Chapter 4 Trigonometric Functions

Section 4.1 Radian and Degree Measure

Course Number
Instructor
Date

Objective: In this lesson you learned how to describe an angle and to convert between degree and radian measures.

Important Vocabulary Define each term or concept.

Trigonometry The Greek word for "measurement of triangles."

Central angle of a circle An angle whose vertex is the center of the circle.

Complementary angles Two positive angles whose sum is $p/2$ radians or 90°.

Supplementary angles Two positive angles whose sum is p radians or 180°.

Degree The most common unit of angle measure, denoted by the symbol °. A measure of one degree (1°) is equivalent to a rotation of 1/360 of a complete revolution about the vertex of an angle.

I. Angles (Page 284)

What you should learn
How to describe angles

An **angle** is determined by . . . rotating a ray (half-line) about its endpoint.

The **initial side** of an angle is . . . the starting position of the rotated ray in the formation of an angle.

The **terminal side** of an angle is . . . the position of the ray after the rotation when an angle is formed.

The **vertex** of an angle is . . . the endpoint of the ray used in the formation of an angle.

An angle is in **standard position** when . . . the angle's vertex is at the origin of a coordinate system and its initial side coincides with the positive x-axis.

A **positive angle** is generated by a ______counterclockwise______ rotation; whereas a **negative angle** is generated by a ________clockwise________ rotation.

If two angles are **coterminal,** then they have . . . the same initial side and the same terminal side.

II. Radian Measure (Pages 285–287)

> ***What you should learn***
> How to use radian measure

The measure of an angle is determined by . . . the amount of rotation from the initial side to the terminal side.

One **radian** is the measure of a central angle q that . . .
intercepts an arc s equal in length to the radius r of the circle.

A central angle of one full revolution (counterclockwise) corresponds to an arc length of s = ______ $2pr$ ______.

In general, the radian measure of a central angle q is obtained by . . . dividing the arc length s by r. That is, $s/r = q$, where q is measured in radians.

A full revolution around a circle of radius r corresponds to an angle of ______ $2p$ ______ radians. A half revolution around a circle of radius r corresponds to an angle of ______ p ______ radians.

Angles with measures between 0 and $p/2$ radians are ______ acute ______ angles. Angles with measures between $p/2$ and p radians are ______ obtuse ______ angles.

To find an angle that is coterminal to a given angle q, . . .
add or subtract $2p$ or integer multiples of $2p$ to the measure of q.

Example 1: Find an angle that is coterminal with $q = -p/8$.
$15p/8$

Example 2: Find the supplement of $q = p/4$.
$3p/4$

III. Degree Measure (Pages 287–288)

> ***What you should learn***
> How to use degree measure

A full revolution (counterclockwise) around a circle corresponds to ______ 360 ______ degrees. A half revolution around a circle corresponds to ______ 180 ______ degrees.

To convert degrees to radians, . . . multiply degrees by (π rad)/180°.

To convert radians to degrees, . . . multiply radians by 180°/(π rad).

Example 3: Convert 120° to radians.
$2p/3$

Example 4: Convert $9p/8$ radians to degrees.
202.5°

Example 5: Complete the following table of equivalent degree and radian measures for common angles.

q (degrees)	0°	30°	45°	60°	90°	180°	270°
q (radians)	0	$p/6$	$p/4$	$p/3$	$p/2$	p	$3p/2$

IV. Applications of Angles (Pages 289–290)

> ***What you should learn***
> How to use angles to model and solve real-life problems

To find the length s of a circular arc of radius r and central angle q, . . . multiply r by q, where q is measured in radians.

Consider a particle moving at constant speed along a circular arc of radius r. If s is the length of the arc traveled in time t, then the **linear speed** of the particle is

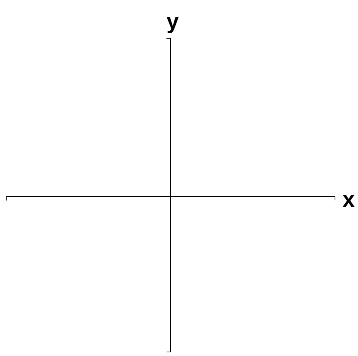
linear speed = (arc length)/(time) = s/t

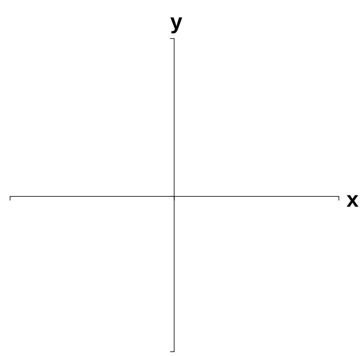
If q is the angle (in radian measure) corresponding to the arc length s, then the **angular speed** of the particle is

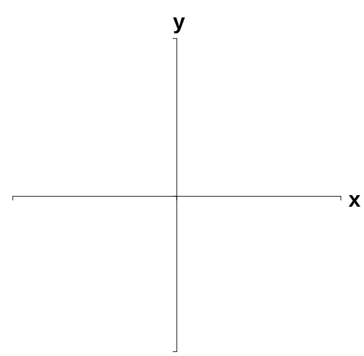
angular speed = (central angle)/(time) = q/t

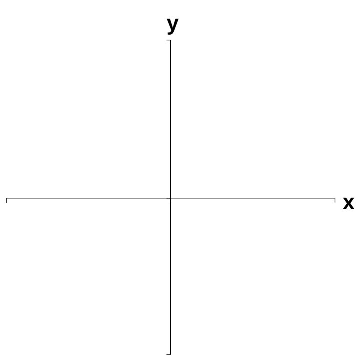
Example 6: A 6-inch-diameter gear makes 2.5 revolutions per second. Find the angular speed of the gear in radians per second.
$5p$ radians per second

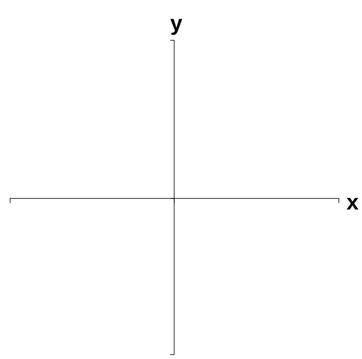
Additional notes

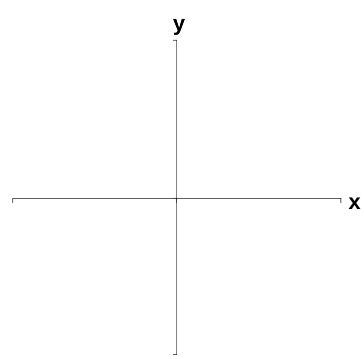












Homework Assignment

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