



National Center and State Collaborative

# **NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Measurement and Geometry Progress Monitoring and Skills Test**

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National Center and State Collaborative

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities. The project draws on a strong research base to develop an AA-AAS that is built from the ground up on powerful validity arguments linked to clear learning outcomes and defensible assessment results, to complement the work of the Race to the Top Common State Assessment Program (RTTA) consortia.

Our long-term goal is to ensure that students with significant cognitive disabilities achieve increasingly higher academic outcomes and leave high school ready for post-secondary options. A well-designed summative assessment alone is insufficient to achieve that goal. Thus, NCSC is developing a full system intended to support educators, which includes formative assessment tools and strategies, professional development on appropriate interim uses of data for progress monitoring, and management systems to ease the burdens of administration and documentation. All partners share a commitment to the research-to-practice focus of the project and the development of a comprehensive model of curriculum, instruction, assessment, and supportive professional development. These supports will improve the alignment of the entire system and strengthen the validity of inferences of the system of assessments.



The contents of this assessment were developed as part of the National Center and State Collaborative by Keri Bethune, Julie Thompson, Alicia Saunders, and Diane Browder at University of North Carolina at Charlotte and verified by Amy Lehew, math content expert, under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, [Susan.Weigert@Ed.gov](mailto:Susan.Weigert@Ed.gov)). However, the contents do not necessarily represent the policy of the U.S. Department of Education and no assumption of endorsement by the Federal government should be made.

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This document is available in alternative formats upon request.

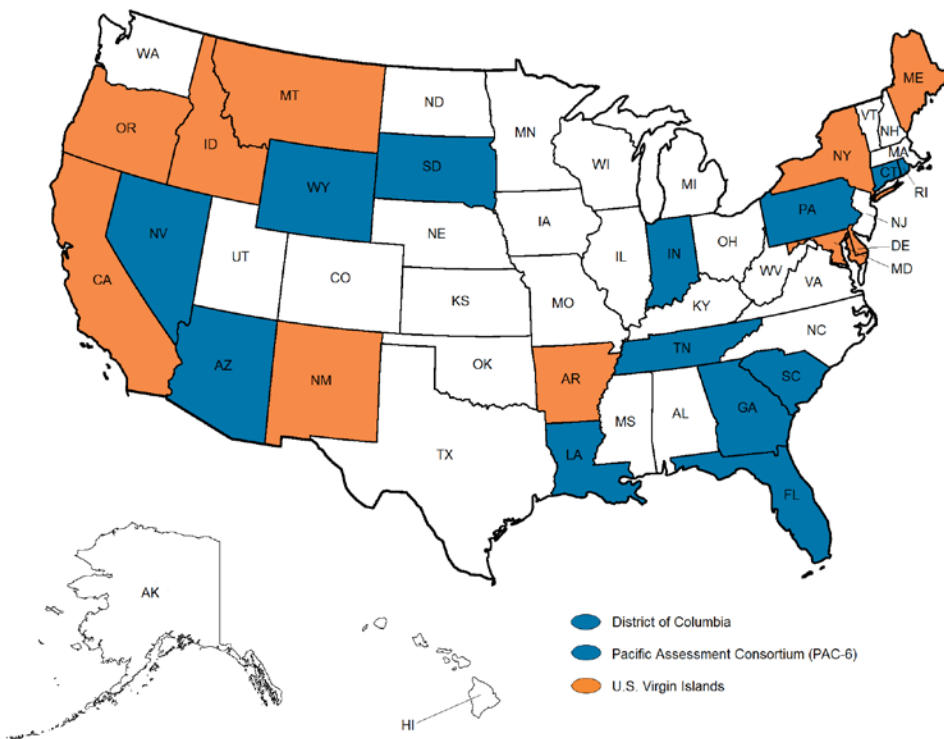


National Center and State Collaborative

NCSC is a collaborative of 15 states and five organizations.

The states include (shown in blue on map): Arizona, Connecticut, District of Columbia, Florida, Georgia, Indiana, Louisiana, Nevada, Pacific Assessment Consortium (PAC-6)<sup>1</sup>, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, and Wyoming.

Tier II states are partners in curriculum, instruction, and professional development implementation but are not part of the assessment development work. They are (shown in orange on map): Arkansas, California, Delaware, Idaho, Maine, Maryland, Montana, New Mexico, New York, Oregon, and U.S. Virgin Islands.



\*Core partner states are blue in color and Tier II states are orange in color.

<sup>1</sup> The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).



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The five partner organizations include: The National Center on Educational Outcomes (NCEO) at the University of Minnesota, The National Center for the Improvement of Educational Assessment (Center for Assessment), The University of North Carolina at Charlotte, The University of Kentucky, and edCount, LLC.



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# **NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Measurement and Geometry Progress Monitoring and Skills Test**

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# MASSI: Elementary Measurement/Geometry

## Options for Progress Monitoring/Formative Assessment

1. Elem Measurement/Geometry Progress Monitoring (pg. 7-11): record student responses made during instruction on data sheet provided; teacher records each step during the lesson.
2. Elem Measurement/Geometry Skills Test (pg. 12-25) - a brief on demand performance assessment; could be given weekly to see if student has mastered this lesson; also helps student practice responding in a test format.
  - a. NOTE: The Skills Test can be used as a baseline assessment to check for any skills the student may already have prior to beginning the MASSI.
  - b. NOTE: The Skills Test can also be re-administered to check for maintenance throughout the year.

## Elementary Measurement/Geometry Progress Monitoring

*Directions: Score each step during instruction or as soon as the lesson is complete. Score the step as unprompted correct with a “+.” Use a system to code level of prompting required for incorrect responses (e.g., V = verbal prompt, G = gesture, P = physical). Graph the number of unprompted correct responses to monitor progress.*

### BUILD ESSENTIAL UNDERSTANDING: CONCEPT AND SYMBOLS: Perimeter, Area, Length, and Width

**3<sup>rd</sup> GRADE BUILD A GRADE ALIGNED COMPONENT: Tiling to find area**

**4<sup>th</sup> and 5<sup>th</sup> GRADE BUILD ESSENTIAL UNDERSTANDING: CONCEPT: Tiling to find area**

<i>Materials and Directions for Teacher</i>	<i>Instructional Cue</i>	<i>Student Expected Response Date:</i>						
1. Student has a photo.	<b>Show me the perimeter of your photograph.</b>	Student uses finger to trace the outside edges of the photo.						
2. Student has a photo.	<b>Show me the area of your photograph.</b>	Student uses hand to indicate the area of the photo.						
3. Student has a photo.	<b>Show me the length of your photograph.</b>	Student uses finger to point to the length of their photo.						
4. Student has a photo.	<b>Show me the width of your photograph.</b>	Student uses finger to point to the width of their photo.						
5. Other objects/pictures (e.g., construction paper, index cards, desk/table tops, posters, computer screens, etc.).	<b>Show me the perimeter of the _____.</b>	Student uses finger to trace the outside edges of the item.						
6. Other objects/pictures (e.g., construction paper, index cards, desk/table tops, posters, computer screens, etc.).	<b>Show me the area of the _____.</b>	Student uses hand to indicate the area of the item.						
7. Other objects/pictures (e.g., construction paper, index cards, desk/table tops, posters, computer screens, etc.).	<b>Show me the length of the _____.</b>	Student uses finger to point to the length of their item.						
8. Other objects/pictures (e.g., construction paper, index cards, desk/table tops, posters, computer screens, etc.).	<b>Show me the width of the _____.</b>	Student uses finger to point to the width of their item.						
9. Each student should have a photo and more than enough tiling squares to cover the picture (don't give the exact amount, give more than needed so that students have to stop at the appropriate number).	<b>Put your tiles on your photo and count to find the area.</b>	Student places and counts the number of tiles on the photo (stopping when the photo is covered in tiles).						

Student Name: \_\_\_\_\_

10. Give each student a second picture.	<b>Now let's try it with another photo to add to our scrapbook. Use the tiling squares to find the area of this photo.</b>	Student places and counts the number of tiles on the photo (stopping when the photo is covered in files).						
11. Student has area equation and scrapbook paper labeled with length and width.	<b>This says length</b> (pointing to the length space in the equation), <b>What is the length of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
12. Student has area equation and scrapbook paper labeled with length and width.	<b>This says width</b> (pointing to the length space in the equation), <b>What is the width of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
		NUMBER CORRECT:						
<b>4<sup>th</sup> BUILD A GRADE ALIGNED COMPONENT: Calculating perimeter and changes in perimeter</b>								
13. Calculator, blank perimeter equation, and scrapbook paper (too small) with length and width labeled.	<b>Look at your worksheet. This says length</b> (pointing to the length space in the equation), <b>What is the length of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
14. See above.	<b>We need to write length again here. Tell me one more time, what was the length?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
15. See above.	<b>Now we need to find the width. What is the width of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
16. See above.	<b>We need to write width again here. Tell me one more time, what was the width?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
17. See above.	<b>Now enter the formula into your calculator to solve for perimeter.</b> Wait for students to independently enter the length into the calculator or say <b>"What's next?"</b>	Student enters the length into the calculator.						
18. See above.	Wait for students to independently enter the plus button or say <b>"What's next?"</b>	Student enters the plus sign into the calculator.						
19. See above.	Wait for students to independently enter the length into the calculator or say <b>"What's next?"</b>	Student enters the length into the calculator.						
20. See above.	Wait for students to independently enter the plus button or say <b>"What's next?"</b>	Student enters the plus sign into the calculator.						
21. See above.	Wait for students to independently enter the width or say <b>"What's next?"</b>	Student enters the width into the calculator.						



Student Name: \_\_\_\_\_

22. See above.	Wait for students to independently enter the plus button or say <b>“What’s next?”</b>	Student enters the plus sign into the calculator.						
23. See above.	Wait for students to independently enter the width or say <b>“What’s next?”</b>	Student enters the width into the calculator.						
24. See above.	Wait for students to independently enter the equals button or say <b>“What’s next?”</b>	Student enters the equals button into the calculator.						
25. See above.	<b>“What is the perimeter of the paper?”</b>	Student says or writes the perimeter of the paper onto the worksheet.						
26. Calculator, blank perimeter equation, and new paper that is also labeled with length and width.	<b>Look at your worksheet. This says length (pointing to the length space in the equation), What is the length of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
27. See above.	<b>We need to write length again here. Tell me one more time, what was the length?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
28. See above.	<b>Now we need to find the width. What is the width of your scrapbook paper?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
29. See above.	<b>We need to write width again here. Tell me one more time, what was the width?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
30. See above.	<b>Now enter the formula into your calculator to solve for perimeter.</b> Wait for students to independently enter the length into the calculator or say <b>“What’s next?”</b>	Student enters the length into the calculator.						
31. See above.	Wait for students to independently enter the plus button or say <b>“What’s next?”</b>	Student enters the plus sign into the calculator.						
32. See above.	Wait for students to independently enter the length into the calculator or say <b>“What’s next?”</b>	Student enters the length into the calculator.						
33. See above.	Wait for students to independently enter the plus button or say <b>“What’s next?”</b>	Student enters the plus sign into the calculator.						
34. See above.	Wait for students to independently enter the width or say <b>“What’s next?”</b>	Student enters the width into the calculator.						
35. See above.	Wait for students to independently enter the plus button or say <b>“What’s next?”</b>	Student enters the plus sign into the calculator.						
36. See above.	Wait for students to independently enter the width or say <b>“What’s next?”</b>	Student enters the width into the calculator.						

Student Name: \_\_\_\_\_

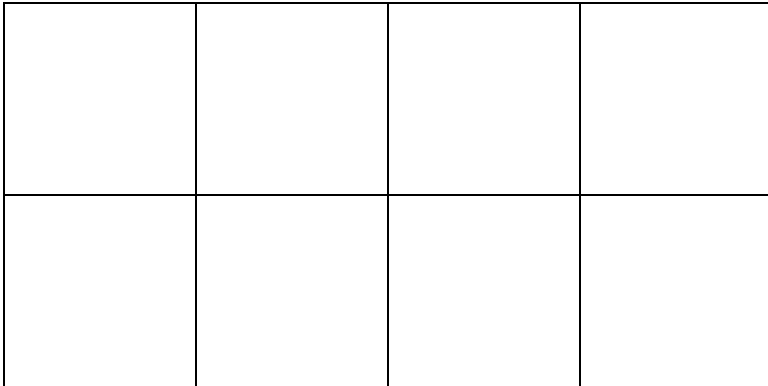
37. See above.	Wait for students to independently enter the equals button or say <b>“What’s next?”</b>	Student enters the equals button into the calculator.						
38. See above.	<b>“What is the perimeter of the paper?”</b>	Student says or writes the area of the paper onto the worksheet.						
39. Calculator, perimeter difference equation with both perimeters written in.	<b>Now enter the formula into your calculator to solve for the change in perimeter.</b> Wait for students to independently enter the bigger perimeter into the calculator or say <b>“What’s next?”</b>	Student enters the bigger perimeter into the calculator.						
40. See above.	Wait for students to independently enter the minus button or say <b>“What’s next?”</b>	Student enters the minus sign into the calculator.						
41. See above.	Wait for students to independently enter the smaller perimeter into the calculator or say <b>“What’s next?”</b>	Student enters the smaller perimeter into the calculator.						
42. See above.	Wait for students to independently enter the equals button or say <b>“What’s next?”</b>	Student enters the equals button into the calculator.						
43. See above.	<b>“What is the change in the perimeter of the paper?”</b>	Student says or writes the change in the perimeter of the paper onto the worksheet.						
			NUMBER CORRECT:					

<b>5<sup>th</sup> BUILD A GRADE ALIGNED COMPONENT: Conversion of units of measurement and area</b>						
44. Conversion chart, worksheet 3, and wrapping paper with one measurement (either length or width) labeled in inches and the other in feet.	<b>Use the chart to convert the square feet to square inches for your wrapping paper.</b>	Put their finger on/eye gazes to ____ feet.				
45. See above.	Wait for student to initiate next step or say <b>“keep going.”</b>	Move your finger/gazes across the line to the inches column.				
46. See above.	Wait for student to initiate next step or say <b>“keep going.”</b>	Read/write the number for inches.				
47. Worksheet 3 and a calculator.	<b>Now enter the formula into your calculator to solve for the area of your wrapping paper.</b> Wait for students to independently enter the length into the calculator or say <b>“What’s next?”</b>	Student enters the length into the calculator.				
48. See above.	Wait for students to independently enter the times button or say <b>“What’s next?”</b>	Student enters the multiplication sign into the calculator.				
49. See above.	Wait for students to independently enter the width or say <b>“What’s next?”</b>	Student enters the width into the calculator.				
50. See above.	Wait for students to independently enter the equals button or say <b>“What’s next?”</b>	Student enters the equals button into the calculator.				
51. See above.	<b>“What is the area of the photo?”</b>	Student says or writes the area of the photo onto the worksheet.				
		NUMBER CORRECT:				

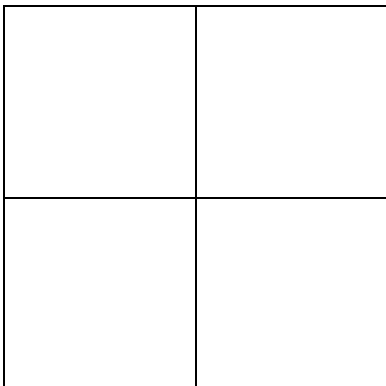
**MEASUREMENT/GEOMETRY SKILL TEST 1: CONCEPT AND SYMBOLS**

Note to teachers: It may be helpful to use a cover sheet of paper. Pull the cover sheet down far enough to show the model and read the text. Then, pull the sheet of paper down to show the problem and read the directions. Record “+” for an independent correct response or “-“ for incorrect response beside number in blank.

\_\_\_ **MODEL: Watch me as I tile this rectangle and count how many tiles I used to find the area.**

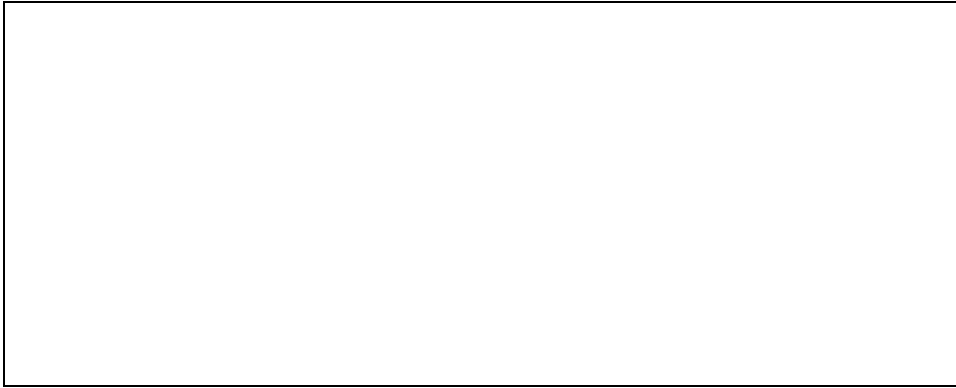


**STUDENT PROBLEM: Use the tiling squares to find the area of this rectangle.**



Student Name: \_\_\_\_\_

\_\_\_ Watch me as I tile this rectangle and count how many tiles I used to find the area.



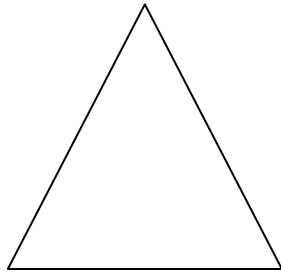
**STUDENT PROBLEM:** Use the tiling squares to find the area of this rectangle.



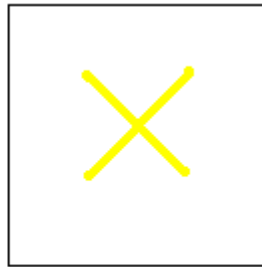
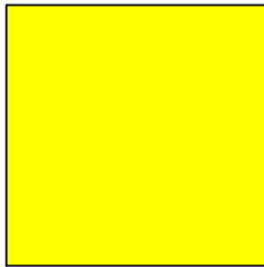
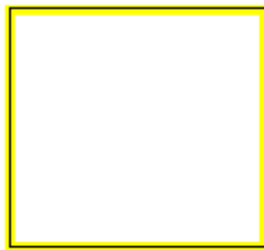
Student Name: \_\_\_\_\_

**\*\*Note:** The following sections use lines and areas highlighted in yellow... If these do not show up sufficiently on your printed version, use a highlighter marker to make them more visible.

\_\_\_ **Watch me as I use my marker to draw a line on the perimeter of this shape.**

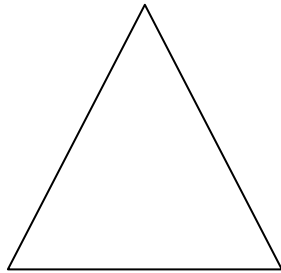


**STUDENT PROBLEM:** Which picture has the perimeter highlighted in yellow?

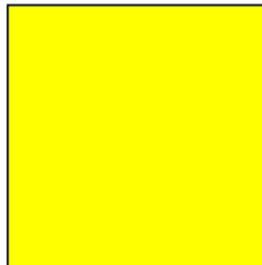
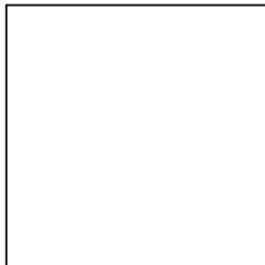
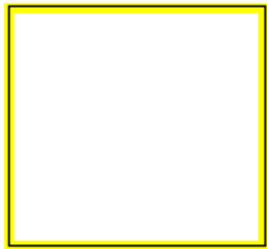


Student Name: \_\_\_\_\_

\_\_\_ Watch me as I use my marker to color in the area.

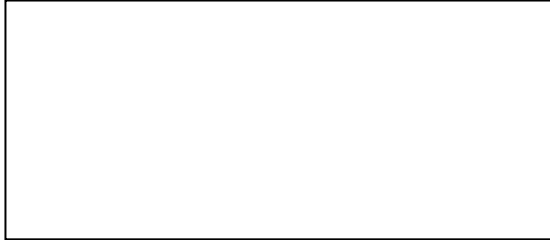


**STUDENT PROBLEM: Which picture has the area colored in yellow?**



Student Name: \_\_\_\_\_

\_\_\_ The length is the longest side of a rectangle. I will use my marker to draw a line along the length.



**STUDENT PROBLEM:** Which picture has the length in yellow?



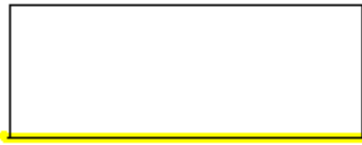


Student Name: \_\_\_\_\_

\_\_\_ The width is the shortest side of a rectangle. I will use my marker to draw a line along the width.

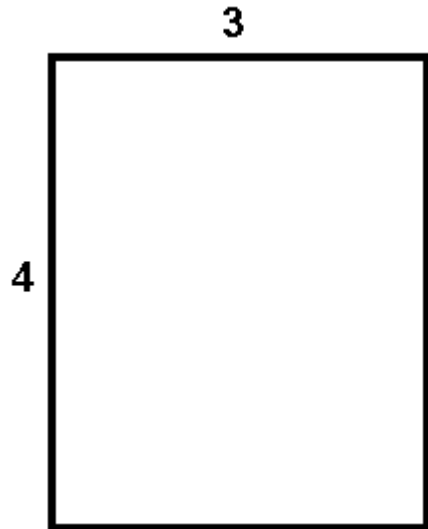


**STUDENT PROBLEM:** Which picture has the width in yellow?



## MEASUREMENT/GEOMETRY SKILLS TEST 2: Calculate Changes in a Perimeter

What is the perimeter of this shape?



$$\text{Perimeter} = \text{length} + \text{length} + \text{width} + \text{width}$$

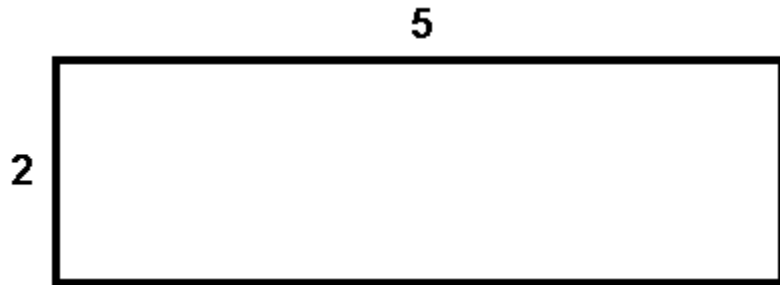
$$\text{Perimeter} = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

length                  length                  width                  width

$$\text{Perimeter} = \underline{\hspace{4cm}}$$

Student Name: \_\_\_\_\_

What is the perimeter of this shape?

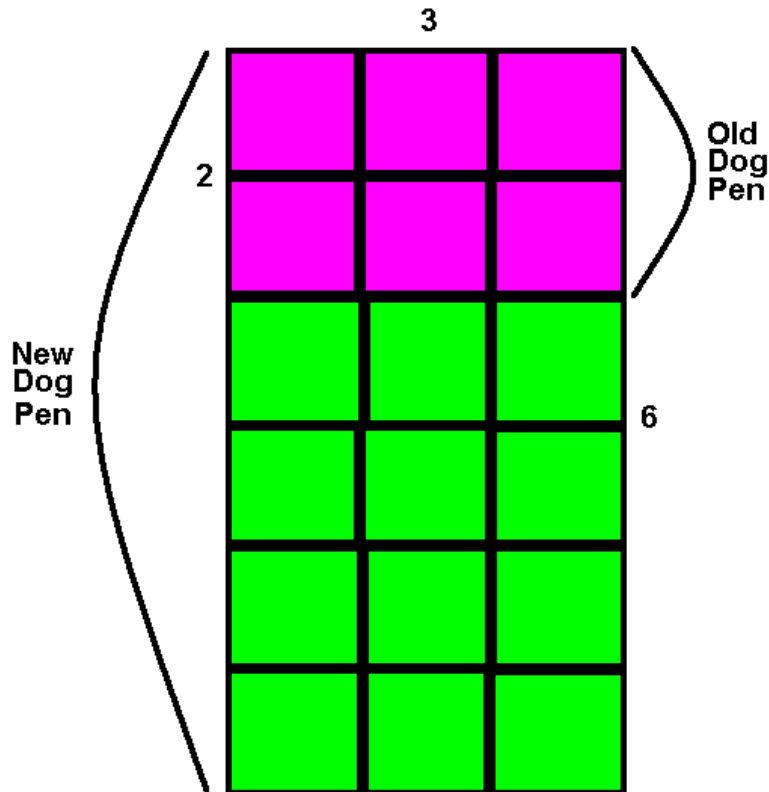


**Perimeter = length + length + width + width**

**Perimeter = \_\_\_\_\_**

Student Name: \_\_\_\_\_

Bobby has a dog named Fido. Fido has a dog pen that is 2 feet by 3 feet. But, as Fido grew bigger he got too big for the old pen, so Bobby made the pen bigger. The new dog pen is 3 feet by 6 feet. What is the change in the perimeter?



**Perimeter = length + length + width + width**

**Perimeter Old Dog Pen = \_\_\_\_\_**

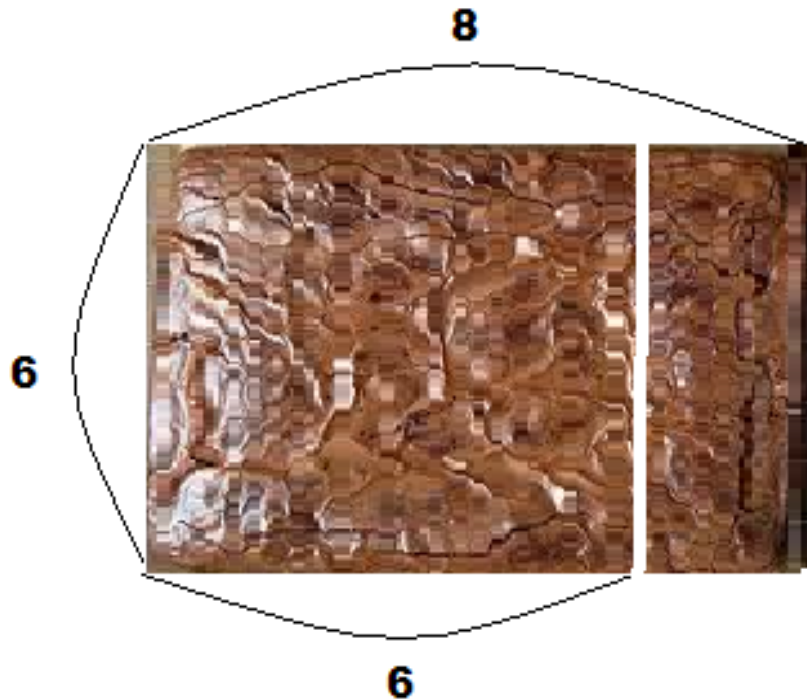
**Perimeter New Dog Pen = \_\_\_\_\_**

**Change in perimeter = Bigger Perimeter – Smaller Perimeter**

**Change in Perimeter = \_\_\_\_\_**

Student Name: \_\_\_\_\_

Jose made some brownies as a birthday gift for his sister. He made the brownies in a 6 inch by 8 inch pan. But then he realized that the gift box for the brownies was 6 inches by 6 inches, so he had to cut the brownies to make them fit. What is the change in the perimeter?



**Perimeter = length + length + width + width**

**Perimeter Original Brownies = \_\_\_\_\_**

**Perimeter Cut Brownies = \_\_\_\_\_**

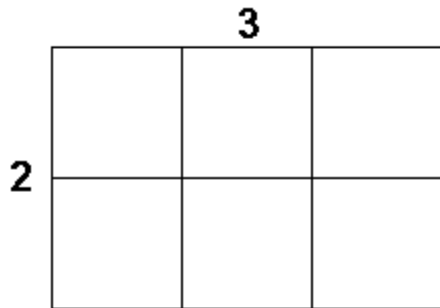
**Change in perimeter = Bigger Perimeter – Smaller Perimeter**

**Change in Perimeter = \_\_\_\_\_**

### MEASUREMENT/GEOMETRY SKILLS TEST 3: Conversion of units of measurement and area

\_\_\_ **What is the area of this rectangle?** (Students can either count the tiles or use a calculator)

area = length x width



Student Name: \_\_\_\_\_

\_\_\_ My new poster is 3 feet long, but I want to know how many inches that is. Use the chart below to find how many inches my poster is.

Feet	Inches
1	12
2	24
3	36

How many inches is my 3 foot poster? \_\_\_\_\_

Student Name: \_\_\_\_\_

\_\_\_ My new necklace is 24 inches long, but I need to know how many feet that is. Use the chart below to find how many feet my poster is.

Feet	Inches
1	12
2	24
3	36

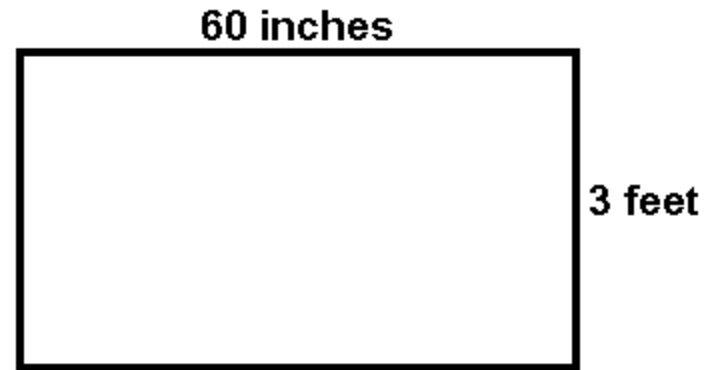
How many feet is my 24 inch poster? \_\_\_\_\_



Student Name: \_\_\_\_\_

\_\_\_ I want to buy a new table cloth for my table, but I need to know the area of the table cloth to make sure it is big enough. The table cloth package says that is it 60 inches by 3 feet. Convert feet to inches and solve for the area of the table cloth.

Feet	Inches
1	12
2	24
3	36



Length = \_\_\_\_\_

Width = \_\_\_\_\_

Area = length x width

Area = \_\_\_\_\_