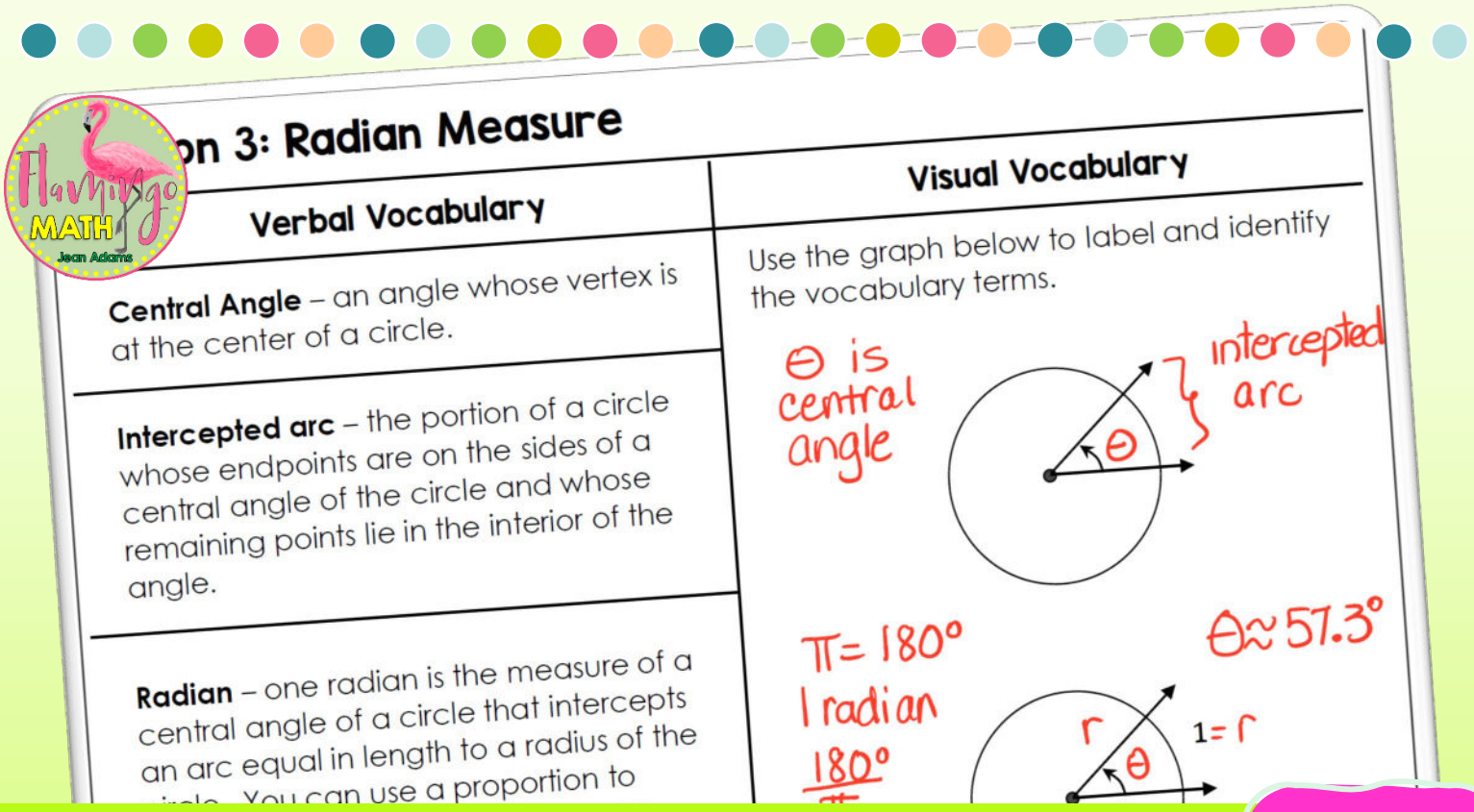
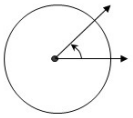
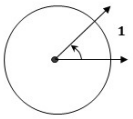
Algebra 2 Honors

Radian Measure



Completely Editable 11.3

Lesson 3: Radian Measure

Verbal Vocabulary	Visual Vocabulary
Central Angle – an angle whose vertex is at the center of a circle.	Use the graph below to label and identify the vocabulary terms.
Intercepted arc – the portion of a circle whose endpoints are on the sides of a central angle of the circle and whose remaining points lie in the interior of the angle.	
Radian – one radian is the measure of a central angle of a circle that intercepts an arc equal in length to a radius of the circle. You can use a proportion to convert an angle measure from one unit of measure to the other.	
Circumference – $2\pi r = \pi d$ 2π radians = 360° π radians = 180°	

Using a Proportion

EX#1: Find the measure of the angles below.

A. Find the radian measure of a 60° angle.

B. Convert 85° to radians.

C. Converts 2.5 radians to degrees.

Using Dimensional Analysis

To convert degrees to radians, multiply by:	To convert radians to degrees, multiply by:

EX #2: Use dimensional analysis to convert each angle measure from degrees to radians or from radians to degrees. Express radian measures in terms of p.

A. $\frac{\pi}{2}$ radians

B. 225°

C. 2 radians

D. 150°

Finding Cosine and Sine of Radian Measures

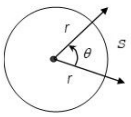
EX #3: Find exact values of the following. Then, use a calculator to find a decimal approximation for each.

A. $cos\left(\frac{\pi}{4}\right)$

B. $sin\left(\frac{\pi}{3}\right)$

Length of an Arc

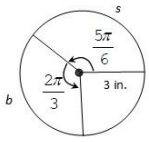
For a circle of radius r, and a central angle of measure θ, in radians, the length s of the intercepted arc is $s = r\theta$.



EX #4: Use the circle at right:

A. Find length s to the nearest tenth.

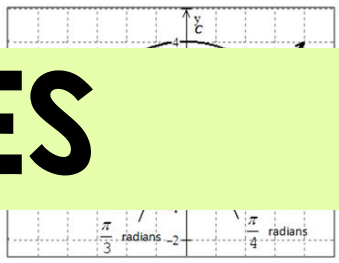
B. Find length b to the nearest tenth.



Arc Length

EX #5: Use the graph to find the intercepted arcs.

A. $\angle AOB$



D. $\angle AOB$

Real-World Connection

EX #6: A weather satellite in a circular orbit around Earth completes one orbit every 2 hours. The radius of Earth is about 6400 km, and the satellite orbits 2600 km above Earth's surface. How far does the satellite travel in 1 hour?

NOTES

Name _____ Date_____

II.3

Radian Measure Practice

Problems 1 – 8, write each measure in radians. Express your answer in terms of π.

1. 60°	**2.** 135°	**3.** −30°	**4.** 75°
5. 20°	**6.** 300°	**7.** 160°	**8.** 220°

Problems 9 – 16, write each measure in degrees. Round your answer to the nearest degree, if necessary.

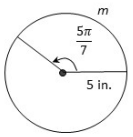
9. 2π	**10.** $\frac{2\pi}{3}$	**11.** $\frac{4\pi}{9}$	**12.** 4.71 radians
13. $\frac{15\pi}{2}$	**14.** 1 radian	**15.** $\frac{11\pi}{10}$	**16.** $\frac{3\pi}{5}$

Problems 17 – 22, the measure θ of an angle in standard position is given. Find the exact values of $\cos\theta$ and $\sin\theta$ for each angle measure.

17. $\frac{5\pi}{3}$	**18.** $\frac{3\pi}{2}$
19. $\frac{7\pi}{6}$	**20.** $-\frac{2\pi}{3}$
21. $\frac{5\pi}{4}$	**22.** $-\frac{\pi}{6}$

Problems 23 – 26, use each circle to find the length of the indicated arc. Round your answer to the nearest tenth.

23.



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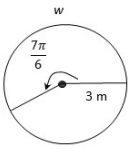

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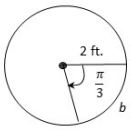
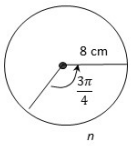


26.



Problems 27 – 30, solve.

27. A pendulum swings through an angle of 2.4 radians. The distance the tip of the pendulum travels is 56 inches. How long is the pendulum?

28. Two arcs have the same length. One arc is intercepted by an angle of 270° in a circle of radius 15 inches. If the radius of the other circle is 25 inches, what is the radian measure of the central angle on the second arc?

29. There are 24 lines of longitude that are equally spaced around the equator. These lines approximate the standard time zones.

A. What is the measure of each angle in degrees and radians?

B. The radius of the equator is about 3960 miles. Find the width of each time zone at the equator.

Practice Sets

Lesson Warm-Ups

3. Write $\frac{2\pi}{3}$ in degrees.	**4.** Write $\frac{5\pi}{2}$ in degrees.

Name _____ Date _____ Period _____

Lesson 11.3: Radian Measure **Warm-Up #2**

1. Write 210° in radian measure.	**2.** Write 75° in radian measure.
3. Write $\frac{3\pi}{4}$ in degrees.	**4.** Write $\frac{\pi}{9}$ in degrees.

Form A

Period _____

f the angles.

2. 84°

Find the degree measure of the angles.

3. $\frac{2\pi}{5}$

4. 4 radians

Grade:

11.3 Radian Measure **Form B**

Name _____

Date _____ Period _____

Find the radian measure of the angles.

1. 240°

2. 75°

Find the degree measure of the angles.

3. $\frac{5\pi}{12}$

4. 5 radians

Grade:

Daily Lesson Quiz