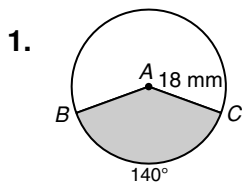
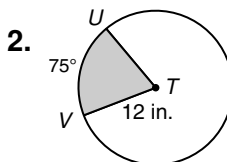


**LESSON**
**Practice B**
**11-3 Sector Area and Arc Length**

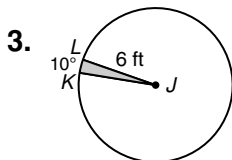
Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.



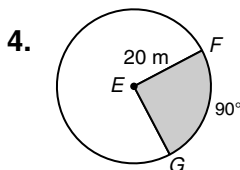
sector  $BAC$  \_\_\_\_\_



sector  $UTV$  \_\_\_\_\_



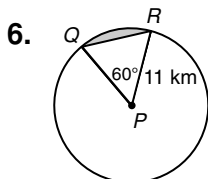
sector  $KJL$  \_\_\_\_\_



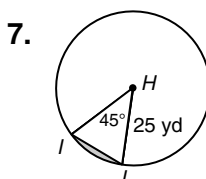
sector  $FEG$  \_\_\_\_\_

5. The speedometer needle in Ignacio's car is 2 inches long. The needle sweeps out a  $130^\circ$  sector during acceleration from 0 to 60 mi/h. Find the area of this sector. Round to the nearest hundredth. \_\_\_\_\_

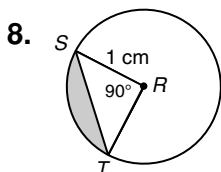
Find the area of each segment to the nearest hundredth.



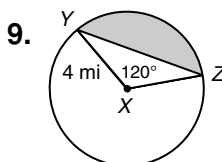
\_\_\_\_\_



\_\_\_\_\_

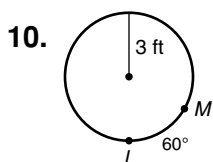


\_\_\_\_\_

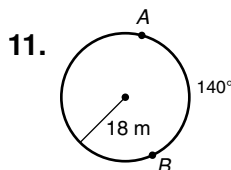


\_\_\_\_\_

Find each arc length. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.



\_\_\_\_\_



\_\_\_\_\_

12. an arc with measure  $45^\circ$  in a circle with radius 2 mi \_\_\_\_\_

13. an arc with measure  $120^\circ$  in a circle with radius 15 mm \_\_\_\_\_

**LESSON 11-3 Practice A**  
**Sector Area and Arc Length**

In Exercises 1 and 2, fill in the blanks to complete each formula.

- The area of a sector of a circle with radius  $r$  and central angle  $m^\circ$  is  $A = \frac{\pi r^2 (\frac{m^\circ}{360^\circ})}{1}$ .
- The length of an arc with central angle  $m^\circ$  on a circle with radius  $r$  is  $L = \frac{2\pi r (\frac{m^\circ}{360^\circ})}{1}$ .

Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

- sector  $BAC$   $9\pi \text{ mm}^2$ ; 28.27  $\text{mm}^2$
- sector  $QPR$   $27\pi \text{ mi}^2$ ; 84.82  $\text{mi}^2$

Different animals have different fields of view. Humans can generally see a  $180^\circ$  arc in front of them. Horses can see a  $215^\circ$  arc. A horse and rider are in heavy fog, so they can see for only 25 yards in any direction. Round your answers to Exercises 5 and 6 to the nearest square yard.

- Find the area of the rider's field of view.  $982 \text{ yd}^2$
- Find the area of the horse's field of view.  $1173 \text{ yd}^2$

Complete Exercises 7–9 to find the area of segment  $KJL$ .

- Find the area of sector  $KJL$ . Give your answer in terms of  $\pi$ .  $25\pi \text{ in}^2$
- Find the area of  $\triangle KJL$ .  $50 \text{ in}^2$
- Subtract the area of  $\triangle KJL$  from the area of sector  $KJL$  to find the area of segment  $KJL$ . Round to the nearest hundredth.  $28.54 \text{ in}^2$

Find each arc length. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

- $\overline{XY}$   $4\pi \text{ cm}$ ; 12.57  $\text{cm}$
- $\overline{MN}$   $3\pi \text{ km}$ ; 9.42  $\text{km}$

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**LESSON 11-3 Practice C**  
**Sector Area and Arc Length**

- Find the measure of a central angle in a circle so that the segment has half the area of the sector. First derive an equation, and then use trial and error to estimate the measure of the central angle to within 1 degree. Explain your answer.

Possible answer: The area of a sector of a circle with radius  $r$  and central angle  $m$  is  $A = \pi r^2 (\frac{m}{360})$ . Half this area is  $\pi r^2 (\frac{m}{720})$ . The measure of the segment cannot be calculated directly. But if the segment has half the area of the sector, then the triangle must have the other half of the area, and the area of the triangle can be calculated. The height of the triangle is  $r \cos(\frac{m}{2})$ , and the length of the base is  $2r \sin(\frac{m}{2})$ . The area of the triangle is  $\frac{bh}{2}$  or  $r^2 \sin(\frac{m}{2}) \cos(\frac{m}{2})$ . Set this equal to the area of half the sector:  $m \frac{\pi r^2}{720} = \sin(\frac{m}{2}) \cos(\frac{m}{2})$ . Notice that this equation is independent of the radius  $r$ . Using trial and error with this equation shows that the measure of a central angle whose segment has half the area of the sector is between  $108^\circ$  and  $109^\circ$ .

- The circumference of a circle is  $18\pi \text{ m}$ . Find the central angle of a sector of the circle whose area is  $40.5\pi \text{ m}^2$ .  $180^\circ$

Find the shaded area of each figure. Round to the nearest hundredth.

- $9.08 \text{ cm}^2$
- $414.69 \text{ ft}^2$

- Find the measure of the central angle of an arc so that the length of the arc is equal to the radius of the circle. Round to the nearest tenth. Explain your answer. Possible answer: The length of an arc with central angle measure  $m$  in a circle with radius  $r$  is equal to  $2\pi r (\frac{m}{360})$ . Set this equal to the radius:  $2\pi r (\frac{m}{360}) = r$ . This simplifies to  $m = \frac{180}{\pi}$ . The measure of the central angle is  $57.3^\circ$ .

Angela is wrapping 1 meter of twine around a spool with a 2-centimeter diameter. The spool is thin and accommodates only one wrap of twine before the twine stacks on top of itself. The twine has a diameter of  $\frac{1}{2} \text{ cm}$ .

- Find how many complete times Angela will wrap the twine around the spool.  $6 \text{ times}$
- Find the percentage of a complete circle that the last wrapping of the twine will make. Round to the nearest tenth.  $60.4\%$

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**LESSON 11-3 Practice B**  
**Sector Area and Arc Length**

Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

- sector  $BAC$   $126\pi \text{ mm}^2$ ; 395.84  $\text{mm}^2$
- sector  $UTV$   $30\pi \text{ in}^2$ ; 94.25  $\text{in}^2$
- sector  $KJL$   $\pi \text{ ft}^2$ ; 3.14  $\text{ft}^2$
- sector  $FEG$   $100\pi \text{ m}^2$ ; 314.16  $\text{m}^2$

- The speedometer needle in Ignacio's car is 2 inches long. The needle sweeps out a  $130^\circ$  sector during acceleration from 0 to 60 mi/h. Find the area of this sector. Round to the nearest hundredth.  $4.54 \text{ in}^2$

Find the area of each segment to the nearest hundredth.

- $10.96 \text{ km}^2$
- $24.47 \text{ yd}^2$
- $0.29 \text{ cm}^2$
- $9.83 \text{ mi}^2$

Find each arc length. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

- $\pi \text{ ft}$ ; 3.14  $\text{ft}$
- $14\pi \text{ m}$ ; 43.98  $\text{m}$

- An arc with measure  $45^\circ$  in a circle with radius 2 mi  $\frac{\pi}{2} \text{ mi}$ ; 1.57  $\text{mi}$
- An arc with measure  $120^\circ$  in a circle with radius 15 mm  $10\pi \text{ mm}$ ; 31.42  $\text{mm}$

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**LESSON 11-3 Reteach**  
**Sector Area and Arc Length**

**Sector of a Circle**

A **sector of a circle** is a region bounded by two radii of the circle and their intercepted arc.

The area of a sector of a circle is given by the formula  $A = \pi r^2 (\frac{m^\circ}{360^\circ})$ .

**Segment of a Circle**

A **segment of a circle** is a region bounded by an arc and its chord.

area of segment  $ABC = \text{area of sector } ABC - \text{area of } \triangle ABC$

Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

- sector  $CDE$   $7\pi \text{ cm}^2$ ; 21.99  $\text{cm}^2$
- sector  $QRS$   $27\pi \text{ in}^2$ ; 84.82  $\text{in}^2$

Find the area of each segment to the nearest hundredth.

- $1.14 \text{ in}^2$
- $5.80 \text{ m}^2$

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