G.GMD.A.3: Volume 5
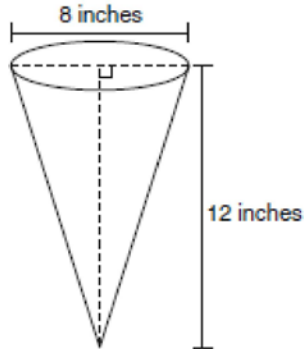
1 In the diagram below, a right circular cone has a diameter of 8 inches and a height of 12 inches.

8 inches

12 inches

What is the volume of the cone to the *nearest cubic inch*?
1) 201
2) 481
3) 603
4) 804

2 What is the volume of a right circular cone that has a height of 7.2 centimeters and a radius of 2.5 centimeters, to the *nearest tenth of a cubic centimeter*?
1) 37.7
2) 47.1
3) 113.1
4) 141.4

3 In the diagram below, a cone has a diameter of 16 inches and a slant height of 17 inches.

16 in

17 in
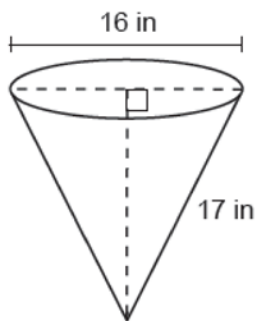
What is the volume of the cone, in cubic inches?
1) 320π
2) 363π
3) 960π
4) 1280π

4 As shown in the diagram below, the radius of a cone is 2.5 cm and its slant height is 6.5 cm.

6.5

2.5
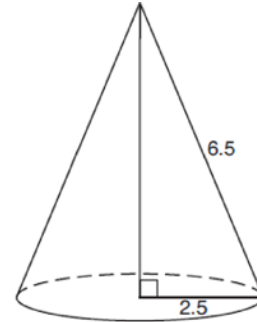
How many cubic centimeters are in the volume of the cone?
1) 12.5π
2) 13.5π
3) 30.0π
4) 37.5π

5 The funnel shown below can be used to decorate cookies with melted chocolate. The funnel can be modeled by a cone whose radius is 6 cm and height is 13 cm.

6 cm

13 cm
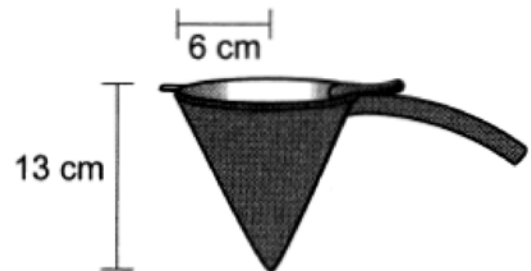
The baker uses 2 cubic centimeters of chocolate to decorate each cookie. When the funnel is completely filled, what is the maximum number of cookies that can be decorated with the melted chocolate?
1) 78
2) 245
3) 490
4) 735

6   A right circular cone has a diameter of $10\sqrt{2}$ and a
    height of 12. What is the volume of the cone in
    terms of π?
    1) 200π
    2) 600π
    3) 800π
    4) 2400π

7   A water cup in the shape of a cone has a height of 4
    inches and a maximum diameter of 3 inches. What
    is the volume of the water in the cup, to the *nearest
    tenth of a cubic inch*, when the cup is filled to half
    its height?
    1)   1.2
    2)   3.5
    3)   4.7
    4)   14.1

8   The area of the base of a cone is 9π square inches.
    The volume of the cone is 36π cubic inches. What
    is the height of the cone in inches?
    1)   12
    2)   8
    3)   3
    4)   4

9   A cone has a volume of 108π and a base diameter
    of 12. What is the height of the cone?
    1)   27
    2)   9
    3)   3
    4)   4

10   An ice cream waffle cone can be modeled by a
    right circular cone with a base diameter of 6.6
    centimeters and a volume of 54.45π cubic
    centimeters. What is the number of centimeters in
    the height of the waffle cone?
    1) $3\frac{3}{4}$
    2)   5
    3)   15
    4) $24\frac{3}{4}$

11   Jaden is comparing two cones. The radius of the
    base of cone *A* is twice as large as the radius of the
    base of cone *B*. The height of cone *B* is twice the
    height of cone *A*. The volume of cone *A* is
    1)   twice the volume of cone *B*
    2)   four times the volume of cone *B*
    3)   equal to the volume of cone *B*
    4)   equal to half the volume of cone *B*

12   In the diagram below, a right circular cone has a
    diameter of 10 and a slant height of 13.

    Determine and state the volume of the cone, in
   terms of π.

13   A candle maker uses a mold to make candles like
    the one shown below.
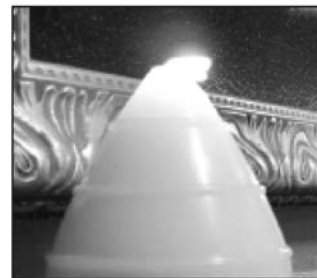
    The height of the candle is 13 cm and the
    circumference of the candle at its widest measure is
    31.416 cm. Use modeling to approximate how
    much wax, to the *nearest cubic centimeter*, is
   needed to make this candle. Justify your answer.

14   A paper container in the shape of a right circular
    cone has a radius of 3 inches and a height of 8
    inches. Determine and state the number of cubic
    inches in the volume of the cone, in terms of π.

Name: _____

15 In the diagram below, a right circular cone with a radius of 3 inches has a slant height of 5 inches, and a right cylinder with a radius of 4 inches has a height of 6 inches.
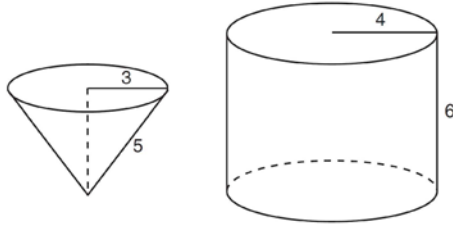

Determine and state the number of full cones of water needed to completely fill the cylinder with water.

16 Sally and Mary both get ice cream from an ice cream truck. Sally's ice cream is served as a cylinder with a diameter of 4 cm and a total height of 8 cm. Mary's ice cream is served as a cone with a diameter of 7 cm and a total height of 12.5 cm. Assume that ice cream fills Sally's cylinder and Mary's cone.
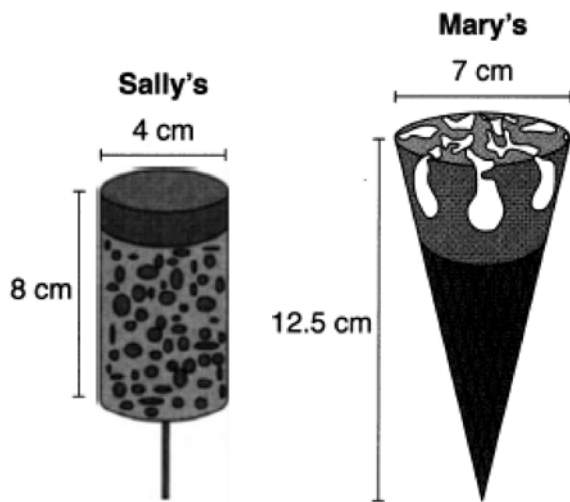
Who was served more ice cream, Sally or Mary? Justify your answer. Determine and state how much more is served in the larger ice cream than the smaller ice cream, to the *nearest cubic centimeter*.

17 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.
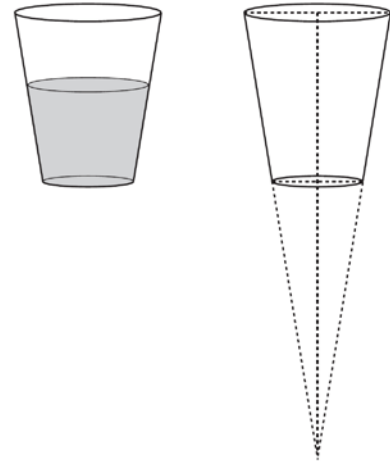
The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the *nearest tenth of a cubic inch*, the volume of the water glass.

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Answer Section

1 ANS: 1

$$V = \frac{1}{3}\,\pi r^2 h = \frac{1}{3}\,\pi \cdot 4^2 \cdot 12 \approx 201$$

REF: 060921ge

2 ANS: 2

$$V = \frac{1}{3}\,\pi \cdot (2.5)^2 \cdot 7.2 \cong 47.1$$

REF: 062303geo

3 ANS: 1

$r = 8$, forming an 8-15-17 triple. $V = \frac{1}{3}\,\pi(8)^2\,15 = 320\pi$

REF: 082318geo

4 ANS: 1

$$h = \sqrt{6.5^2 - 2.5^2} = 6,\ V = \frac{1}{3}\,\pi(2.5)^2 6 = 12.5\pi$$

REF: 011923geo

5 ANS: 2

$$\frac{\frac{1}{3}\,\pi(6)^2\,13}{2} \approx 245$$

REF: 062408geo

6 ANS: 1

$$V = \frac{1}{3}\,\pi \cdot \left(5\sqrt{2}\right)^2 \cdot 12 = 200\pi$$

REF: 011623ge

7 ANS: 1

$$V = \frac{1}{3}\,\pi\left(\frac{1.5}{2}\right)^2\left(\frac{4}{2}\right) \approx 1.2$$

REF: 011724geo

8   ANS: 1

$$36\pi = \frac{9\pi h}{3}$$

$$108 = 9h$$

$$12 = h$$

REF: 082411geo

9   ANS: 2

$$108\pi = \frac{6^2 \pi h}{3}$$

$$\frac{324\pi}{36\pi} = h$$

$$9 = h$$

REF: 012002geo

10   ANS: 3

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

$$54.45\pi = \frac{1}{3}\pi(3.3)^2 h$$

$$h = 15$$

REF: 011807geo

11   ANS: 1

$$\frac{\frac{1}{3}\pi(2)^2\left(\frac{1}{2}\right)}{\frac{1}{3}\pi(1)^2(1)} = 2$$

REF: 012010geo

12   ANS:

If $d = 10$, $r = 5$ and $h = 12$ $V = \frac{1}{3}\pi(5^2)(12) = 100\pi$

REF: 062227geo

13   ANS:

$$C = 2\pi r \quad V = \frac{1}{3}\pi \cdot 5^2 \cdot 13 \approx 340$$

$$31.416 = 2\pi r$$

$$5 \approx r$$

REF: 011734geo

14 ANS:

$$V = \frac{1}{3} \pi (3^2)(8) = 24\pi$$

REF: 081530ge

15 ANS:

$$h = \sqrt{5^2 - 3^2} = 4 \quad V = \frac{1}{3} \pi \cdot 3^2 \cdot 4 = 12\pi \quad V = \pi \cdot 4^2 \cdot 6 = 96\pi \quad \frac{96\pi}{12\pi} = 8$$

REF: 011537ge

16 ANS:

Mary. Sally: $V = \pi \cdot 2^2 \cdot 8 \approx 100.5$ Mary: $V = \frac{1}{3} \pi \cdot 3.5^2 \cdot 12.5 \approx 160.4$ $160.4 - 100.5 \approx 60$

REF: 012332geo

17 ANS:

Similar triangles are required to model and solve a proportion. $\dfrac{x+5}{1.5} = \dfrac{x}{1}$ $\quad \frac{1}{3} \pi (1.5)^2 (15) - \frac{1}{3} \pi (1)^2 (10) \approx 24.9$

$$x + 5 = 1.5x$$

$$5 = .5x$$

$$10 = x$$

$$10 + 5 = 15$$

REF: 061636geo

3