

1 The Classic Scoop

A local ice cream shop, "Pi in the Sky," serves perfectly spherical scoops of vanilla ice cream. Each scoop has a radius of 3 cm.

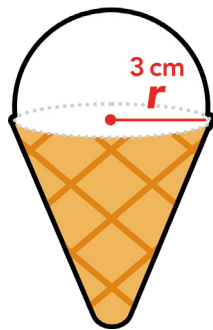
The Challenge:

If the scoop sits perfectly in the cone such that half of the spherical scoop sits inside the cone, how much chocolate shell coating is needed to cover the exposed scoop?

Hint:

Use the formula for the surface area of a sphere and remember that only half of the scoop will be covered:

$$A = 4\pi r^2$$



2 The Melting Point

You have a cylindrical pint of "Peanut Butter Pi" ice cream. The container has a diameter of 10 cm and a height of 12 cm. You want to know if the ice cream will fit into your favorite bowl, which can hold 800 mL (or, 800 cm³) of liquid.

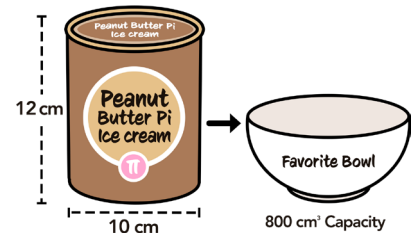
The Challenge:

Find the volume of the cylindrical pint. Will the ice cream overflow the bowl if it melts?

Hint:

Use the formula for the volume of a cylinder:

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



3 The Waffle Cone Conundrum

An artisan waffle cone is shaped like a perfect right circular cone. The cone has a slant height of 15 cm and a radius of 5 cm. The shop owner wants to dip only the exterior lateral surface of the cone (not the circular opening) into sprinkles.

The Challenge:

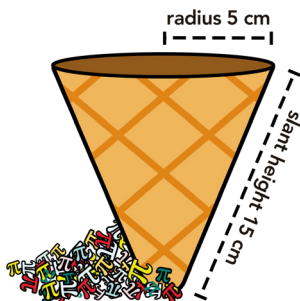
Calculate the lateral surface area of the cone to determine the "sprinkle zone." Then, if a single sprinkle covers approximately 0.5 cm², about how many sprinkles will you need?

Hint:

Use the lateral surface area formula:

$$A = \pi r s$$

(where s is the slant height).



4 The "Brain Freeze" Special

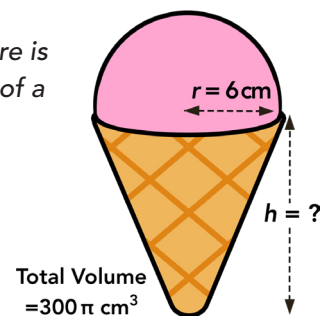
A giant promotional ice cream cone consists of a hemisphere (half-sphere) of strawberry ice cream sitting perfectly on top of a conical waffle base. Both the hemisphere and the cone share the same radius (r).

The Challenge:

The shop manager tells you that the total volume of the entire treat is exactly 300π cm³. If the radius of the scoop is 6 cm, what is the height (h) of the cone section?

Hint:

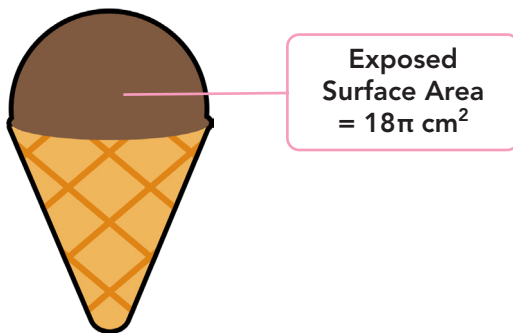
The volume of a hemisphere is $V = \frac{2}{3}\pi r^3$, and the volume of a cone is $V = \frac{1}{3}\pi r^2 h$.



1 The Classic Scoop

Answer

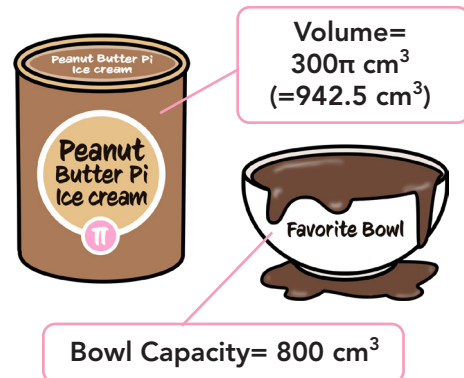
Half of the surface area of the spherical scoop is $18\pi \text{ cm}^2$ which is the amount of chocolate shell coating needed to cover the exposed scoop.



2 The Melting Point

Answer

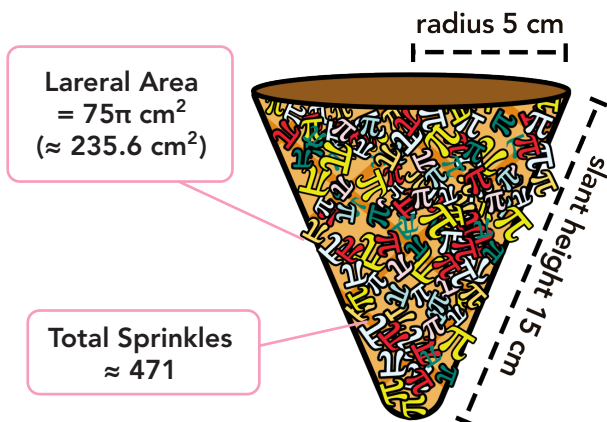
Since the volume of the cylindrical pint is about 942.5 mL (or, 942.5 cm^3), the melted ice cream will overflow the bowl.



3 The Waffle Cone Conundrum

Answer

Since the area of the exterior lateral surface of the cone is about 235.6 cm^2 , we need about 471 sprinkles to cover it.



4 The "Brain Freeze" Special

Answer

Adding the volume of the hemisphere and the volume of the cone (where $r = 6 \text{ cm}$ and $V = 300\pi \text{ cm}^3$), and then solving for h , we get $h = 13 \text{ cm}$.

