

How to succeed in Trigonometry

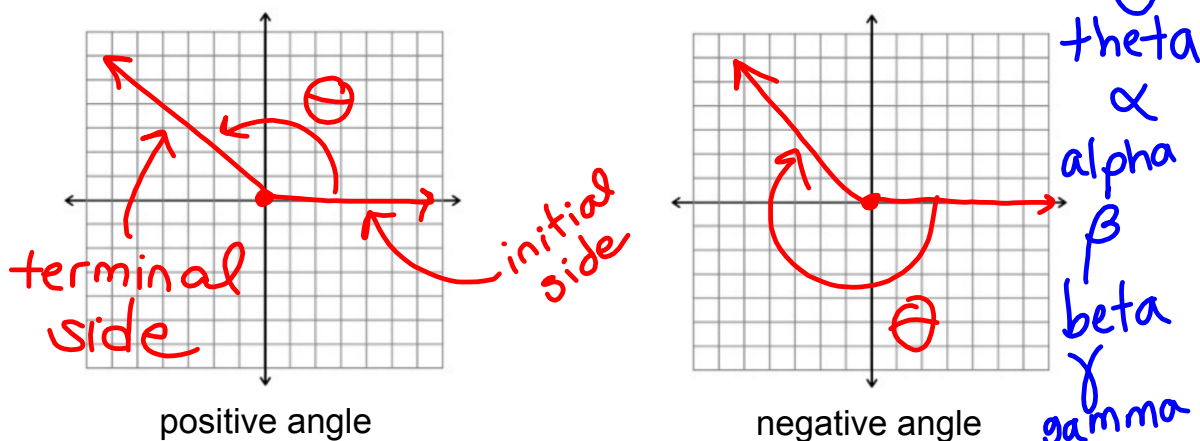
- come to class on time every day
- pay attention and take notes in class
- **ask questions** about lecture in class, after class, during Office Hours, and in the Math Lab
- **do your homework** as soon as it is assigned
- if you have trouble with your homework, make sure you understand what the question is asking by looking up definitions and examples in your notes and textbook
- ask questions about homework questions you have trouble with in Math Lab
- if you still have questions after going to Math Lab, come to my Office Hours
- **make a habit of attending Office Hours and Math Lab** to work on homework even when you don't think you need help, so that someone is on hand to help if you need it
- don't wait until the night before a quiz or test to study
- learn your definitions
- **memorize your formulas**

5.1 Angles and Arcs

An **angle** is formed by rotating a given ray about its endpoint to some terminal position. The original ray is the **initial side** of the angle, and the second ray is the **terminal side** of the angle. The common endpoint is the **vertex** of the angle.

Angles formed by a counterclockwise rotation are considered **positive angles**, and angles formed by a clockwise rotation are considered **negative angles**.

An angle in **standard position** has its vertex at the origin and initial side on the positive x-axis.



One degree is the measure of an angle formed by rotating a ray $1/360$ of a complete revolution. The symbol for degree is $^\circ$.

180° angles are straight angles.

90° angles are right angles.

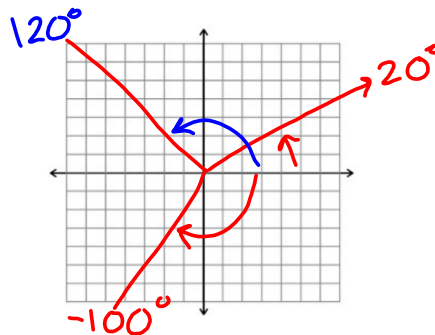
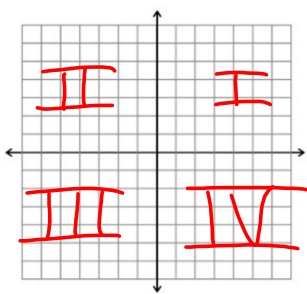
angles that have a measure greater than 0° but less than 90° are acute angles.

angles that have a measure greater than 90° but less than 180° are obtuse angles.

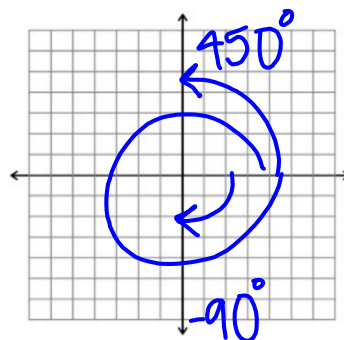
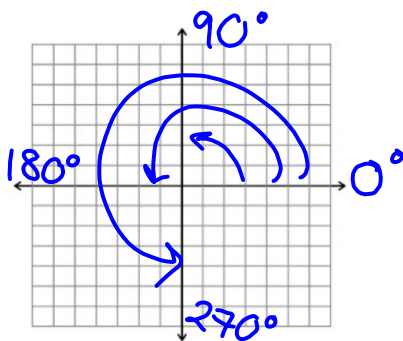
Two positive angles are complementary angles if the sum of the measures of the angles is 90° . Each angle is the *complement* of the other angle.

Two positive angles are supplementary angles if the sum of the measures of the angles is 180° . Each angle is the *supplement* of the other angle.

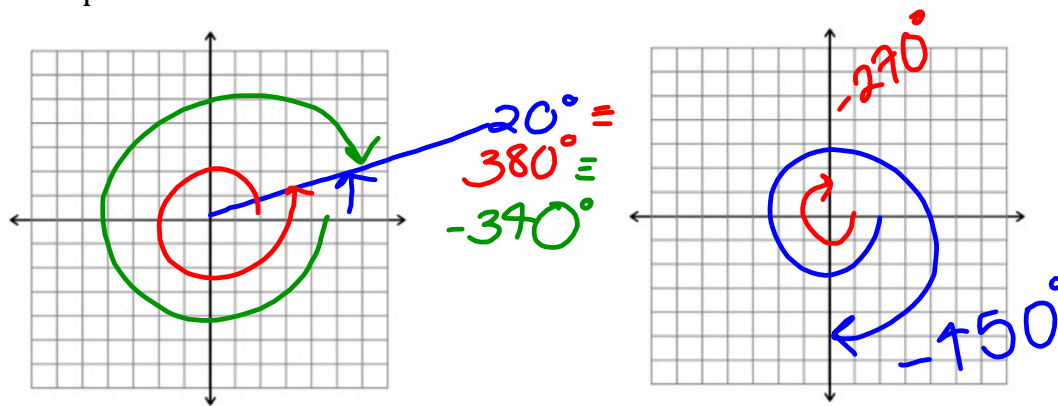
The coordinate plane is divided into four quadrants.



An angle whose terminal side falls on an axis is called a quadrantal angle.



Two angles sharing a terminal side are called coterminal and differ by integer multiples of 360° .



Find two positive and two negative angles that are coterminal with 89° .

$$89^\circ + 360^\circ = 449^\circ + 360^\circ = 809^\circ$$

$$89^\circ - 360^\circ = -271^\circ - 360^\circ = -631^\circ$$

Radian Measure

The circumference of a circle of radius r is given by the equation:

$$C = 2\pi r$$

Therefore, the unit circle, which has radius 1, has circumference:

$$2\pi$$

The irrational number pi is approximately: $\pi \approx 3.14$

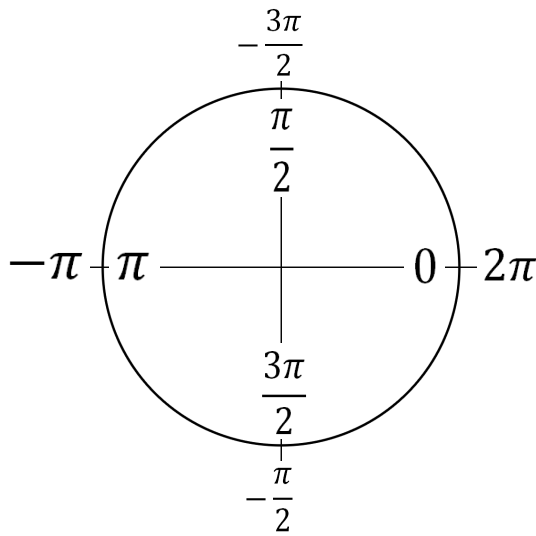
3.1415926535897932384626433832795

Therefore $2\pi \approx 6.28$

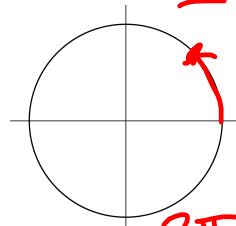
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$$4\pi \approx 12.56$$

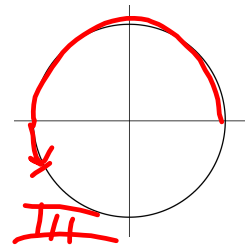
If we think about these numbers as corresponding to arc lengths around the unit circle, in which quadrant (or on which axis) do we end up?



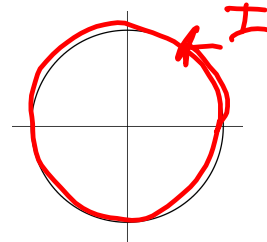
$$\frac{\pi}{4}$$



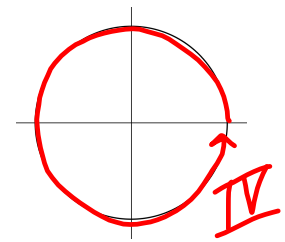
$$\frac{7\pi}{6} = \frac{6\pi}{6} + \frac{\pi}{6} = \pi + \frac{\pi}{6}$$



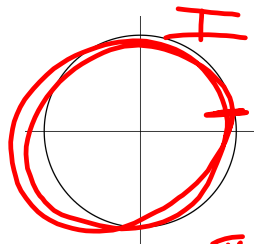
$$\frac{7\pi}{3} = \frac{6\pi}{3} + \frac{\pi}{3} = 2\pi + \frac{\pi}{3}$$



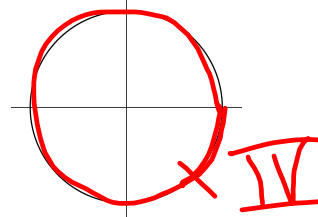
$$6$$



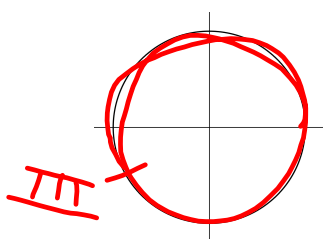
$$13$$



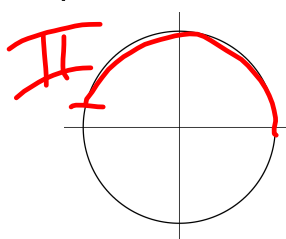
$$-\frac{9\pi}{4} = \frac{-8\pi}{4} - \frac{\pi}{4} = -2\pi - \frac{\pi}{4}$$



$$\frac{19\pi}{6} = \frac{18\pi}{6} + \frac{\pi}{6} = 3\pi + \frac{\pi}{6}$$



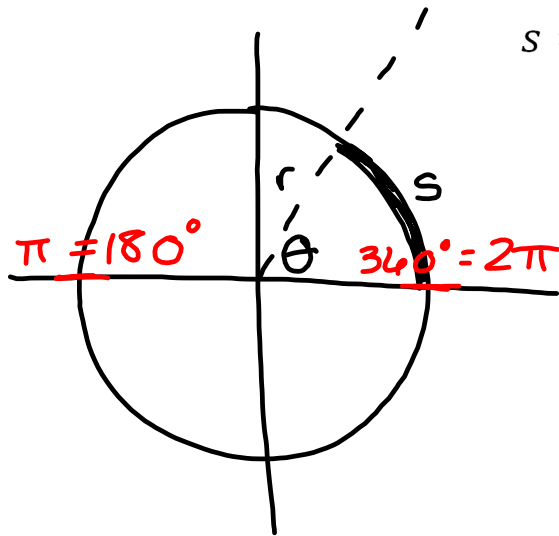
$$\frac{6\pi}{7}$$



What is a radian?

r = radius length

s = arc length



When $s = r$, we say that the corresponding angle θ which is subtended by arc s has measure 1 radian.

$$1 \text{ radian} \approx 57.3^\circ$$

$$\pi = 180^\circ$$

$$2\pi = 360^\circ$$

Note that θ is independent of the radius length and any unit of measurement. Therefore radians have no associated units, and any angle measure without a degree symbol is assumed to be in radians.

Converting between radians and degrees

$$\pi = 180^\circ \quad \therefore \quad \frac{\pi}{180^\circ} = 1 = \frac{180^\circ}{\pi}$$

Convert 225° to radians.

$$\frac{225^\circ}{1} \cdot \frac{\pi}{180^\circ} = \frac{5\pi}{4}$$

Convert $\frac{5\pi}{6}$ to degrees.

$$\frac{5\pi}{6} \cdot \frac{180^\circ}{\pi} = 150^\circ$$

Homework:
5.1 #1, 2, 7-18 all, 31-54 all