Trigonometry   Section 2.1
Degrees and Radians:
Arc Length Formula (Radian Measure) and (Degree Measure):
Angular and Linear Motion:

Degrees and Radians
Working with DMS measure:

(a) Convert 37.425° to DMS.   (b) Convert 42°24'36" to Degrees

In Exercises 1 to 12, find the measure of the complement and supplement of each angle.

2.   87°   6.   19°42'05"   11. $\frac{2\pi}{5}$

You try ☺
5.   56°33'15"

Standard Position:

Positive Angles: Negative Angles

Coterminal Angles are standard position angles that have the same terminal side.
To find angles coterminal to a given angle:

In Exercises 13 to 18, classify each angle by quadrant, and state the measure of the positive angle with measure less than 360° that is coterminal with the given angle.

13. $\alpha = 610°$ 18. $\alpha = -3789°$

In Exercises 19 to 24:
Use a calculator to convert each decimal degree measure to its equivalent DMS measure.

20.   110.24'   22.   18.96'

In Exercises 25 to 30:
Use a calculator to convert each DMS measure to its equivalent degree measure.

26.   63°29'42"   30.   19°12'18"

Degree-Radian Conversion:

In Exercises 31 to 39, convert the degree measure to exact radian measure.

31. 30°   38.   630°

In Exercises 40 to 48, convert the radian measure to exact degree measure.

44. $\dfrac{\pi}{9}$ 48 $\dfrac{6\pi}{5}$

In Exercises 49 to 54, convert radians to degrees or degrees to radians.
Round answers to the nearest hundredth.

50.   −2.3   52.   427°

Arc Length Formula (Radian Measure):   Arc Length Formula (Degree Measure):

In Exercises 55 to 58, find the measure in radians and degrees of the central angle
of a circle subtended by the given arc, Round answers to the nearest hundredth.

56. $r = 7\ ft., s = 8\ inches$ 58. $r = 35.8\ meters, s = 84.3\ inches$

In Exercises 59 to 62, find the measure of the intercepted arc of a circle
with the given radius and central angle. Round answers to the nearest hundredth.

59. $r = 8\ inches, \theta = \dfrac{\pi}{4}$ 62. $r = 5\ meters, \theta = 144°$

Convert:
65 miles per hour to feet per second.

Angular and Linear Motion:

Using Angular Speed:
Albert Juarez's truck has wheels 36 inches in diameter.
If the wheels are rotating at 630 rpm (revolutions per minute),
find the truck's speed in miles per hour.

$$\dfrac{630\ rev}{1\ min} \times \underline{\quad\quad} \times \underline{\quad\quad} \times \underline{\quad\quad} \times \underline{\quad\quad} \times \underline{\quad\quad} \times \underline{\quad\quad} \approx$$

Trigonometry   Section 2.1
Degrees and Radians:
Arc Length Formula (Radian Measure) and (Degree Measure):
Angular and Linear Motion:

Degrees and Radians
Working with DMS measure:

$$1 \text{ degree} = 60 \text{ minutes}$$
$$1 \text{ minute} = 60 \text{ seconds}$$

(a) Convert 37.425° to DMS.

$$37°\ 25'\ 30''$$

(b) Convert 42°24'36" to Degrees

$$42.41°$$

In Exercises 1 to 12, find the measure of the complement and supplement of each angle.

2.   87°   c) 3°
             s) 93°

6.   85°19'42'05"
      $\begin{array}{r} 90\ \cancel{60}°\cancel{59}'60'' \\ -19°42'05'' \\ \hline \end{array}$
      c) 70°17'55''
      s) 160°17'55''

11. $\frac{2\pi}{5}$

c) $\frac{\pi}{2} - \frac{2\pi}{5} = \frac{\pi}{10}$

s) $\frac{\pi}{?} - \frac{2\pi}{5} = \frac{3\pi}{5}$

You try ☺
5.   56°33'15"

Standard Position:
Vertex at the origin
Initial side is the positive x-axis, Terminal side is
                                        rotating ray

Positive Angles: Negative Angles

Counter-clockwise   clock wise

Coterminal Angles are standard position angles that have the same terminal side.
To find angles coterminal to a given angle:

$$\theta \pm 360$$
$$\theta \pm 2\pi$$

In Exercises 13 to 18, classify each angle by quadrant, and state the measure of the positive angle with measure less than 360° that is coterminal with the given angle.

13.   α = 610°

$\begin{array}{r} 610 \\ -360 \\ \hline \end{array}$ = 250°

18.   α = −3789°

$\begin{array}{r} +3600 \\ \hline -189 \\ +360° \\ \hline \end{array}$ = 171°

In Exercises 19 to 24:
Use a calculator to convert each decimal degree measure to its equivalent DMS measure.
20.   110.24°

$$110°\ 14'\ 24''$$

22.   18.96°

$$18°\ 57'\ 36''$$

In Exercises 25 to 30:
Use a calculator to convert each DMS measure to its equivalent degree measure.
26.   63°29'42"   30.   19°12'18"

$$63.495°$$ $$19.205°$$

Degree-Radian Conversion:

Degrees to Radians $\left(\frac{\pi}{180}\right)$ Radians to Degrees $\left(\frac{180°}{\pi}\right)$

In Exercises 31 to 39, convert the degree measure to exact radian measure.

31. 30°. $\frac{\pi}{180°}$ = $\boxed{\frac{\pi}{6}}$ 38. 630°. $\frac{\pi}{180°}$ = $\boxed{\frac{7\pi}{2}}$

In Exercises 40 to 48, convert the radian measure to exact degree measure.

44. $\frac{\pi}{9}$. $\frac{180°}{\pi}$ = $20°$ 48 $\frac{6\pi}{5}$. $\frac{180°}{\pi}$ = $216°$

In Exercises 49 to 54, convert radians to degrees or degrees to radians.
Round answers to the nearest hundredth.

50. −2.3 . $\frac{180}{\pi}$ ≈ $-131.78°$ 52. 427°. $\frac{\pi}{180}$ ≈ 7.45

Arc Length Formula (Radian Measure):   Arc Length Formula (Degree Measure):

$S = r \cdot \theta$ $S = r \cdot \frac{\pi}{180} \cdot \theta$

In Exercises 55 to 58, find the measure in radians and degrees of the central angle
of a circle subtended by the given arc, Round answers to the nearest hundredth.

56. $r = 7\ ft., s = 8\ inches$ 58. $r = 35.8\ meters, s = 84.3\ inches$

$r = 84\ in$ $S = r \cdot \theta$
  $8 = 84 \cdot \theta$
$\boxed{\theta = 5.46° \quad ; \quad \theta \approx .095}$

In Exercises 59 to 62, find the measure of the intercepted arc of a circle
with the given radius and central angle. Round answers to the nearest hundredth.

59. $r = 8\ inches, \theta = \frac{\pi}{4}$ 62. $r = 5\ meters, \theta = 144°$

$S = 8 \cdot \frac{\pi}{4} = 2\pi \approx \boxed{6.28\ in}$ $5 \cdot 144° \cdot \frac{\pi}{180°}$ $\boxed{= 12.57\ m}$

Convert:
65 miles per hour to feet per second.

$\frac{65\ miles}{1\ hour} \times \frac{1\ hour}{60\ min} \times \frac{1\ min}{60\ sec} \times \frac{5280\ ft}{1\ miles}$ $\boxed{= 95.3\ ft/sec}$

Angular and Linear Motion:

Angular motion is (rpm) rev/min   linear motion (mph) miles/hour

Using Angular Speed:
Albert Juarez's truck has wheels 36 inches in diameter.   radius = 18 inches
If the wheels are rotating at 630 rpm (revolutions per minute),
find the truck's speed in miles per hour.

$1\ rev = 2\pi\ rad.$
$1\ rad. = 1\ radius$ $\frac{630\ rev}{1\ min} \times \frac{60\ min}{1\ hour} \times \frac{2\pi\ rad}{1\ rev} \times \frac{18\ inches}{1\ radian} \times \frac{1\ ft}{12\ in} \times \frac{1\ mile}{5280\ ft} \approx \boxed{67.5\ \frac{miles}{hour}}$

To convert degrees to DMS (degrees, minutes, and seconds), follow these steps:

1. Put the calculator in Degree mode.

2. If necessary, press [2nd][MODE] to access the Home screen.

3. Enter the degree measure.

4. Press [2nd][APPS][4][ENTER] to convert the degrees to DMS.

To convert DMS to degrees, follow these steps:

1. Put the calculator in Degree mode.

2. If necessary, press [2nd][MODE] to access the Home screen.

3. Enter the DMS measure.

4. Press [ENTER] to convert the DMS entry to degrees.

Enter angles in DMS measure on the TI-84 Plus

To enter an angle in DMS measure:

1. Enter the number of degrees and press [2nd][APPS][1] to insert the degree symbol.

2. Enter the number of minutes and press [2nd][APPS][2] to insert the symbol for minutes.

3. Enter the number of seconds and press [ALPHA][+] to insert the symbol for seconds.