

Area of Regular Polygons

Lesson 5-4

Name: _____

Date: _____

Class: _____

Key Vocabulary

Level 1 support

Picture first, then the word, then a plain-language meaning. Say each word out loud.

A stop sign is a regular octagon — all 8 sides are the same length and all 8 angles are equal

Regular Polygon

A shape where all sides and all angles are equal.

Draw lines from the center of a hexagon to each corner → you get 6 equal triangles you can find the area of

Decompose

To break a shape into smaller, simpler shapes.

Each triangle inside a decomposed hexagon has a base = one side of the hexagon and height = distance from center to side

Triangle

A shape with three sides.

6 triangles, each with area 15 sq ft, combine to form a hexagon with total area = $6 \times 15 = 90$ sq ft

Composite

Made by putting two or more simple shapes together.

A house shape = rectangle (walls) + triangle (roof); find each area, then add them together

Composite figure

A shape made by putting two or more simple shapes together.

For a regular hexagon: Total Area = $6 \times (\frac{1}{2} \times b \times h)$, where b = side length and h = height of each triangle

Formula

A math rule written with symbols.

Key Ideas & Notes

- Your architecture firm is designing a hexagonal skylight for the lobby of a new museum.
- The glass fabricator needs to know the total area so they can cut the correct amount of glass.
- Each side of the hexagon is 6 feet, and the height of each triangle formed from the center is 5.2 feet.
- Drag each regular polygon to show how it can be decomposed into triangles. Match each polygon to the correct number of triangles it contains.

Think About It

- What shape is the skylight?
- How many sides does a hexagon have?
- Can you see smaller shapes inside the hexagon?

My Notes

Guided Examples

Example 1

A regular hexagon is divided into 6 equal triangles from the center. Each triangle has a base of 6 ft and a height of 5.2 ft. What is the area of one triangle?

Solution: $A = \frac{1}{2} \times b \times h = \frac{1}{2} \times 6 \times 5.2 = 15.6$ square feet.

Answer: A. 15.6 sq ft

Example 2

Using the triangle from the previous question, what is the total area of the hexagonal skylight?

Solution: Total area = 6 triangles \times 15.6 sq ft = 93.6 square feet.

Answer: A. 93.6 sq ft

Example 3

A regular hexagon is split into 6 triangles, each with base 4 cm and height 3.5 cm. What is the total area?

Solution: Each triangle: $\frac{1}{2} \times 4 \times 3.5 = 7$ sq cm. Total: $6 \times 7 = 42$ sq cm.

Answer: A. 42 sq cm

Write About the Math

The Writing Revolution

I can explain my steps using the words regular polygon, decompose, triangle, and composite.

1. Kernel Sentence subject + verb

Model: Regular Polygon is a shape where all sides and all angles are equal.

Polígono regular es una figura donde todos los lados y ángulos son iguales.

Write a kernel sentence about regular polygon. Use a subject and a verb.

Escribe una oración base sobre polígono regular. Usa un sujeto y un verbo.

2. Sentence Expansion because · but · so

Kernel: Regular Polygon matters in math

Polígono regular importa en matemáticas

Expand the kernel three ways. Add a reason, a contrast, and a result.

because
porque

Regular Polygon matters in math because ____.

Polígono regular importa en matemáticas porque ____.

but
pero

Regular Polygon matters in math, but ____.

Polígono regular importa en matemáticas, pero ____.

so
entonces

Regular Polygon matters in math, so ____.

Polígono regular importa en matemáticas, entonces ____.

3. Sentence Types 4 ways to write a math idea

Statement
Afirmación

Tell one true fact about regular polygon.
Di un hecho verdadero sobre regular polygon.

Regular polygon ____.

Question
Pregunta

Ask a question about regular polygon.
Haz una pregunta sobre regular polygon.

How does ____ ?

¿Cómo ____ ?

Exclamation
Exclamación

Show excitement about regular polygon.
Muestra entusiasmo sobre regular polygon.

Wow, ____ !

¡Guau, ____ !

Command
Mandato

Tell a partner what to do with regular polygon.
Dile a un compañero qué hacer con regular polygon.

First, ____ .

Primero, ____ .

4. Explain Your Reasoning use a sentence starter

I split it into ____.

Lo dividí en ____.

Then I added ____.

Luego sumé ____.

I see these shapes in ____.

Veo estas formas en ____.

Try It

Solve on your own. Check the answer key when you are done.

1. A regular hexagon is split into 6 triangles, each with base 4 cm and height 3.5 cm. What is the total area?

- A. 42 sq cm
- B. 21 sq cm
- C. 84 sq cm
- D. 14 sq cm

Show your work:

2. How many triangles can you make from the center of a regular pentagon?

- A. 5
- B. 3
- C. 6
- D. 10

Show your work:

Stretch Your Thinking

Level 2 enrichment

Challenge task — explain your reasoning in full sentences.

A regular hexagon and a regular pentagon both have triangles with the same base (6 ft) and the same height (5 ft). Which polygon has the greater total area? Explain why the number of sides matters.

Sentence starter: One triangle's area is $\frac{1}{2} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$. The hexagon has $\underline{\hspace{1cm}}$ triangles so its area is $\underline{\hspace{1cm}}$. The pentagon has $\underline{\hspace{1cm}}$ triangles so its area is $\underline{\hspace{1cm}}$. The $\underline{\hspace{1cm}}$ has more area because $\underline{\hspace{1cm}}$.

Show your work:

Reflect — Exit Ticket

A regular pentagon is decomposed into 5 triangles from its center. Each triangle has a base of 7 inches and a height of 4.8 inches. What is the total area of the pentagon?

- A. 84 sq in
- B. 16.8 sq in
- C. 168 sq in
- D. 84 in

Your answer:

Answer Key & Teacher Guide

1. **Try It 1:** A. 42 sq cm — *Each triangle: $\frac{1}{2} \times 4 \times 3.5 = 7$ sq cm. Total: $6 \times 7 = 42$ sq cm.*
2. **Try It 2:** A. 5 — *A regular pentagon has 5 sides, so drawing lines from the center to each vertex creates 5 equal triangles.*
3. **Exit Ticket:** A. 84 sq in — *One triangle: $A = \frac{1}{2} \times 7 \times 4.8 = 16.8$ sq in. Total = $5 \times 16.8 = 84$ square inches.*

Writing (TWR) — what to look for

- **Kernel sentence:** A complete sentence needs a subject and a verb. Example: Regular Polygon is a shape where all sides and all angles are equal.
- **Expansion:** *because* gives a reason, *but* shows a contrast or exception, *so* shows a result. Answers vary; each must keep the kernel idea and add the correct kind of detail.
- **Sentence types:** Statement ends with a period, question with "?", exclamation with "!", and a command starts with an action verb (a "bossy" verb).