PreCalculus Name: Period: Date:

Warm Up 2/5

Lesson 6-1: Angles and Trigonometry II

Objectives

Students will…

- Be able to calculate the length of a circular arc and circular sector area, given the radius of the circle and the angle measure.
- Be able to differentiate between angular and linear speed and compute them.

Angles

In trigonometry, however, angles are viewed as _________________ of **one** line. In other words, angle measurement represents the ______________ travelled, or rotated. The beginning, or the stationary, position is known as the **initial side**, while the line at its finishing position is known as the **terminal side**. In this case, rotating **counter-clockwise** is positive, while rotating **clockwise** is negative.

Circular Arc Length

In our last lesson, we learned that radian represented the _____________________________ of the rotation, or the **distance travelled**. In this lesson, we now want to calculate the ___________ length of this distance. This is known as the _______________. Even though an arc is a part of a circle, we say linear length, since we can always picture cutting this arc out and laying it flat, or **straight**. We would then be able to measure the length with a ruler, for example. Following is the formula for measuring the arc length, ***s***, with radius, r and radian angle measurement θ:

____

We can then modify this equation and get a very important formula: ___________
One thing to keep in mind is we always need to use __________.

Example

Find the length of an arc of a circle with radius 10m that subtends a central angle of 30°.

Find the length of an arc of a circle with radius 21m that subtends a central angle of 15°.

A central angle θ in a circle of radius 4m is subtended by an arc of length 6m. Find the measure of θ in radians.

A central angle θ in a circle of radius 9m is subtended by an arc of length 12m. Find the measure of θ in radians.

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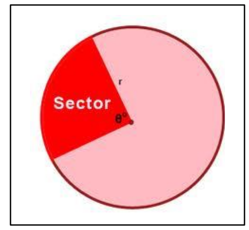
Area of a Circular Sector

We can also find the area of a ________________ by any given central angle θ. The section in red is the circular sector. Combining with the area formula of a circle: $A = \pi r^2$, we get the following formula for finding the area of a given circular sector.



$$A = \frac{1}{2} r^2 \theta$$

Ex. Find the area of a sector of a circle with central angle $60°$ if the radius of the circle is 3m.

Circular Motion

The last thing regarding the angular rotation is the concept of ________________, which simply describes an object moving in circles. There are two ways to describe this type of motion: _________ and __________ speed.

Linear speed describes the **explicit** distance travelled over **time** (i.e. how fast the object is traveling along the circle). The unit is $\frac{\boldsymbol{distance\ (m, miles, etc.)}}{\boldsymbol{time}}$ Linear Speed $(\boldsymbol{v})$**:** , where s is the ____________.
Angular speed, on the other hand, describes the **angular change** over time (i.e. how fast the angle is changing). The unit is $\frac{\boldsymbol{angle\ (rad\ or\ deg)}}{\boldsymbol{time}}$ Angular Speed $(\boldsymbol{\omega})$**:**

Examples

A boy rotates a stone in a 3-ft-long sling at the rate of 15 revolutions every 10 seconds. Find the angular and linear speeds of the stone.

A disk with a 12-inch diameter spins at the rate of 45 revolutions per minute. Find the angular and linear velocities of a point at the edge of the disk in radians per second and inches per second, respectively.

Linear and Angular Speed

It turns out that there is a way to take any angular speed and find its corresponding linear speed. With v being the linear speed, and ω being the angular speed, with radius r we have the following:

Ex. A woman is riding a bicycle whose wheels are 26 inches in diameter. If the wheels rotate at 125 rpm (revolutions per minute), find the speed at which she is traveling.

A woman is riding a bicycle whose wheels are 30 inches in diameter. If the wheels rotate at 150 rpm (revolutions per minute), find the speed at which she is traveling.

Homework 2/5
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