

Eureka Remediation Tool: Grade 8

Module 5, Topic B

To become mathematically proficient, students **must** access on-grade-level content. This document aims to help teachers who use the Eureka curriculum to target remediation for students needing extra support before and **during** approaching on-grade-level work, creating opportunities for on-time remediation directly connected to the new learning.

About this Topic

Focus Standards:

8.G.C.9: Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Topic Overview per the Eureka Curriculum

In Lesson 9, students work with functions from geometry. For example, students write the rules that represent the perimeters of various regular shapes and areas of common shapes. Along those same lines, students write functions that represent the area of more complex shapes (e.g., the border of a picture frame). In Lesson 10, students learn the volume formulas for cylinders and cones. Building upon their knowledge of area of circles and the concept of congruence, students see a cylinder as a stack of circular congruent disks and consider the total area of the disks in three dimensions as the volume of a cylinder. A physical demonstration shows students that it takes exactly three cones of the same dimensions as a cylinder to equal the volume of the cylinder. The demonstration leads students to the formula for the volume of cones in general. Students apply the formulas to answer questions such as, “If a cone is filled with water to half its height, what is the ratio of the volume of water to the container itself?” Students then use what they know about the volume of the cylinder to derive the formula for the volume of a sphere. In Lesson 11, students learn that the volume of a sphere is equal to two-thirds the volume of a cylinder that fits tightly around the sphere and touches only at points. Finally, students apply what they have learned about volume to solve real-world problems where they will need to make decisions about which formulas to apply to a given situation.

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Overview

Eureka Remediation Tools include:

1. a diagnostic assessment to help teachers determine the misunderstandings or gaps in mathematical knowledge related to a specific Topic in the Eureka curriculum
2. guidance for teachers to analyze student work on the diagnostic assessment
3. suggested materials for targeted remedial instruction

Note: The use of this guidance is not intended to delay students' engagement with on-grade-level learning. On-grade-level learning should be the focus of instructional time and be treated as an opportunity for students to "finish" learning previous skills and deepen conceptual understanding.

Diagnostic Assessment

The diagnostic assessment is designed to be administered to targeted students prior to beginning instruction on the given Topic. When appropriate, it is broken into parts (Part A, Part B, and so on); each part addresses a different prerequisite standard and contains three problems. If a student correctly answers at least 2 out of the 3 problems, it can be assumed that he/she is ready to engage with the new content of the Topic with little to no support needed prior to engaging with the Topic. The diagnostic assessment is designed in this way so that teachers can determine the "entry point" to remedial instruction and/or opportunities for unfinished learning within the context of the new learning. The entry points and opportunities for unfinished learning will vary between students.

Guidance for Remediation

The Remediation Guidance is designed for teacher use. It is also broken into parts (Part A, Part B, and so on) and correlates to the parts on the diagnostic assessment. Each part contains the following:

1. **The focus standard:** The focus standards are strategically chosen to address prerequisite skills and are purposefully arranged in the order that students typically master the skills and knowledge.
2. **Why this is important for current grade level work:** This section describes how the work of the prerequisite standard relates to the standard(s) addressed in the Topic of instruction.
3. **Using the diagnostic assessment to identify gaps:** This section identifies common errors students make on the diagnostic assessment items.
4. **Remediation Resources for Targeted Instruction:** The resources pinpoint specific Eureka lessons and parts of lessons for teachers to use to address gaps in mathematical knowledge. Using Eureka materials to address remediation ensures alignment to the standards, consistency in approach to learning, and similarities in strategies for solving problems.

Diagnostic Assessment: Grade 8 Eureka Module 5, Topic B

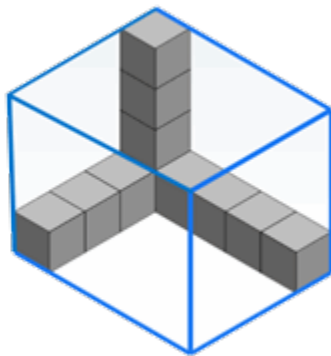
Part A: 5.MD.C.3

1. What is the volume of a box that can be packed without gaps or overlaps using 63 unit cubes?
2. What is the volume of the rectangular prism in cubic units?



one unit cube

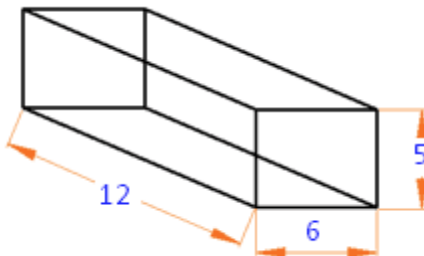
3. What is the volume of the rectangular prism in cubic units?



one unit cube

Part B: 5.MD.C.5b

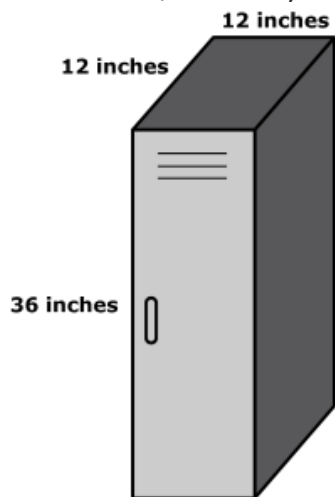
4. If the length of the given rectangular prism (show below) was decreased from 12 units to 8 units, how many cubic units of volume would be lost? Explain your answer and/or show your work.



Diagnostic Assessment: Grade 8 Eureka Module 5, Topic B

5. Jude made his mother a wooden box, in the shape of a rectangular prism, for her keepsakes. He lined the inside of the box with felt. For the bottom Jude used a piece of felt that was 128 square inches, and for the sides he used pieces of felt that were 6 inches tall. What is the volume of the wooden box? Explain your answer and/or show your work.

6. Reynolds' school locker (shown below) is in the shape of a right rectangular prism. His mother wants to fill his entire locker with confetti for his birthday. If one bag of confetti fills 288 cubic inches of space, how many bags of confetti should she buy? Explain your answer and/or show your work.



Diagnostic Assessment: Grade 8 Eureka Module 5, Topic B

Part C: 7.G.B.4

7. Find the area of a circle whose diameter is 14 cm in length. Show your work and leave your answer in terms of π .
8. For his winter art project, Lucas is drawing a snowman made of three circles stacked one on top of another. The smallest circle, used for the snowman's head, has a radius of 1 in, while the radius of the largest circle, used for the base of the snowman, is 3 in. What is the difference in area between the largest and smallest circles on the snowman drawing? Show your work and leave your answer in terms of π .
9. Joy is painting polka dots (circles) on her bedroom wall. She plans to paint two different size polka dots: a small one that is 10 inches in diameter and a large one that is 18 inches in diameter. Joy plans to paint 20 large polka dots and 30 small polka dots. How many square inches of Joy's bedroom wall will be covered by polka dots? Show your work and leave your answer in terms of π .

Diagnostic Assessment Key: Grade 8 Eureka Module 5, Topic B

Solutions:

1. 63 cubic units
2. 20
3. 80
4. 120
5. 768 cubic inches
6. 18
7. 49π cm²
8. 8π in²
9. $2,370\pi$ (in²)

Remediation Guidance: Grade 8 Eureka Module 5, Topic B

Part A Focus: 5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

- a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
- b. A solid figure that can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

<p>Why this is important for current grade level work: The target Topic focuses on a single standard, which is devoted to the concept of volume applied to circular figures (e.g., cones, cylinders, and spheres). This foundational standard was students’ first introduction to the concept of volume. The item set will help teachers identify which students have the base understanding of the concept of volume necessary to engage with the new learning of the target Topic. Many students will likely struggle to extend the idea of filling a figure with unit cubes to circular figures; therefore, it is imperative that students have a solid conceptual understanding of volume prior to beginning the target Topic.</p>			<p>Remediation Resources for Targeted Instruction: <u>5th Grade, Module 5, Topic A, Lesson(s) 1 – 3</u> Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding.</p>		
<p>Using the Diagnostic Assessment to identify gaps:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> <p>Problem 1: Students should recognize the language used in the problem and connect that to the definition of volume. Students who miss this item likely have no understanding of volume, even if they can perform calculations given a formula.</p> </td> <td style="width: 33%; vertical-align: top;"> <p>Problem 2: Look for students who only count a single row of unit cubes or who try to use a formula or further calculations beyond counting the given unit cubes. Both show a gap in understanding of volume and will need to be addressed prior to starting the target Topic.</p> </td> <td style="width: 33%; vertical-align: top;"> <p>Problem 3: Look for students who only count the given unit cubes as this a gap in understanding that volume is found by packing without gaps or overlaps (as stated in problem 1). Students who simply count the given unit cubes are likely not ready to engage with the new learning of the target Topic.</p> </td> </tr> </table>				<p>Problem 1: Students should recognize the language used in the problem and connect that to the definition of volume. Students who miss this item likely have no understanding of volume, even if they can perform calculations given a formula.</p>	<p>Problem 2: Look for students who only count a single row of unit cubes or who try to use a formula or further calculations beyond counting the given unit cubes. Both show a gap in understanding of volume and will need to be addressed prior to starting the target Topic.</p>
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Remediation Guidance: Grade 8 Eureka Module 5, Topic B

Part B Focus: 5.MD.C.5b: Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

Why this is important for current grade level work:

While students will learn new volume formulas in the target Topic, these problems assess the same concepts and the same ability to apply those concepts to solve real-world and mathematical problems. Moreover, Lesson 9 still relies heavily on the volume of rectangular prisms, connecting the concept to functions. If students already have a solid understanding of volume and the ability to solve real-world and mathematical problems involving volume, they will be able to focus on the connection to functions, allowing them to think deeper about both concepts. Students who are distracted by the volume context due to a lack of understanding or skill will struggle to keep up and struggle to make the meaningful, undoubtedly helpful connections to functions. The problems here mirror those of 7.G.B.6 but are limited to rectangular prisms. If students demonstrate mastery of these problems, they should be considered ready for the new learning of the target Topic without any further assessment of 7.G.B.6.

Using the Diagnostic Assessment to identify gaps:

Problem 4:

Students should recognize that the area of the base (i.e., 6×5 or 30 square units) will not be affected by changing the length; thus, the difference is $12 \times 30 - 8 \times 30$ which is 4×30 , or 120. Look for students who simply subtract 12 minus 8, showing a misunderstanding of the question. Students who work the problem correctly but have an arithmetic mistake along the way should still be considered ready for the target Topic although they will likely need additional support while engaging with some of the problems within the target Topic.

Problem 5:

Students should recognize that the all of the information needed to calculate the volume is given (i.e., the area of the base and the height of the prism).

Problem 6:

Students should recognize that 288 square inches is double the area of the base (i.e., $12 \times 12 \times 2$), leading them to dividing 36 by 2 to get 18. If a student arrives at the correct answer via another method, he/she should be considered ready for the target Topic.

Remediation Resources for Targeted Instruction:

5th Grade, Module 5, Topic B, Lesson(s) 4 – 5, 7

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding, procedural skill and fluency, and/or application (depending on the diagnosed gap).

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Part C Focus: 7.G.B.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Why this is important for current grade level work: Not only does Lesson 9 include a few problems involving the area of a circle, Lessons 10 and 11 cannot be done without a solid understanding of the area of a circle as cones, cylinders, and spheres are have a direct connection to circles. Moreover, students should know and be equipped to handle π as it shows up in all of the formulas for circles, cones, cylinders, and spheres. The item set will teachers determine which students understand the connection between diameter and radius, as well as, which students can identify and use only the information needed to perform the necessary calculations. The items scaffold in difficulty.			Remediation Resources for Targeted Instruction: 7th Grade, Module 3, Topic C, Lesson(s) 16 – 18 Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding, procedural skill and fluency, and/or application (depending on the diagnosed gap).	
Using the Diagnostic Assessment to identify gaps:				
Problem 7: Look for students who use 14 to find the area, either not recognizing that area is calculated from the radius or not realizing the given number was the diameter. Further questioning should help determine the gap in understanding.	Problem 8: Look for students who neglect to keep π in their answer, thinking it subtracts out when calculating the difference. Students should connect subtracting terms involving pi to their work with linear expressions.	Problem 9: Similar to problem 7, look for students who use 14 to find the area, either not recognizing that area is calculated from the radius or not realizing the given number was the diameter. Further questioning should help determine the gap in understanding. Furthermore, look for students who simply quit along the way, either lacking the perseverance needed to finish or not fully understanding what the question is asking.		