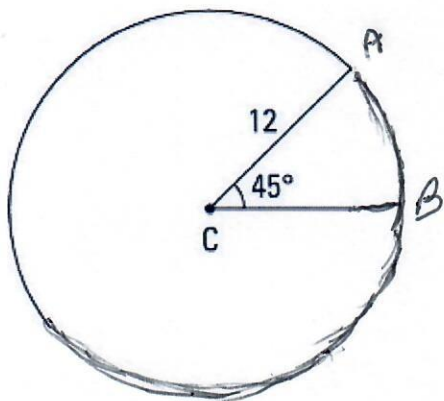


Geometry Honors – Dr. Sargent – Work for April 27-May 8

Week of April 27-May 1

This week we continue to work on circles, arcs, and chords. Last week, we learned that the degree of an arc is the same as the degree of the central angle. With this information, we can now find the length of an arc. The length of the arc is the measure of the distance along the curved line making up the arc. It is longer than the straight line distance between its endpoints (that would be a chord). There is a shorthand way of writing the length of an arc: $l \widehat{AB} = 10$, which you would read as “the length of arc AB is 10.”

Basically, the length of an arc is a percentage or proportion of the circumference. If you know the central angle, the degree of the arc, and the measure of the diameter or radius, then you can find the length of the arc. The formula for find the arc length, l , is: $l = \frac{C \cdot x}{360}$ where $C =$ circumference and x is the degree measure of the arc. Remembering that $C = 2\pi r$, we could write this as $l = \frac{2\pi r \cdot x}{360}$. We stated that the length of the arc is a percentage or proportion of the circumference. We could have stated the formula this way: $\frac{x}{360} = \frac{l}{C}$. This can be simplified by cross-multiplying, giving us: $x \cdot C = l \cdot 360$, we can now divide both sides by 360 giving us the formula for finding the arc length: $l = \frac{x \cdot C}{360}$. Let's try an example:



The radius = 12, which would make the circumference $2\pi 12 = 75.4$. The degree of $\widehat{AB} = 45^\circ$. So, to find the length of arc AB we would use the formula:

$$l = \frac{C \cdot x}{360} = \frac{75.4 \cdot 45}{360} = 9.43 .$$

Note that there are 3 variables in the formula: C (circumference), x (degree of arc) and l (length of the arc). As long as we know two of these three, we can solve for the third. So, for example, if we had known that $C = 75.4$ and that the arc length was 9.43, we could have written it as $9.43 = \frac{75.4x}{360}$ and solved for x .

You should also know that the area of a part of the circle bounded by an arc and two radii is in proportion to the total area of the circle. Using the illustration above, the area bounded by AC, BC and arc AB is in a ratio of 45/360 to the total area of the circle. *Area of the circle* $= \pi 12^2 = 144\pi \approx 452.39$; therefore the smaller Area $= \frac{45}{360} = \frac{x}{452.39}$; $360x = 45 \cdot 452.39$; $x = 56.55$

I am attaching a worksheet on arc length that you can use to gain practice. When you have the hang of this, do Unit 10 Homework 3. You will not need to return any of this to me.

Week of May 4-8 – Congruent Chords and Arcs

This is a rather complex section of this unit, so I am going to spend a bit of time here, and I want you to feel free to ask questions you may have. I am attaching a worksheet on Congruent Chords and Arcs, so please have that in front of you as we begin. If you need additional explanation, you can log into Clever and access your textbook – this section begins on page 546 of the textbook.

Looking at the illustrations on the attached worksheet, here is the info you can fill in:

Two Chords are congruent if and only if:

- Their corresponding arcs are congruent. That is: $AB = CD \leftrightarrow m \widehat{AB} = m \widehat{CD}$
- They are equidistant from the center. That is: $AB = CD \leftrightarrow EF = EG$

If a diameter or radius is perpendicular to a chord, then it bisects the chord and its arc. That is:

$$\overline{EH} \perp \overline{AB} \rightarrow AF = FB \text{ and } m \widehat{AH} = m \widehat{HB}$$

So look at the first problem. Since the chords are congruent, the arcs made by the chords must also be congruent. Therefore, we can set them equal to one another and solve for x : $7x + 24 = 115$; $7x = 91$; $x = 13$

In problem 3, the reverse is true: Since the arcs are congruent, therefore their corresponding chords must also be congruent, so we can set them equal and solve for the variable: $9x - 34 = 4x + 1$; $5x = 35$; $x = 7$. We then go back and substitute the 7 for x to find the length of Chord XY: $XY = 4(7) + 1 = 29$

Can you figure out problem 5? IF the arc XZ is 76° , then $m \widehat{XTZ} = 360 - 76 = 284^\circ$. Since the two chords are congruent, the arcs they form must be congruent, so each would be one-half of the 284, or 142° . Thus we can solve by setting $6x - 20 = 142$; $6x = 162$; $x = 27$.

See if you can do the balance of this worksheet. Answers to selected problems are at the end of these instructions, but please try and do them yourself before checking answers. When you think you have these concepts clearly in mind, feel free to tackle Unit 10 Homework 4. You will not need to return this to me.

When you are ready, go to ALEKS and complete Quiz 10-1. This will touch on all the topics we have been discussing so far dealing with circles. The quiz will be open through Sunday, May 10. You may take it twice - once for practice and once for real. I will record your higher grade. If you do not have access to ALEKS, a copy will be in the written pack, and you can return this to

me when you pick up your next packet of materials. In the written packet I will attach two copies, one for practice (#5), with the answers so you can check yourself; and one for real (#1).

Ongoing ALEKS – remember your 12 topics per week. Thanks.

Answers to selected questions:

Worksheet on Arc Length

$$\text{Problem 1: } l = \frac{107 \cdot 2\pi 6}{360} = \frac{1284\pi}{360} \approx 11.2m$$

$$\text{Problem 3: } l = \frac{218 \cdot 2\pi 4}{360} = \frac{1744\pi}{360} \approx 15.2cm$$

$$\text{Problem 5: } l = \frac{112 \cdot 30\pi}{360} = \frac{3360\pi}{360} \approx 29.3cm$$

$$\text{Problem 7: } l = \frac{37 \cdot 12\pi}{360} = \frac{444\pi}{360} \approx 3.9m$$

$$\text{Problem 9: } l = \frac{233 \cdot 54\pi}{360} = \frac{12582\pi}{360} \approx 109.8yd$$

$$\text{Problem 11: } l = \frac{40 \cdot 2\pi 16}{360} = \frac{1280\pi}{360} \approx 11.2in$$

Unit 10 Homework 3

$$\text{Problem 1: } l = \frac{35 \cdot 2\pi 7.5}{360} = \frac{525\pi}{360} \approx 4.6 in$$

$$\text{Problem 4: } l = \frac{164 \cdot 2\pi 11}{360} = \frac{3608\pi}{360} \approx 31.5ft$$

$$\text{Problem 8: } \frac{242 \cdot 2\pi 9}{360} = \frac{4536\pi}{360} \approx 39.6cm$$

Worksheet on Congruent Chords and Arcs

$$\text{Problem 7: } 32x - 27 = 11x + 15; 21x = 42; x = 2; DE = 11(2) + 15 = 37$$

$$\text{Problem 9: } TV = 9; TU = 18; WS = 9; m \widehat{YU} = 42^\circ; m \widehat{RS} = 84^\circ$$

$$\text{Problem 11: } 6x - 11 = 2x + 9; 4x = 20; x = 5; MR = 2(5) + 9 = 19; MN = 2(19) = 38$$

Problem 13: $x^2 + 5^2 = 13^2$; $x^2 + 25 = 169$; $x^2 = 144$; $x = 12$; $VW = 2(12) = 24$

Problem 15: $8^2 + 15^2 = x^2$; $289 = x^2$; $x = 17$; $PH = 17$

Unit 10 Homework 4

Problem 1: $x=9$

Problem 4: $LM=33$

Problem 7: $m\widehat{BAD} = 214^\circ$

Problem 10: $QU = 8$; $QR = 16$; $m\widehat{ST} = 114^\circ$; $m\widehat{QR} = 114^\circ$; $m\widehat{XT} = 57^\circ$

Problem 13: NK-12

Problem 16: $m\widehat{PK} = 253.8^\circ$

Name:

Date:

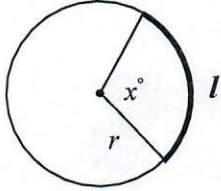
Topic:

Class:

Main Ideas/Questions

Notes/Examples

ARC LENGTH



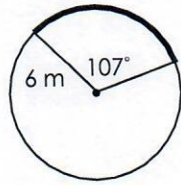
The length of an arc is a portion of the circumference.

Arc Length Formula:

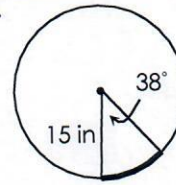
x = degree measure of arc
 C = circumference

Directions: Find the length of each bolded arc to the nearest hundredth.

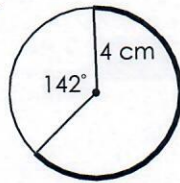
1.



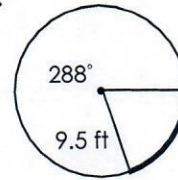
2.



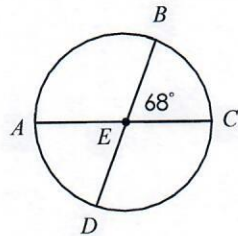
3.



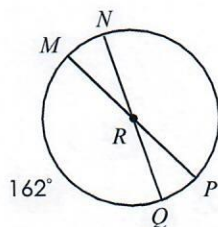
4.



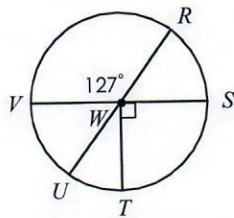
5. If $EB = 15$ centimeters, find the length of \widehat{CD} .



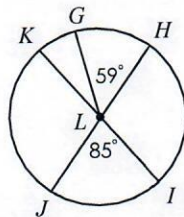
6. If $NR = 8$ feet, find the length of \widehat{NMP} .



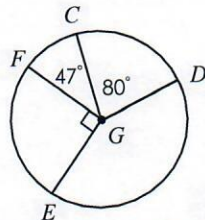
7. If $VS = 12$ meters, find the length of \widehat{UT} .



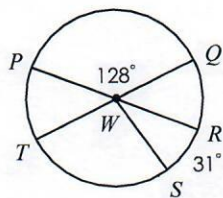
8. If $JH = 21$ inches, find the length of \widehat{KJG} .



9. If $FG = 27$ yards, find the length of \widehat{FED} .



10. If $WS = 4.5$ millimeters, find the length of \widehat{TS} .



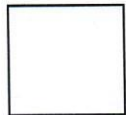
APPLICATIONS

11. A 16-inch pendulum swings through an angle of 40° . How far does the tip of the pendulum travel in a single swing?

12. A car entered a roundabout from Mason Avenue, traveled 280 feet, then turned onto Perry Street. If the roundabout has a diameter of 150 feet, find the angle of rotation to the nearest degree the car traveled.

Name: _____

Unit 10: Circles

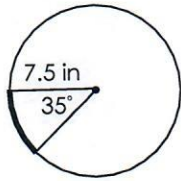


Date: _____ Per: _____

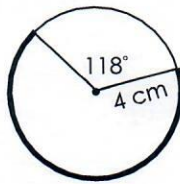
Homework 3: Arc Lengths

Directions: Find the measure of each bolded arc. Round to the nearest hundredth.

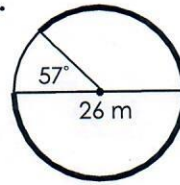
1.



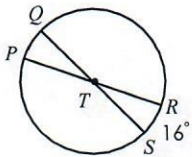
2.



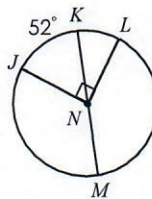
3.



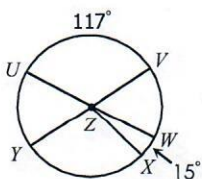
4. If $TR = 11$ ft, find the length of \widehat{PS} .



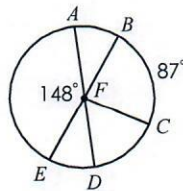
5. If $MK = 10$ m, find the length of \widehat{MKL} .



6. If $YV = 28$ in, find the length of \widehat{VYX} .



7. If $AF = 23$ cm, find the length of \widehat{EC} .



8. The minute hand on a clock is 9 centimeters long and travels through an arc of 252° every 42 minutes. To the nearest tenth of a centimeter, how far does the minute hand travel during a 42-minute period?

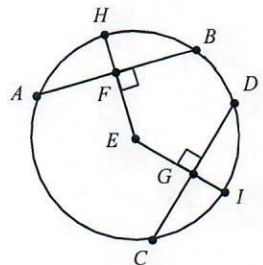
9. A Ferris wheel has a diameter of 225 feet. If a passenger gets in a car and travels 38 feet when the wheel stops to let more passengers on, find the angle of rotation to the nearest degree.

Name: _____

Date: _____

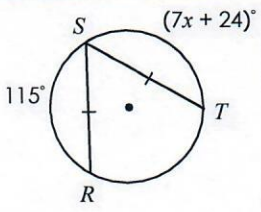
Topic: _____

Class: _____

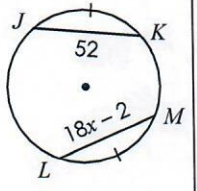
Main Ideas/Questions	Notes/Examples
<p style="text-align: center;"><i>Congruent</i> CHORDS & ARCS</p> 	<ul style="list-style-type: none"> Two chords are congruent if and only if: <ul style="list-style-type: none"> a) _____ _____ ↔ _____ b) _____ _____ ↔ _____ If a diameter or radius is _____ to a chord, then it _____ the _____ and its _____. _____ → _____ and _____

Directions: Find the indicated value.

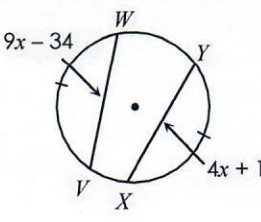
1. Find x .



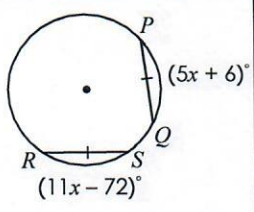
2. Find x .



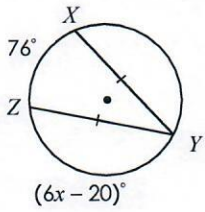
3. Find XY .



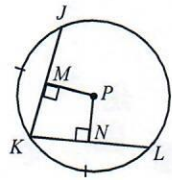
4. Find $m\widehat{RS}$.



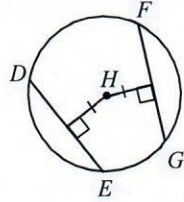
5. Find x .



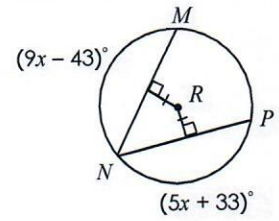
6. If $MP = 5x - 34$ and $PN = 2x - 4$, find MP .



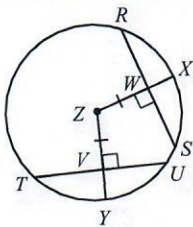
7. If $DE = 11x + 15$ and $FG = 32x - 27$, find DE .



8. Find $m\widehat{MP}$.

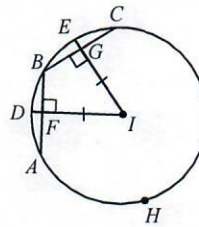


9. In circle Z, if $RS = 18$, and $m\widehat{TY} = 42^\circ$, find each measure.



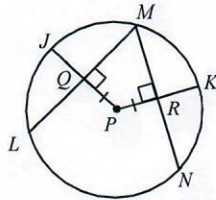
$TV =$ _____
 $TU =$ _____
 $WS =$ _____
 $m\widehat{YU} =$ _____
 $m\widehat{RS} =$ _____

10. In circle I, if $BG = 17$, and $m\widehat{CHA} = 256^\circ$, find each measure.

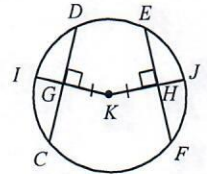


$BC =$ _____
 $FB =$ _____
 $m\widehat{AB} =$ _____
 $m\widehat{BC} =$ _____
 $m\widehat{EC} =$ _____

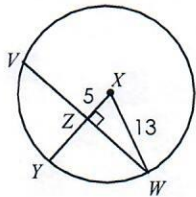
11. If $QM = 6x - 11$ and $MR = 2x + 9$, find MN .



12. If $m\widehat{CI} = (7x - 15)^\circ$ and $m\widehat{EF} = (12x - 8)^\circ$, find $m\widehat{CI}$.



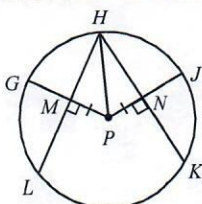
Use the circle below for questions 13 and 14.



13. Find VW .

14. Find $m\widehat{YW}$.

Use the circle below for questions 15 and 16.



$HK = 30$ and $PM = 8$

15. Find PH .

16. Find $m\widehat{GJ}$.

Name: _____

Unit 10: Circles

Date: _____ Per: _____

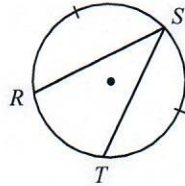
Homework 4: Congruent Chords & Arcs



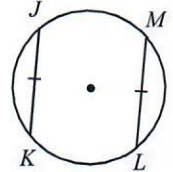
**** This is a 2-page document! ****

Directions: Find each value or measure.

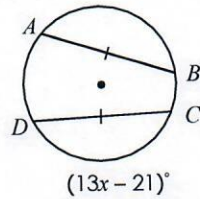
1. If $RS = 59$ and $ST = 10x - 31$, find x .



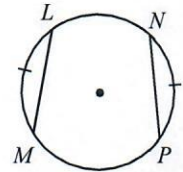
2. If $m\widehat{JK} = (7x - 39)^\circ$ and $m\widehat{ML} = 87^\circ$, find x .



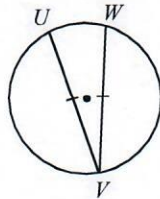
3. If $m\widehat{AD} = 85^\circ$ and $m\widehat{BC} = 31^\circ$, find the value of x .



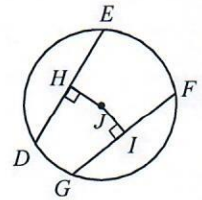
4. If $LM = 41 - 2x$ and $NP = 7x + 5$, find LM .



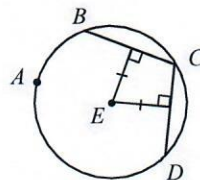
5. If $m\widehat{UV} = (8x - 17)^\circ$ and $m\widehat{WV} = (5x + 52)^\circ$, find $m\widehat{WV}$.



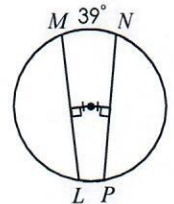
6. If $DE = GF$, $HJ = 3x + 20$ and $JI = 15x - 64$, find JI .



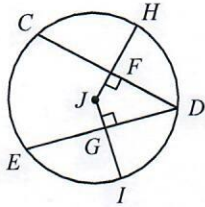
7. If $m\widehat{BC} = (9x - 53)^\circ$ and $m\widehat{CD} = (2x + 45)^\circ$, find $m\widehat{BAD}$.



8. If $m\widehat{LM} = (8x - 56)^\circ$ and $m\widehat{NP} = (5x + 22)^\circ$, find $m\widehat{LP}$.



9. If $JG = JF$, $GD = 13$, and $m\widehat{CD} = 136^\circ$, find each measure.



$$ED = \underline{\hspace{2cm}}$$

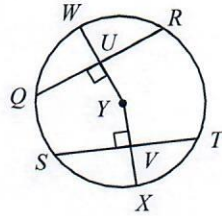
$$CF = \underline{\hspace{2cm}}$$

$$m\widehat{ED} = \underline{\hspace{2cm}}$$

$$m\widehat{HD} = \underline{\hspace{2cm}}$$

$$m\widehat{CE} = \underline{\hspace{2cm}}$$

10. If $YU = YV$, $ST = 16$, $m\widehat{QS} = 34^\circ$, and $m\widehat{RT} = 98^\circ$, find each measure.



$$QU = \underline{\hspace{2cm}}$$

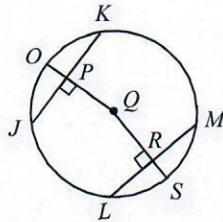
$$QR = \underline{\hspace{2cm}}$$

$$m\widehat{ST} = \underline{\hspace{2cm}}$$

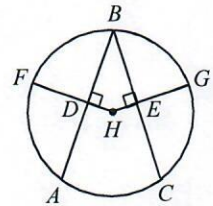
$$m\widehat{QR} = \underline{\hspace{2cm}}$$

$$m\widehat{XT} = \underline{\hspace{2cm}}$$

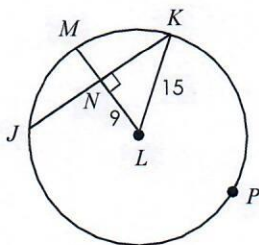
11. If $PQ = QR$, $JK = 3x + 23$ and $LM = 9x - 19$, find PK .



12. If $DH = HE$, $m\widehat{BG} = (9x - 20)^\circ$ and $m\widehat{GC} = (5x + 28)^\circ$, find $m\widehat{AB}$.



Use the circle below for questions 13 – 16.



13. Find NK .

14. Find $m\widehat{MK}$.

15. Find JK .

16. Find $m\widehat{JPK}$.