



National Center and State Collaborative

# **NCSC Math Activities with Scripted Systematic Instruction (MASSI): High School 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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These materials and documents were developed under the National Center and State Collaborative (NCSC) General Supervision Enhancement Grant and are consistent with its goals and foundations. Any changes to these materials are to be consistent with their intended purpose and use as defined by NCSC.

This document is available in alternative formats upon request.

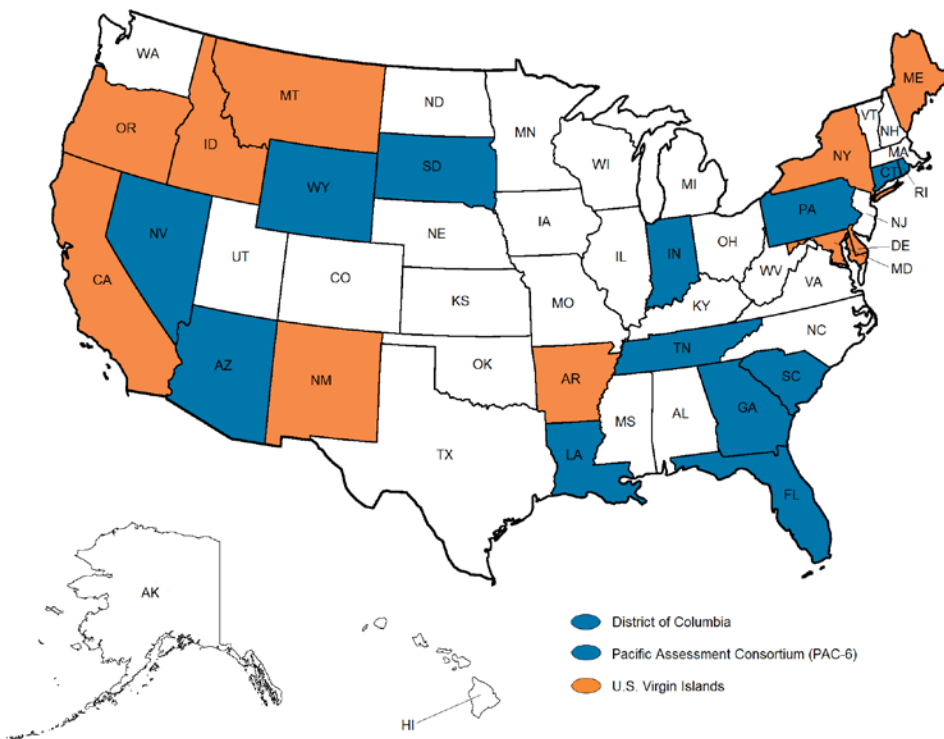


National Center and State Collaborative

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).



National Center and State Collaborative

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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National Center and State Collaborative

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

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January 2013

# MASSI: High School Measurement/Geometry

## Options for Progress Monitoring/ Formative Assessment

1. High School Measurement/Geometry Progress Monitoring (pg. 7-12): record student responses made during instruction on data sheet provided; teacher records each correct step during or just after the lesson.
2. High School Measurement/Geometry Skills Test (pg. 13-29): 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 Skill 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 Skill Test can also be readministered to check for maintenance throughout the year.

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

## High School 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, Width, Height, and Volume**

<i>Materials and Directions for Teacher</i>	<i>Instructional Cue</i>	<i>Student Expected Response</i> <i>Date:</i>							
1. Student has a photo.	<b>Show me the perimeter of your photo.</b>	Student uses finger to trace the outside edges of the photo.							
2. Student has a photo.	<b>Show me the area of your photo.</b>	Student uses hand to indicate the area of the photo.							
3. Student has a photo.	<b>Show me the length of your photo.</b>	Student uses finger to point to the length of their photo.							
4. Student has a photo.	<b>Show me the width of your photo.</b>	Student uses finger to point to the width of their photo.							
5. Student has a box/cube.	<b>Show me the volume of the box.</b>	Student uses hand to indicate the volume of the box.							
6. Student has a box/cube.	<b>Show me the length of the box.</b>	Student uses finger to point to the length of the box.							
7. Student has a box/cube.	<b>Show me the width of the box.</b>	Student uses finger to point to the width of the box.							
8. Student has a box/cube.	<b>Show me the height of the box.</b>	Student uses finger to point to the height of the box.							
9. Student has a teacher selected 2D item.	<b>Show me the perimeter of the ____.</b>	Student uses finger to trace the outside edges of the item.							
10. Student has a teacher selected 2D item.	<b>Show me the area of the ____.</b>	Student uses hand to indicate the area of the item.							
11. Student has a teacher selected 2D item.	<b>Show me the length of the ____.</b>	Student uses finger to point to the length of their item.							
12. Student has a teacher selected 2D item.	<b>Show me the width of the ____.</b>	Student uses finger to point to the width of their item.							
13. Student has a teacher selected 3D item.	<b>Show me the length of the __ (3D object).</b>	Student uses finger to point to the length of their item.							
14. Student has a teacher selected 3D item.	<b>Show me the width of the __ (3D object).</b>	Student uses finger to point to the width of their item.							
15. Student has a teacher selected 3D item.	<b>Show me the height of the __ (3D object).</b>	Student uses finger to point to the height of their item.							

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

16. Student has a teacher selected 3D item.	<b>Show me the volume of the ___(3D object).</b>	Student uses hand to indicate volume of the box.						
		NUMBER CORRECT:						
<b>HS BUILD ESSENTIAL UNDERSTANDING: SYMBOL USE: Calculating area and volume</b>								
17. Student worksheet 2. Student has a picture that is labeled with length and width.	<b>What is the length of your photo?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
18. See above.	<b>Now we need to find the width. What is the width of your photo?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
19. See above.	<b>Now enter the formula into your calculator to solve for area of your photo.</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.						
20. 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.						
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.						
22. 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.						
23. See above.	<b>What is the area of the photo?</b>	Student says or writes the area of the photo onto the worksheet.						
24. Student worksheet 2. Student has a box that is labeled with length, width, and height.	<b>Look at your worksheet. This says length (pointing to the length space in the equation). What is the length of the box?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
25. See above.	<b>Now we need to find the width. What is the width of the box?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the width.						
26. See above.	<b>Now we need to find the height. What is the height of the box?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the height.						
27. See above.	<b>Now enter the formula into your calculator to solve for volume of the box.</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.						
28. 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.						



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

29. See above.	Wait for students to independently enter the width or say <b>“What’s next?”</b>	Student enters the width into the calculator.						
30. 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.						
31. See above.	Wait for students to independently enter the height or say <b>“What’s next?”</b>	Student enters the height into the calculator.						
32. 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.						
33. See above.	<b>What is the volume of the box?</b>	Student says or writes the volume of the box onto the worksheet.						
		NUMBER CORRECT:						
<b>HS BUILD A GRADE ALIGNED COMPONENT: Calculating a missing attribute given area and volume</b>								
34. Student worksheet 3. Student has a picture that is labeled with length and area, but NOT width.	<b>Look at your worksheet. This says area</b> (pointing to the area space in the equation). <b>What is the area of your photo?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the area.						
35. See above.	<b>This says length</b> (pointing to the length space in the equation). <b>What is the length of your photo?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
36. See above.	<b>We don’t know the width of the photo. We need to write “width” (or “w”) here.</b>	Student writes/stamps/uses Velcro “width” or “w”/points to/eye gazes to the width.						
37. See above.	<b>Now solve for the width of your photo.</b> Wait for students to independently write the number for the length under both sides of the equation or say <b>“What’s next?”</b>	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the length under both sides of the equation.						
38. See above.	Wait for students to independently cancel out the #'s for length on the right side of the equation or say <b>“What’s next?”</b>	Student writes an “X”/stamps/ Velcro’s/or eye gazes to cancel out the length on the top and bottom of the right side of the equation.						
39. See above.	Wait for students to independently rewrite the equation reflecting the cancelled numbers or say <b>“What’s next?”</b>	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the area on the top of the left side of the equation and the number for length on the bottom side of the left side of the equation leaving the word width alone on the right.						
40. See above.	<b>Now use your calculator to solve for the width.</b>	Student enters the number for the area into the calculator.						

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

41. See above.	Wait for students to independently enter the divide button or say <b>“What’s next?”</b>	Student enters the division sign into the calculator.						
42. See above.	Wait for students to independently enter the length or say <b>“What’s next?”</b>	Student enters the length into the calculator.						
43. 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.						
44. See above.	<b>What is the width of the photo?</b>	Student says/writes/stamps/selects the width of the photo onto the worksheet.						
45. Student worksheet 3. Student has a box that is labeled with length, height, and area, but NOT width.	<b>Look at your worksheet. This says volume</b> (pointing to the volume space in the equation). <b>What is the volume of the box on your desk?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the volume.						
46. See above.	<b>This says length</b> (pointing to the length space in the equation). <b>What is the length of the box?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the length.						
47. See above.	<b>This says height</b> (pointing to the height space in the equation). <b>What is the height of the box?</b>	Student writes/stamps/uses Velcro numbers/points to/eye gazes to the height.						
48. See above.	<b>We don’t know the width of the box. We need to write “width” or “w” here.</b> Have students copy the equation into the spaces below before moving to step 49.	Student writes/stamps/uses Velcro “width” or “w”/points to/eye gazes to the width.						
49. See above.	<b>Now solve for the width of the box.</b> Wait for students to independently write the number for the length under both sides of the equation or say <b>“What’s next?”</b>	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the length under both sides of the equation.						
50. See above.	Wait for students to independently cancel out the #'s for length on the right side of the equation or say <b>“What’s next?”</b>	Student writes an “X”/stamps/ Velcro’s/or eye gazes to cancel out the length on the top and bottom of the right side of the equation.						
51. See above.	Wait for students to independently rewrite the equation reflecting the cancelled numbers or say <b>“What’s next?”</b>	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the area on the top of the left side of the equation and the number for length on the bottom side of the left side of the equation leaving the width variable and height alone on the right.						
52. See above.	<b>Now use your calculator to divide the left side of the equation.</b>	Student enters the number for the volume into the calculator.						

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

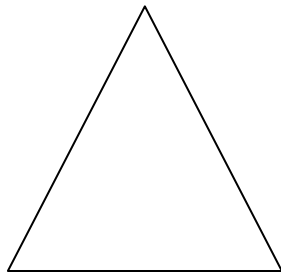
53. See above.	Wait for students to independently enter the divide button or say <b>“What’s next?”</b>	Student enters the division sign into the calculator.						
54. See above.	Wait for students to independently enter the length or say <b>“What’s next?”</b>	Student enters the length into the calculator.						
55. 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. Student writes/stamps/uses Velcro # /points to/eye gazes to the quotient and copies right side of the equation (width variable and height).						
56. See above.	Have students copy the equation into the spaces below. <b>Now you need to finish isolating the width. That means we need to move the height to the other side of the equation. Do it just like you did for the length.</b> Wait for students to independently write the number for the height under both sides of the equation	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the height under both sides of the equation.						
57. See above.	Wait for students to independently cancel out the #'s for height on the right side of the equation or say <b>“What’s next?”</b>	Student writes an “X” /stamps/ Velcro's/or eye gazes to cancel out the height on the top and bottom of the right side of the equation						
58. See above.	Wait for students to independently rewrite the equation reflecting the cancelled numbers or say <b>“What’s next?”</b>	Student writes/stamps/uses Velcro # /points to/eye gazes to place the number for the area on the top of the left side of the equation and the number for height on the bottom side of the left side of the equation (leaving the word width alone on the right).						
59. See above.	<b>Now use your calculator to solve for the width.</b>	Student enters the number for the area into the calculator.						
60. See above.	<b>What is the width of the photo?</b>	Student says/writes/stamps/selects the width of the photo onto the worksheet.						
		NUMBER CORRECT:						

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

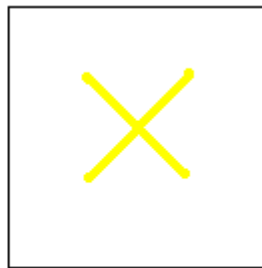
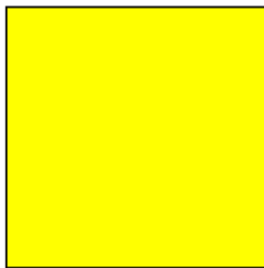
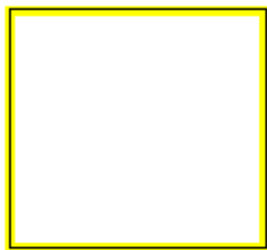
Note to teachers: It may be helpful to use a cover sheet of paper. Pull the cover sheet down far enough to show the model and read the text. Then, pull the sheet of paper down to show the problem and read the directions. Record “+” for an independent correct response or “-“ for incorrect response in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

\*\*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 around the perimeter of this shape.

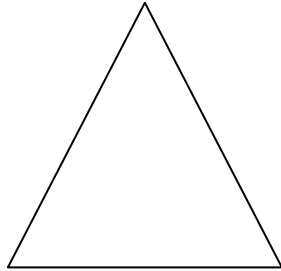


**STUDENT PROBLEM: Which picture has the perimeter highlighted in yellow?**

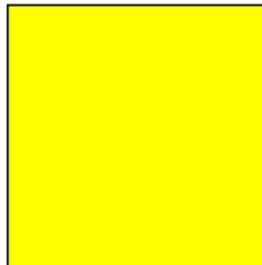
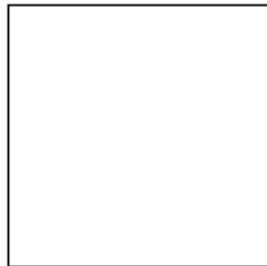
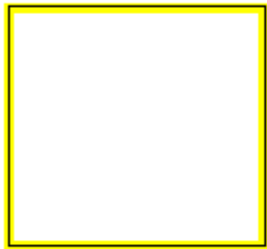


Student Name: \_\_\_\_\_

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



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

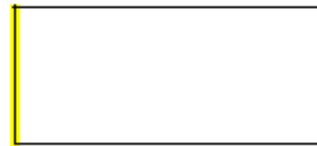


Student Name: \_\_\_\_\_

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

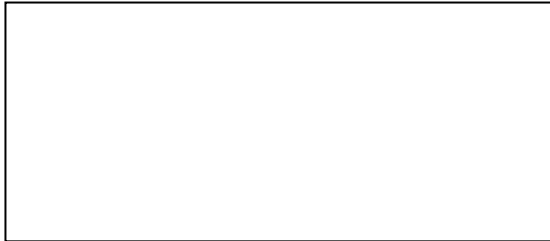


**STUDENT PROBLEM:** Which picture has the length in yellow?

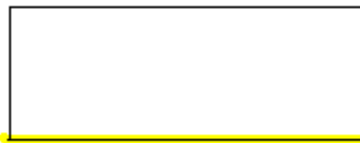


Student Name: \_\_\_\_\_

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

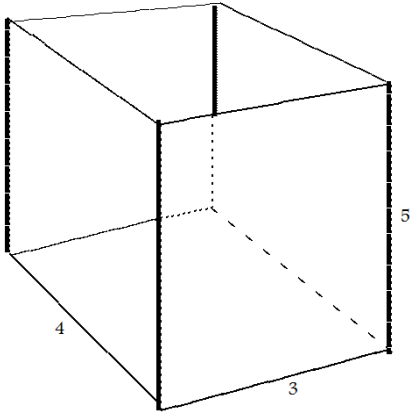


**STUDENT PROBLEM:** Which picture has the width in yellow?

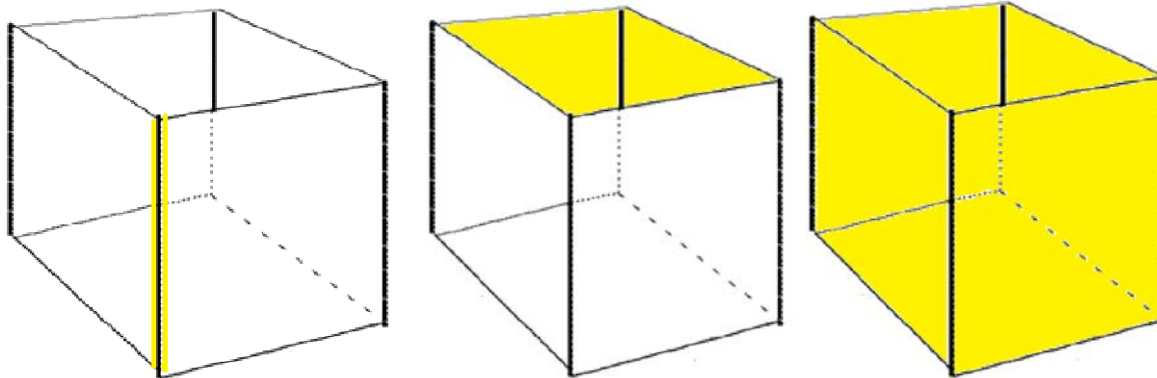


Student Name: \_\_\_\_\_

\_\_\_ The height is the side of a cube/box that goes up and down. I will use my marker to draw a line along the height.



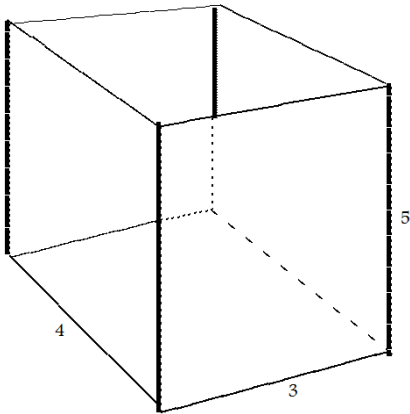
**STUDENT PROBLEM:** Which picture has the height highlighted in yellow?



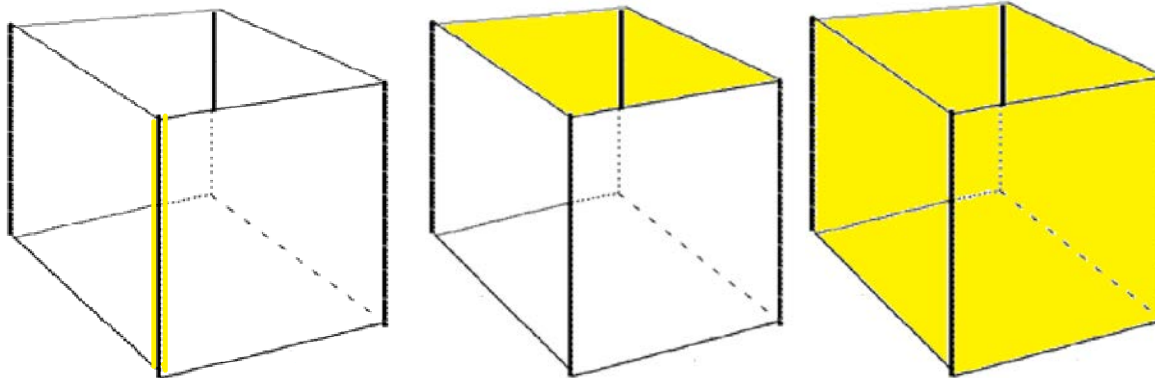


Student Name: \_\_\_\_\_

\_\_\_ The volume is the space inside the box. I will use my marker to color in the volume.

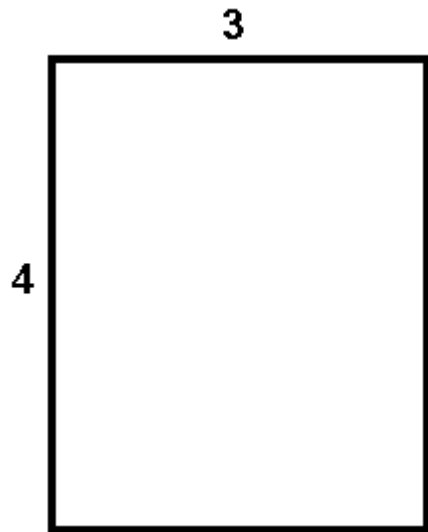


**STUDENT PROBLEM:** Which picture has the volume highlighted in yellow?



## MEASUREMENT/GEOMETRY SKILLS TEST 2: CALCULATING AREA AND VOLUME

What is the area of this shape?



$$\text{Area} = \text{length} \times \text{width}$$

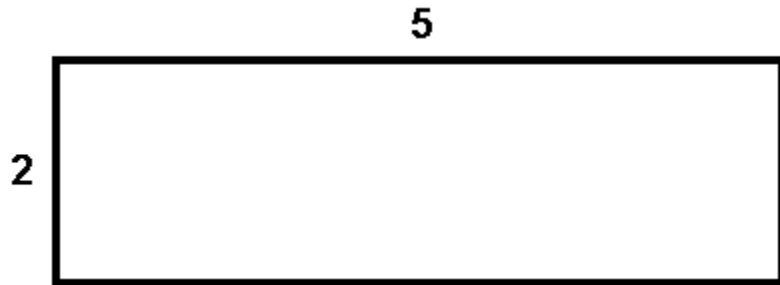
$$\text{Area} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

length                      width

$$\text{Area} = \underline{\hspace{2cm}}$$

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

What is the area of this shape?



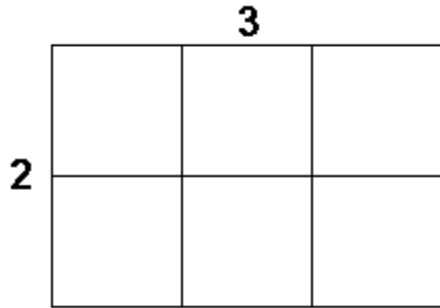
Area = length x width

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

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

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

area = length x width

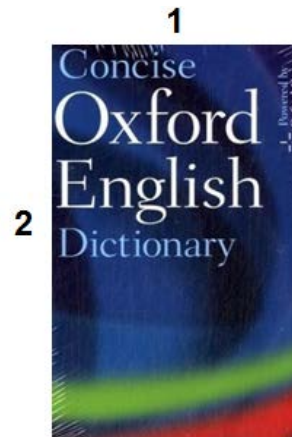


area = \_\_\_\_\_

\_\_\_ **What is the area of this book cover?**

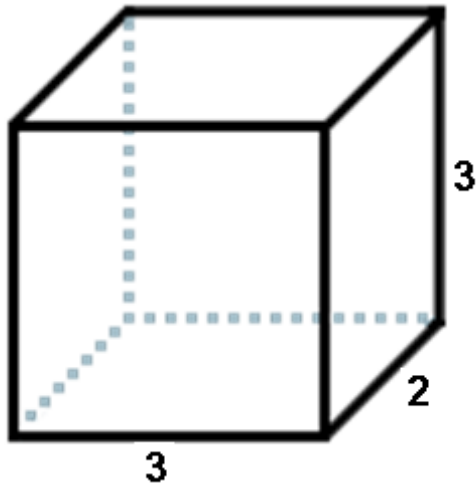
area = length x width

area = \_\_\_\_\_



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

What is the volume of this shape?



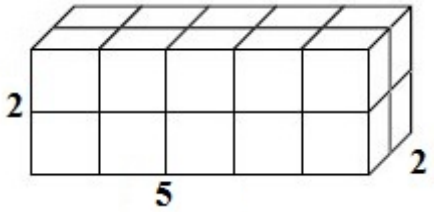
Volume = length x width x height

Volume = \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_  
length width height

Volume = \_\_\_\_\_

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

What is the volume of this shape?



**Volume = length x width x height**

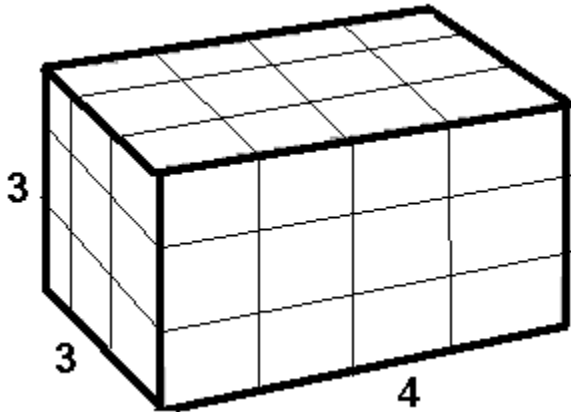
**Volume = \_\_\_\_\_**

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

\_\_\_ What is the volume of this shape?

volume = length x width x height

volume = \_\_\_\_\_



Sam has an aquarium that is 24 inches long by 10 inches wide by 12 inches high.

\_\_\_ What is the volume of this aquarium?

volume = length x width x height

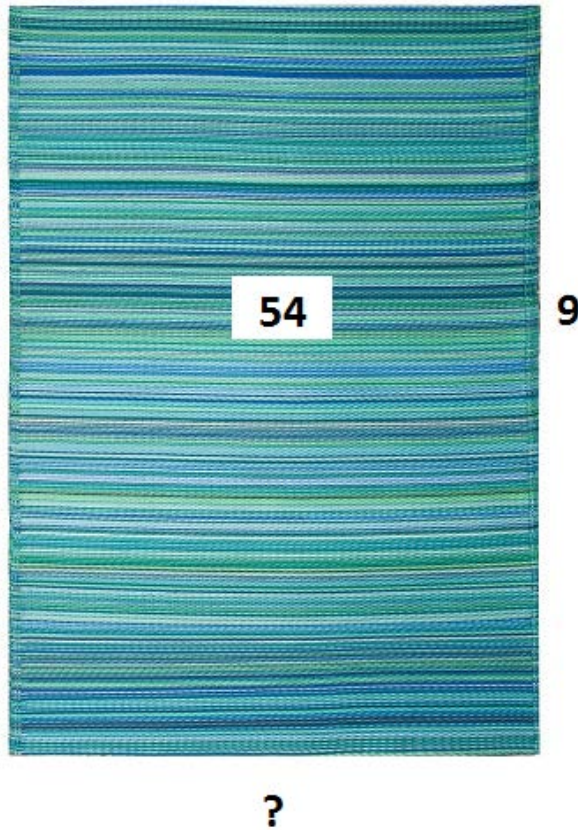
volume = \_\_\_\_\_





### MEASUREMENT/GEOMETRY SKILLS TEST 3: Finding a missing attribute when given area or volume

Arjun wants to know if this rug will fit under his dining room table. He knows the area of the rug is 54 feet squared. The length of the rug is 9 feet long. What is the width of the rug shown below?



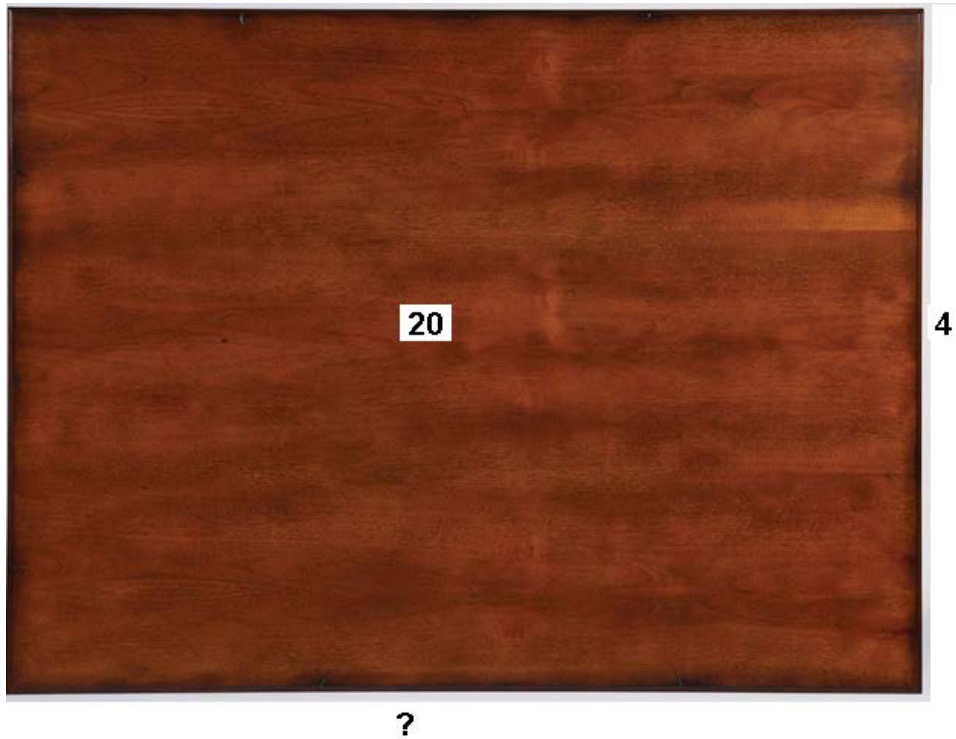
$$\text{Area} = \text{length} \times \text{width}$$

$$\text{Width} =$$

---

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

The area of Arjun's dining room table is 20 feet squared. The width of the table is 4 feet. What is the length of the table?



$$\text{Area} = \text{length} \times \text{width}$$

$$\text{Length} = \underline{\hspace{2cm}}$$

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

The storage box is 7 inches long and 6 inches high. The volume shows how much storage space is inside the box. The volume of the box is 252 cubic inches. Use the formula to calculate the width of the box.

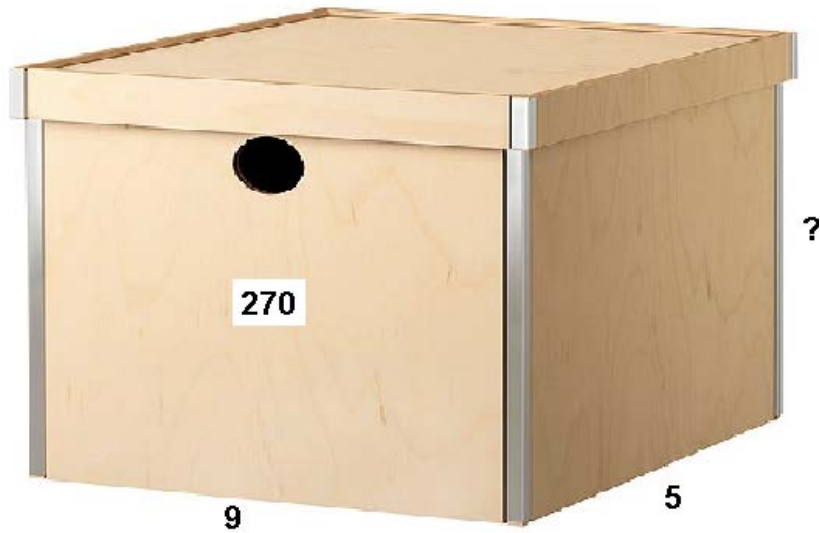
$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$



$$\text{Width} = \underline{\hspace{2cm}}$$

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

Allison needs a box to hold files but wants to make sure it will hold her files. The box is 9 inches long and 5 inches wide. The volume of the box is 270 cubic inches. What is the height of the box shown below?



Volume = length x width x height

Height = \_\_\_\_\_