

Grade 8 Mathematics Item Specification C1 TI

Task Model 1

Response Type:
Equation/Numeric;
Multiple Choice,
single correct
response

DOK Level 2

8.G.9

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

Evidence Required:

1. The student solves real-world problems by applying the formulas for the volumes of cylinders, cones, and spheres.

Tools: Calculator

Prompt Features: The student is prompted to find the volumes or dimensions of cylinders, cones, or spheres in real-world scenarios.

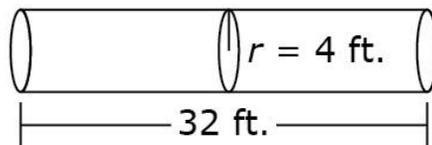
Stimulus Guidelines:

- Context should be familiar to students 13 to 15 years old.
- Use rational numbers in real-world context.
- The pi symbol should be a part of the solution for each answer choice for some items.
- Item difficulty can be adjusted via these methods:
 - Find the volume given the dimensions.
 - Find the dimensions given the volume.
 - Find the volume given the dimensions using fractions and decimals.
 - Find the dimensions given the volume using fractions and decimals.
 - No figure, write the expression from verbal text and find the volume.
 - Include extraneous measurements.

TM1

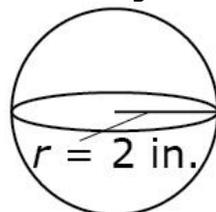
Stimulus: The student is presented with a situation that includes sufficient measurements of a cylinder, cone, or sphere.

Example Stem 1: This figure shows the dimensions of a tanker truck. The tank forms a cylinder with a length of 32 feet and radius of 4 feet.



What is the volume, in cubic feet, of the tank? Round your answer to the nearest hundredth.

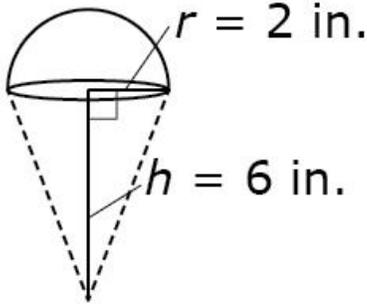
Example Stem 2: A baseball has a radius of 2 inches, as shown in the diagram.



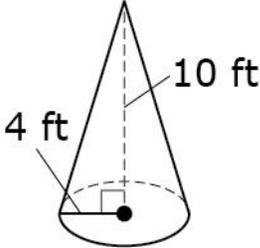
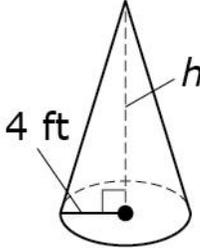
What is the volume, in cubic inches, of the baseball? Round your answer to the nearest hundredth.

Rubric: (1 point) The student gives the correct volume within a range to accommodate different acceptable values of pi (e.g., 1608.50; 33.51).

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<p>Task Model 1</p> <p>Response Type: Equation/Numeric; Multiple Choice, single correct response</p> <p>DOK Level 2</p> <p>8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>Evidence Required: 1. The student solves real-world problems by applying the formulas for the volumes of cylinders, cones, and spheres.</p> <p>Tools: Calculator</p>	<p>Response Type: Equation/Numeric</p> <p>Example Stem 3: An ice cream cone has a height of 6 inches and a radius of 2 inches as shown. The ice cream completely fills the cone, as well as the half-sphere above the cone.</p>  <p>Which is closest to the total volume, in cubic inches, of the ice cream?</p> <p>A. $\frac{16}{3}\pi$ B. 8π C. $\frac{40}{3}\pi$ D. 20π</p> <p>Answer Choice: The answer choices include the pi symbol as part of the solution. Incorrect answer choices show errors based on miscalculations such as multiplying instead of applying the exponent rule, including the height as a part of the formula for sphere.</p> <p>Rubric: (1 point) The student gives the correct solution (e.g., C).</p> <p>Response Type: Multiple Choice, single correct response</p>
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<p>Task Model 2</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>Evidence Required: 2. The student solves mathematical problems by applying the formulas for the volumes of cylinders, cones, and spheres.</p> <p>Tools: Calculator</p>	<p>Prompt Features: The student identifies the volumes or dimensions of cylinders, cones, or spheres in mathematical contexts.</p> <p>Stimulus Guidelines: Item difficulty can be adjusted via these methods:</p> <ul style="list-style-type: none"> • Find the volume directly. • Solve for missing dimensions. • Use whole numbers, fractions, and decimals. • Use verbal descriptions instead of figures. • Include extraneous information. <p>TM2 Stimulus: Student is presented with a 3-dimensional object with measurements.</p> <p>Example Stem 1: A cone with radius 4 feet and height 10 feet is shown.</p>  <p>Enter the volume of the cone, in cubic feet. Round your answer to the nearest hundredth.</p> <p>Example Stem 2: A cone with radius 4 feet is shown. Its approximate volume is 165 cubic feet.</p>  <p>Enter the height of the cone, in feet. Round your answer to the nearest hundredth.</p> <p>Rubric: (1 point) The student gives the correct value within a range to accommodate different acceptable values of pi (e.g., 167.47; 9.85).</p> <p>Response Type: Equation/Numeric</p>
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