Name:_____per._____ ***GEO:*** Arc Length & Area Sector Problems – 2/16/16

Angles In Circles

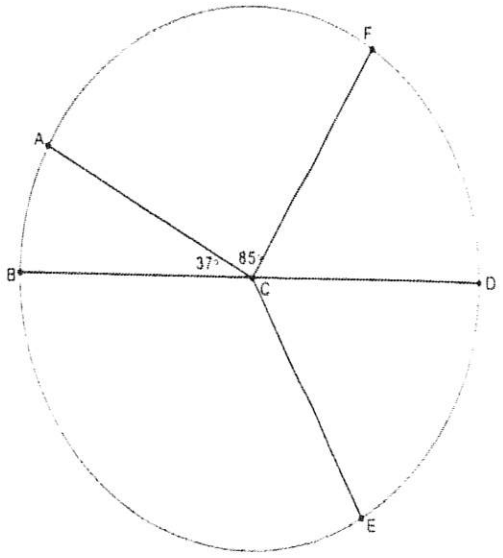
Part I – Central Angles

The measure of a central angle is _____ the measure or the intercepted arc created by the angle.

The total number of degrees in a circle is _____.

The total number of degrees in a semicircle is _____.

Use the picture of ⊙C at right for the example questions. Tell whether each arc is a major arc, minor arc, or a semi-circle. Then, find the degree measure of each arc. BD is a diameter and CD is an angle bisector.



Ex 1: $m\widehat{AB}$

Ex 2: $m\widehat{AF}$

Ex 3: $m\widehat{BE}$

Ex 4: $m\widehat{FBE}$

Ex 5: $m\widehat{BD}$

Ex 6: $m\widehat{FD}$

Ex 7: $m\widehat{DAE}$

1.

2.

3.

4.

5.

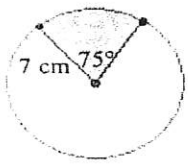
6.

7.

Arc Length and Sector Area NOTES

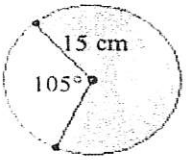
The area of sectors is actually finding a _____ of the circle's _____ _____. You can set up a proportion to solve using $\frac{part}{total}$.

Ex 1.



_____ = _____

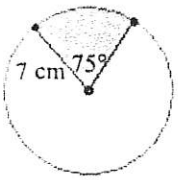
Ex. 2.



_____ = _____

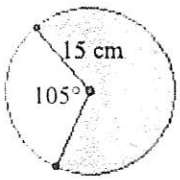
The arc length is actually finding a _____ of the circle's _____ _____. You can set up a proportion to solve using $\frac{part}{total}$.

Ex 3



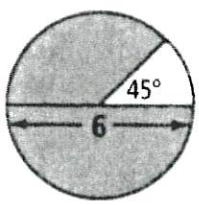
_____ = _____

Ex. 4.

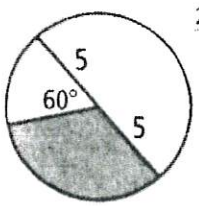


_____ = _____

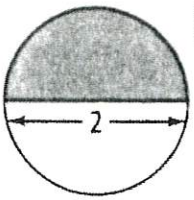
What about more difficult problems?

15. 

$\frac{63}{8}\pi$

16. 

$\frac{25}{3}\pi$

17. 

$\frac{\pi}{2}$

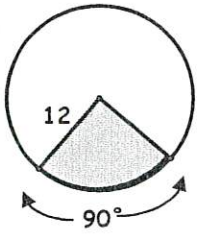
Geometry Worksheet
Arc Length, Sector Area, Segment Area

Name_____
Date_____Period_____

Find the shaded area. On problems 1-3, find the arc length for the shaded sector also.

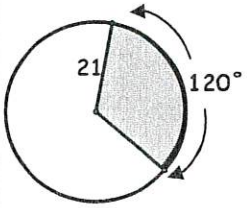
1. A_{sector} = _____

   Arc length = _____



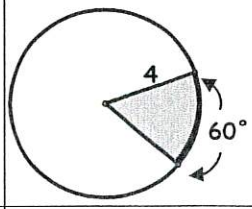
2. A_{sector} = _____

   Arc length = _____

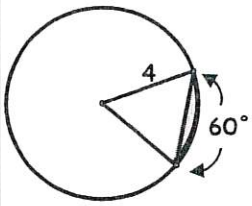


3. A_{sector} = _____

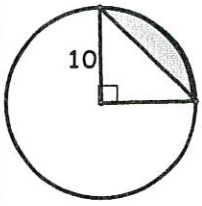
   Arc length = _____



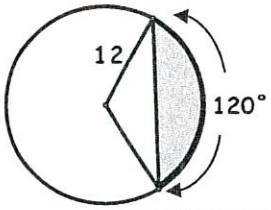
4. $A_{segment}$ = _____



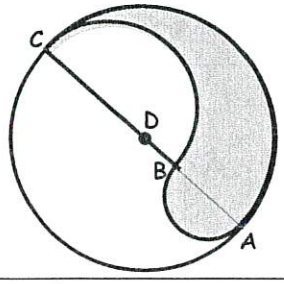
5. $A_{segment}$ = _____



6. $A_{segment}$ = _____



7. If BC = 2AB, what fraction of the circle is shaded? (Hint: Let the AB = 2x. D is the center of the big circle. AB is the diameter of a little circle and BC is the diameter of a medium circle. Find the areas in terms of x.)



8. Find the degree measure of the arc of a sector with area 36π if the area of the circle is 144π.

9. Two circles have radii 3 cm. and 5 cm. Find the ratio of their areas.

10. The areas of two circles are in the ratio 16 to 9. Find the ratio of their radii.

Name:_____ per.____ ***GEO:*** Arc Length & Area Sector Problems – 2/16/16 Key

Angles In Circles

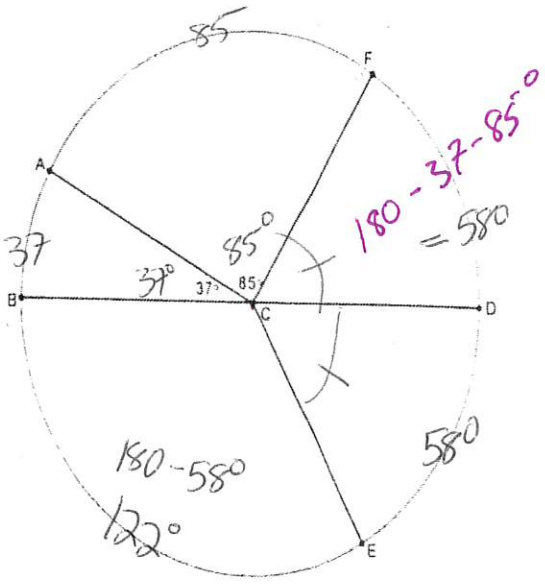
Part I – Central Angles

The measure of a central angle is equal to the measure or the intercepted arc created by the angle.

The total number of degrees in a circle is 360°.

The total number of degrees in a semicircle is 180°.

Use the picture of ⊙C at right for the example questions. Tell whether each arc is a major arc, minor arc, or a semi-circle. Then, find the degree measure of each arc. BD is a diameter and CD is an angle bisector.



minor Ex 1: $m\overset{\frown}{AB}$ = 37°

minor Ex 2: $m\overset{\frown}{AF}$ = 85°

major Ex 3: $m\overset{\frown}{BE}$ 122°

major Ex 4: $m\overset{\frown}{FBE}$ 244° 122+37+85

semicircle Ex 5: $m\overset{\frown}{BD}$ = 180°

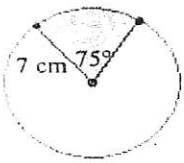
minor Ex 6: $m\overset{\frown}{FD}$ = 58°

major Ex 7: $m\overset{\frown}{DAE}$ 302° 360 - 58

Arc Length and Sector Area NOTES

The area of sectors is actually finding a fraction of the circle's total area. You can set up a proportion to solve using $\frac{part}{total}$.

Ex 1.



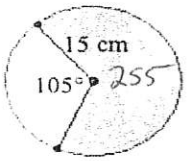
$\frac{75}{360} = \frac{A}{\pi(7^2)}$

$\frac{49 \cdot 75 \cdot \pi}{360} = A$

$= 10.21\pi \text{ cm}^2$

$\approx 32.07 \text{ cm}^2$

Ex. 2.



360 - 105

$\frac{255}{360} = \frac{A}{\pi(15)^2}$

$A = \frac{255}{360} \cdot \pi(15^2)$

$A \approx 500.69 \text{ cm}^2$

$A = 159.375\pi \text{ cm}^2$

The arc length is actually finding a fraction of the circle's total circumference. You can set up a proportion to solve using $\frac{part}{total}$.

Ex 3

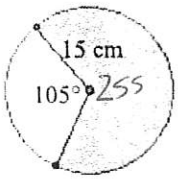
$L = 2.92\pi \text{ cm}$

$\approx 9.16 \text{ cm}$

$\frac{75}{360} = \frac{L}{2\pi(7)}$

$\frac{75}{360} \cdot 14\pi = L$

Ex. 4.



$\frac{255}{360} = \frac{L}{2\pi(15)}$

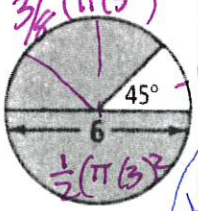
$L = \frac{255}{360} \cdot 2\pi(15)$

$L = 21.25\pi \text{ cm}$

$L \approx 66.76 \text{ cm}$

What about more difficult problems?

15.



$\frac{3}{8}(\pi(3^2))$

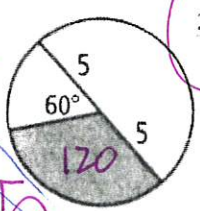
$\frac{1}{2}(\pi(3^2))$

$\frac{63}{8}\pi = \frac{27}{8}\pi + \frac{36}{8}\pi$

$\frac{9}{2}\pi$

$\left(\frac{36}{8}\right)(\pi(3^2)) = \frac{81}{8}\pi$

16.



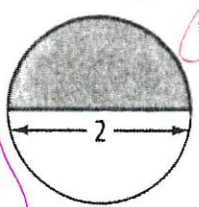
$\frac{25}{3}\pi$

$\frac{120}{360} = \frac{A}{\pi(5)^2}$

$= \frac{25 \cdot 120}{360}\pi$

$= 8.33\pi$

17.



$\frac{\pi}{2}$

$= \frac{1}{2}(\pi(1^2))$

$= \pi/2$

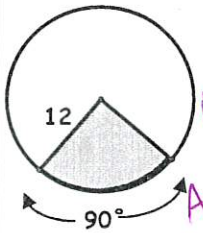
Geometry Worksheet
Arc Length, Sector Area, Segment Area

Name Key
Date _____ Period _____

Find the shaded area. On problems 1-3, find the arc length for the shaded sector also.

1. A_{sector} = 36π un^2

Arc length = _____

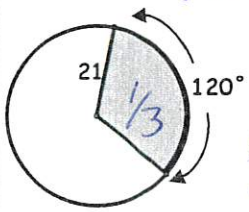


$A = \frac{1}{4}(2\pi(12)$

$A = \frac{1}{4}\pi(12)^2$

2. A_{sector} = 147π un^2

Arc length = 14π



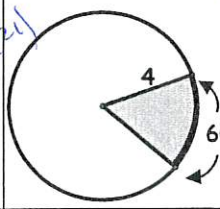
$A = \frac{1}{3}(\pi(21)^2)$

$L = \frac{1}{3}(2\pi(21)$

$\frac{120}{360} = \frac{12}{36} = \frac{1}{3}$

3. A_{sector} = $\frac{16}{6}\pi = \frac{8\pi}{3}$ un^2

Arc length = $\frac{8}{6}\pi = \frac{4\pi}{3}$ un



$L = \frac{1}{6}(2\pi(4)$

$\frac{60}{360} = \frac{1}{6}$

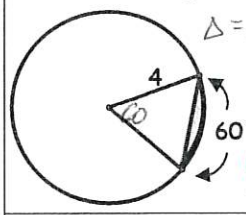
$A = \frac{1}{6}(\pi(4^2)$

4. $A_{segment}$ = $2.67\pi - 6.93 =$

Sector: $A = \frac{60}{360}\cdot\pi(4^2) = 2.67\pi$

$\Delta = \frac{1}{2}\cdot 4\cdot 4\cdot \sin 60°$

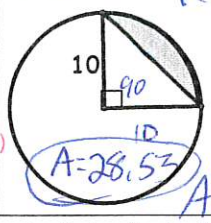
$= 6.93$



$= 1.46$ un^2

5. $A_{segment}$ = Sector − triangle

Sector: $\frac{1}{4}(\pi(10^2)) = 25\pi$



$\Delta = \frac{1}{2}(10)(10)\sin 90°$

$= (50)(1)$

$= 50$

$A = 25\pi - 50$ un^2

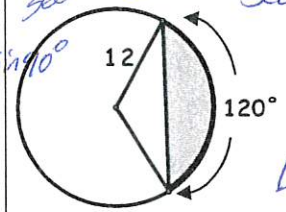
$A = 28.53$

6. $A_{segment}$ = 86.45 un^2

$\frac{120}{360} = \frac{1}{3}$

Sector $= \frac{1}{3}(\pi(12^2))$

$= \frac{144}{3}\pi$



$\Delta = \frac{1}{2}(12)(12)\sin 120°$

$\Delta = 62.35$

7. If BC = 2AB, what fraction of the circle is shaded? (Hint: Let the AB = 2x. D is the center of the big circle. AB is the diameter of a little circle and BC is the diameter of a medium circle. Find the areas in terms of x.)

Answer: $3\pi x$

If $AB = 2x$

$r\theta_1 = 2x = AB$

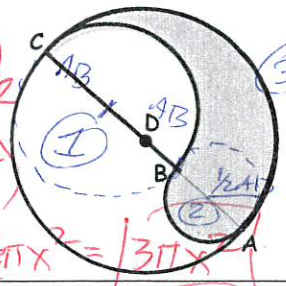
$r\theta_2 = x = \frac{AB}{2}$

$r\theta_3 = 3(2x) = 3x = \frac{3(AB)}{2}$

Shaded $= \frac{1}{2}(\theta_3) - \frac{1}{2}(\theta_1) + \frac{1}{2}\theta_2$

$= \frac{1}{2}(\pi AB x)^2 - \frac{1}{2}(\pi x^2) + \frac{1}{2}(\pi x^2)$

$\frac{9}{2}\pi x^2 - \frac{4}{2}\pi x^2 + \frac{\pi}{2}x^2 = \frac{6}{2}\pi x^2 = 3\pi x^2$



8. Find the degree measure of the arc of a sector with area 36π if the area of the circle is 144π.

$360\left(\frac{\theta}{360}\right) = \frac{36\pi}{144\pi}360 \rightarrow \theta = \frac{36\times 360}{144} = 90°$

$\frac{36}{144} = \frac{1}{4}$th

9. Two circles have radii 3 cm. and 5 cm. Find the ratio of their areas.

$\frac{\text{small}}{\text{large}} = \frac{9\pi}{25\pi} = \frac{9}{25}$

10. The areas of two circles are in the ratio 16 to 9. Find the ratio of their radii.

$\frac{\text{large}}{\text{small}}: \frac{\pi r^2}{\pi r^2} = \frac{16}{9} \rightarrow \sqrt{\frac{r^2}{r^2}} = \sqrt{\frac{16}{9}} = \frac{4}{3}$

Answers:

1. Area = 36π u^2 and arc length = 6π u
2. Area = 147π u^2 and arc length = 14π u
3. Area = $8\pi/3$ u^2 and arc length = $4\pi/3$ u
4. $\left(\frac{8}{3}\pi - 4\sqrt{3}\right)u^2$
5. $(25\pi - 50)$ u^2
6. $(48\pi - 36\sqrt{3})$ u^2
7. $\frac{1}{3}$
8. $90°$
9. $\frac{9}{25}$
10. $\frac{4}{3}$