Eureka Remediation Tool: Grade 7
Module 3, Topic C

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:

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.

7.G.B.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (Pyramids limited to surface area only.)

Topic Overview per the Eureka Curriculum

Topic C begins with students discovering the greatest ratio of all, pi. In Lesson 16, students use a compass to construct a circle and extend their understanding of angles and arcs from earlier grades to develop the definition of a circle through exploration. A whole-group activity follows, in which a wheel, chalk, and string are used to physically model the ratio of a circle's circumference to its diameter. Through this activity, students conceptualize pi as a number whose value is a little more than 3. The lesson continues to examine this relationship between a circle's circumference and diameter, as students understand pi to be a constant, which can be represented using approximations.

Students see the usefulness of approximations such as 22/7 and 3.14 to efficiently solve problems related to the circumference of circles and semicircles. Students continue examining circles in Lesson 17, as they discover what happens if they cut a circle of radius length r into equivalent-sized sectors and rearrange them to resemble a rectangle. Applying what they know about the area of a rectangle, students examine the dimensions to derive a formula for the area of the circle (**7.G.B.4**). They use this formula, $A = \pi r^2$, to solve problems with circles. In Lesson 18, students consider how to adapt the area and circumference formulas to examine interesting problems involving *quarter circle* and *semicircle* regions. Students analyze figures to determine composite area in Lesson 19 and 20 by composing and decomposing into familiar shapes. They use the coordinate plane as a tool to determine the length and area of figures with vertices at grid points.

This topic concludes as students apply their knowledge of plane figures to find the surface area and volume of three-dimensional figures. In Lessons 21 and 22, students use polyhedron nets to understand surface area as the sum of the area of the lateral faces and the area of the base(s) for figures composed of triangles and quadrilaterals. In Lessons 23 and 24, students recognize the volume of a right prism to be the area of the base times the height and compute volumes of right prisms involving fractional values for length (**7.G.B.6**). In the last two lessons, students solidify their understanding of two- and three-dimensional objects as they solve real-world and mathematical problems

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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.

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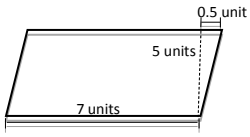
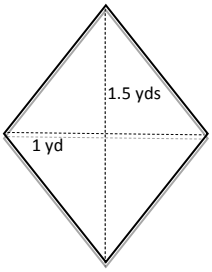
Part A: 6.G.A.1:

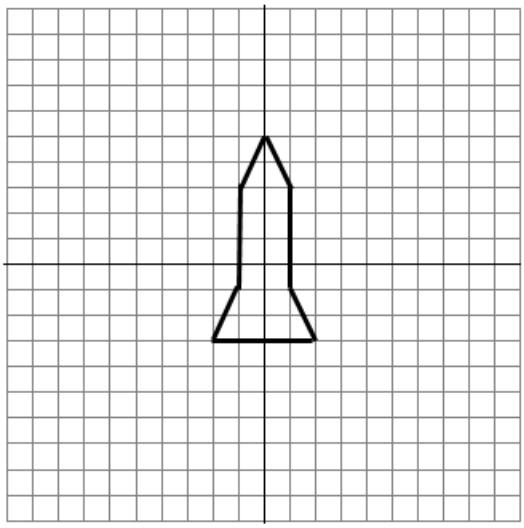
1. Find the area of the parallelogram shown.



2. Molly is buying fabric to create a kite. How much fabric will Molly need to purchase to create the kite shown below (not to scale)?



3. The space club at a local middle school is designing a patch for their club sweatshirts. The patch will be in the shape of a rocket ship as shown below. To find the cost for creating one patch, they need to find the area of the design. What is the area, in square inches, of the design? (Each square measures 1 square inch)



Part B: 6.G.A.2:

4. A shoebox has a length of 10½ inches, height of 3½ inches, and a width of 6 inches. What is the volume of the shoebox?

5. Lauryn's dad is filling her rectangular prism shaped sandbox in their back yard. The sandbox has a depth of $1\frac{1}{3}$ feet, a length of $6\frac{2}{3}$ feet, and a width of 4½ feet. How many cubic feet of sand will her dad need to fill the sandbox?

6. Jadarius is building a keepsake box for his mother for Mother's Day. His initial design was a rectangular prism with edge lengths of 12 inches, 12 inches, and 6 inches. Now, Jadarius wants to increase the front edge from 12 inches to 13 ½ inches. How much greater will the volume of the new design be when compared to the original design?

Part C: 6.G.A.3

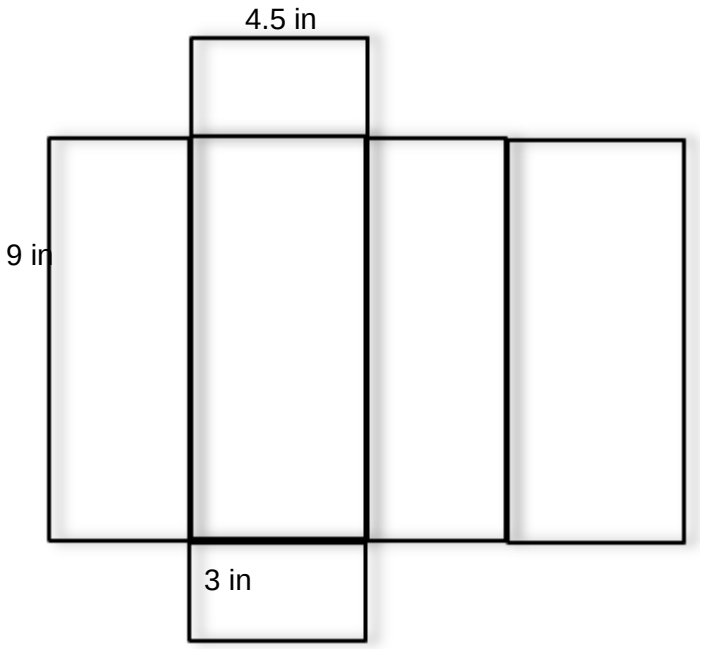
7. The following ordered pairs are vertices of a rectangle. (4, 3), (0, 3), (0, 0) Identify the missing point/vertex that would create the rectangle.

8. On a map of a local city, the library is located at point (4, -3) and the supermarket is located at (4, 6). What is the distance from the library to the supermarket?

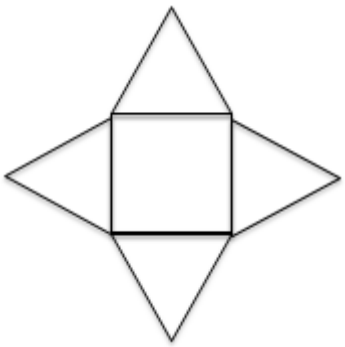
9. The base of a triangle has vertices at (-4, 0) and (1, 0). What is the length of the base of triangle?

Part D: 6.G.A.4

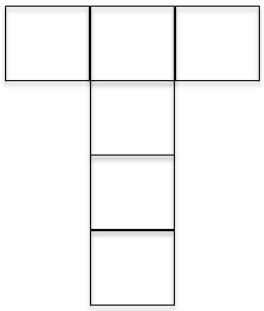
10. Karsyn is decorating a tissue box to create a Mardi Gras float for her class parade. She wants to begin the decorating process by completely covering the tissue box with yellow paper. Use the diagram to determine how much yellow paper, in square inches, Karsyn will need to cover the box.



11. Identify which three-dimensional figure can be formed using the following net.



12. Identify which three-dimensional figure can be formed using the following net.



Solutions:

1. 35 unit^2
2. 3 yards^2
3. 16 inches^2
4. 220½ inches^3
5. 40 feet^3
6. (Sample) 108 in^2
7. (4, 0)
8. 9 units
9. 5 units
10. 162
11. Triangular pyramid
12. Cube

Remediation Guidance: Grade 7
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Part A Focus: 6.G.A.1: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real- world and mathematical problems.

Why this is important for current grade level work:
Topic C requires students to extend their previous knowledge of area of rectangles and other two dimensional shapes. Using this previous knowledge, they will use this information to determine the formula for the area of a circle (7.G.B.4). In lessons 19 and 20, students will have to also determine composite area by composing and decomposing them into familiar shapes. Mastery of this previous content is imperative to students' ability to master this subsequent learning.

Using the Diagnostic Assessment to identify gaps:

Problem 1:
Students may decompose the parallelogram into two triangles (each with an area of 1.25 un^2) and a rectangle (with an area of 32.5 un^2). A student may also use the formula for area of a parallelogram (*base* x *height*). If students calculated the area as being 37.5, they may not have subtracted the 0.5 units from the length of 7 units from the base of the parallelogram when decomposing it into a rectangle.

Problem 2:
Students may decompose the kite shape into four triangles or two. Either way, students should find the area of all triangles, then find the sum. Take note of students who calculated an area of 6. These students may not have divided the area by 2, which indicates that they have not mastered calculating area of triangles.

Problem 3:
Take note of students who calculate unreasonable answers for the area. A common mistake students make is rather than counting the units for the base and height of the triangles, they try to "piece" the parts of the triangle together to create a whole unit.

Remediation Resources for Targeted Instruction:

6th Grade, Module 5, Topic A, Lesson(s) 1 – 6

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding and/or application.

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Part B Focus: 6.G.A.2: Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Why this is important for current grade level work:
Students were introduced to the concept of volume in grade 5. In sixth grade, they extended their understanding of volume from simply calculating volume to applying it in real life situations and fractional edge lengths. The final lessons in Topic C require students to solve real-world problems involving volume. Mastery of these concepts will be beneficial to students as they solidify their understanding of three dimensional objects and solve problems involving volume.

Using the Diagnostic Assessment to identify gaps:

Problem 4:
A student may use 220.5 in^3 as their answer and still be considered ready for the target Topic. Any answer equivalent to 220½ should be accepted.

Problem 5:
The fractions in the previous problem could easily be converted into decimals prior to solving. The fractions in this problem cannot. Students have to manipulate the fractions to arrive at the correct answer. A student may convert the mixed numbers into improper fractions prior to multiplying. If students get a fractional answer that is not equivalent to 40, they may have gaps with conducting operations with fractions. Any answer equivalent to 40 should be accepted.

Problem 6:
Look for students who think the volume will increase by 1 ½ inches (additive comparison), not realizing that increasing the edge length will have a multiplicative impact. Students can either state the provided sample answer, which is the difference of the two volumes, or students may say the new volume is 1.125 (or 1 1/8) times as large. Both answers should be accepted as a sign of readiness.

Remediation Resources for Targeted Instruction:

6th Grade, Module 5, Topic C, Lesson(s) 11 – 14

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding and/or application.

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Part C Focus: 6.G.A.3: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Why this is important for current grade level work: Lesson 19 pushes students to connect their understanding of area to their understanding of the coordinate plane and the content of the focus standard, 6.G.A.3. In this lesson students will be required to find side lengths of vertical and/or horizontal sides as well as represent polygons on the coordinate plane. Unlike the work from Grade 6, the target Topic does not limit the work to the first Quadrant but pushes students to use all four Quadrants. While arithmetic with integers is new to Grade 7, using the coordinate plane to calculate distance of horizontal or vertical sides does not require fluency with arithmetic on signed numbers; rather, it requires a strong conceptual understanding and the ability to count. This item set should identify which students do not have the foundational conceptual understanding needed to be successful with the new learning of the target Topic.	**Remediation Resources for Targeted Instruction:** 6th Grade, Module 5, Topic B, Lesson(s) 7 – 9 Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding.
Using the Diagnostic Assessment to identify gaps: **Problems 7 - 9** These problems list ordered pairs but do not provide a coordinate plane. In sixth grade, students were taught how to determine the distance between two points without using the coordinate plane. It is appropriate and acceptable for students to still use the coordinate plane to calculate distances, and, and such, graph paper should be made available to them for these problems.	

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Part D Focus: 6.G.A.4: Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Why this is important for current grade level work:
In the last two lessons of the topic, students solidify their understanding of two and three-dimensional objects and use that understanding to solve real-world math problems involving area, surface area, and volume. In order to apply and build on their knowledge, they must be familiar with three dimensional shapes and their nets.

Using the Diagnostic Assessment to identify gaps:

Problem 10:
Students can solve this problem using different processes. They can use the surface area formula or they can calculate the area of each rectangle (or face) of the prism, then find the sum of those areas. If students calculate the surface area and get 121.5 (or its equivalent), they may have multiplied the length, width, and height (i.e. found the volume).

Problems 11 and 12:
Students are required to recall which nets can be composed to create which three dimensional shapes. If students are unable to do this, they need to be retaught the three dimensional shapes and their characteristics. Knowledge of these shapes and characteristics is necessary for the students to be able to calculate the surface area of the shapes using the nets.

Remediation Resources for Targeted Instruction:

6th Grade, Module 5, Topic B, Lesson(s) 15 – 17

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set that focus on conceptual understanding.