

Area of Triangles & Quadrilaterals Discovery

Decompose, Compose & Justify

Grade 6 | CCSS 6.G.A.1

- 4 Discovery-Based Lessons
- Cut-Out Manipulatives (Color & B&W)
- 24 Real-World Task Cards
- Anchor Chart & Vocabulary Foldable
- Exit Tickets & Quiz with Keys

UM Printables

Discovery-Based Math Resources for Deep Understanding



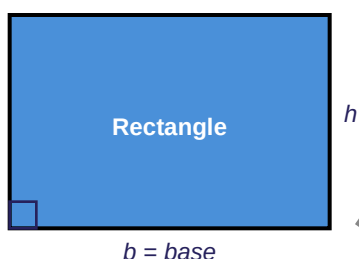
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Anchor Chart: Area Formulas with Visual Derivations

This anchor chart displays all four area formulas with their visual derivations. Print on poster paper or project on a screen. Each formula is connected to the rectangle formula ($A = bh$) through a transformation, reinforcing the core idea that **all area formulas come from rectangles**. Hang this in your classroom throughout the unit.

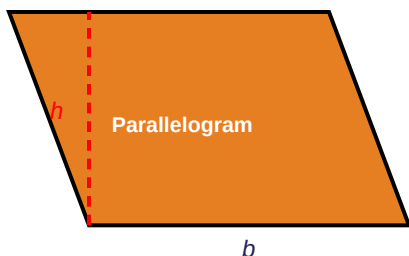
1. Rectangle: $A = bh$



$$A = b \times h$$

The area of a rectangle is found by multiplying the base (length) by the height (width). This formula is the foundation for all other area formulas. Every shape we study in this unit can be connected back to the rectangle through cutting, decomposing, or composing.

2. Parallelogram: $A = bh$



Same base, same height
Slide triangle $\rightarrow$ same area!

$$A = b \times h$$

By cutting a triangle off one end of a parallelogram and sliding it to the other end, we transform the parallelogram into a rectangle with the **same base** and **same height**. Since the rectangle's area is bh , the parallelogram's area must also be bh . The key insight: **sliding does not change area**.

3. Triangle: $A = \frac{1}{2}bh$

Discovery 1: Rectangle to Parallelogram

In this discovery, students **cut a rectangle, slide a triangle, and discover that a parallelogram has the same area as a rectangle** with the same base and height. This is the most direct connection to 6.G.A.1's "composing into rectangles" language: we are **recomposing** the rectangle into a parallelogram and observing that the area does not change. Students will use a physical rectangle cut-out, make one strategic cut, slide the resulting triangle, and witness the transformation firsthand.

Learning Target

I can explain why the area of a parallelogram is $A = bh$ by transforming a rectangle into a parallelogram and showing that the area does not change.

Materials

Rectangle cut-out (provided, 8 cm x 5 cm) — 1 per student

Scissors, ruler, glue stick

Student Recording Sheet (provided)

Colored pencils or markers

Teacher Lesson Script

Teacher: Hold up a rectangle. Ask: 'What is the area of this rectangle? How do you know?' Students should say: 'Area is base times height, so 8 times 5 = 40 square cm.' Confirm: 'Yes! We all agree the area of this rectangle is 40 sq cm. Now watch what happens when I make one cut and slide the piece.'

Teacher: Cut the rectangle along a line perpendicular to the base, cutting off a right triangle from the left side. A good cut is about 3 cm from the left edge, creating a triangle with legs 3 cm and 5 cm, and a trapezoid on the right. 'What shape did I cut off?' (Right triangle.) 'Now watch — I'm going to slide this triangle all the way to the right side.' Slide the triangle to the right and reattach it. 'What shape do we have now?' (Parallelogram!)

Teacher: 'Is the base the same?' (Yes, still 8 cm.) 'Is the height the same?' (Yes, still 5 cm.) 'Did I add or remove any area when I slid the triangle?' (No!) 'So what is the area of this parallelogram?' (40 sq cm.) 'And what is 8 times 5?' (40.) 'So the area of a parallelogram is base times height — just like a rectangle!'

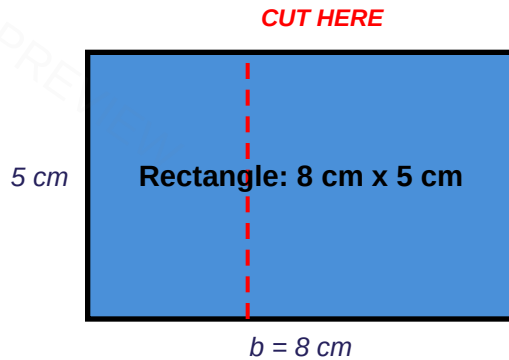
Teacher: Now draw a different parallelogram on the board with base 10 cm and height 6 cm. Ask: 'Do I need to actually cut and slide to know the area?' (No — the formula $A = bh$ works for ALL parallelograms!) 'What is the area?' ($10 \times 6 = 60$ sq cm.) Emphasize: the height is the PERPENDICULAR distance, not the slant side.

Key Discussion Questions

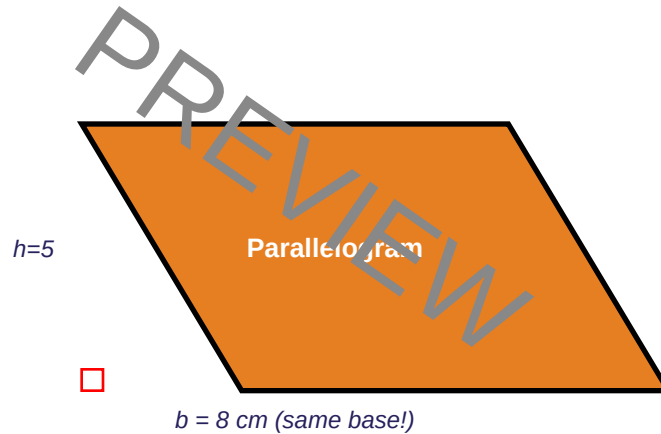
Discovery 1 — Cut-Out Manipulative (Color)

Print this page for each student. Cut out the rectangle along the solid line. Then cut along the dashed line to separate the right triangle from the rest of the shape. Slide the triangle to the right side to form a parallelogram. The rectangle is 8 cm x 5 cm with a cut line 3 cm from the left edge.

Cut on dashed line, then slide triangle to the right



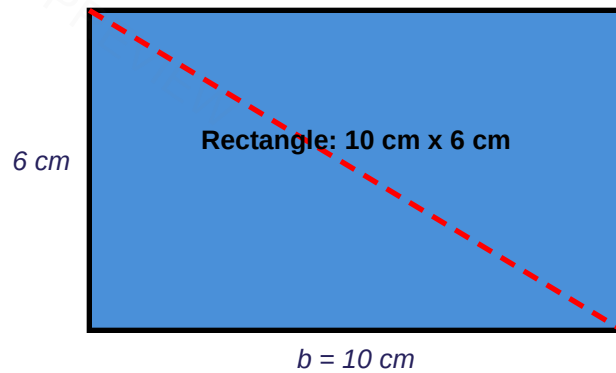
After sliding the triangle:



Discovery 2 — Cut-Out Manipulative (Color)

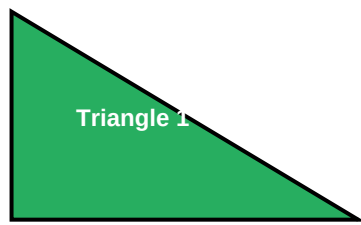
Print this page for each student. Cut out the rectangle along the solid border, then cut along the diagonal (dashed red line) to create two identical right triangles. Verify they are congruent by stacking them on top of each other.

Cut along the diagonal (dashed red line) to make 2 identical right triangles

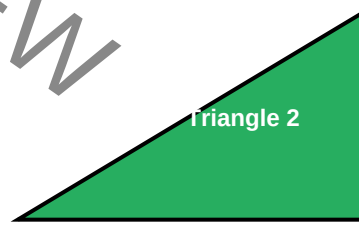


After cutting along the diagonal:

Both triangles are congruent! Together they make the original rectangle.



$$A = \frac{1}{2} \times 10 \times 6 = 30 \text{ sq cm}$$

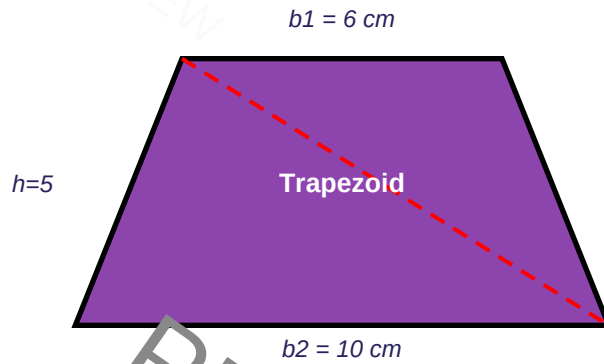


$$A = \frac{1}{2} \times 10 \times 6 = 30 \text{ sq cm}$$

Discovery 3 — Cut-Out Manipulative (Color)

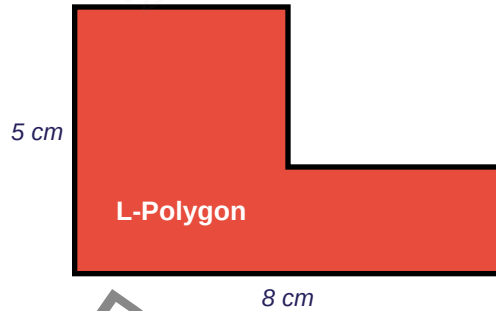
Print this page for each student. Cut out the trapezoid along the solid border. Draw a diagonal from the top-left to the bottom-right vertex, then cut along it to decompose into two triangles. Find each triangle's area separately and add them.

Draw diagonal (dashed) and cut to decompose into 2 triangles



Discovery 4 — Cut-Out Manipulative (Color)

Print this page for each student. Cut out the L-shaped polygon along the solid border. Practice decomposing it into two rectangles in different ways. Verify that each decomposition gives the same total area.



Practice Set: 24 Real-World Task Cards

These 24 task cards apply area formulas to real-world scenarios. Cards 1-6 focus on parallelograms, 7-12 on triangles, 13-18 on trapezoids, and 19-24 on composite figures. Print on card stock, cut apart, and use in math centers, small groups, or as a scoot activity. A recording sheet and full answer key with worked solutions follow.

Card 1 [Parallelogram] A painting canvas is shaped like a parallelogram with a base of 12 inches and a height of 8 inches. How many square inches of canvas need to be painted?	Card 2 [Parallelogram] A playground slide has a safety mat shaped like a parallelogram. The base is 3.5 meters and the height is 2 meters. What is the area of the mat?
Card 3 [Parallelogram] A farmer's field is shaped like a parallelogram with base 250 ft and height 120 ft. How many sq ft is the field?	Card 4 [Parallelogram] A tabletop is a parallelogram with base 60 cm and height 40 cm. How much varnish is needed to cover the top?
Card 5 [Parallelogram] A banner is shaped like a parallelogram with base 5 ft and height 3 ft. If paint covers 10 sq ft per ounce, how many ounces are needed?	Card 6 [Parallelogram] A brick wall section is a parallelogram with base 4 m and height 2.5 m. Each brick covers 0.05 sq m. How many bricks are needed?

Exit Tickets 1-4

Use these exit tickets at the end of each discovery lesson for quick formative assessment. Each ticket has two questions: one computation and one word problem. Students should complete these independently in 3-5 minutes.

Exit Ticket 1: Parallelogram Area

Question	Show Your Work	Answer
1. Find the area of a parallelogram with base = 11 cm and height = 7 cm.		
2. A rug is shaped like a parallelogram with base 9 ft and height 6 ft. What is the area?		

Exit Ticket 2: Triangle Area

Question	Show Your Work	Answer
1. Find the area of a triangle with base = 16 m and height = 5 m.		
2. A triangular flag has base 20 in and height 12 in. What is the area of the flag?		

Exit Ticket 3: Trapezoid Area

Question	Show Your Work	Answer
1. Find the area of a trapezoid with $b_1 = 7$ cm, $b_2 = 13$ cm, $h = 6$ cm.		
2. A table top is a trapezoid with bases 3 ft and 5 ft and height 4 ft. Find the area.		

Exit Ticket 4: Composite Figure Area

Question	Show Your Work	Answer
1. An L-shape is made of a 7×3 rectangle and a 4×5 rectangle (no overlap). Find the total area.		
2. A frame is a 10×8 rectangle with a 6×4 rectangle removed. Find the area of the frame.		

Quiz: 12 Questions

This comprehensive quiz covers all four shape types. Questions 1-3 are parallelogram problems, 4-6 are triangle problems, 7-9 are trapezoid problems, and 10-12 are composite figure problems. Show all work. Write the formula, substitute values, and give the final answer with units.

1. Find the area of a parallelogram with base = 14 cm and height = 9 cm.

2. A parking space is shaped like a parallelogram with base 8 ft and height 12 ft. What is the area?

3. A parallelogram has an area of 120 sq m and a base of 15 m. What is the height?

4. Find the area of a triangle with base = 18 in and height = 10 in

5. A triangular park has base 50 m and height 30 m. How many sq m of grass are needed?

6. A triangle has an area of 72 sq cm and a height of 12 cm. What is the base?

7. Find the area of a trapezoid with $b_1 = 5$ cm, $b_2 = 11$ cm, $h = 8$ cm.

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What's Inside the Full Resource?

80 pages • Grade 6 • CCSS 6.G.A.1

1 Discovery & Teacher Support

- 4 discovery lessons: Rectangle → Parallelogram, Rectangle → Triangle, Trapezoid Decomposition, Composite Polygons
- Teacher scripts, learning targets, materials, discussion questions, and student recording sheets
- CCSS 6.G.A.1 alignment chart, pacing guide, vocabulary foldable, and visual area anchor chart
- Color + black-and-white cut-out manipulatives with lesson extensions

2 Practice & Assessment

- 24 real-world task cards across parallelograms, triangles, trapezoids, and composite figures, with answer key
- 4 exit tickets with answer keys
- 12-question quiz with answer key and scoring rubric
- Additional Discovery Practice Sets: 4 sets of 8 problems each (32 items)

3 Review, Application & Extension

- Study Guide & Unit Review plus Mixed Practice: All Shape Types (16 problems)
- Grid Practice Sheets and 4 additional Extra Practice Grids
- Reflection Journal Prompts and 6 Additional Real-World Applications
- Enrichment: 5 Area Puzzles & Challenges

4 Family & Quick Reference

- Parent Connection: Family Math Activities with 3 home activities
- Key formula reference for rectangle, parallelogram, triangle, trapezoid, rhombus, and composite figures
- Quick Reference Card for formulas and common reminders
- Final thank-you / feedback page branded for UMPrintables.com

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PREVIEW 12/12