

AREA OF TRAPEZIUM

Subject

Mathematics

Prepared By

[Instructor Name]

Grade Level

5

Overview

This lesson plan covers teaching content for;

1. Area of Trapezium.
2. Area of other figures (parallelogram, triangle, rectangle)
3. Deriving formula of trapezium.
4. Solving area problems involving trapezium.

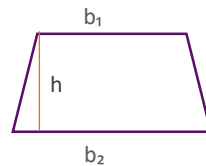
Objectives

Students should be able to;

1. Derive the formula for the area of a trapezoid by combining the formulas for the areas of a triangle and rectangle
2. Solve area problems involving trapezium.

Activity Starter/Instruction

1. A trapezoid is a quadrilateral that has only one pair of sides that are parallel.



- 2.
3. Similar to the process we use with a triangle to find a formula for area:
4. We can;
 - Create a duplicate trapezoid
 - Rotate the duplicate 180 degrees
 - Place the duplicate next to the original trapezoid to form a parallelogram.
 - We can see that the base of our newly formed parallelogram is $b_1 + b_2$, while the height remains the same as the original trapezoid.
5. The area of the parallelogram is therefore $A = h(b_1 + b_2)$.
6. However, since we want to know the area of one trapezoid, we need to divide this amount by two because the two trapezoids that were used to

Teacher Guide

Day 1/ Lesson 1: 20mins

1. Students need one sheet of shapes to cut out and one recording sheet.
2. We will be working with the shapes we've cut out, and we'll be recording our work as we go. Colored pencils work nicely to show what we're doing.
3. Students will be discovering methods and formulas to find the area.
4. Set the parallelogram in the center of your desk and set the other shapes aside. Trace the parallelogram onto your paper to show what shape you're using.
5. Tell students they will find the area of one parallelogram. Tell them to ahead and examine the parallelogram and discuss any ideas for how they can find the area.
6. If students are stuck, ask questions about how they can change the parallelogram to be like a rectangle so they can use what they already know about area.
7. Let them share their findings. Hopefully, students discover that by decomposing a parallelogram into a trapezoid and a triangle, then moving the triangle to the other side, they can transform the parallelogram into a rectangle.
8. Record this transformation on your paper using a different color.

Materials Required

- Scissors
- Colored pencils
- Paper
- Shape Sheet (parallelogram, triangle and trapezoid)
- Recording Sheet
- White board
- Marker
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Additional Resources

- <https://www.nctm.org/Classroom-Resources/Lessons/Area-of-Trapezoids/>
- <http://www.cpalms.org/Public/PreviewResourceLesson>
- <https://betterlesson.com/lesson/488216/finding-the-trapezoid>
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Additional Notes

Guided Practice

Day 2/ Lesson 2: 15 Mins

1. Ask students to unscramble key words.
 - LARPELLA PARALLEL
 - EAER AREA
 - LERRATQUDLAAI QUADRILATERAL
 - GHRIT LEANG RIGHT ANGLE
 - ERIMPTREE PERIMETER
2. Tell them the main properties of trapezium
 - One pair of Parallel Lines
 - Quadrilateral
 - 4 interior angles add up to 360°
3. Draw several shapes on the board, ask them to identify a trapezium.
4. Explain to them that b_1 and b_2 can also be labelled as a and b .
5. Give them an example: If a trapezium with $a = 3$ cm, $b = 5$ cm and $h = 4$ cm, what is the area?
6. Area of a Trapezium = $\frac{1}{2}(a + b) \times h$
 $\text{Area} = \frac{1}{2}(3 + 5) \times 4$
 $\text{Area} = \frac{1}{2}(8) \times 4$
 $\text{Area} = \frac{1}{2} \text{ of } 32$
7. Area = 16 cm^2

create the parallelogram are congruent to each other.

7. This makes our formula for the area of a trapezoid to be $A = \frac{1}{2}h(b_1 + b_2)$.
8. If $b_1 = 8$ cm, $b_2 = 12$ cm, and $h = 5$ cm, then the area would be;
9. $A = \frac{1}{2}h(b_1 + b_2)$
10. $A = \frac{1}{2}(5 \text{ cm})(8 \text{ cm} + 12 \text{ cm})$
11. $A = \frac{1}{2}(5 \text{ cm})(20 \text{ cm}) = \frac{1}{2}(100 \text{ cm}^2)$
12. $A = 50 \text{ cm}^2$

Guided Practice

Day 3/ Lesson 3: 20mins

1. Which shapes can trapezoids be decomposed into to get the area?
2. One way to solve for the area of a trapezoid is to decompose it into a rectangle and two triangles.
3. The sum of the rectangle and triangles will equal the area of the trapezoid.
4. Area of Trapezoid = Area of Left Triangle + Area of Rectangle + Area of Right Triangle.

9. The area of the original parallelogram will be the same as the area of the original rectangle. Thus, the formula we already know for rectangles

$b \times h = A$ works for parallelograms as well.

10. Repeat the steps using the triangle instead. If they need hints guide them towards thinking about how we can make a triangle look like a rectangle or parallelogram. Recommend that they partner with someone at their table and combine their two triangles. Students record their work on their paper.
 11. However, we only want the area of one of the triangles, so have the students explain how we can find only half of the area of the new parallelogram
 $\frac{1}{2} b \times h = A$
 12. Record findings on the paper next to the triangle.
 13. Repeat the steps using the trapezoid. Students record what they've tried on their paper.
 14. Once they've discovered how to find the area, you can have students present the different ways they decomposed. Use the example where the trapezoid was decomposed into a rectangle and two triangles and then rearranged to form a rectangle to discuss the formula.
 15. Talk to them about how each trapezoid has two bases, and that it is helpful to label them Base 1 and Base 2. Look at the base of the created rectangle. Is it like Base 1? Base 2? Would you say it's in between the size of base 1 and 2? The base of the created rectangle is the average of base 1 and 2.
 16. Introducing the base as the average of the two bases might be the simplest way of getting students to understand the formula.
 17. If your students are Algebra ready, you can try showing how the formula can be derived algebraically. Once you've come up with the formula
 $\frac{1}{2} \times (\text{base 1} + \text{base 2}) \times h = A$
 18. They record it on their paper. Have them calculate the area using the formula.
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