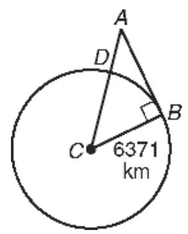
Name ________________________ Date ____________ Class ____________

LESSON **12-1**

Problem Solving

Lines That Intersect Circles

1. The cruising altitude of a commercial airplane is about 9000 meters. Use the diagram to find *AB*, the distance from an airplane at cruising altitude to Earth's horizon. Round to the nearest kilometer.



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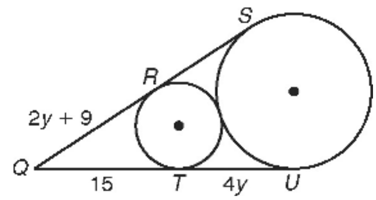
2. In the figure, segments that appear to be tangent are tangent. Find *QS*.



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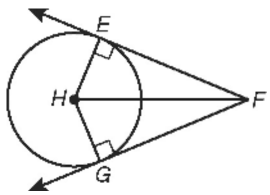
3. The area of $\odot H$ is 100π, and $HF = 26$ centimeters. What is the perimeter of quadrilateral *EFGH*?



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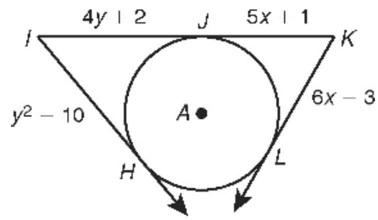
4. $\overrightarrow{IH}$, $\overline{IK}$, and $\overrightarrow{KL}$ are tangent to $\odot A$. What is *IK*?



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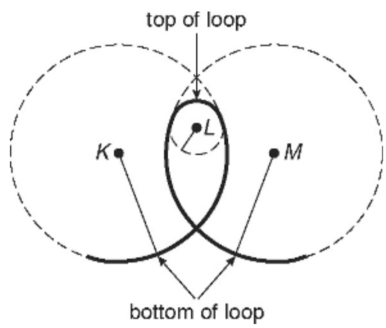
Choose the best answer.

5. A teardrop-shaped roller coaster loop is a section of a spiral in which the radius is constantly changing. The radius at the bottom of the loop is much larger than the radius at the top of the loop, as shown in the figure. Which is a true statement?



A $\odot K$ and $\odot M$ have two points of tangency.

B $\odot K$, $\odot L$, and $\odot M$ have one point of tangency.

C $\odot L$ is internally tangent to $\odot K$ and $\odot M$.

D $\odot L$ is externally tangent to $\odot K$ and $\odot M$.

6. $\odot G$ has center (2, 5) and radius 3. $\odot H$ has center (2, 0). If the circles are tangent, which line could be tangent to both circles?

F $x = 2$ H $y = 2$

G $x = 0$ J $y = 5$

7. The Hubble Space Telescope orbits 353 miles above Earth, and Earth's radius is about 3960 miles. Which is closest to the distance from the telescope to Earth's horizon?

A 1634 mi C 3976 mi

B 1709 mi D 5855 mi

Reteach

1. chord: $\overline{FG}$; secant: ℓ; tangent: m; diam.: $\overline{FG}$; radii: $\overline{HF}$ and $\overline{HG}$
2. chord: $\overline{LM}$; secant: $\overleftrightarrow{LM}$; tangent: $\overleftrightarrow{MN}$; radius: $\overline{JK}$
3. ⊙N: $r = 3$; ⊙P: $r = 1$; pt. of tangency: (–1, –2); tangent line: $y = -2$
4. ⊙S: $r = 4$; ⊙T: $r = 2$; pt. of tangency: (7, 0); tangent line: $x = 7$
5. 6
6. 14
7. 10
8. 19

Challenge

1. $ST = SU$
2. If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency (Theorem 11-1-1).
3. If two segments are tangent to a circle from the same external point, then the segments are congruent (Theorem 11-1-3).
4. Reflexive Property
5. Hypotenuse-Leg or SSS
6. CPCTC
7. $\frac{PQ}{PS} = \frac{QR}{RS}$
8. $\frac{15}{x} = \frac{22}{30 - x}$; $12.16 = PS$

Problem Solving

1. 339 km
2. 27
3. 68 cm
4. 47
5. C
6. H
7. B

Reading Strategies

1. interior
2. secant
3. because it intersects the circle at only one point
4. line z
5. point B
6. line k
7. $\overline{XY}$
8. point R
9. point P

12-2 ARCS AND CHORDS

Practice A

1. 90°
2. 144°
3. 108°
4. 234°
5. chords
6. chords
7. adjacent
8. perpendicular bisector
9. central angles
10. radius or diameter
11. 150°
12. 240°
13. 125°
14. 11 cm
15. 30 in.
16. 96 m

Practice B

1. 115.2°
2. 93.6°
3. 126°
4. 90°
5. 3.6°
6. 241.2°
7. 125°; 227°
8. 67°; 203°
9. 102°
10. 49 cm
11. 76.3 mi
12. 4.9 km

Practice C

1. Possible answer: Draw $\overline{AF}$ and $\overline{EF}$. It is given that $\overline{AE}$ is perpendicular to $\overline{FG}$. Therefore $\angle ACF$ and $\angle ECF$ are right angles and are congruent. It is also given that $\overline{AC} \cong \overline{EC}$. $\overline{FC} \cong \overline{FC}$ by the Reflexive Property of Congruence. So $\triangle AFC \cong \triangle EFC$ by SAS. By CPCTC, $\overline{AF} \cong \overline{EF}$. $\overline{AF}$ and $\overline{EF}$ are radii of ⊙A and ⊙E, and circles with congruent radii are congruent circles, so ⊙$A \cong$ ⊙E.
2. Possible answer: Draw $\overline{RU}$, $\overline{PR}$, $\overline{PU}$, $\overline{QR}$, and $\overline{QU}$. Because $\overline{PR}$ and $\overline{PU}$ are radii of ⊙P, they are congruent and $\triangle PRU$ is isosceles. Similar reasoning shows that $\triangle QRU$ is also isosceles. By the Base Angles Theorem, $\angle PUR \cong \angle PRU$ and $\angle QRU \cong \angle QUR$. So m$\angle PUR$ and m$\angle PRU$ are each equal to $\frac{1}{2}(180 - m\angle RPU)$. Also, m$\angle QRU$ and