

2026 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics

Question 27: Constructed-Response

Reporting Category: Geometry

Standard: [G-GMD.A.3](#) - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Item Description: Calculate and compare the volumes of a cylinder and a cone, and equate the volume of the cylinder to that of a prism.

Calculator: Allowed

This item can be found in the released item sets on the [MCAS Resource Center](#).

Scoring Guide

Select a score point in the table below to view the sample student response.

Score*	Description
4A 4B	The student response demonstrates an exemplary understanding of the Geometry concepts involved in using volume formulas for cylinders and cones to solve problems. The student correctly finds volumes and uses them to calculate dimensions based on a real-world situation.
3	The student response demonstrates a good understanding of the Geometry concepts involved in using volume formulas for cylinders and cones to solve problems. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Geometry concepts involved in using volume formulas for cylinders and cones to solve problems. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Geometry concepts involved in using volume formulas for cylinders and cones to solve problems.
0	The student response contains insufficient evidence of an understanding of the Geometry concepts involved in using volume formulas for cylinders and cones to solve problems. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



Part A

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = \pi r^2 h$$

$$r = 5 \text{ cm}$$

$$h = 16 \text{ cm}$$

$$V_1 = \pi(5)^2 \cdot 16$$

$$V_1 = 25\pi \cdot 16$$

$$V_1 = 1256.637 \text{ cm}^3$$

Part B

A scoop in the shape of a cone is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = \frac{1}{3} \pi r^2 h$$

$$r = 2.5 \text{ cm}$$

$$h = 4 \text{ cm}$$

$$V_2 = \frac{1}{3} \pi (2.5)^2 \cdot 4$$

$$V_2 = \frac{6.25\pi \cdot 4}{3}$$

$$V_2 = \frac{25\pi}{3}$$

$$V_2 = 8.333\pi$$

$$V_2 = 26.179 \text{ cm}^3$$

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$x = \frac{V_1}{V_2}$$

$$x = \frac{1256.637}{26.179}$$

$$x = 48.001$$

$$x \approx 48$$

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the **height**, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = Bh$$

$$V_2 \approx 2V_1$$

$$V_2 = 2(1256.637)$$

$$V_2 = 2513.274$$

$$B = 144$$

$$h = \frac{V}{B}$$

$$h = \frac{2513.274}{144}$$

$$h = 17.453 \text{ cm}$$

[Back to Scoring Guide](#)

Score Point 4B

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



Part A

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

To find the volume of a cylinder, the formula $V = \pi r^2 h$. Using this data, $V = \pi 5^2 \cdot 16$. Simplified, the volume is 400π cubic centimeters, or about 1257 cm^3 .

Part B

A scoop in the shape of a cone is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The volume of a cone can be found using the formula $V = \frac{1}{3}\pi r^2 h$. Using the given values for r and h , the volume of this cone is 8.333π cubic centimeters. $V = \frac{1}{3}\pi 2.5^2 \cdot 4 = 8.333\pi$.

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

To find how many scoops of coffee (or cups because a scoop = a cup), the volume of the cylinder is divided by the volume of the cone. $\frac{(400\pi)}{8.333\pi} = 48$. From this can, 48 cups of coffee can be made.

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the height, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The height of a prism can be found using the formula $\frac{V}{B} = h$. Using the given values for B , and knowing that $V = 800\pi$, h can be determined. $\frac{(800\pi)}{144} = 5.555\pi \text{ cm}$.

Score Point 3

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



Part A

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = \pi(5)^2(16)$$

$$V = \pi \cdot 25 \cdot 16$$

$$V = 1256.64 \text{ cm}^3$$

Part B

A scoop in the shape of a cone is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = \frac{1}{3}\pi \cdot 2.5^2 \cdot 4$$

$$V = \frac{1}{3}\pi \cdot 6.25 \cdot 4$$

$$V = 26.18 \text{ cm}^3$$

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\frac{1256.64}{26.18} = 48 \text{ cups}$$

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the height, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$h = 4$$

$$628 = 144 \cdot h$$

Score Point 2

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



Part A

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

the volume would equal 1256 i did $v = 3.14 (5)^2 16$ which got me that answer

Part B

A scoop in the shape of a **cone** is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

for my answer i got 26.2 i did $v = \frac{1}{3}$ time $3.14 (2.5)^2 4$ which have me the answer

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

i would say about 281 and simplified about 16.7 i did 5 to the second and 16 to the second then i got 281 and i square rooted it to get my answer

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the **height**, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

i did 144 times 10 cause it is twice the base length which got me the answer of 1440

Score Point 1

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.

**Part A**

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\pi 5^2 \cdot 16$$

$$1256.64$$

Part B

A scoop in the shape of a **cone** is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\frac{1}{3} \text{ radius} \cdot 2.5 \times 4$$

$$10.47\text{v}$$

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

3 cups of coffee

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the **height**, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

12 centimeters

Score Point 0

This question has four parts.

A can completely filled with ground coffee is in the shape of a circular cylinder. The can of ground coffee and some of its dimensions are shown in this diagram.



Part A

Based on the diagram, what is the volume, in cubic centimeters, of the can of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$16\text{cm} \times 2 = 22 = 32$$

$$5\text{ cm} \times 2 = 10 = 32$$

Part B

A scoop in the shape of a cone is used to remove the ground coffee from the can and place it into a coffee maker.

- The radius of the scoop is 2.5 cm.
- The height of the scoop is 4 cm.

What is the volume, in cubic centimeters, of the scoop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\text{The equation for this statement would be. } V = 3.14(2.5)^2 (4)$$

$$2.5^2 = 6.25$$

$$4 \times 6.25 = 25$$

$$3.14 \times 25 = 78.5$$

Part C

One full scoop of ground coffee is needed to make one cup of coffee. What is the total number of cups of coffee that can be made from the ground coffee in the can? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\text{So we need to multiply } 78.5 \times 32 = 2,512. \text{ cups of coffee.}$$

Part D

The ground coffee is also available in a package that is in the shape of a prism.

- The volume of the package is approximately twice the volume of the can.
- The area of the base of the package is 144 square centimeters.

What is the **height**, in centimeters, of the package of ground coffee? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$V = bh$$

The volume is 157, and the base is 144. So to be able to find the height we divide, both numbers.

$$\frac{157}{144} = 1.09 \text{ would be the height.}$$