Number Worlds™

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Activity Cards

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Mc Graw Hill Education

Level F

ACTIVITY 5A

Using the Formula for Area

Objective

Students can find the area of rectangular shapes by using the standard formula.

Materials

Additional Materials

- 3 × 5 index cards, 1 per student
- graph paper, 3 sheets per student
- paper, 1 sheet per student
- rulers, 1 per student
- scissors, 1 per student

Alternative Groupings

Pair: Have partners take turns measuring classroom objects, calculating the areas, and recording the data.

Whole Class: Have volunteers measure classroom objects, calculate the areas, and record the data on the board.

Introduce the Activity

- Tell students they are going to learn an easier way to find the areas of surfaces than by covering them with squares and counting the squares.
- Distribute index cards, graph paper, plain paper, scissors, and rulers to each student or each pair of students. Have students measure and cut out twenty one-inch squares from graph paper.

Begin the Activity

- Distribute a 3 × 5 index card to each student. Have students find the approximate area of the index card using the graph paper squares. 15 square inches
- Have students measure the sides of the card. Explain that the product of the length and the width is the same as the number of square inches counted.
- Tell students that for larger areas, counting square units is not always possible or practical.
- Write the formula for the area of a rectangle on the board: *area of a rectangle = length × width.*
- Have students measure and calculate the areas of five rectangular objects in the classroom.
- Remind students to measure the length and width of rectangles by using a ruler, and to use the formula *area of a rectangle = length × width*.

Conclude the Activity

- Ask students which units they would use to find the area of the classroom floor—square inches or square feet. square feet
- Have the entire class work together using the formula for *area* to calculate the area of the classroom floor.

Questions to Ask

- **How did you know which numbers to use in the formula?**
- **How did you decide which units of measure to use for each object?**
- **Is it easier to count squares or to use the formula to find the area of small items? Why? What about for large items? Why?**

ACTIVITY 5B

Using the Formula for Perimeter

Objective

Students can use the formula ($P = 2l + 2w$) to find the perimeter of rectangles.

Materials

Program Materials

Number Cards (0–100), six per student pair

Additional Materials

- graph paper, 3 sheets per student
- rulers (customary), 1 per student

Alternative Groupings

Individual: Have students pick two number cards, one representing the length of a rectangle and the other representing the width. Have each student draw a rectangle on graph paper, and find the perimeter. Repeat the process three times, and have students label the largest and smallest perimeters.

Small Group: Provide each group with six Number Cards (1–10). Have each student pick two cards, one representing the length of a rectangle and the other representing the width. Have each player draw a rectangle on graph paper, and find the rectangle's perimeter. The player with the largest perimeter wins.

Introduce the Activity

- Display the following formula: Perimeter = (2 × length) + (2 × width) or $P = 2l + 2w$.
- Draw a rectangle on the board. Label the bottom side 7 *inches* and the left side *5 inches*.

► **This rectangle has a length of 7 inches and a width of 5 inches. What is its perimeter?**

- Allow students to discuss the answer. Write this multiplication sentence on the board: $(2 \times 7) + (2 \times 5) = 14 + 10 = 24$ inches
- Draw a second rectangle with the bottom side labeled *9 inches* and the left side labeled *3 inches*. After students have had a chance to discuss the perimeter, write $(2 \times 9) + (2 \times 3) = 18 + 6 = 24$ inches on the board.

► **Which rectangle has the greater perimeter?** They are equal.

Begin the Activity

- Organize students into pairs.
- Distribute six (or more) Number Cards (1–10) to each pair of students.
- Each player picks two cards, one representing the length of a rectangle and the other representing the width. On graph paper, the players draw rectangles and find their perimeter. Then the players find the perimeter of their partners' drawings.
- If both players correctly find the perimeters, the players receive the number of points equal to the perimeters of their rectangles. If one student's response is correct, that player receives the number of points equal to the perimeter of both rectangles. If neither student is correct, no points are awarded.
- Play continues until one player has 100 points.

Conclude the Activity

Address any questions or problems students had.

Questions to Ask

► **Look at the perimeter measurements you found. Do they seem reasonable given the lengths and widths of the rectangles?**

► **Based on your Number Cards, would a perimeter of 50 be reasonable?**

Variation

Have one student draw two number cards representing the length and width of a rectangle. Then have the second student choose two numbers that produce the same perimeter.

Challenge

Have each student pick two number cards representing the length and width of a rectangle. Then have students figure out all of the other rectangles (with whole-number measurements) that have the same perimeter.

ACTIVITY 5C

Area or Perimeter?

Objective

Students can solve real-world problems by finding the area and perimeter of rectangles.

Materials

Program Materials

- Number 1–6 Cubes, 1 per pair
- Number 7–12 Cubes, 1 per pair
- Vocabulary Card 7, *area*
- Vocabulary Card 46, *perimeter*
- Two-Color Counters, 1 per pair

Additional Materials

- graph paper, 1 sheet per student
- rulers (customary), 1 per student

Alternative Groupings

Small group: Students should take turns tossing the number cube. The first toss represents the length of a rectangle, and the second toss represents the width. Have students calculate the area and perimeter of their rectangles. Then have group members compare their findings. Students with the largest area and perimeter receive a point. Students having the most points after two rounds win.

Individual: Have students toss the number cube. The first toss represents the length of a rectangle, and second toss represents the width. Have students write their own real-world problems focusing on area and perimeter.

Introduce the Activity

- Tell students they will be finding the area and the perimeter of the same rectangle in real-world problems.
- Draw a rectangle. Label the bottom side *8 yards* and one side *6 yards*.
- ► **This shape represents a garden that needs to be seeded. Once seeded, the garden will be enclosed by a fence. To find how much seed, do we need to find the area or the perimeter?** area
- Give students a chance to discuss the answer. To find the amount of seed, one would need to find the area.
- ► **What is the area that needs to be seeded?** 48 square yards
- ► **To find the amount of fencing, do we find the area or the perimeter?** perimeter
- ► **How much fencing is needed?** 28 yards

Begin the Activity

- Organize students into pairs.
- Each pair receives a Number 1–6 Cube.
- Write this problem on the board, "A closet is ____ feet long and ____ feet wide. A border will be placed around the closet, and the closet needs to be carpeted. How much border is needed? How much carpeting is needed?"
- Each player tosses the number cube once to establish the length and width of the rectangle. Player 1 also tosses the Two-Color Counter. If it lands on the red side, then Player 1 must choose the situation involving area. If it lands on the yellow side, Player 1 must choose the situation involving perimeter. Meanwhile, Player 2 works on the other situation (area or perimeter).
- Have pairs discuss which situation involves area and which involves perimeter.
- Both players should try to answer their own questions, using graph paper, if necessary. Then they should try to answer their partners' questions.
- If players answer correctly, they receive the number of points equal to the perimeter or area, as appropriate.
- Then the players switch roles and repeat the activity.
- The player with the higher number of points wins.

Conclude the Activity

Address any questions or problems students had about the activity or the concepts of area and perimeter.

Questions to Ask

- **If you want to know how much paper you would need to cover the front of your math book, would you find the perimeter or the area?** area
- **If you want to put a stripe around your math book, would you find the perimeter or the area?** perimeter

Variation

Play the game as instructed, but allow students to use the Number 7–12 Cube or both Number Cubes.

Challenge

Have students write real-world situations involving area and perimeter. Then have them toss the Number 7–12 Cube to choose lengths and widths.

ACTIVITY 5D

Finding the Unknown Dimension

Objective

Students can find the missing dimension of a rectangle when they know the area and one other dimension.

Materials

Additional Materials

- graph paper, 1 sheet per student
- paper, 1 sheet per student
- rulers (customary), 1 per student

Alternative Groupings

Small Group: Have one person in each group draw a rectangle. Tell students the area and either the length or the width of the rectangle.

Whole Group: Draw a rectangle for everyone to see. Ensure that the rectangle has a length and a width of 10 or fewer units. Provide the area and the length of the rectangle. Ask students to figure out the width.

Introduce the Activity

- Explain that students will be finding an unknown length or width of a rectangle when given the area and one of the two dimensions.
- Draw a rectangle. Label one side *7 centimeters*, and the area *35 square centimeters*.
- ▶ **How can we find the width of this rectangle?** Divide the area by the length.
- ▶ **What is the width?** 5 centimeters
- Write *5 centimeters* on the left side of the rectangle, and say that 5 centimeters times 7 centimeters equals 35 square centimeters.

Begin the Activity

- Organize students into pairs.
- Give each student a sheet of graph paper and a blank sheet of paper.
- Have each partner use the graph paper to draw a rectangle that has a length of 10 or fewer units and a width of 10 or fewer units.
- Each partner finds the area of his or her rectangle. On the other sheet of paper, each partner draws a rectangle with the area and one of the two dimensions given.
- Partners then exchange papers and determine the unknown length or width.

Conclude the Activity

Address any concerns or problems students had.

Questions to Ask

- ▶ **How can you use multiplication to help you find the unknown dimension?** Because multiplication and division are inverse operations, a multiplication fact can be used to find a division fact.
- ▶ **How can you check that your unknown dimension is correct?** Multiply the length times the width. If the product is equal to the area, the dimension is correct.

Variation

Have students find the possible whole-number dimensions of a rectangle when given the area.

Challenge

Have students find the dimensions of squares by giving them the areas of squares. The area of the squares can be 1, 4, 9, 16, 25, 36, 49, 64, 81, or 100 square units.