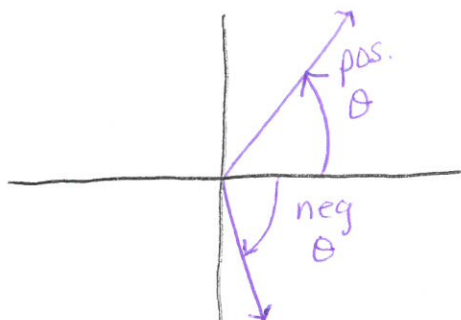


Section 2-2 Reference Angles, Coterminal Angles

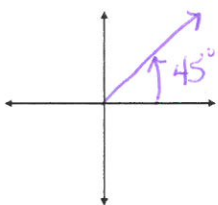


An angle whose vertex is at the origin and whose initial side is the positive x-axis is in **standard position**

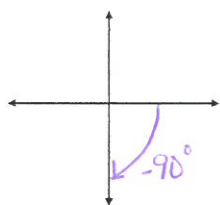
The angle measure is **positive** if the rotation is **counterclockwise**, and **negative** if the rotation is **clockwise**.

Draw an angle with the given measure in standard position.

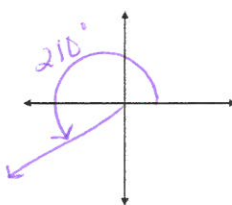
1a. 45°



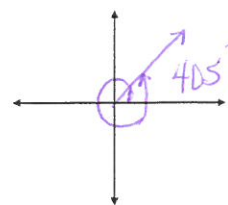
b. -90°



c. 210°



d. 405°



In example #1d, 405° and 45° are **coterminal**. Two angles in standard position are considered coterminal if their terminal sides coincide (are the same).

Some angles are measured in degrees, minutes and seconds.

Convert between Decimals and Degrees, Minutes, Seconds

1 revolution of circle = 360°

$1^\circ = 60'$

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

$D^\circ M' S''$

$1' = 60''$

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

Ex. $15^\circ 30' = 15.5^\circ$

Ex. $32^\circ 15' = 32.25^\circ$

2. Convert $50^\circ 6' 21''$ to a decimal in degrees. Round to 4 places.

$$50^\circ 6' \frac{21}{60} = 50^\circ 6.35' \Rightarrow 50^\circ \frac{6.35}{60} = \boxed{50.1058\bar{3}^\circ}$$

OR: use ANGLE menu on calc. (#1 for deg., #2 for min + ALPHA + for sec)

3. Convert 21.256° to $D^\circ M' S''$. Round to the nearest second.

$$21.256^\circ \Rightarrow .256 * 60 = 15.36 \rightarrow 50 \quad 21^\circ 15.36'$$

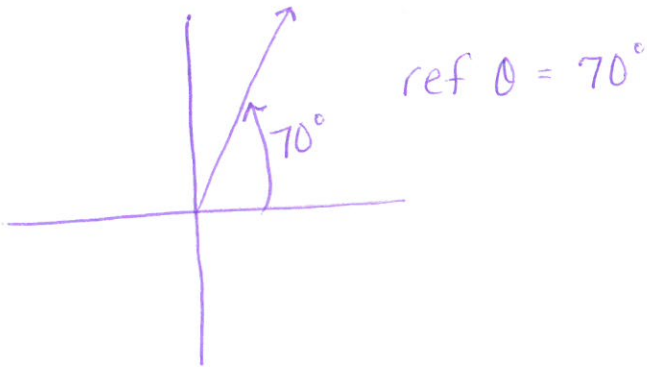
$$50: 21^\circ 15.36' \Rightarrow .36 * 60 = 21.6 \rightarrow \boxed{21^\circ 15' 21.6''}$$

OR: use ANGLE menu (#4)

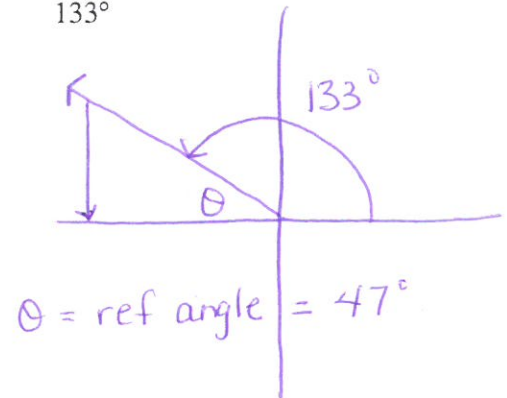
The **reference angle** of an angle in standard position is the *positive, acute* angle between the x-axis and terminal side.

Sketch the angle in standard position, mark the reference angle, and find its measure.

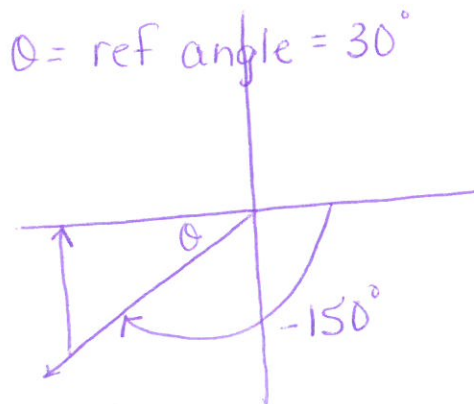
4. 70°



5. 133°



6. -150°



7. 1740°

