \quad \cot \theta = \frac{6\sqrt{13}}{13}
\]

#26. 71.2
1. Mark the center of your plate AND put a hash mark where the 0° would be – you don’t need to label it.
2. Check to make sure the small piece of paper handed to you is the length of the RADIUS of your paper plate.
Discovering Radians

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?

• Distance around the circle ≈ _______ radians.

• How many radians fit in half of the circle?

• Distance around half the circle ≈ _______ 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.

• A central angle has a measure of 1 radian if it intercepts an arc with the same length as the radius of the circle.
Estimate the angle to the nearest one-half radian:
In which quadrant would you find the angle:

\[
\begin{align*}
\frac{\pi}{7} & \quad - \quad \frac{2\pi}{3} \\
- \frac{5\pi}{8} & \quad \frac{7\pi}{3}
\end{align*}
\]
Complementary Angles

• Two angles that add to 90° or ___ radians.

  – To find a complement:

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

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

  – To find a supplement:

    $180^\circ - \textit{ANGLE}$ or $\pi - \textit{ANGLE}$
Find (if possible) the complement and supplement of an angle

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

3 \pi \\
5
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

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

Objective: SWBAT identify co-terminal angles.
Look at the worksheet:
Try #1 with your shoulder buddy
(on the radian side!!)
Converting Deg→Rad and Rad→Deg

• _____ ° = ______

• Convert Deg→Rad:

• Convert Rad→Deg:

*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°  
\[ \frac{3\pi}{4} \]

b) 540°  
\[ 3\pi \]

c) -270°  
\[ -\frac{3\pi}{2} \]

Convert From Radians to Degrees

a) \( \frac{5\pi}{6} \)  
-150°

b) 2  
114.59°

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 $\pi$.

- $-20^\circ$ becomes $-\pi/9$
- $144^\circ$ becomes $4\pi/5$

Convert From Radians to Degrees

- $\frac{3\pi}{5}$ becomes $108^\circ$
- $b) \ -1.5$ becomes $-85.94^\circ$

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

$150^\circ$ $-30^\circ$

Express the angle in degree measure.

$-\frac{7\pi}{6}$ $\frac{2\pi}{5}$
Summary:

How do you convert a radian measure to a degree?

Homework:

Wksht (S2) #2, 3
Wksht (S1) #4, 10
Page 227 #8, 26
Wksht (S2) #9, 16

Homework Quiz Next Class!!