11.3 – Perimeters and Areas of Similar Figures

1. Perimeter of a Polygon – the sum of the lengths of its sides.

2. Area of a Polygon – the number of square units contained in the interior of the polygon.

3. Theorem 11.5 – Areas of Similar Polygons

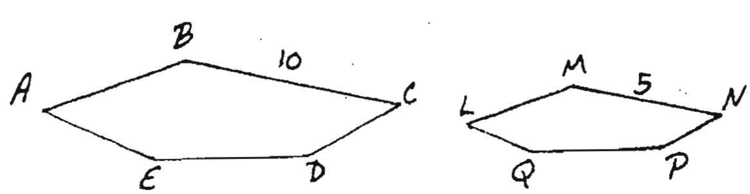
   If two polygons are similar with the lengths of their corresponding sides (or perimeters) in the ratio of a:b, then the ratio of their areas is $a^2 : b^2$.

4. Example for Theorem 11.5 :

Pentagons ABCDE and LMNPQ are similar.

a) Find the ratio of the perimeters of the pentagons.

b) Find the ratio of the areas of the pentagons.



11.3 Examples

1. The ratio of the lengths of corresponding sides of two similar hexagons is 2:5. What is the ratio of their areas?

2. A regular octagon has an area of $49m^2$. Find the scale factor of this octagon to a similar octagon that has an area of $100m^2$.

3. ΔABC is a right triangle whose hypotenuse is 8 *inches* long. Given that the area of ΔABC is $13.9in^2$, find the area of similar ΔDEF whose hypotenuse is 20 *inches* long.

4. Regular pentagon ABCDE has a side length of $6\sqrt{5}$ *cm*. Regular pentagon QRSTU has a perimeter of 40 *cm*. Find the ratio of the perimeters of ABCDE to QRSTU.

5. A square has a perimeter of 36 *cm*. A smaller square has a side length of 4 *cm*. What is the ratio of the areas of the larger square to the smaller one?

6. A regular nonagon has an area of $90ft^2$. A similar nonagon has an area of $25ft^2$. What is the ratio of the perimeters of the first nonagon to the second?

 Name ______________________

VOCABULARY

The **circumference** of a circle is the distance around the circle.

An **arc length** is a portion of the circumference of a circle.

Theorem 11.6 Circumference of a Circle The circumference C of a circle is $C = \pi d$ or $C = 2\pi r$, where d is the diameter of the circle and r is the radius of the circle.

Arc Length Corollary In a circle, the ratio of the length of a given arc to the circumference is equal to the ratio of the measure of the arc to 360°.

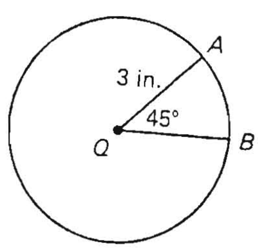
$$\frac{\text{Arc length of } \overset{\frown}{AB}}{2\pi r} = \frac{m\overset{\frown}{AB}}{360^\circ}, \text{ or Arc length of } \overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360^\circ} \cdot 2\pi r$$

Ex1 Find the circumference of a circle with radius 17*cm*.

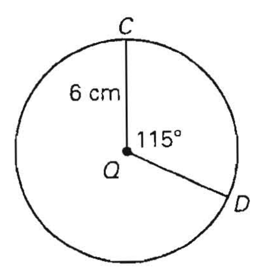
Ex2 Find the radius of a circle with circumference 14*yds*.

Ex3 Find the diameter of a circle with circumference 12*ft*.

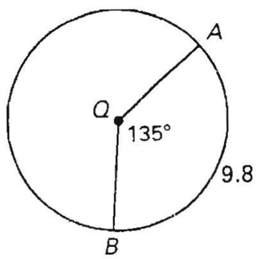
Ex4 Find the arc length of $\overset{\frown}{AB}$.



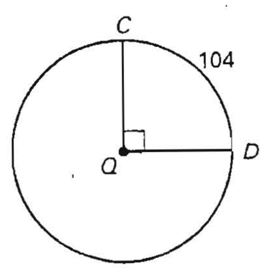
Ex5 Find the arc length of $\overset{\frown}{CD}$.



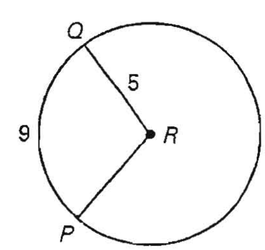
Ex6 Find the circumference.



Ex7 Find the radius.



Ex8 Find $m\overset{\frown}{PQ}$



11.5 – Areas of Circles and Sectors

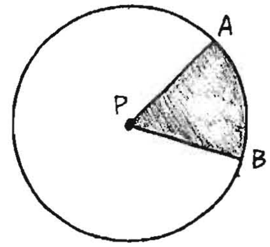
1. Theorem 11.7 – Area of a Circle $A = \pi r^2$

Ex1 Find the area of a circle with radius $8in$.

Ex2 Find the diameter of a circle with an area of $96\ cm^2$.

2. Sector of a Circle – the region bounded by two radii of the circle and their intercepted arc.

- Sector APB is bounded by $\overline{AP}$, $\overline{BP}$, and $\overset{\frown}{AB}$.

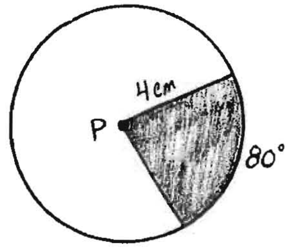


3. Theorem 11.8 – Area of a Sector

The ratio of the area of a sector to the area of its circle is equal to the ratio of the measure of the intercepted arc to $360°$.

$$\frac{A}{\pi r^2} = \frac{m\overset{\frown}{AB}}{360°} \quad \text{or} \quad A = \frac{m\overset{\frown}{AB}}{360°} \cdot \pi r^2$$

Ex3 Find the area of the sector.



11.6 – Geometric Probability

Name ______________________________

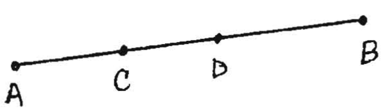
1. Probability – a number from 0 to 1 that represents the chance that an event will occur.

- An event with a probability of: 0 – cannot occur
  1 – is certain to occur
  0.5 – just as likely to occur as not

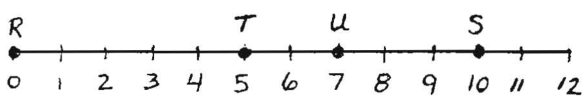
Geometric Probability

a) Probability and Length – Let $\overline{AB}$ be a segment that contains $\overline{CD}$. If a point on $\overline{AB}$ is chosen at random, then the probability that it is on $\overline{CD}$ is:

$$P = \frac{\text{Length of } \overline{CD}}{\text{Length of } \overline{AB}}$$

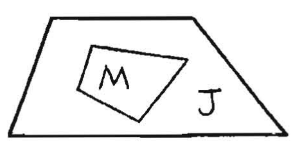


Ex1 Find the probability that a point chosen at random on $\overline{RS}$ is on $\overline{TU}$.



b) Probability and Area – Let J be a region that contains region M. If a point in J is chosen at random, then the probability that it is in region M is:

$$P = \frac{\text{Area of } M}{\text{Area of } J}$$



Ex2 A dart is tossed and hits the dart board shown. The dart is equally likely to land on any part of the board. Find the probability that the dart lands on the shaded region.