

Title: Backyard Building – Area and Perimeter

Brief Overview:

The students will use prior knowledge and manipulatives to explore the concepts of area and perimeter. The students will use their problem solving skills to create a space-saving backyard of their dreams.

NCTM Content Standard/National Science Education Standard:

- Measurement – Area and Perimeter
- Geometry

Grade/Level:

Second/Third Grade

Duration/Length:

Four days (50 minutes each day)

Student Outcomes:

Students will:

- Develop the concept of perimeter by utilizing pretzels to count the exterior of polygons.
- Develop the concept of area by utilizing color tiles and grid paper to count the interior of polygons.
- Create a backyard of their dreams using various figures with different areas and perimeters.

Materials and Resources:

Day 1

- Pretzel sticks (one baggie per child – several pretzel sticks in each bag)
- Blank white paper
- Pencils
- Sentence strips
- Chart Paper
- Markers
- Student Resource Sheet1
- Teacher Resource Sheet 1

Day 2

- Color Tiles (basket per team to be determined by teacher)

- Grid paper
- Pencils
- Crayons (one baggie per child - match crayon colors to Color Tiles)
- Student Resource Sheet 2
- Student Resource Sheet 3
- Student Resource Sheet 4
- Teacher Resource Sheet 2

Day 3

- Chart Paper
- Grid paper
- Markers
- Crayons
- Pencils
- Student Resource Sheet 4
- Student Resource Sheet 5
- Teacher Resource Sheet 3
- Teacher Resource Sheet 4

Day 4

- Chart Paper
- Grid paper
- Markers
- Crayons
- Pencils
- Student Resource Sheet 6
- Student Resource Sheet 7
- Summative Assessment
- Brief Constructed Response

Development/Procedures:

Lesson 1

Preassessment

Use the Perimeter worksheet, Student Resource Sheet 1, to preassess what students already know about perimeter. Students will estimate the perimeter of their desks using their pencils as a non-standard measuring tool. Students will then actually measure their desks using their pencils. Share and discuss answers.

Launch

Instruct the students to close their eyes and imagine their own backyards. What sort of items do you see in your imagination? Teacher will call on students and list items on chart paper with markers. (Items could include: doghouse, pool, deck/patio/porch, garden, sandbox, shed, tree house,

play/clubhouse, swing set, basketball court, trampoline, tennis court, picnic table, etc.)

Teacher Facilitation

Each student will be given a small baggie of pretzels and blank white paper. Teacher will use Teacher Resource Sheet 1 to create sentence strips. The students will be instructed to create a backyard item with a given perimeter. "What kind of backyard item did you give the perimeter for?" Demonstrate how to create this first backyard item. Explain that you will be using pretzels as a non-standard unit of measurement. Repeat several more times with the other items.

Student Application

Students will continue, using pretzels and blank white paper to create their own items.

Embedded Assessment

Informally assess the students by asking them to name a backyard item and show how they measured the perimeter using their pretzels.

Reteaching/Extension

- Have students use flat toothpicks to measure the perimeter of other items.
- Use pattern blocks, geoboards or linking cubes to determine perimeter.

Lesson 2

Preassessment

Use the Area worksheet, Student Resource Sheet 2, to preassess what students already know about area. Students will estimate the area of their math book using color tiles as a measuring tool. Students will then actually measure their math book using the color tiles to determine the area. Share and discuss answers.

Launch

Give the students thirty seconds to create a polygon of their choice using color tiles. Then they are to determine the area of their shape. Allow the students to share their answers orally.

Teacher Facilitation

Distribute Student Resource Sheets 3 and 4, to students. Ask students to find the area of the four polygons and label the area on Student Resource Sheet 3. Answers are on Teacher Resource Sheet 2. On Student Resource Sheet 4, ask the students to find another way of drawing polygons with the same areas that were on Student Resource Sheet 3, and draw their

polygons on the grid paper. "What were some of the polygons you came up with to show the same area?"

Student Application

Students will use colored tiles to show other ways to show area and draw their findings. They may then color in their findings with crayon.

Embedded Assessment

Informally assess the students as they create their polygons. Ask students how they determined the area of their polygon.

Reteaching/Extension –

- Have students draw other objects from the room and use color tiles to measure the area of the object.
- Use pattern blocks or geoboards to determine area.

Lesson 3

Preassessment

Distribute grid paper (Student Resource Sheet 4) and ask each child to draw and create a polygon with a perimeter of 8 units. Ask the students to determine the area of the polygon.

Launch

Review and revisit the backyard items list on chart paper from Day 1. Discuss map key features and designs. Remind the students that a map key is used to explain diagrams on a map.

Teacher Facilitation

Teacher will draw examples on the board of map key features from the list of backyard items that were written on chart paper from Day 1, see Teacher Resource Sheet 3. "Can anyone think of any other map key features that we can use?"

Student Application

Students will individually create a map key on paper for their dream backyard. Encourage them to use some of their own features that may not be on the class list.

Embedded Assessment

Have students complete the Exit Slip, Student Resource Sheet 5, which requires them to tell the area and perimeter of the given figure. Answers can be found on Teacher Resource Sheet 4.

Reteaching/Extension –

- Allow students to work in pairs to create their map key features.

- Revisit map key features in more detail if needed.

Lesson 4

Preassessment

Ask what the definition of area and perimeter are. Call on two students to explain how to find the area and perimeter of a polygon.

Launch

Review the key features from Lesson 3.

Teacher Facilitation

Each student will be given a blank house map, Student Resource Sheet 6 or 7 (depending upon student's choice) with room to draw their dream backyard. Encourage students to use their creativity in designing the ultimate dream backyard. Explain that they will want to plan out the spacing of their backyard items as they create their backyard plan. They will have a limited amount of space to work with in their dream backyard. "Who's up to the challenge of building the ultimate dream backyard?"

Student Application

Students will create their dream backyard and measure the perimeter and area of their backyard items. Area and perimeter will be labeled below each item. Students will have a corresponding key to explain the key features of their dream backyard.

Embedded Assessment

There are many worksheets and additional materials to use with area and perimeter.

Reteaching/Extension –

- Have students create a map of their neighborhood, incorporating area and perimeter.
- Have students create a zoo, incorporating area and perimeter.
- Give students time to share their dream backyards with the class.

Summative Assessment:

Students will be given an assessment similar to the Maryland State Assessment. There will be a Selected Response section followed by a Brief Constructed Response. In the Selected Response section the students will choose the correct perimeter or area for a given shape. The Brief Constructed Response section will have Step A and Step B. In step A, the students will write the area and perimeter of a given shape. In step B, the students will use what they know about area and perimeter to explain in writing why their answer is correct. They will be sure to use

words and/or numbers in their explanations. (Student Resource Sheets # 8 A-C) Answer key can be found on Teacher Resource Sheets # 5 A-C.

Authors:

Alexis Howell
J.P. Ryon Elementary
Charles County, MD

Sandra Krainer
Crofton Elementary
Anne Arundel County, MD

Student Resource Sheet 1



Perimeter of my desk

Perimeter: I know perimeter means _____

Estimation of the perimeter of my desk _____

Exact measurement of the perimeter of my desk _____

Directions: Write the sentence in the rectangle below on a sentence strip. Fill in the first blank with a backyard item and the second blank with a number for the perimeter's measurement. Show one sentence strip at a time and have the students show their shape with the correct perimeter. (Shapes may vary.)

Show a (backyard item) with a perimeter of (number) units.

*** Backyard items: doghouse, pool, deck/patio/porch, garden, sandbox, shed, tree house, play/clubhouse, swing set, basketball court, trampoline, tennis court, picnic table, etc.



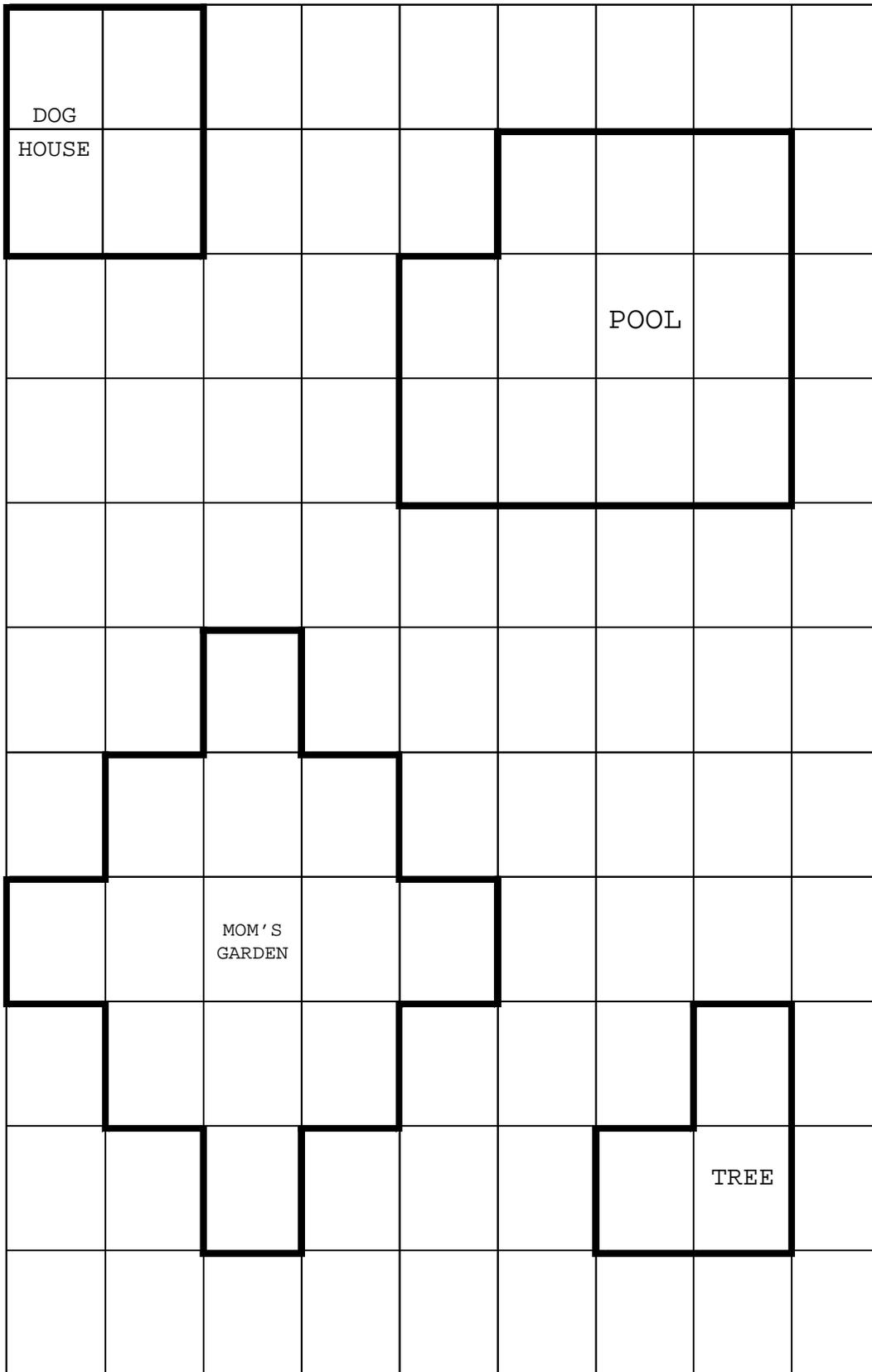


Area of my math book

Area: I know area means _____

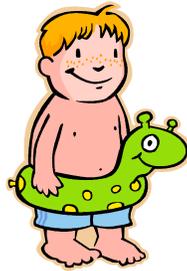
Estimation of the area of my math book _____

Exact measurement of the area of my math book _____

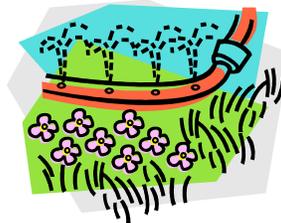




Dog House Area = 4 square units



Pool Area = 11 square units

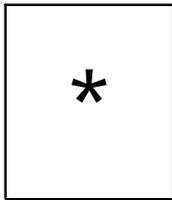


Mom's Garden Area = 13 square units

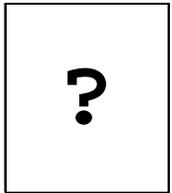


Tree Area = 3 square units

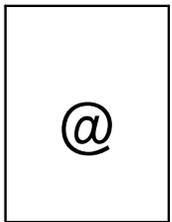
These are just a few ideas for your final map key. You may use them, or create your own. Have fun and be creative!



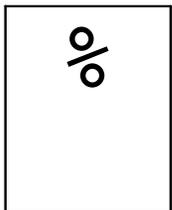
= Tree



= Bush

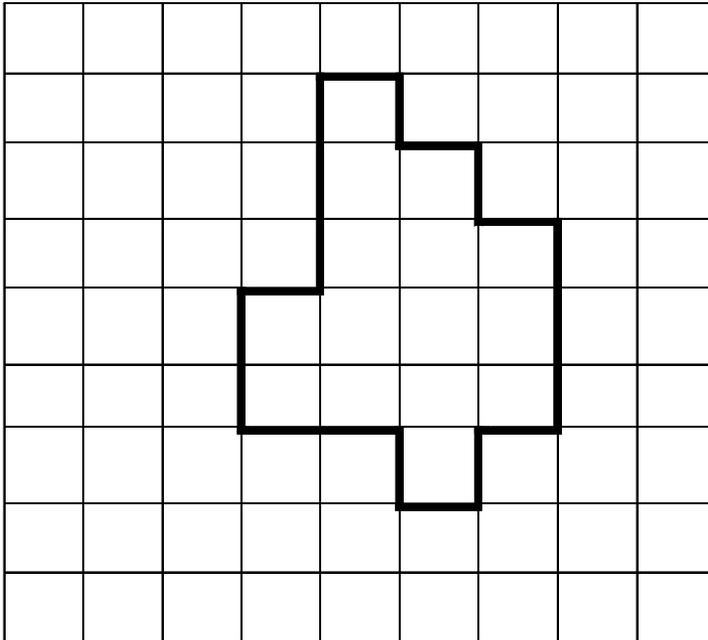


= Pool



= Trampoline

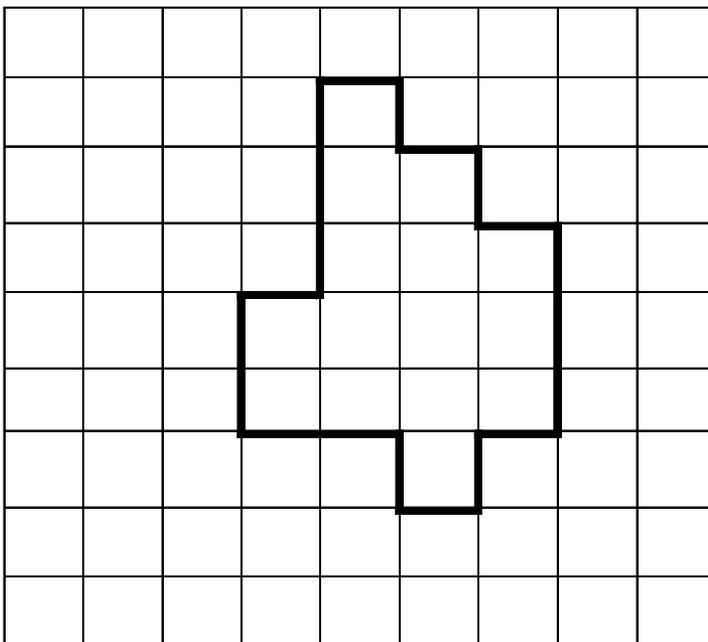
Exit Slip



What is the perimeter
of the figure? _____

What is the area of the
figure? _____

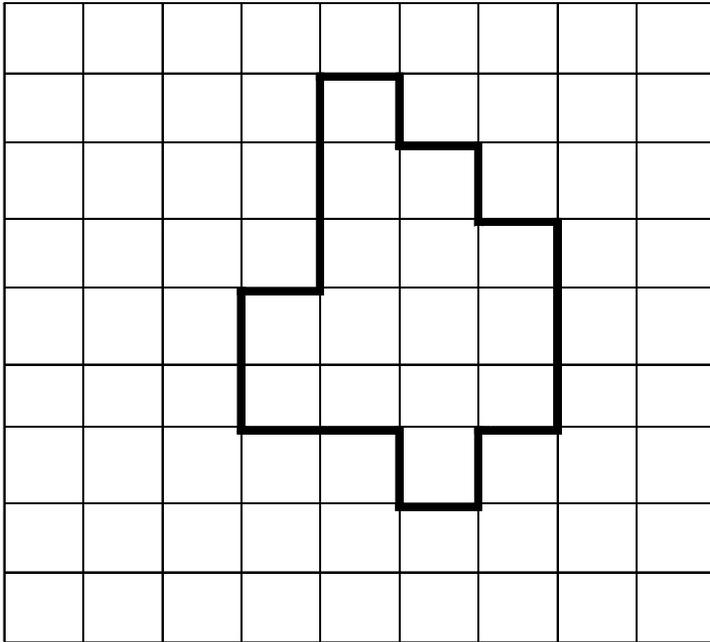
Exit Slip



What is the perimeter
of the figure? _____

What is the area of the
figure? _____

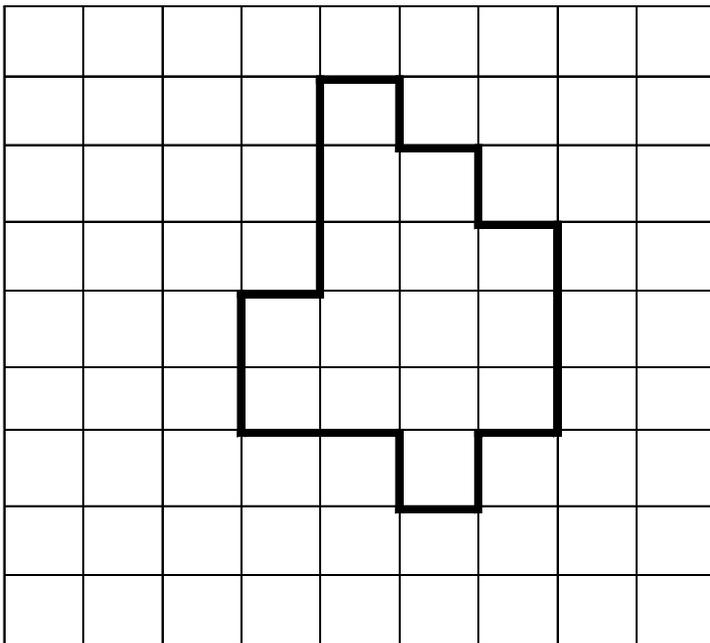
Exit Slip



What is the perimeter of the figure? 20 units

What is the area of the figure? 15 square units

Exit Slip



What is the perimeter of the figure? 20 units

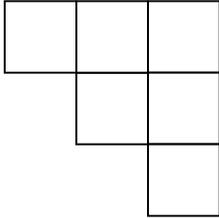
What is the area of the figure? 15 square units

Name _____ Date _____

Summative Assessment

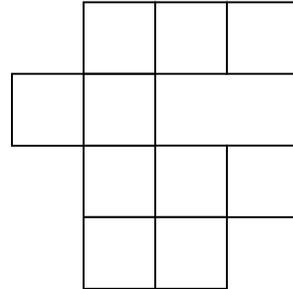
Directions: Find the area for the following shapes.

1.



- A. 4 square units
- B. 6 square units
- C. 8 square units
- D. 12 square units

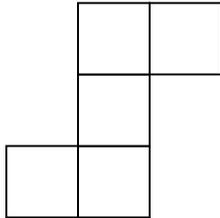
2.



- A. 20 square units
- B. 12 square units
- C. 15 square units
- D. 10 square units

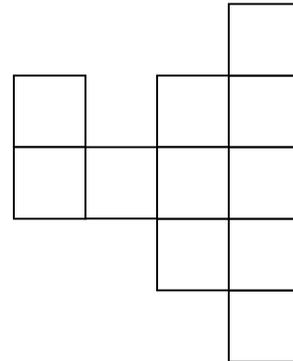
Directions: Find the perimeter of the following shapes.

3.



- A. 10 units
- B. 5 units
- C. 21 units
- D. 12 units

4.



- A. 10 units
- B. 20 units
- C. 19 units
- D. 21 units

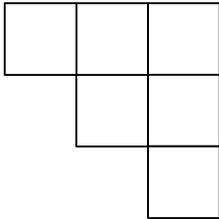
Name _____

Date _____

Summative Assessment

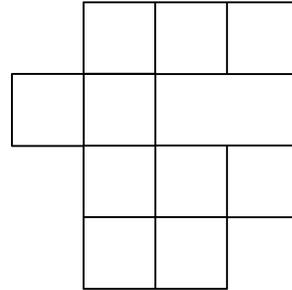
Directions: Find the area for the following shapes.

1.



- A. 4 square units
- B. 6 square units
- C. 8 square units
- D. 12 square units

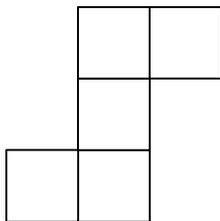
2.



- A. 20 square units
- B. 12 square units
- C. 15 square units
- D. 10 square units

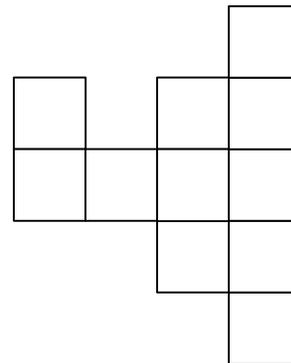
Directions: Find the perimeter of the following shapes.

3.



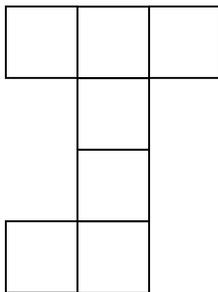
- A. 10 units
- B. 5 units
- C. 21 units
- D. 12 units

4.



- A. 10 units
- B. 20 units
- C. 19 units
- D. 21 units

Brief Constructed Response

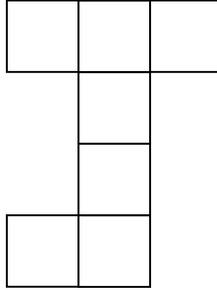
**Step A**

What is the area **and** the perimeter of the above shape?

Step B

Use what you know about area and perimeter to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response

**Step A**

What is the area and the perimeter of the above shape?

The area is 7 square units and the perimeter is 16 units

~~~~~

**Step B**

Use what you know about area and perimeter to explain why your answer is correct. Use words and/or numbers in your explanation.

Answers will vary but will include that the number of square units were

counted and is equal to 7, and that the number of units around the

shape were counted and it was 16. May also include definition of area

and perimeter.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**“Backyard Building”**  
 Brief Constructed Response  
 Mathematics Rubric  
 Grades 1-8

| Score    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2</b> | <p>My answer shows I completely understood the problem and how to solve it:</p> <ul style="list-style-type: none"> <li>❖ I used very good, complete strategy to correctly solve the problem.</li> <li>❖ I used my best math vocabulary to clearly explain what I did to solve the problem. My explanation was complete, well organized and logical.</li> <li>❖ I applied what I know about math to correctly solve the problem.</li> <li>❖ I used numbers, words, symbols or pictures to show how I solved the problem.</li> </ul>                                                                       |
| <b>1</b> | <p>My answer shows I understood most of the problem and how to solve it:</p> <ul style="list-style-type: none"> <li>❖ I used a strategy to find a solution that was partly correct.</li> <li>❖ I used some math vocabulary and most of my reasons were correct to explain how I solved the problem. My explanation needed to be more complete, well organized or logical.</li> <li>❖ I partly applied what I know about math to solve the problem.</li> <li>❖ I tried to use numbers, words, symbols or pictures to show how I got my answer, but these may not have been completely correct.</li> </ul> |
| <b>0</b> | <p>My answer shows I did not understand the problem and how to solve it:</p> <ul style="list-style-type: none"> <li>❖ I was not able to use a good strategy to solve the problem.</li> <li>❖ My strategy was not related to what was asked.</li> <li>❖ I did not apply what I know about math to solve the problem.</li> <li>❖ I left my answer blank.</li> </ul>                                                                                                                                                                                                                                        |