College Review Math
Section 7A
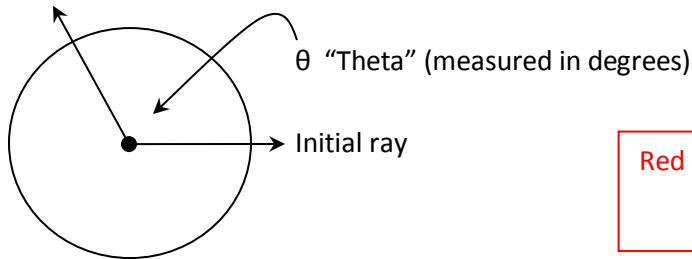
Measurement of Angles

Terminal ray

θ "Theta" (measured in degrees)

Initial ray

Red

Degree breakdown:
Minutes & Seconds

Convert the following degree measurements to decimal form. Round to nearest hundredth.

Examples:
1) 50°45'10"
50 degrees, 45 minutes, 10 seconds

= 50 + (45/60) + (10/3600)
punch in calc., round to 2-decimals
= 50.75°

2) 185°5'32"
185 degrees, 5 minutes, 32 seconds

= 185 + (5/60) + (32/3600)
= 185.09°

Your turn:
3) 296°30'15"

= 296 + (30/60) + (15/3600)
= 296.50°

4) 11°8'59"

= 11 + (8/60) + (59/3600)
= 11.15°

Convert the following decimals into degree-minute-second notation.

Examples:
1) 42.7°

multiply tenths digit by 60
= 42 + (.7)(60)
= 42° 42'

2) 322.815°

= 322 + (.815)(60)
= 322 and 48.9 minutes
multiply .9 by (60) to get the seconds
= 322° 48' 54"

Your turn:
3) 199.25°

= 199 + (.25)(60)
= 199° 15'

4) -87.205°

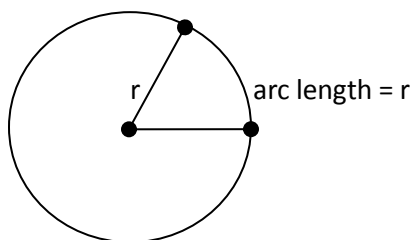Best to just include the -87 for the
final answer. (.205)(60) = 12.3
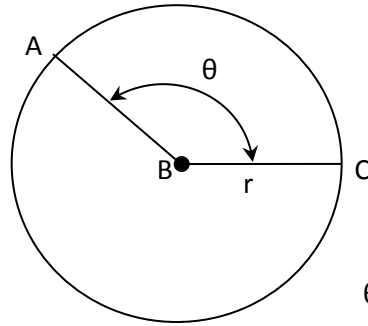(.3)(60) = 18
Answer: -87° 12' 18"

r
arc length = r

1 radian unit is the equivalent measure of an angle
in degrees, where the radius of the circle is equal to
the arc length that it cuts.

The distance from A to C is the arc-length noted with the variable "s"

θ is also known as the central angle

Formula:

$$\theta = \frac{s}{r} \quad \text{needed in Section 7-2}$$

Change each degree measurement into radians (round answers to the nearest hundredth)

Examples: 1)   212°   2)   18°6'

Formula:

$$d \cdot \frac{\pi}{180}$$

$212\left(\frac{\pi}{180}\right)$ use a calculator…

≈3.70 radians

$\left(18 + \frac{6}{60}\right)\left(\frac{\pi}{180}\right)$

≈0.32 radians

Your turn: 3)   307°   4)   111°55'30"

$307\left(\frac{\pi}{180}\right)$ Use a calculator…

≈5.36 radians

$\left(111 + \frac{55}{60} + \frac{30}{3600}\right)\left(\frac{\pi}{180}\right)$

≈1.95 radians

Change each degree measurement into radians (in terms of π)

Examples: 1)   160°   2)   840°

Formula:

$$d \cdot \frac{\pi}{180}$$

$160\left(\frac{\pi}{180}\right) = \left(\frac{160}{1}\right)\left(\frac{\pi}{180}\right) = \frac{160\pi}{180}$

Reduce the fraction, leave pi.

$= \frac{8\pi}{9}$ radians

$840\left(\frac{\pi}{180}\right) = \frac{840\pi}{180}$

$= \frac{14\pi}{3}$

Your turn: 3)   45°   4)   480°

$45\left(\frac{\pi}{180}\right) = \frac{45\pi}{180}$

$= \frac{\pi}{4}$

$480\left(\frac{\pi}{180}\right) = \frac{480\pi}{180}$

$= \frac{8\pi}{3}$

Converting radian measurements to degrees

Change each radian measurement (in either decimal or π-form) into degrees.
Round any decimal answers to nearest hundredth.

Examples:　　1)　　$\dfrac{5\pi}{4}$

2)　　-9.5

Formula:

$$r \bullet \dfrac{180}{\pi}$$

$\left(\dfrac{5\pi}{4}\right)\left(\dfrac{180}{\pi}\right)$ Use a calculator.
=225°

$-9.5\left(\dfrac{180}{\pi}\right)$
≈ −544.31°

Your turn:　　3)　　$\dfrac{7\pi}{2}$

4)　　1.06

$\left(\dfrac{7\pi}{2}\right)\left(\dfrac{180}{\pi}\right)$ Use a calculator.
=630°

$1.06\left(\dfrac{180}{\pi}\right)$
≈ 60.73°

Coterminal angles
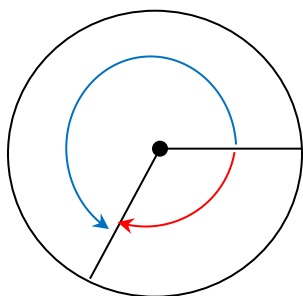
If the blue angle is 260°, what is the red angle?

Are there any other angles that begin on the "Initial ray"
and end at the same "Terminal ray"?

Yes, every time you rotate 360° in either direction, you end up at the same terminal ray.

Find two angles, one positive and one negative, which are coterminal to the given angle.

Examples:　　1)　　135°　　　　2)　　-513°　　　　3)　　276°11'

135　　　　135 +360　　　−360 495°　　　−225° etc., you may continue to add or subt. 360 to find more possibilities.	−513 +360 −153° ←could be used +360　　as neg. angle. 207° add/subt 360 for more	Method1 Convert to decimal 276+$\dfrac{11}{60}$', then add/subt 360 = 636.18$\bar{3}$° and = −83.81$\bar{6}$°	Method2 (add 360) 276°11" + 360 636°11" (subt 360) 　360 → borrow 359°60" − 276°11"　　− 276°11" 　　　　　　　　83°49" Just add the sign −83°49"