

Grade 4 Mathematics

Measurement: Lesson 2

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students will have an arrow symbol (\Rightarrow) by them.

Purpose of Lesson 2:

- In this lesson, the tutor and the students will
 - ✓ find the perimeter of a geometric shape by adding the lengths of the sides,
 - ✓ find the area of a square or rectangle by counting square units,
 - ✓ use multiplication to find the area of a rectangle, and
 - ✓ estimate the area of irregular figures.

Equipment/Materials Needed:

- Pieces of grid paper – Student Sheet 24
- Copies of Student Sheets 39 and 40
- Measuring tapes/rulers. Use all customary or all metric, either will do; but use all the same kind.
- Calculators (optional)
- Paper and pencils

Preparations before beginning Lesson 2:

- Run off 2 sheets of the grid paper (Student Sheet 24) for each student.
- Run off 1 copy of Student Sheets 39 and 40 for each student.
- Gather the measuring tapes or rulers, paper and pencils.
- Have calculators available if you choose to use them.
- Have paper and pencils available.

Lesson 2: Measurement

Say:

Do you know what the word *perimeter* means? (The distance around a figure—any figure. It can be a square, triangle, a figure with 20 sides, etc. Note: When we find the distance around a circle, we give it a special name of circumference.)

⇒ Write the word *perimeter* on a piece of paper or on the board. Underline *rim* in the word. A *rim* is an edge or border around an object. You can think of the rim on a jar or the rim of the Grand Canyon. This explanation may give them a visual clue about perimeter.

Say:

Look around the classroom. What could we find the perimeter of? (distance around the classroom, around your waist, around the bulletin board, etc.) **Why would you want to find these perimeters?** (To measure for baseboards, to buy a belt, to put a border around the bulletin board)

Say:

I want you to use your ruler (or tape) to measure the perimeter of two items. Write on your paper what items you chose and what you found the perimeter to be. Remember to write the units. Have each student share at least one item that they measured. **How did you find the perimeter?** (They probably measured all sides and added them together.) If an item was a rectangle, ask them whether they had to measure all four sides. They could measure the length and double it, measure the width, double it, and add the two measurements. This process is really the formula for the perimeter of a rectangle: $P = 2L + 2W$. Do not emphasize the formula. If the item is a square, the students can simply measure one side and multiply by 4. This fact is why the formula for a square is $P = 4s$. Again, do not emphasize the formula. You would like them to see the shortcut, however.

⇒ Place 1 piece of grid paper in front of you. Draw a 4 x 3 rectangle.

Say:

We can use the grid paper to find the perimeter of figures. I am going to draw a rectangle on my grid paper. I want you to find the perimeter of my rectangle. Each box has a length and width of 1 unit. Who can tell me the perimeter (the distance around) of my rectangle? (14 units)

How did you get the answer? (They could count the sides of the outer rectangles. There are 4 on the top, 3 on the right side, 4 on the bottom, and 3 on the left side for a total of 14 units.) **Did anyone work the problem a different way?** (Some may see that they could count the top and double it and the side and double it and add the 2 together.) **Did anyone find the answer still a different way?** (Some may count the top and 1 side and double that.) **Did anyone have a different way to work the problem?** (Just make sure that they did not count the squares and get 12. If so, they are finding area, not perimeter.)

⇒ Pass out sheets of the grid paper to the students.

Say:

I want you to draw a rectangle on your paper. Find the perimeter. Can you draw another rectangle with the same perimeter that looks different? Share your two rectangles with the group. You need to check to see whether they drew the rectangles correctly.

⇒ Give this problem to the students.

Say:

Ms. Daigle is building a pen for her pet pot-bellied pig. She wants it to be a rectangle that is 6 ft by 8 ft. How much fencing material will she need to buy? Draw the rectangle on grid paper. How big will the pen be? (28 ft) So she will need 28 ft of fencing.

⇒ Give the students Student Sheet 39. Emphasize that when finding the perimeter, you have to find the distance around the entire figure so you need to add all of the sides. (If they are going to use calculators on the test, I would allow them to do so now.)

Answers:

- | | | | |
|-------------|----------------|---------------|----------------|
| 1) 14 units | 2) 12 units | 3) 180 inches | 4) 12.8 meters |
| 5) 16 feet | 6) 21.6 inches | 7) 18.6 cm | 8) 24 m |
| 9) 20 m | 10a) A & C | 10b) No | |

Say:

Let's go back to the problem about Ms. Daigle's pet pig. Look at your 6 ´ 8 rectangle. What was the perimeter? (28 ft) Suppose Ms. Daigle wanted to make a cover for the pen for very hot or cold days. How much material would she need to buy?

This time you are looking to see what it would take to cover the pen. Count the number of squares that it would take to cover the pen. (48 squares) You have now found the area of the pen. Area is the number of square units that it takes to cover a figure. I will give you some dimensions and I want you to draw the rectangles. Find the perimeter and the area of each.

A. 4×6 (P = 20 units, A = 24 square units)

B. 4×4 (P = 16 units, A = 16 square units)

C. 8×2 (P = 20 units, A = 16 square units)

Say:

Did you notice anything about the areas of the rectangles? (B and C have the same areas, but different perimeters.) Did you notice anything about the perimeters of the rectangles? (A and C have the same perimeters, but different areas.)

Say:

I will give you some more dimensions and I want you to draw the rectangles. This time I want you to find only the area of each.

A. 3×7 (A = 21 square units)

B. 3×3 (A = 9 square units)

C. 6×2 (A = 12 square units)

Did you have to count the squares each time? Hopefully, they will see that to find the area of a rectangle, you can simply multiply the length times the width.

⇒ Give this problem to the students.

Say:

Mr. Lopez needs to buy wallpaper to cover a wall that is 8 ft by 25 ft. How much wallpaper does he need to buy? (200 sq. ft) We find the area when we are trying to find out how much we need to cover a space or figure.

⇒ Give Student Sheet 40. Emphasize that area is the number of square units needed to cover a figure.

Answers:

1) 12 square units 2) 9 square units 3) 3 square units 4) E

5) A and D 6) 25 square cm 7) 24 square miles

8) They may draw any of these rectangles 1×12 ; 12×1 ; 2×6 ; 6×2 ; 3×4 ; or 4×3 . Make sure that their rectangles look about right. Do not allow them to draw figures that are as off scale as these two are. Neither of these shows 12×1 rectangle.



9) They may draw a triangle with sides of 4 units each or a rectangle that is 1×5 ; 5×1 ; 2×4 ; or 4×2 ; or a square that is 3×3 . Again, they should not draw a square and label it 4×2 .

10) area

11) perimeter

12) perimeter

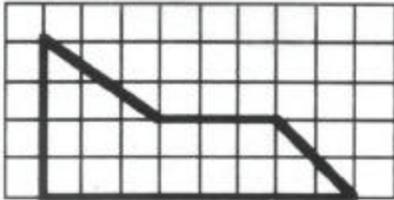
13) area

Extension:

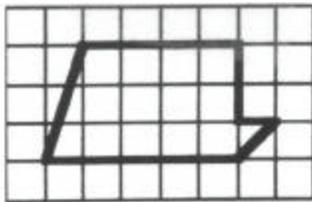
Say:

Not all figures are in the shapes of rectangles or squares. Sometimes you need to find the area of a figure that is different, or “irregular.” Counting squares on grid paper will give you an approximate area.

Here are 2 examples.



There are 13 or 14 whole squares. If I put the others together to make whole squares, I get about 3 more; so the answer is about 17 or 18 whole units.



There are 12 whole squares and about 2 others; so the area is about 14 square units.

Say:

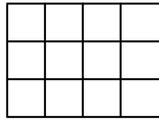
Trace a figure on grid paper. (a coke can, their hands, a box, etc.) Count the squares that are covered. Most will realize that it is easier to count the whole squares first and then to estimate with others. How did you estimate the area? (Answers will vary, but let them talk about their methods.)

Have one student summarize today’s lesson.

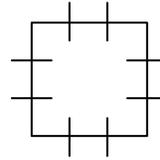
Student Sheet 39 (Measurement: Lesson 2)

Find the perimeter of the following figures.

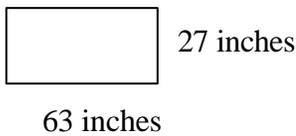
1. $P = \underline{\hspace{2cm}}$ units



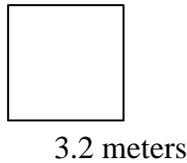
2. $P = \underline{\hspace{2cm}}$ units



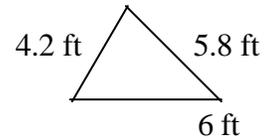
3. $P = \underline{\hspace{2cm}}$ units



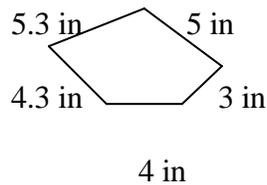
4. $P = \underline{\hspace{2cm}}$



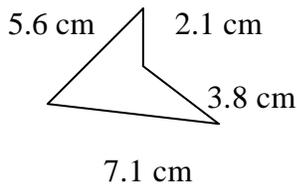
5. $P = \underline{\hspace{2cm}}$ units



6. $P = \underline{\hspace{2cm}}$



7. $P = \underline{\hspace{2cm}}$



Use the figures below to answer the following questions.

Figure A

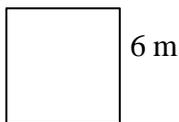


Figure B

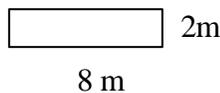
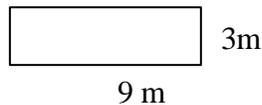


Figure C



8. What is the perimeter of figure A? _____
9. What is the perimeter of figure B? _____
- 10a. Which two figures have equal perimeters? _____
- 10b. Are these two figures shaped exactly alike? _____

Student Sheet 40 (Measurement: Lesson 2)

Use the figures below to answer the following questions.

Figure A

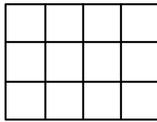


Figure B

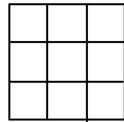


Figure C



Figure D

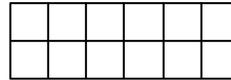
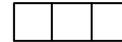


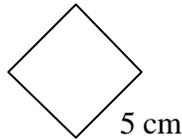
Figure E



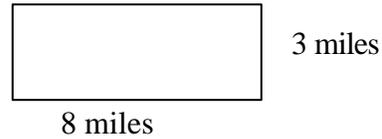
1. What is the area of figure A? _____ sq. units
2. What is the area of figure B? _____ sq. units
3. What is the area of figure E? _____ sq. units
4. Which figure has the smallest area? _____
5. Which two figures have equal areas? _____

Find the area (A) of each of the following figures.

6. $A =$ _____



7. $A =$ _____



8. Draw a rectangle that has an area of 12 square units. Label the sides.
9. Draw a figure that has a perimeter of 12 units. Label the sides.

Would you find the area or perimeter if you needed to ...

10. Carpet your bedroom? _____
11. Frame a picture? _____
12. Measure the distance around the playground? _____
13. Buy a cover for your swimming pool? _____