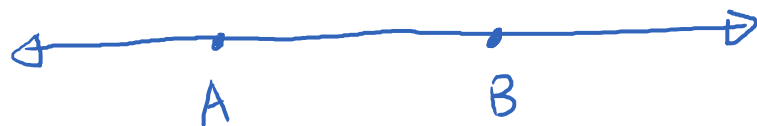


Objective 1: Basic Terminology.



2 distinct points A and B determine a line AB

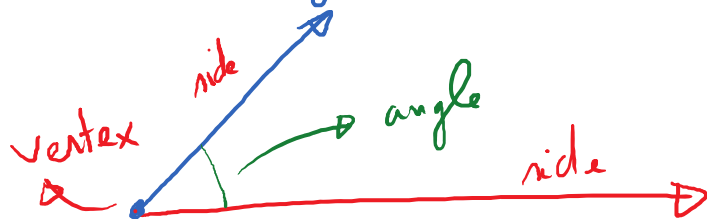


Line segment AB: a portion of the line between A and B including the endpoints A, B



Ray AB: portion of the line AB starting at A continue through B and on past B

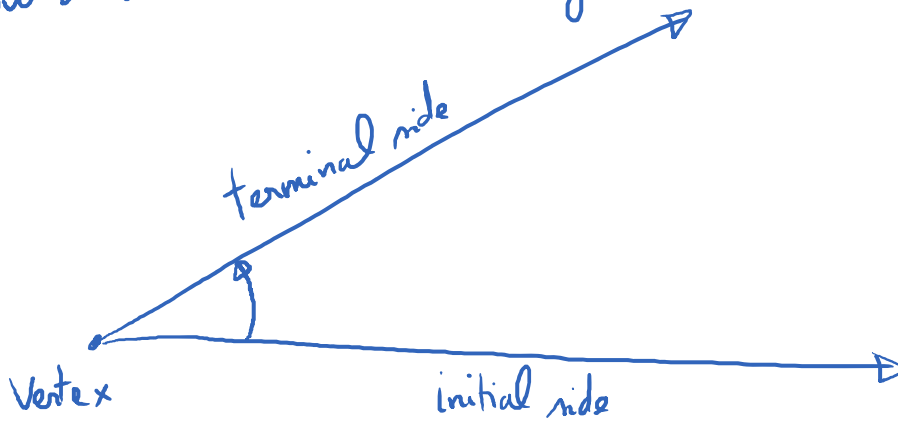
What is an angle?



An angle consists of 2 rays in a plane with a common

endpoint.

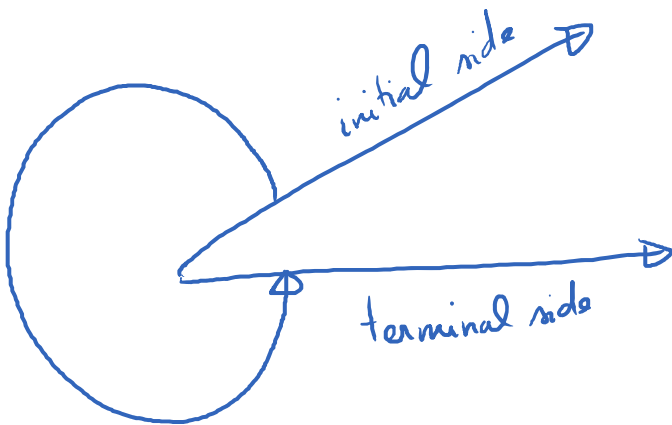
How do we measure an angle?



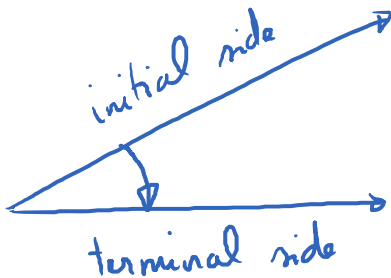
Rotate a ray starting at a side of the angle

Sign Convention.

Positive angle: Rotation in counter clock-wise



Negative angle: Rotation in clockwise direction.

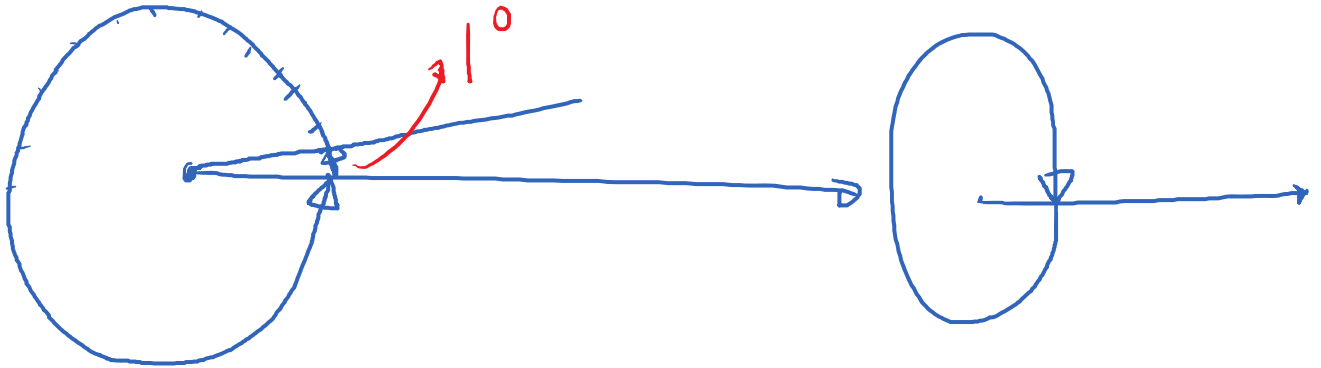


A common unit for measuring angles is the degree.

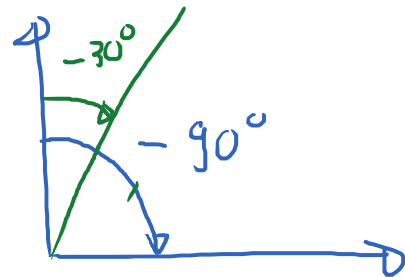
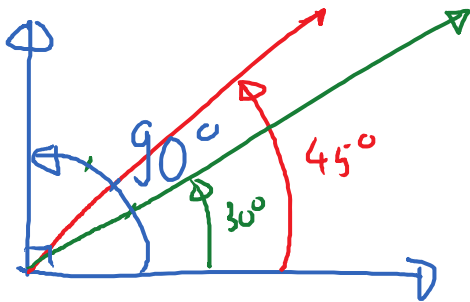
A common unit for measuring angles

360°

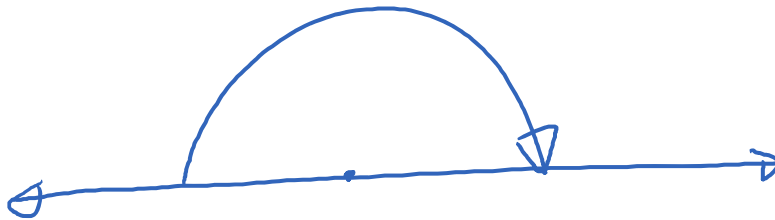
-360°



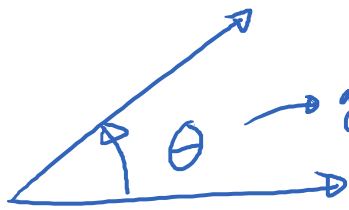
Cut the circle into 360 parts



-180°



Classify Angles



→ greek letter
theta

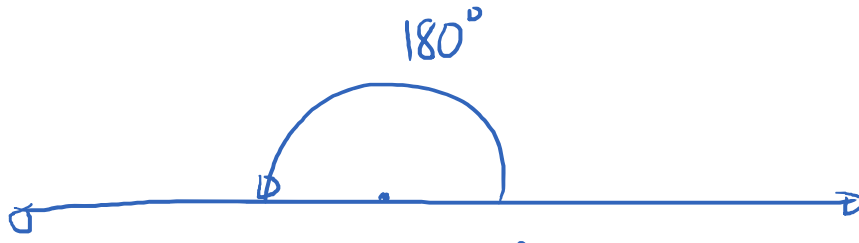
Acute Angle

$$0^\circ < \theta < 90^\circ$$

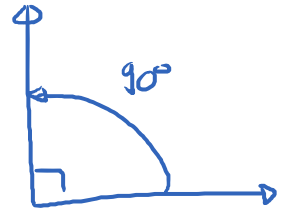


Obtuse angle

$$90^\circ < \theta < 180^\circ$$



Straight angle

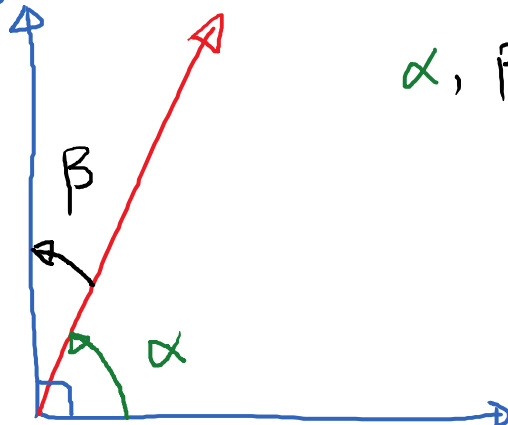


Right angle.

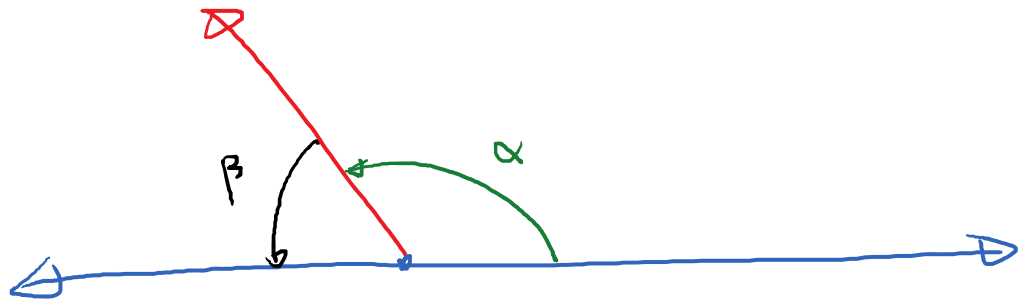
* Complementary and Supplementary Angles.

2 angles are complementary if their sum equals to 90° .

2 angles are supplementary if their sum equals to 180° .

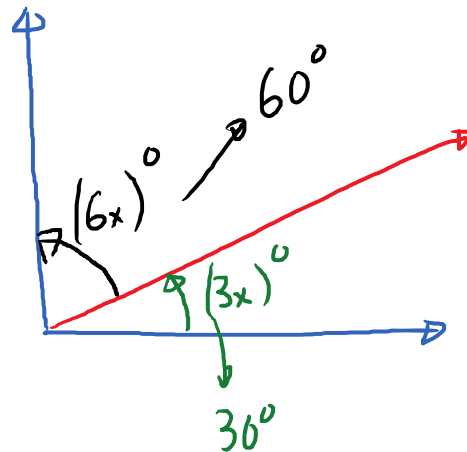


α, β are complementary angles



α, β are supplementary angles.

E.g.

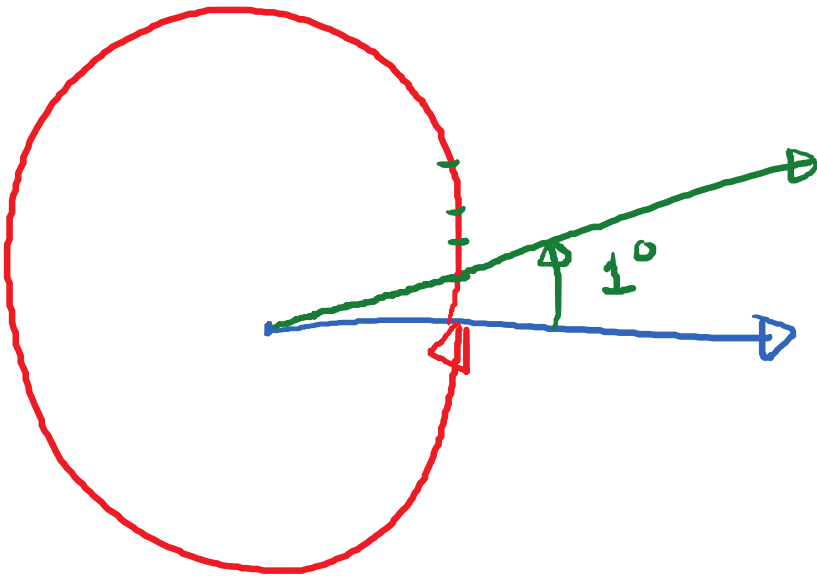


Find x ?

$$3x + 6x = 90^\circ$$

$$9x = 90^\circ$$

$$x = 10^\circ$$



360°

Degrees, minutes and seconds.

$$1 \text{ ft} = 12 \text{ inches}$$

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

$$1^\circ = 60'$$

$$\longrightarrow 1' = \left(\frac{1}{60}\right)^\circ$$

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

$$1' = 60''$$

$$\longrightarrow 1'' = \left(\frac{1}{60}\right)' = \left(\frac{1}{3600}\right)^\circ$$

$$1' = 60'' \longrightarrow 1 = \left(\frac{1}{60}\right) = \left(\frac{1}{3600}\right)$$

Convert between degrees, minutes and seconds to decimal degrees

(a) Convert $74^{\circ} 08' 14''$ into decimal degrees to nearest thousand.

$$74 + \frac{8}{60} + \frac{14}{3600} = 74.137^{\circ}$$

(b) Convert 34.817° into degrees, minutes and seconds form

$$\begin{aligned} 34.817^{\circ} &= 34^{\circ} + 0.817^{\circ} \\ &= 34^{\circ} + (0.817^{\circ}) \cdot (60') \\ &= 34^{\circ} + 49.02' \\ &= 34^{\circ} + 49' + 0.02' \end{aligned}$$

$$= 34^{\circ} + 49' + (0.02') \cdot (60'')$$

$$= 34^{\circ} + 49' + 1.2''$$

round to the nearest second

$$\approx 34^{\circ} + 49' + 1''$$

$$34.817^{\circ} \approx 34^{\circ} 49' 1''$$

Calculate with degrees, minutes and seconds

(a) $51^{\circ} 29' + 32^{\circ} 46'$

$$\begin{array}{r} 51^{\circ} 29' \\ + 32^{\circ} 46' \\ \hline 83^{\circ} 75' \end{array}$$

$$83^{\circ} 75'$$

$$83^{\circ} + 1^{\circ} 15'$$

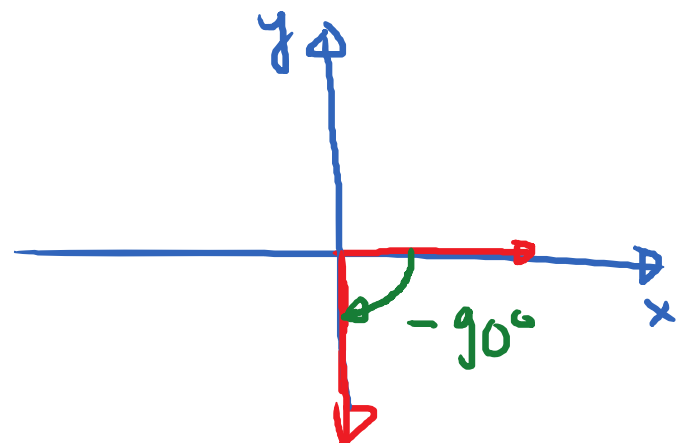
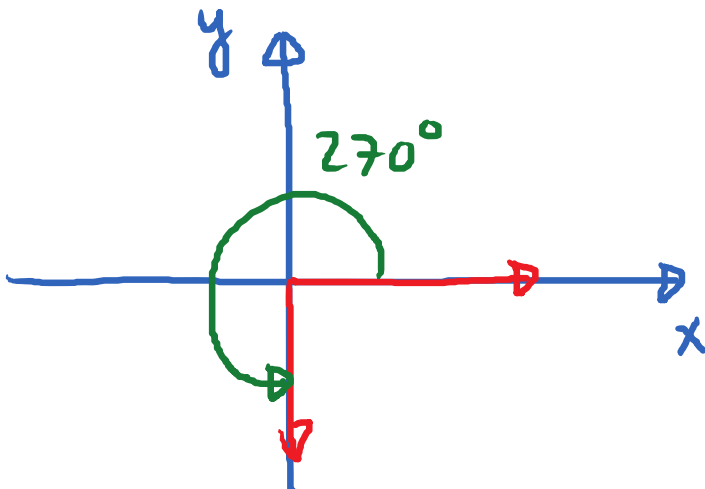
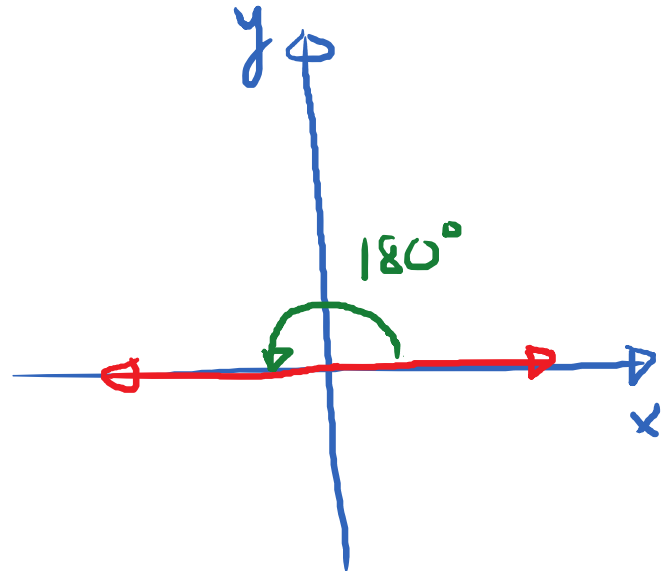
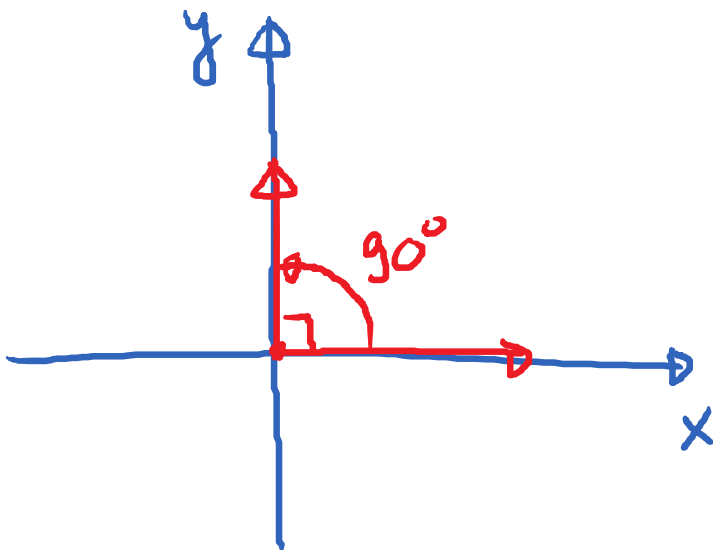
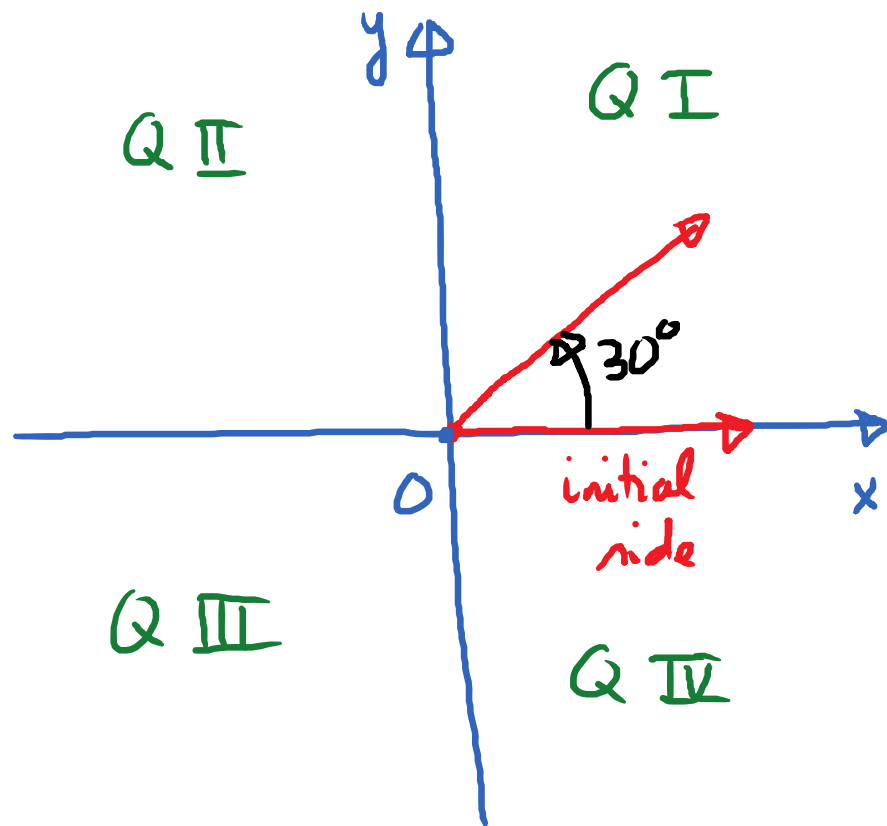
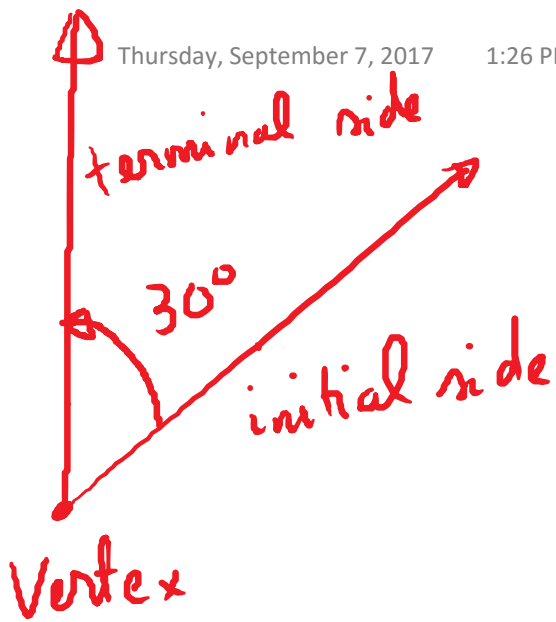
$$84^{\circ} 15'$$

Eg. $90^\circ - 73^\circ 12'$

$$\begin{array}{r}
 90^\circ \\
 - 73^\circ 12' \\
 \hline
 \end{array}
 \rightarrow
 \begin{array}{r}
 89^\circ 60' \\
 - 73^\circ 12' \\
 \hline
 \boxed{16^\circ 48'}
 \end{array}$$

Standard Position

An angle is in Standard Position if its vertex is at the origin and the initial side of the angle must be along the positive x-axis.





Coterminal Angles

 390°

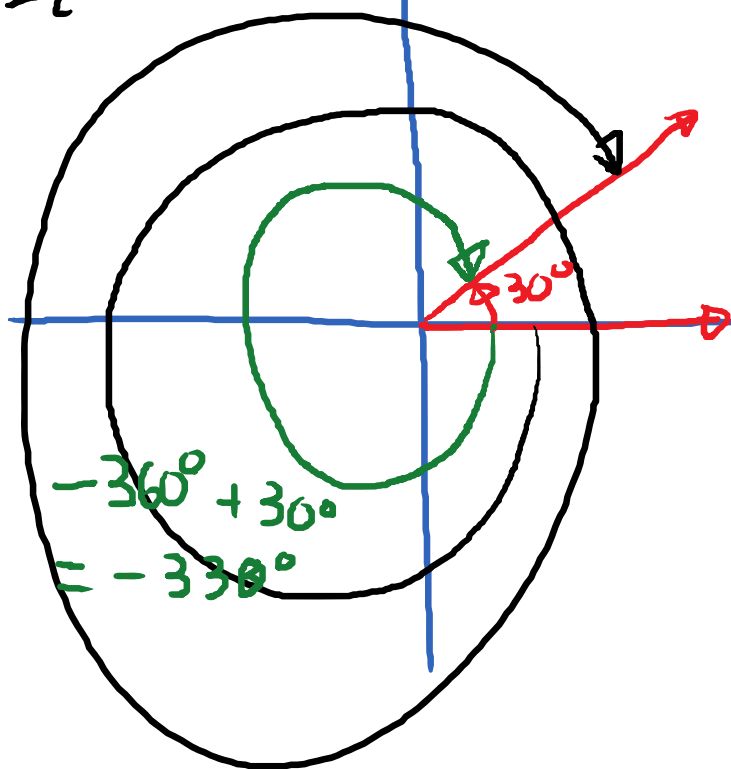
30° and 390° are
coterminal angles

# of complete rotations	terminal angles
0	30°
1	390°
2	750°
3	1110°

Thursday, September 7, 2017

1:38 PM

$$-2 \cdot 360^\circ + 30^\circ = -690^\circ$$



# of clockwise rotation	coterminal angles
0	30°
1	$-360^\circ + 30^\circ$ -330°
2	$-2 \cdot 360^\circ + 30^\circ$ -690°
3	$-3 \cdot 360^\circ + 30^\circ$ -1050°

The expression

$$30^\circ + n \cdot 360^\circ, \text{ } n \text{ is an integer}$$

describes all angles that are coterminal with 30° .

E.g. Find the angle of least positive measure coterminal with the angle of 908° .

$$908^\circ - 360^\circ = 548^\circ$$

$$548^\circ - 360^\circ = \boxed{188^\circ}$$

E.g. Find the angle of least positive measure coterminal with the angle -75° .

$$-75^\circ + 360^\circ = \boxed{285^\circ}$$