

Angles

RAY: a line segment that continues in one direction.

ANGLE: a ray rotating around its endpoints; can move clockwise or counterclockwise.

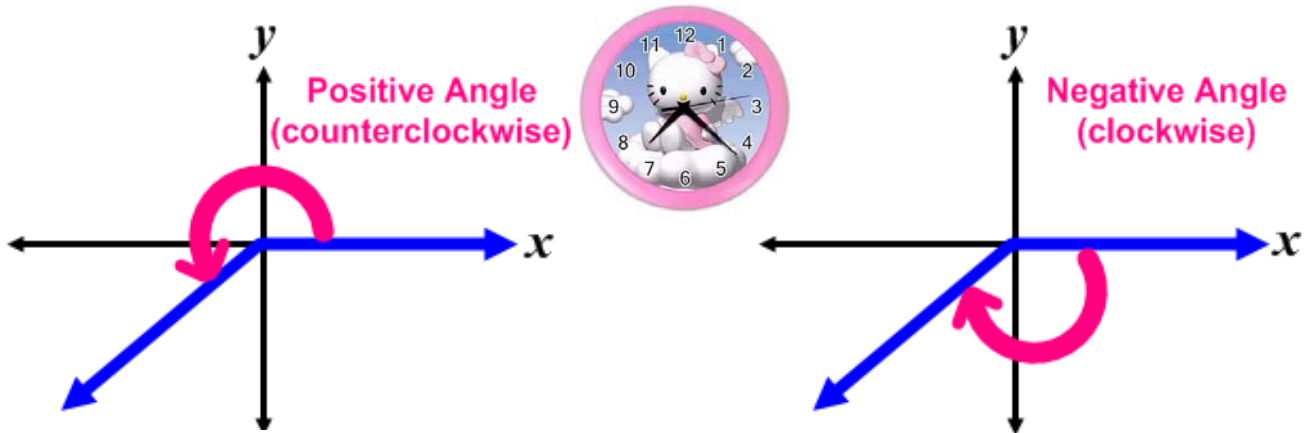
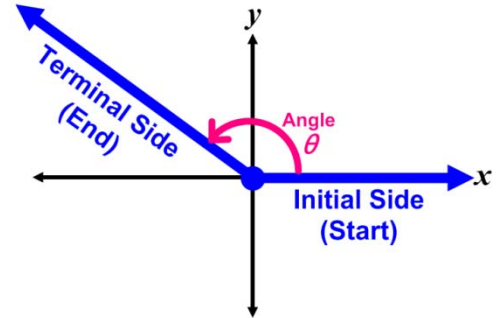
DEGREE: most common unit for measuring angles.

INITIAL SIDE: the beginning side of an angle.

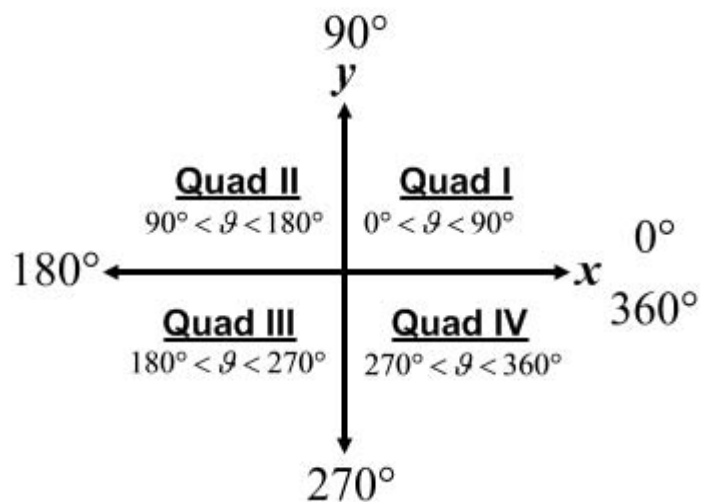
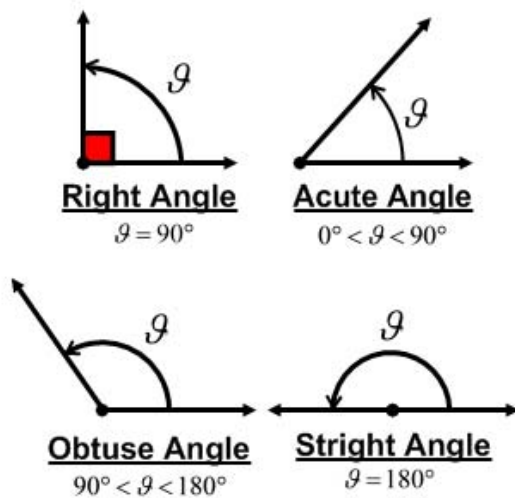
TERMINAL SIDE: the ending side of an angle.

POSITIVE ANGLE: angle formed when moved counterclockwise from the initial side.

NEGATIVE ANGLE: angle formed when moved clockwise from the initial side.



Types of Angles and Coordinate Plane

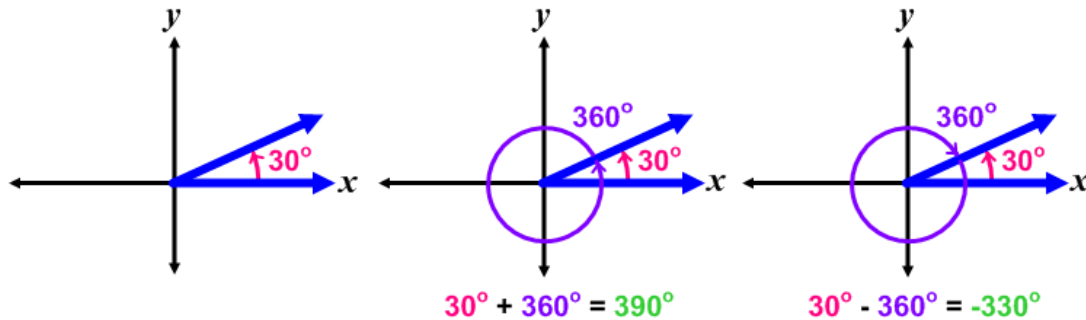


Coterminal Angles

COTERMINAL ANGLES: two angles that have the same initial and terminal sides.

To find a coterminal angle to a given angle, add or subtract 360° .

To find angles of *smallest positive measure* to a given angle, add or subtract multiples of 360° .
Angles must be positive and between 0° and 360° .



1. Find two coterminal angles to 167° .
2. Find the angle of *smallest positive measure* coterminal with each given angle.
 - (a) -135°
 - (b) 1200°

Reference Angles

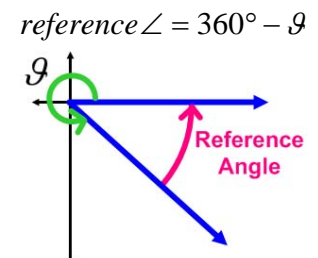
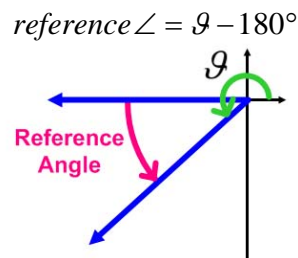
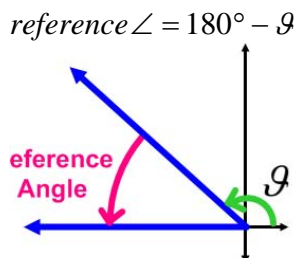
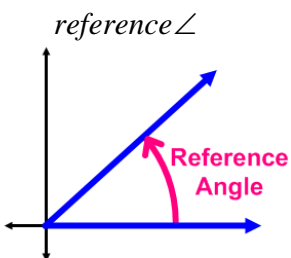
REFERENCE ANGLE: a positive acute angle made by the terminal side of an angle and the x -axis.

Quadrant I

Quadrant II

Quadrant III

Quadrant IV

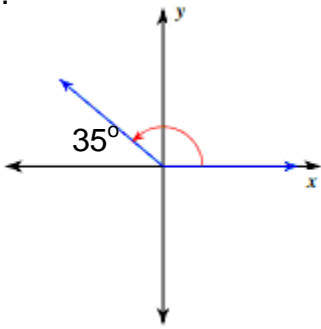


State the quadrant of each given angle and then find its reference angle.

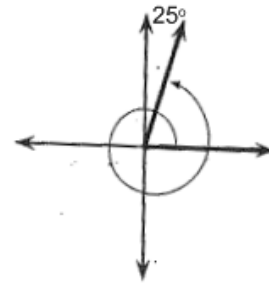
- | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| 3. 165° | 4. 254° | 5. -200° | 6. 1387° |
| Quadrant _____ | Quadrant _____ | Quadrant _____ | Quadrant _____ |
| Ref. $\angle =$ _____ | Ref. $\angle =$ _____ | Ref. $\angle =$ _____ | Ref. $\angle =$ _____ |

Find the measure of each angle that is in standard position.

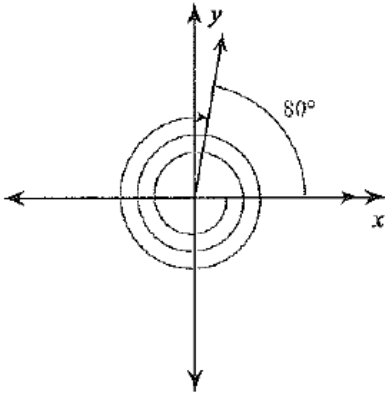
7.



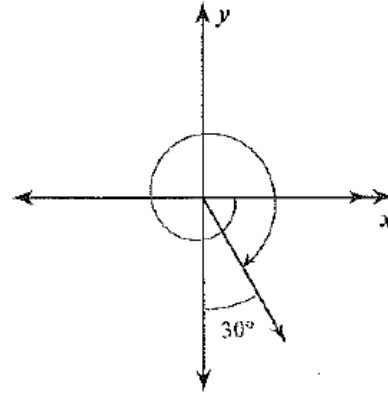
8.



9.



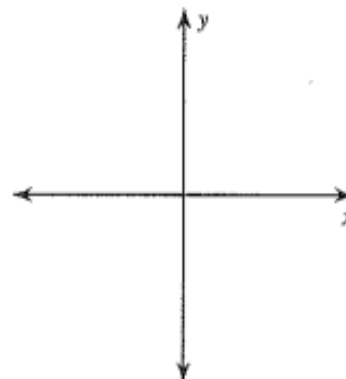
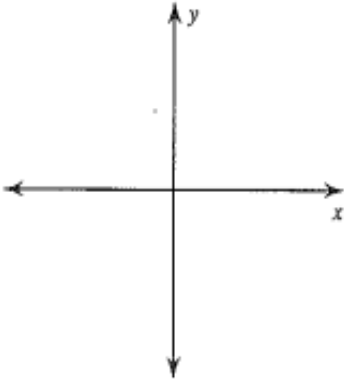
10.



Draw an angle with the given measure in standard position. Then state its quadrant and find its reference angle.

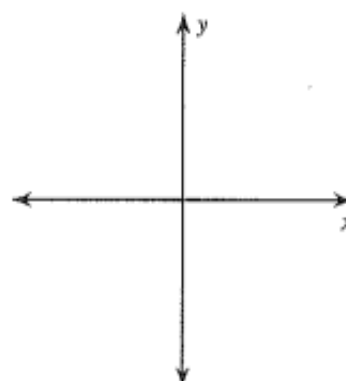
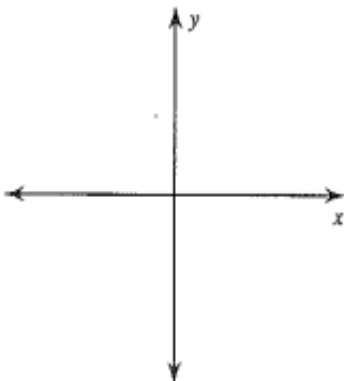
11. -670° Quadrant _____ Ref. $\angle =$ _____

12. 275° Quadrant _____ Ref. $\angle =$ _____



13. 440° Quadrant _____ Ref. $\angle =$ _____

14. -509° Quadrant _____ Ref. $\angle =$ _____



State the quadrant in which the terminal side of each angle lies and then find the reference angle.

13. -189°

14. 920°

15. -310°

16. 1430°

Quadrant _____

Quadrant _____

Quadrant _____

Quadrant _____

Ref. $\angle =$ _____

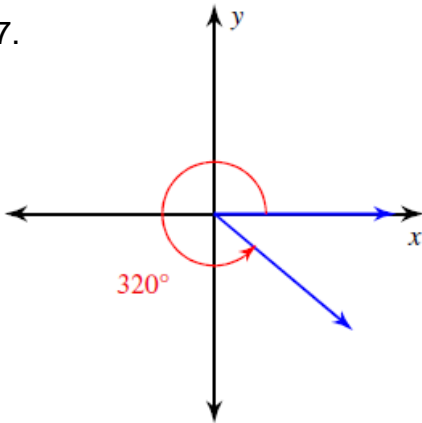
Ref. $\angle =$ _____

Ref. $\angle =$ _____

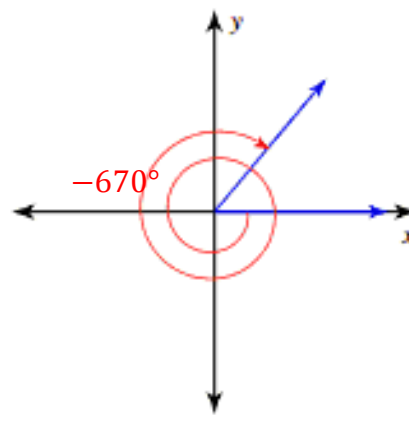
Ref. $\angle =$ _____

Find the reference angle.

17.



18.



18. Find the values of the six, simplified trigonometric functions of angle ϑ .

Point $(-\sqrt{15}, 2\sqrt{3})$.

$\sin\vartheta =$ _____ $\csc\vartheta =$ _____

$\cos\vartheta =$ _____ $\sec\vartheta =$ _____

$\tan\vartheta =$ _____ $\cot\vartheta =$ _____

19. A person at the edge of a cliff looks down at a boat on a lake. The angle of depression of a person's line of sight is 10° and the line of sight distance from the person to the boat is 555 feet. How high is the cliff?