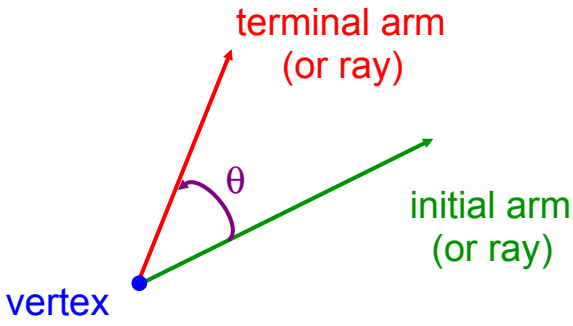
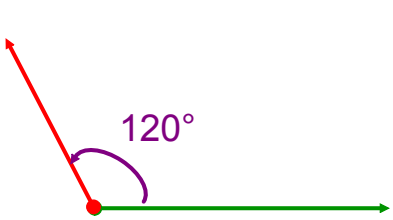
Angles in the Cartesian (x-y) Plane

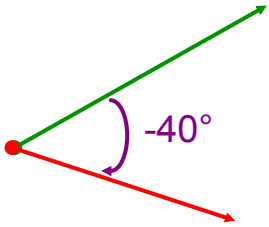
Nov. 18/2013

Terminology:



- an angle is positive if measured counter clockwise, and negative if measured clockwise.





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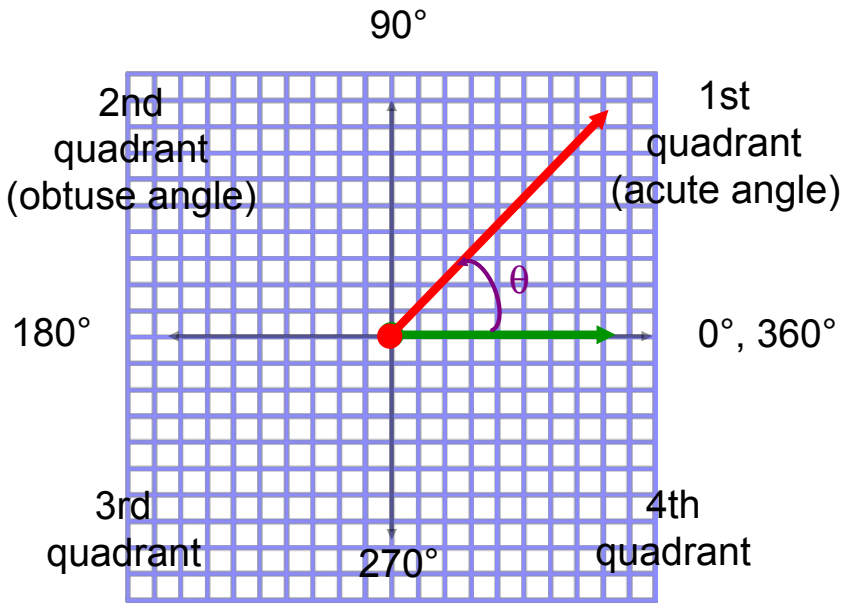
Definitions:

1. Standard Position - the vertex is at the origin and the initial arm is on the positive x-axis.



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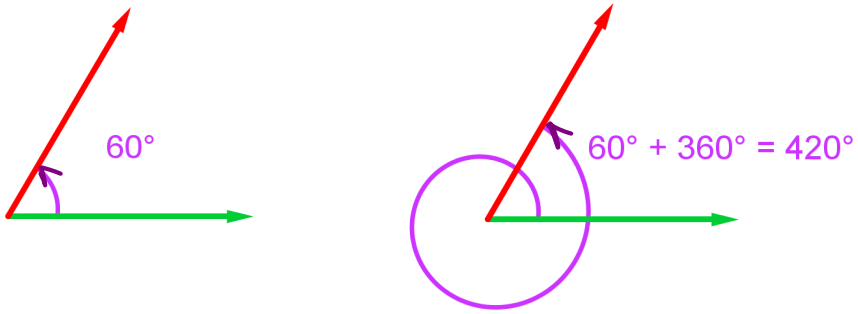
2. Principal Angle - an angle between 0° and 360°.

3. Coterminal Angle(s) - angles that share the same initial and terminal arm.



4. Related Acute Angle / Reference Angle
- an angle formed between the terminal arm and the (closest part of the) x-axis.
- always positive
- always acute ($0° < \theta < 90°$)

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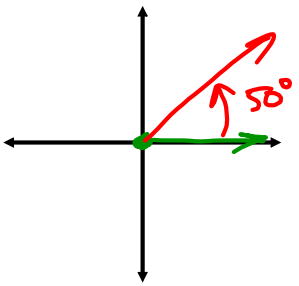
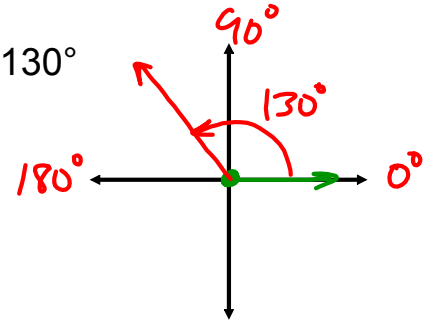
Ex.1 Show the terminal arm for each angle:

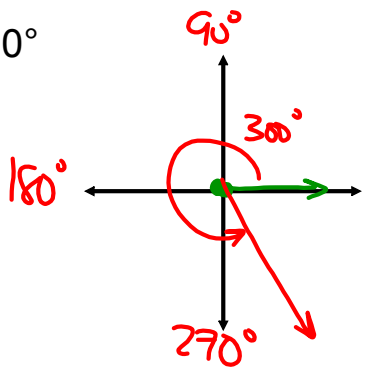
(a) 50°



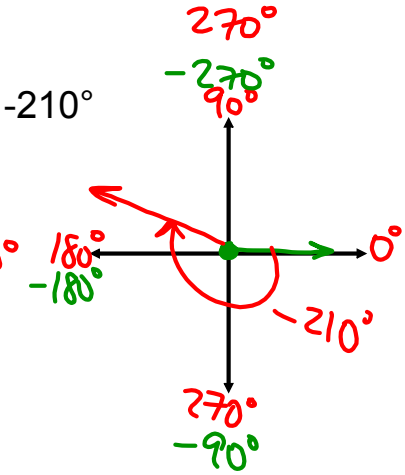
(b) 130°



(c) 300°



(d) -210°



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Ex.2 State the principal angle of: (between 0° and 360°)

(a) 463°

$-360°$

$103°$

(b) 940°

$-360°$

$580°$

$-360°$

$220°$

(c) -387°

$+720°$

$333°$

$-387°$

$+360°$

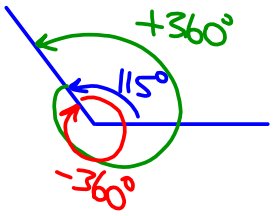
$-27°$

$+360°$

$333°$

Ex.3 State a positive and negative coterminal angle: (diagram unchanged)

(a) 115°



$115° + 360° = 475°$

$115° - 360° = -245°$

(b) 28°

$28° + 360° = 388°$

$28° - 360° = -332°$

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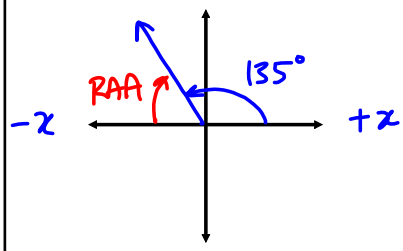
Ex.4 Determine the reference angle (RAA) for:

(a) 135°



135° closest to -x axis

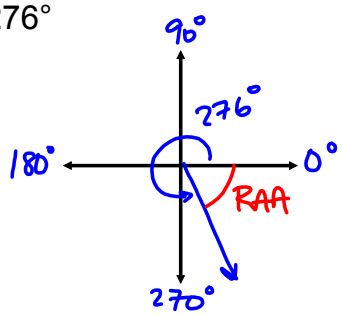
$RAA + 135° = 180°$

↑ Straight line

$RAA = 180° - 135°$

$RAA = 45°$

(b) 276°



$RAA + 276° = 360°$

↑ Circle

$RAA = 360° - 276°$

$= 84°$

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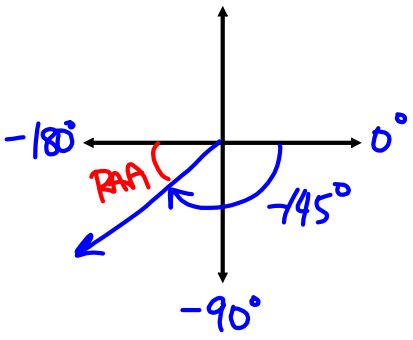
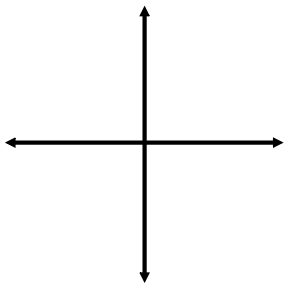
Ex.4 Determine the reference angle (RAA) for:

(c) -145°



(b) 195°



RAA + 145° = 180°

RAA = 35°

(always positive)

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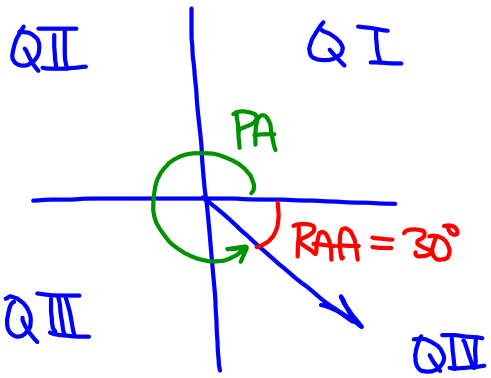
Ex. 5 Given RAA = 30° in QIV (quadrant 4)

find the principal angle (PA).



PA + RAA = 360°

PA + 30° = 360°

PA = 330°

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Assigned Work:

(Handout)

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