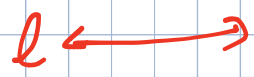
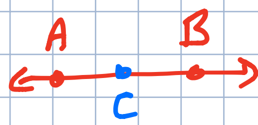
Line – straight set of points

– extends in both directions without end

– one-dimensional (no thickness)



line l



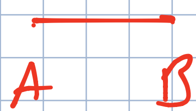
denoted by two points on the line

$\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$

$\overleftrightarrow{AC}$ as long as C is collinear to A and B

$\overleftrightarrow{BC}$

line segment – line w/ two endpoints

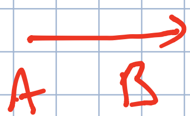


$\overline{AB}$ or $\overline{BA}$

denoted by the endpoints

ray – line extended from a single point indefinitely

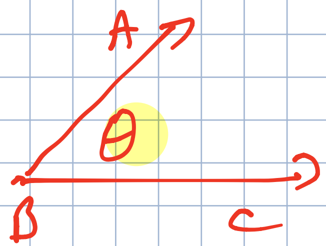
keeps going for undefined length.



$\overrightarrow{AB}$ ← another point on ray

↑ endpoint first

angle – intersection of two rays @ a common endpoint



$\angle B$ – intersection @ B

→ vertex point is Point B

$\angle ABC$ or $\angle CBA$

Middle letters represent points of intersection

Greek Letters

α = alpha γ = gamma θ = theta

β = beta δ = delta

We measure angles in **degrees**

$\frac{1}{360}$ of a full rotation.

360° is full rotation

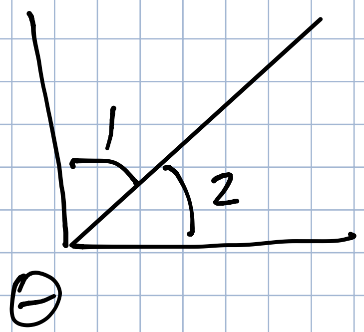
180° is straight angle

90° is a right angle.

acute angle = measures $0 < m < 90$, $m \in (0,90)$

obtuse angle = $90 < m < 180$, $m \in (90,180)$

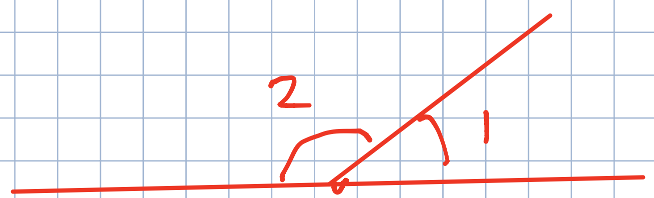
* Angle Addition Postulate



$$m(\angle\theta) = m(\angle 1) + m(\angle 2)$$

measure of larger angle
=
sum of measures of smaller, adjacent angles

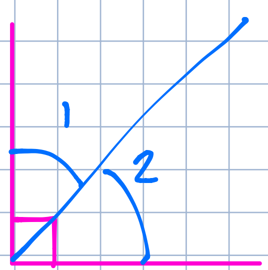
supplementary angles - two angles whose sum is 180°



$$m(\angle 1) + m(\angle 2) = 180°$$

→ ∠1 and ∠2 are supplementary angles

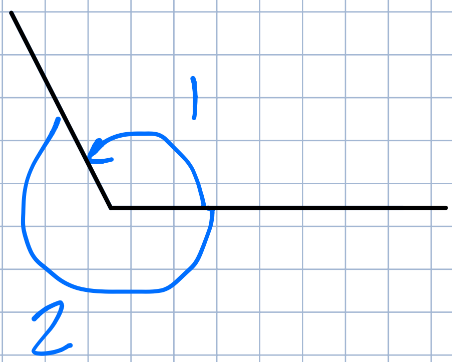
complementary angles two angles whose sum is 90°



$$m(\angle 1) + m(\angle 2) = 90°$$

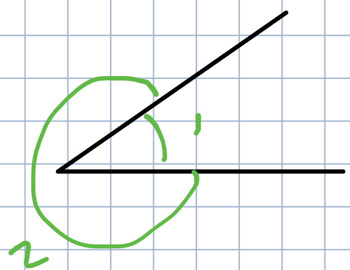
→ ∠1 and ∠2 are complementary angles

Reflex angles – two angles whose sum is 360°



$m(\angle 1) + m(\angle 2) = 360°$

→ ∠1 and ∠2 are reflex angles



– coterminal angles

they share same rays

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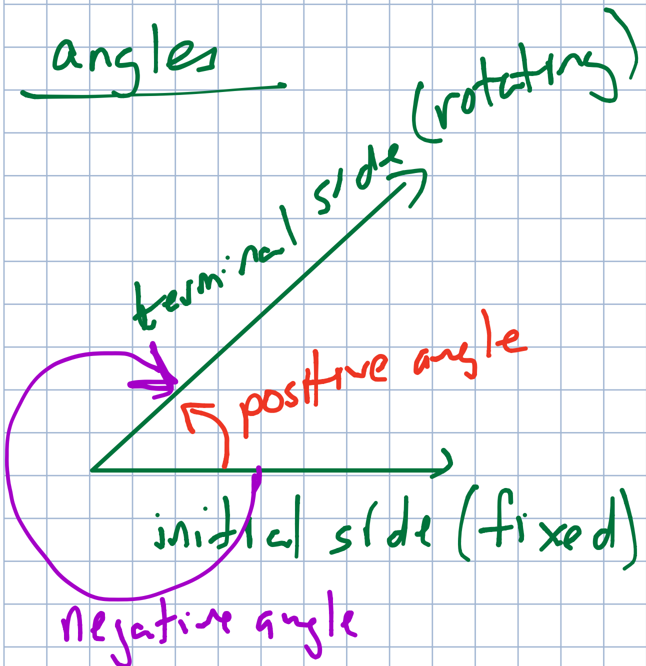
supplement of 132° angle → $180° - 132° = \boxed{48°}$

complement of 57° angle → $90° - 57° = \boxed{23°}$

reflex of 110° angle → $360° - 110° = \boxed{250°}$

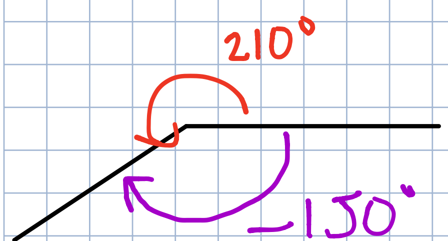
angles



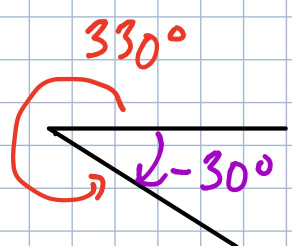
positive angles are measured counter clockwise rotation

negative angles are measured clockwise rotation

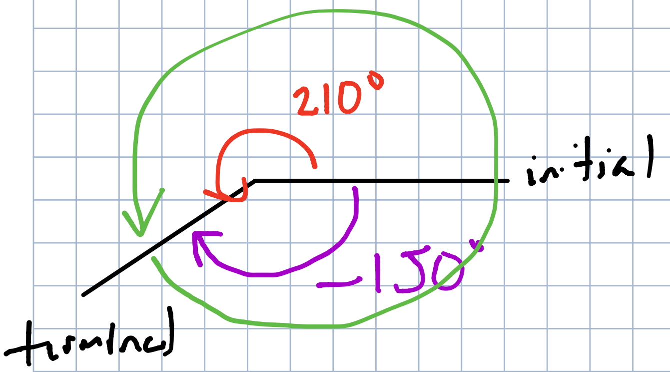
positive angle + negative angles are coterminal angles share both the initial side and terminal side.



210° and -150° are coterminal angles



330° and -30° are coterminal angles



Add another full rotation of terminal side. in positive direction

new measure of angle

$210° + 360° = 570°$

$570° + 360 = 930°$

$\ldots, -150, \underbrace{\ }_{+360} 210, \underbrace{\ }_{+360} 570, \underbrace{\ }_{+360} 930 \ldots$

→ if we keep adding or subtracting 360°
we'll have coterminal angles

Given $m(\angle\theta)$, $m(\angle\theta) + 360°n$ for coterminal angles, where

$n \in \{\pm 1, \pm 2, \pm 3, \pm 4, \ldots\}$

$n \in \mathbb{Z}$, $n \neq 0$

Find two positive & two negative angles which are coterminal with $60°$

positive

$60° + 360° = 420°$

$60° + 2(360°) = 60° + 720°$
$= 780°$

$60 + 10(360) = 60 + 3600$
$= 3660°$

negative

$60° - 360° = -300°$

$60 + (-2)(360) = 60° - 720°$
$= -660°$

$60 + (-20)(360) = 60 - 7200$
$= -7140°$

Angles in Radians

central circle - circle in x,y plane with origin as the center

$\rightarrow x^2 + y^2 = r^2$

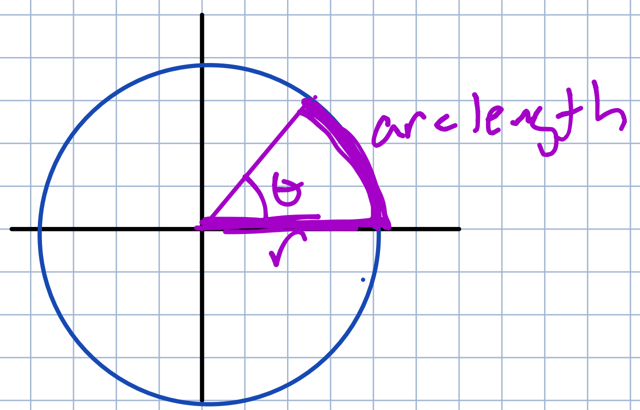
$(x-h)^2 + (y-k)^2 = r^2$

"general form"

$(h,k) = (0,0)$

central angle - vertex is @ the center

radian – measure of angle whose arc length is the same measure as the radius.



$m(\angle\theta) = 1$ radian

Radian Measure of standard angles

$C = 2\pi r$ → the radius can wrap around a circle 2π times

→ the radian measure of a circle 2π

Note: the full rotation of a circle is $360°$

→ 2π radians $= 360°$

π radians $= \frac{360°}{2}$

π radians $= 180°$

1 radian $= \frac{180°}{\pi}$

If you want to convert degrees to radians, multiply degrees by $\frac{\pi}{180}$

$90°\left(\frac{\pi}{180°}\right) = \frac{\pi}{2}$ radians

$60°\left(\frac{\pi}{180°}\right) = \frac{\pi}{3}$ radians

$30°\left(\frac{\pi}{180°}\right) = \frac{\pi}{6}$ radians

$45°\left(\frac{\pi}{180}\right) = \frac{\pi}{4}$ radians

$120° = \frac{120\pi}{180} = \frac{2\pi}{3}$

$270° = \frac{270\pi}{180} = \frac{3\pi}{2}$

$-225° = \quad = -\frac{5\pi}{4}$

If you want to convert from radians to degrees multiply by $\frac{180}{\pi}$

$\frac{5\cancel{\pi}}{\cancel{6}_{1}}\left(\frac{\overset{30°}{\cancel{180}}}{\cancel{\pi}}\right) = \frac{900}{6} = 150°$

$\frac{11\cancel{\pi}}{\cancel{12}}\text{rad}\left(\frac{\overset{15}{\cancel{180}}}{\cancel{\pi}}\right) = 165°$

$-2.5\,\text{rad}\left(\frac{180°}{\pi}\right) \approx -143.2°$

* **Coterminal Angles**

Given $m(\angle\theta)$

coterminal angles

$m(\angle\theta) + 2\pi n$

$n \in \{\pm1, \pm2, \pm3, \ldots\}$

$n \in \mathbb{Z} \quad n \neq 0$