

April 15, 2019, Monday

Item 23
Selected-Response
When rolling a number cube with sides numbered 1 through 6, what is the probability of rolling a number less than 3?

Handwritten: $2, 4, 6 = 3$
 $1 = \frac{1}{6}$

23 MGSE9-12.S.CP.7

The correct answer is choice (B) $\frac{1}{3}$. An even number or a number less than 3 includes the outcomes of 1, 2, 4, and 6, and there are 6 outcomes in the sample space; $\frac{4}{6}$ simplifies to $\frac{2}{3}$. Choice (A) is incorrect because the probability of rolling a 1 and the probability of rolling a number less than 3 were added together without subtracting the overlap. Choice (C) is incorrect because it is the probability of an even number only. Choice (D) is incorrect because it is the probability of a number less than 3 only.

Item 24
Selected-Response
What is the probability of having an even number when you roll a 6-sided die?

Handwritten: $\frac{4}{6}$

24 MGSE9-12.S.CP.3 2 B

The correct answer is choice (B) $\frac{1}{2}$. With the conditional probability, we assume that an odd number was rolled, which reduces our sample space to 1, 3, and 5. Out of those possibilities, the probability of rolling a 5 is $\frac{1}{3}$. 1 successful outcome out of 3 total outcomes. Choice (A) is incorrect because it is the probability of rolling a 5 without knowing an odd number was rolled. Choice (C) is incorrect because it is the probability of rolling an odd number. Choice (D) is incorrect because it is the complement of the correct answer.

PARTS OF A CIRCLE

EQ: What is a circle and how do we identify points, segments and lines that are related to a circle?

> A **circle** is a set of points in a plane that have an equal distance from a given point.

Read each of the questions below. How can you respond to the questions using one of the mentioned circle parts and the given visual?

- > The **Center** of a circle is a point that has an equal distance from each point on the circle. Which mentioned part is the center? **A**
- > A **radius** of a circle is a segment between the center and a point on the circle. Which mentioned part is a radius? **AB**
- > A **diameter** of a circle is a segment between two points on the circle whose midpoint is the center. Which mentioned part is a diameter? **CB**
- > A **chord** of a circle is a segment between two points on the circle. Which mentioned part is a non-diameter chord? **EF**
- > A **tangent** of a circle is a line that touches or intersects the circle at exactly one point. Which mentioned part is a tangent? **GH**
- > A **secant** of a circle is a line that touches or intersects the circle at exactly two points. Which mentioned part is a secant? **JK**
- > The **Point of Tangency** of a circle is the point of intersection of a circle and a line. Which mentioned part is a point of tangency? **L**
- > How many radii make up a diameter? **2** How much of the diameter makes up a radius? **1/2**
- > From #2, segment AD is the mentioned radius. What are two other radii shown on the circle? **AE, AB**
- > From #4, segment EF is the mentioned non-diameter chord. What is another non-chord shown on the circle? **GH**

TANGENT PROPERTY
On $\odot T$, draw radius TN . The tangent line is **perpendicular** to the radius drawn to the tangent point.

Pythagorean Theorem
 $a^2 + b^2 = c^2$

For #1-6, ✓ whether the line or segment is best described as a radius, diameter, chord, secant or tangent.

	Radius	Diameter	Chord	Secant	Tangent
1 AD		✓			
2 CD	✓				
3 EG			✓		
4 HB				✓	
5 IB					✓
6 JI					✓

For #7-12, ✓ whether the line or segment is best described as a radius, diameter, chord, secant or tangent.

	Radius	Diameter	Chord	Secant	Tangent
7 AE				✓	
8 BD			✓		
9 AB		✓			
10 AB			✓		
11 EA				✓	
12 BC					✓

For #13-16, write whether \overline{AB} is tangent to $\odot O$ or not. Show work.

13 If Pyth. works, yes it is a point of tangency.
 $9^2 + 12^2 = 15^2$
 $81 + 144 = 225$
 $225 = 225$
Yes, it is a point of tangency.

14 $9^2 + 12^2 = 15^2$
 $81 + 144 = 225$
 $225 \neq 196$
No, it is not a point of tangency.

15 $7.5^2 + 10^2 = 12.5^2$
 $56.25 + 100 = 156.25$
 $156.25 = 156.25$
Yes, it is a point of tangency.

16 $5^2 + 12^2 = 13^2$
 $25 + 144 = 169$
 $169 = 169$
Yes, it is a point of tangency.

RELATIONSHIPS BETWEEN TWO CIRCLES

No Points of Intersection: Three circles do not intersect. These are **CONCENTRIC CIRCLES** because they have the same center.

1 Point of Intersection: These are **INTERNALLY TANGENT** circles because one is inside the other.

2 Points: These circles intersect at a maximum of 2 points. These are **EXTERNALLY TANGENT** circles because one is outside the other.

COMMON TANGENTS BETWEEN TWO CIRCLES

These are **COMMON INTERNAL TANGENTS** because they intersect the segment that joins the centers of the two circles.

These are **COMMON EXTERNAL TANGENTS** because they do not intersect the segment that joins the centers of the two circles.

For #17-24, match the notation with the term that best describes it.

17 F	A	Center
18 GE	B	Chord
19 HC	C	Diameter
20 DB	D	Radius
21 C	A	Center
22 BE	F	Common External Tangent
23 EG	G	Common Internal Tangent
24 AE	H	Secant

SEGMENTS are segments on tangents that are congruent.

How do we know tangent segments are congruent?

What kinds of circle parts are line AB and line CD? **tangent**
What kind of angles are $\angle TAB$ and $\angle TCB$? **right angles**
TB is TB. What part of the right triangle is TB to $\triangle TAB$ and $\triangle TCB$? **hypotenuse**
TA is TC. What kinds of circle parts are TA and TC to $\odot O$? **radii**
What part of the right triangle is TA to $\triangle TAB$ and TC to $\triangle TCB$? **legs**
WHY is AB congruent to CB? **CPCTC**. AB is CB because CPCTC.

For each of the following, find the unknown tangent segments to $\odot O$. How can we show the process for finding the requested measures?

25. $3x - 9 = 2x + 16$
 $3x - 2x = 16 + 9$
 $x = 25$
 $AB = 12$, $QC = 5$, $QB = 13$, $x = 7$, $CB = 15$, $QA = 8$, $QB = 17$

26. $2x + 1 = 3x - 6$
 $2x - 3x = -6 - 1$
 $-x = -7$
 $x = 7$
 $AB = 12$, $QC = 5$, $QB = 13$, $x = 7$, $CB = 15$, $QA = 8$, $QB = 17$

How can we show the process for finding the perimeter of each quadrilateral?

Quadrilateral	Perimeter
NWAK	30
PVEE	30
ALSV	30
LSEF	30

ARC AND CENTRAL ANGLES OF A CIRCLE

EQ: What is the relationship between major arcs, minor arcs and central angles of a circle?

> An **arc** is a portion of a circle. There are several arcs and angles of a circle that are of interest to us. In the given circle below, some of these parts are $\angle DBE$, \overline{DE} , \overline{DB} , \overline{BE} , \overline{AC} and \overline{BC} .

Read each of the questions below. How can you respond to the questions using the mentioned circle parts and the given visual?

- > A **central angle** of a circle is an angle whose vertex is the center of the circle and whose sides are radii of the circle. Which mentioned part is a central angle? $\angle DBE$
- > A **minor arc** is part of a circle that measures less than 180° . Which two mentioned parts are **minor arcs**? \overline{AC}
- > A **semicircle** is an arc of a circle that equals 180° . Which mentioned part is a **semicircle**? \overline{BC}
- > A **major arc** is part of a circle that measures more than 180° . Which mentioned part is a **major arc**? \overline{ACE}
- > **congruent** arcs are two or more arcs that have the same measure. Which pair of mentioned parts are **congruent arcs**? \overline{AD} , \overline{AC}

EX: How can we check whether the given arc is a minor arc, major arc or semicircle of $\odot O$?

Given Arc	Minor Arc	Major Arc	Semicircle
1 \overline{AE}	✓		
2 \overline{CB}		✓	
3 \overline{FE}			✓
4 \overline{FB}	✓		
5 \overline{EF}		✓	
6 \overline{FB}	✓		

How many degrees is a circle? **360** How many degrees is a semicircle? **180** How can we use this information to help us find the measure of each arc?

Example: Find the measure of the given arcs.

1 $m\overline{QR}$	70°
2 $m\overline{RQ}$	180°
3 $m\overline{SR}$	110°
4 $m\overline{RS}$	110°
5 $m\overline{SP}$	$210^\circ = 110^\circ + 70^\circ + 30^\circ$
6 $m\overline{RQ}$	80°
7 $m\overline{PR}$	$280^\circ = 360^\circ - 110^\circ$
8 $m\overline{QR}$	$280^\circ = 360^\circ - 80^\circ$

OUR TURN 1. $m\angle AOC = 180^\circ$
 $m\angle BOC = 80^\circ$
 $m\angle AOB = 100^\circ$

YOUR TURN 2. $m\angle AOC = 130^\circ$
 $m\angle BOC = 120^\circ$
 $m\angle AOB = 110^\circ$

3. $m\angle AOC = 180^\circ$
 $m\angle BOC = 50^\circ$
 $m\angle AOB = 130^\circ$

4. $m\angle AOC = 120^\circ$
 $m\angle BOC = 125^\circ$
 $m\angle AOB = 205^\circ$

5. $m\angle AOC = 100^\circ$
 $m\angle BOC = 100^\circ$
 $m\angle AOB = 200^\circ$

6. $m\angle AOC = 360^\circ$
 $m\angle BOC = 80^\circ$
 $m\angle AOB = 280^\circ$

7. $m\angle AOC = 180^\circ$
 $m\angle BOC = 190^\circ$
 $m\angle AOB = 270^\circ$

8. $m\angle AOC = 80^\circ$
 $m\angle BOC = 140^\circ$
 $m\angle AOB = 220^\circ$

9. $m\angle AOC = 120^\circ$
 $m\angle BOC = 190^\circ$
 $m\angle AOB = 210^\circ$

10. $m\angle AOC = 120^\circ$
 $m\angle BOC = 170^\circ$
 $m\angle AOB = 290^\circ$

11. $m\angle AOC = 145^\circ$
 $m\angle BOC = 220^\circ$
 $m\angle AOB = 265^\circ$

12. $m\angle AOC = 145^\circ$
 $m\angle BOC = 220^\circ$
 $m\angle AOB = 265^\circ$

OUR TURN 1. $m\angle AOC = 360^\circ$
 $m\angle BOC = 136^\circ$
 $m\angle AOB = 224^\circ$

YOUR TURN 2. $m\angle AOC = 64^\circ$
 $m\angle BOC = 196^\circ$
 $m\angle AOB = 260^\circ$

3. $m\angle AOC = 112^\circ$
 $m\angle BOC = 190^\circ$
 $m\angle AOB = 178^\circ$

4. $m\angle AOC = 170^\circ$
 $m\angle BOC = 242^\circ$
 $m\angle AOB = 192^\circ$

5. $m\angle AOC = 112^\circ$
 $m\angle BOC = 190^\circ$
 $m\angle AOB = 178^\circ$

6. $m\angle AOC = 170^\circ$
 $m\angle BOC = 242^\circ$
 $m\angle AOB = 192^\circ$

7. $m\angle AOC = 112^\circ$
 $m\angle BOC = 190^\circ$
 $m\angle AOB = 178^\circ$

8. $m\angle AOC = 170^\circ$
 $m\angle BOC = 242^\circ$
 $m\angle AOB = 192^\circ$

April 16, 2019, Tuesday

Item 22
 Constructed Response
 There are 52 cards in a deck. Each card in the deck is numbered with the whole numbers 1 through 13. Each number appears on 4 cards in the deck. A student draws a card from the deck and then draws another card without replacing the first.

Part A: What is the probability of picking a 1 on the first draw and then a 7 on the second draw?
 Write: Item 22

Part B: Explain in the Exemptor Response

Part A: $\frac{4}{52} \times \frac{4}{51} = \frac{16}{2652} = \frac{4}{663} \approx 60\%$

Part B: AND
 Part B: When the first card is drawn from the deck, there are 52 cards to choose from. Because the first card is not replaced, there are only 51 cards to choose from when the second card is drawn. So the result of picking a 1 on the first draw affects the sample space and, therefore, the probability of picking a 7 on the second draw. This means the events are not independent. Or other valid explanation.

1. Part B: When the first card is drawn from the deck, there are 52 cards to choose from. Because the first card is not replaced, there are only 51 cards to choose from when the second card is drawn. So the result of picking a 1 on the first draw affects the sample space and, therefore, the probability of picking a 7 on the second draw. This means the events are not independent. Or other valid explanation.

0. Response is irrelevant, inappropriate, or not provided.

INSCRIBED ANGLES OF A CIRCLE

Analyze the angles in Circle O below. Distinguish between the two.

CENTRAL $\angle ACB$
 The central angle has the vertex at the center of the circle and its sides are radii.

INSCRIBED $\angle APB$
 The inscribed angle has its vertex on the circle and its sides are chords.

Formulas
 Central Angle: Vertex is in center of circle. $m\angle CAD = m\widehat{CD}$
 INSCRIBED ANGLE: Vertex is on circle. $m\angle CAD = \frac{1}{2} m\widehat{CD}$

For #1-8, find the measure of the arc, central angle and inscribed angle.

1.	2.	3.	4.
ARC \widehat{AB} _____	ARC \widehat{AB} _____	ARC \widehat{AB} _____	ARC \widehat{AB} _____
CENTRAL $\angle ACB$ _____	CENTRAL $\angle ACB$ _____	CENTRAL $\angle ACB$ _____	CENTRAL $\angle ACB$ _____
INSCRIBED $\angle APB$ _____	INSCRIBED $\angle APB$ _____	INSCRIBED $\angle APB$ _____	INSCRIBED $\angle APB$ _____

For #9-14, find the measure of the requested angle or arc.

9. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

10. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

11. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

12. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

13. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

14. $m\angle AOC = 160^\circ$
 $m\angle BOC = 24^\circ$
 $m\angle AOB = 136^\circ$

For #15-26, find the measure of the requested angle or arc.

15. $m\angle AOC = 122^\circ$
 $m\angle BOC = 122^\circ$
 $m\angle AOB = 244^\circ$

17. $m\angle AOC = 122^\circ$
 $m\angle BOC = 122^\circ$
 $m\angle AOB = 244^\circ$

19. $m\angle AOC = 122^\circ$
 $m\angle BOC = 122^\circ$
 $m\angle AOB = 244^\circ$

23. $m\angle AOC = 180^\circ$
 $m\angle BOC = 61^\circ$
 $m\angle AOB = 241^\circ$

24. $m\angle AOC = 180^\circ$
 $m\angle BOC = 61^\circ$
 $m\angle AOB = 241^\circ$

SOLVING EQUATIONS: For #25-26, solve for x and find each angle or arc. Show work.

25. $m\angle AOC = 3x+4^\circ$
 $m\angle BOC = 11x-12^\circ$
 $m\angle AOB = 118^\circ$

26. $m\angle AOC = 12x-1^\circ$
 $m\angle BOC = 9^\circ$
 $m\angle AOB = 99^\circ$

27. $m\angle AOC = 2x+8^\circ$
 $m\angle BOC = 4x-3^\circ$
 $m\angle AOB = 118^\circ$

NOTE: For #29-34, inscribed angles are formed by a tangent and a chord. Find the measure of each angle or arc.

29	30	31
$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$
32	33	34
$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$

PARALLEL LINES

For #35-38, find the measure of each angle or arc.

35	36
$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$
37	38
$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$	$m\angle PQR = \dots$ $m\text{arc } PQR = \dots$

Partner 1-10
Individual 2, 4, 6, 8, 10

Geometry - U4 Day 2
TODD - Tangents, Central Angles, & Arcs

Solve for x . Assume that lines which appear to be tangent are tangent.

1)

2)

Find the segment length indicated. Assume that lines which appear to be tangent are tangent.

3)

4)

Find the measure of the arc or central angle indicated. Assume that lines which appear to be diameters are actual diameters.

5) $m\angle BEG$

6) $m\text{arc } LN$

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Solve for x . Assume that lines which appear to be diameters are actual diameters.

7)

8)

Find the measure of the arc or central angle indicated. Assume that lines which appear to be diameters are actual diameters.

9) $m\angle EIJ$

10) $m\text{arc } EF$

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April 17, 2019, Wednesday

Item 15
Selected-Response
Look at quadrilateral QRST.

What is the image of point R after a counterclockwise rotation of 270 degrees about the origin?

A. (6, -3)
B. (-3, 6)
C. (-6, 3)
D. (3, -6)

15

RELATED ANGLES FROM INSCRIBED ANGLES

For #1-10, x° is formed by the intersection of two chords. Use an auxiliary line and inscribed angles to solve for x .

$$m\angle x = \frac{1}{2}(\text{Arc } + \text{Arc})$$

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.

For #11-20, x° is formed by the intersection of two secants or by the intersection of a secant and tangent. Use an auxiliary line and inscribed angles to solve for x .

$$m\angle x = \frac{1}{2}(\text{Big Arc} - \text{Small Arc})$$

11.	12.
13.	14.
15.	16.
17.	18.
19.	20.

April 18, 2019, Thursday

Distance Formula
 $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Item 16

The correct answer is choice (B) 25.6 units. Apply the distance formula to find the length of one side, which is 6.4. Since this is a square, multiply 6.4 by 4 to obtain the perimeter. Choice (A) is incorrect because the number of unit squares on a line segment was counted to estimate the length and then multiplied by 4. Choice (C) is incorrect because the number of unit squares across the square was counted to estimate the length and then multiplied by 2. Choice (D) is incorrect because it is the approximate area of the square.

Which measure is closest to the perimeter of square WXYZ?

A. 20 units
 B. 25.6 units
 C. 32 units
 D. 40.9 units

Item 17

What are the coordinates of a point that lies along the directed line segment from Q(2, 5) to R(7, 12) and partitions the segment in the ratio of 3 to 2?

A. (3, 4.2)
 B. (4.5, 8.5)
 C. (5, 9.2)
 D. (5, 7)

Coordinates of point which partitions a directed line segment AB at the ratio of a:b from A(x₁, y₁) to B(x₂, y₂):
 $(x, y) = \left(\frac{bx_1 + ax_2}{b+a}, \frac{by_1 + ay_2}{b+a} \right)$
 OR
 $(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1) \right)$

Handwritten notes: x, y coordinates and y-coordinates. x_1, y_1, x_2, y_2 . a, b .

Coordinates of point which partitions a directed line segment AB at the ratio of a:b from A(x₁, y₁) to B(x₂, y₂):
 $(x, y) = \left(\frac{bx_1 + ax_2}{b+a}, \frac{by_1 + ay_2}{b+a} \right)$
 OR
 $(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1) \right)$

Selected-Response

What are the coordinates of a point that lies along the directed line segment from Q(2, 5) to R(7, 12) and partitions the segment in the ratio of 3 to 2?

A. (3, 4.2)
 B. (4.5, 8.5)
 C. (5, 9.2)
 D. (5, 7)

Handwritten notes: x_1, y_1, x_2, y_2 . a, b . $(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1) \right)$. $(2 + \frac{3}{3+2}(7-2), 5 + \frac{3}{3+2}(12-5))$. $(5, 8.5)$.

ARC LENGTH AND SECTOR AREA OF CIRCLES

Let θ (theta) represent the central angle of a circle. The sector of a circle is the partial area of the circle that contains the central angle and its arc.

The arc length of a circle represents part of the circumference of the circle.
 $Arc\ Length = \frac{\theta^\circ}{360^\circ} \cdot 2\pi r$

The area of the sector represents part of the area of the circle.
 $Sector\ Area = \frac{\theta^\circ}{360^\circ} \cdot \pi r^2$

For #1-3, the central angle and either the radius are given. How do we show the process for finding the arc length and sector area of each shaded region using proper units?

	Arc Length	Sector Area
1		
2		
3		

For #4-9, find the requested measure. Make sure to use appropriate units.

4	What is the area of the shaded part of the circle? 	5	What is the arc length of the shaded part of the circle?
6	What is the arc length of the shaded part of the circle? 	7	What is the area of the shaded part of the circle?
8	What is the area of the shaded part of the circle? 	9	What is the arc length of the shaded part of the circle?

For #10-17, find the requested measure. Make sure to use appropriate units.

10	Length of the arc AB = 38.38 in 	11	Length of the arc CD = 15.18 in
----	-------------------------------------	----	-------------------------------------

12	Length of the arc CD = 18.32 m 	13	Length of the arc YZ = 37.42 cm
14	Area = 284.96 cm ² 	15	Area = 529.35 in ²
16	Area = 32.33 m ² 	17	Area = 151.66 cm ²

Geometry Name _____ ID: 1


Are Length & Sector Area _____ Date _____ Period _____


Find the length of each arc. Round your answers to the nearest tenth.


1)	2)
3)	4)
5)	6)


A) 33.8 in B) 52.4 in A) 18 ft B) $\frac{5\pi}{2}$ ft
 C) 40.8 in D) 52.6 in C) π ft D) 20 ft


Find the area of each sector. Round your answers to the nearest tenth.


7) 

8) 

9) 

10) 

11) 

12) 

A) 47.1 m² B) 137.8 m²
 C) 25.1 m² D) 1.2 m²

A) $\frac{95\pi}{3}$ km² B) 900π km²
 C) $\frac{3211\pi}{24}$ km² D) $\frac{25\pi}{2}$ km²

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April 19, 2019, Friday

Item 18
 Selected-Response
 What is the equation of the line that is perpendicular to $y = \frac{1}{2}x - 6$ and passes through the point (6, 4)?

A. $y = -\frac{1}{2}x + 1$
 B. $y = -\frac{1}{2}x + 7$
 C. $y = -2x - 8$
 D. $y = -2x + 16$

Item 19
 Selected-Response
 Study this equation of a circle.
 $x^2 - 6x + y^2 + 2y + 6 = 0$


Which of these represents the center and radius of the circle?


A. center: (3, -1), radius: 4
 B. center: (-3, 1), radius: 4
 C. center: (3, -1), radius: 2
 D. center: (-3, 1), radius: 2

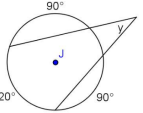
18		
19		


Geometry GROUP WORK Name: _____ Date: _____
CIRCLES Period: _____

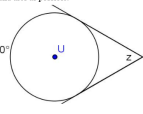
Show all work by writing on your diagram! Answers will not be scored without writing on diagrams. One paper from your group will be randomly chosen to be scored for your whole group grade.

1) Find the value of v . 


2) Find the value of x . 

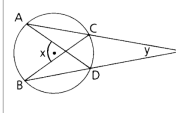
3) Find the value of y by finding as many other angles and arcs as possible. 

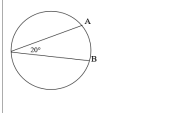
4) Find the value of w by finding as many other angles and arcs as possible. 

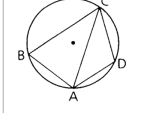
5) Find the value of z by finding as many other angles and arcs as possible. 

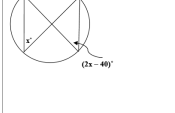
6) If $m\widehat{AB} = 60^\circ$ and radius is 8 cm:
 a) What is the length of \widehat{AB} ? Include units.
 b) What is the area of the 60° sector? Include units.

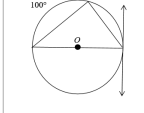
7) A square is inscribed in a circle as shown. If the radius of the circle is 6 in., find the area of the shaded region. 

8) For $\odot O$, $m\widehat{AB} = 100^\circ$ and $m\widehat{CD} = 30^\circ$. Find x and y . Show work. 

9) If length of \widehat{AB} is 10π cm, what is the circumference of the circle? Show work. 

10) $\triangle ABC$ is inscribed with base \widehat{AB} . $m\angle BAC = 35^\circ$ and $m\angle C = 160^\circ$. Find all angles and arcs. 

11) Find $m\widehat{AM}$. 

12) In $\odot O$, write all angles and arcs in the figure that can be found. 

13) Find all angles and arcs in the circle below. 