Vocabulary

● Review

1. Underline the correct word to complete the sentence.

Area is the number of cubic / square units needed to cover a given surface.

2. Circle the formula for the *area* of a triangle.

$$A = bh \qquad A = \frac{1}{2}bh \qquad A = \frac{1}{2}h(b_1 + b_2) \qquad A = \frac{1}{2}d_1d_2$$

● Vocabulary Builder

trigonometry (noun) **trig uh NAHM uh tree**

Other Word Form: trigonometric (adjective)

Related Words: cosine, sine, tangent

Definition: **Trigonometry** is the study of the relationships among two sides and an angle in a right triangle.

Main Idea: You can use **trigonometry** to find the area of a regular polygon.

● Use Your Vocabulary

Complete each sentence with the word *trigonometry* or *trigonometric*.

3. The sine, cosine, and tangent ratios are __?__ ratios.

4. This year I am studying __?__ in math.

Draw a line from each *trigonometric ratio* in Column A to its name in Column B.

| Column A	Column B
5. $\dfrac{\text{length of opposite leg}}{\text{length of hypotenuse}}$	cosine
6. $\dfrac{\text{length of adjacent leg}}{\text{length of hypotenuse}}$	sine
7. $\dfrac{\text{length of opposite leg}}{\text{length of adjacent leg}}$	tangent

Problem 1 Finding Area

Got It? What is the area of a regular pentagon with 4-in. sides? Round your answer to the nearest square inch.

8. Underline the correct words to complete the sentence.

To find the area using the formula $A = \frac{1}{2}ap$, you need to know the length of the

apothem / radius and the perimeter / width of the pentagon.

9. In the regular pentagon at the right, label center C, apothem $\overline{CR}$, and radii $\overline{CD}$ and $\overline{CE}$.

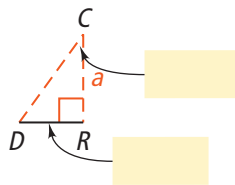4 in.
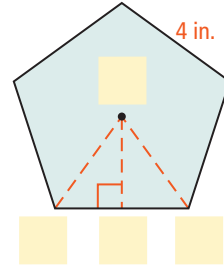
10. The perimeter of the pentagon is 5 · [ ] in., or [ ] in.

11. The measure of central angle DCE is $\dfrac{360}{\boxed{}}$, or [ ].

Complete Exercises 12 and 13.

12. $m\angle DCR = \frac{1}{2}m\angle DCE$
$= \frac{1}{2} \cdot \boxed{}$
$= \boxed{}$

13. $DR = \frac{1}{2}DE$
$= \frac{1}{2} \cdot \boxed{}$
$= \boxed{}$

14. Use your results from Exercises 12 and 13 to label the diagram below.

C

a [ ]

D R [ ]

15. Circle the equation you can use to find the apothem a.

$\tan 72° = \dfrac{36}{a}$ $\tan 36° = \dfrac{2a}{a}$ $\tan 36° = \dfrac{2}{a}$

$\tan 36° = \dfrac{a}{2}$ $\tan 72° = \dfrac{2}{a}$

16. Use the justifications below to find the apothem and the area.

$\tan 72° = \dfrac{\boxed{}}{a}$ — Use the tangent ratio.

$a \cdot \tan 36° = \boxed{}$ — Multiply each side by a.

$a = \dfrac{\boxed{}}{\tan 36°}$ — Divide each side by $\tan 36°$.

$A = \frac{1}{2}ap$ — Write the formula for the area of a regular polygon.

$= \frac{1}{2} \cdot \dfrac{\boxed{}}{\tan 36°} \cdot \boxed{}$ — Substitute for a and p.

$\approx \boxed{}$ — Use a calculator.

17. To the nearest square inch, the area of the regular pentagon is [ ] in.^{2}.

Lesson 10-5

Got It? A tabletop has the shape of a regular decagon with a radius of 9.5 in. What is the area of the tabletop to the nearest square inch?
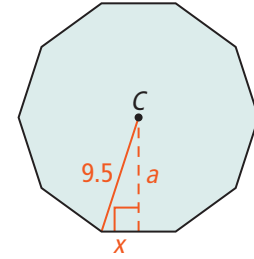
18. Complete the problem-solving model below.

Know	Need	Plan
		Use trigonometric ratios to find the apothem and the length of a side.

19. Look at the decagon at the right. Explain why the measure of each central angle of a decagon is 36 and $m\angle C$ is 18.

_____

_____

20. Use the cosine ratio to find the apothem a.

$$\cos 18° = \frac{a}{\boxed{}}$$

$$\boxed{} \cdot \cos 18° = a$$

21. Use the sine ratio to find x.

$$\sin 18° = \frac{x}{\boxed{}}$$

$$\boxed{} \cdot \sin 18° = x$$

22. Use the justifications below to find the perimeter.

$p = \boxed{} \cdot$ length of one side   perimeter = number of sides times length of one side

$\quad = 10 \cdot \boxed{} \cdot x$ The length of each side is $2x$.

$\quad = 10 \cdot \boxed{} \cdot \boxed{}$ Substitute for x.

$\quad = \boxed{} \cdot \sin 18°$ Simplify.

23. Find the area. Use a calculator.

24. To the nearest square inch, the area of the tabletop is $\boxed{}$ in.^{2}.
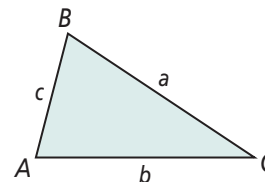
take note

Theorem 10-8   Area of a Triangle Given SAS

The area of a triangle is half the product of the lengths of two sides and the sine of the included angle.
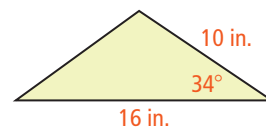
25. Complete the formula below.

Area of $\triangle ABC = \frac{1}{2}bc(\sin \boxed{})$

Problem 3 Finding Area

Got It? What is the area of the triangle? Round your answer to the nearest square inch.

10 in.

34°

16 in.

26. Complete the reasoning model below.

Think	Write
I know the lengths of two sides and the measure of the included angle.	Side lengths: ☐ in. and 16 in. Angle measure: ☐
I can use the formula for the area of a triangle given SAS.	$A = \frac{1}{2} \cdot$ ☐ $\cdot 16 \cdot \sin$ ☐ $\approx$ ☐

27. To the nearest square inch, the area of the triangle is ☐ in.^{2}.

Lesson Check • Do you UNDERSTAND?

Error Analysis Your classmate needs to find the area of a regular pentagon with 8-cm sides. To find the apothem, he sets up and solves a trigonometric ratio. What error did he make? Explain.

$$\frac{a}{4} = \tan 36°$$
$$a = 4 \cdot \tan 36°$$

28. The lengths of the legs of the triangle in the regular pentagon are ☐ and ☐ cm.

29. The tangent of the 36° angle is $\dfrac{\text{length of opposite leg}}{\text{length of adjacent leg}}$, or $\dfrac{☐}{☐}$.

36°

a

8 cm

30. Explain the error your classmate made.

_____

Math Success

Check off the vocabulary words that you understand.

☐ area   ☐ trigonometry

Rate how well you can use *trigonometry to find area*.

| Need to review | 0   2   4   6   8   10 | Now I get it! |

Lesson 10-5