

Area, Surface Area, and Volume: math practice, Grade 10 – download the PDF

23 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Area of a triangle

★ ★ ★

A triangular sail has a base of 12 cm and a height of 7 cm on a scale drawing. Find its area.

2 A trapezoid garden

★ ★ ★

A garden bed is a trapezoid with parallel sides 9 m and 15 m, and the distance between them is 6 m. What is its area?

3 A shoebox

★ ★ ★

A shoebox measures 12 in by 7 in by 5 in. Find its volume and its total surface area.

4 A soup can

★ ★ ★

A soup can has radius 4 cm and height 10 cm. What volume of soup can it hold? Give an exact value and a value rounded to the nearest hundredth.

5**A party hat**

A cone-shaped party hat has base radius 9 cm and height 12 cm. Find the slant height, the volume, and the lateral area (rounded to the nearest hundredth).

6**A globe**

A desk globe has radius 5 in. Find its volume and surface area, in terms of π and rounded to the nearest hundredth.

7**Name the cross section**

Name the shape of each cross section.

- A plane parallel to the bases of a cylinder.
- A plane through the axis of a cylinder, perpendicular to its bases.
- A plane through the apex of a cone and the center of its base.
- A plane parallel to the base of a square pyramid.

8**Doubling the radius**

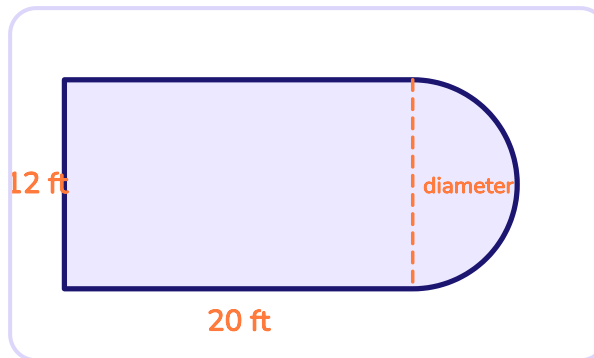
True or false: if you double the radius of a sphere, its volume doubles. Justify with a calculation using $r = 2$ and $r = 4$, and say what happens to the surface area.

9

A patio with a curved end

★★★

A patio is a 20 ft by 12 ft rectangle with a semicircle attached to one 12 ft side, as shown.



Find the total area, to the nearest hundredth.

10

A hexagonal tile

★★★

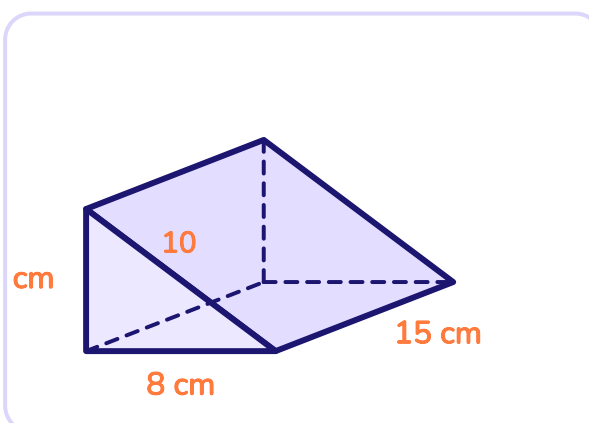
A regular hexagon has side length 6 cm. Its apothem is $3\sqrt{3}$ cm. Find its area, exact and rounded to the nearest hundredth.

11

A tent shaped like a prism

★★★

A camping tent is a triangular prism. The triangular end is a right triangle with legs 6 cm and 8 cm and hypotenuse 10 cm (this is a scale model), and the length is 15 cm.



Find the volume and the total surface area.

12 A glass pyramid

A museum entrance is a square pyramid with base side 10 m and height 12 m. Find its volume, its slant height, and its total surface area (all faces and the floor).

13 An ice cream cone

An empty waffle cone has base radius 6 cm and slant height 10 cm. Find its height, its volume, and the area of its lateral surface (nearest hundredth).

14 Slicing a cone

A cone has height 20 cm and base radius 8 cm. A plane parallel to the base cuts the cone 12 cm below the apex. Find the area of the cross section, to the nearest hundredth.

15 Slicing a sphere

A sphere has radius 13 cm. A plane cuts it at a distance of 5 cm from the center. Find the radius and the area of the circular section.

16 A water tank

A cylindrical tank has diameter 6 ft and is filled 5 ft deep. Using $1 \text{ ft}^3 \approx 7.48$ gallons, how many gallons does it hold, to the nearest gallon?

17 A steel rod

A solid steel cylinder has radius 2 cm and height 10 cm. Steel has density 7.85 g/cm^3 . Find its mass to the nearest tenth of a gram.

18 A hollow pipe

★★★

A pipe 20 in long has outer radius 5 in and inner radius 4 in. How much material is in the pipe wall? Give the exact value and a decimal rounded to the nearest hundredth.

19 A stack of coins

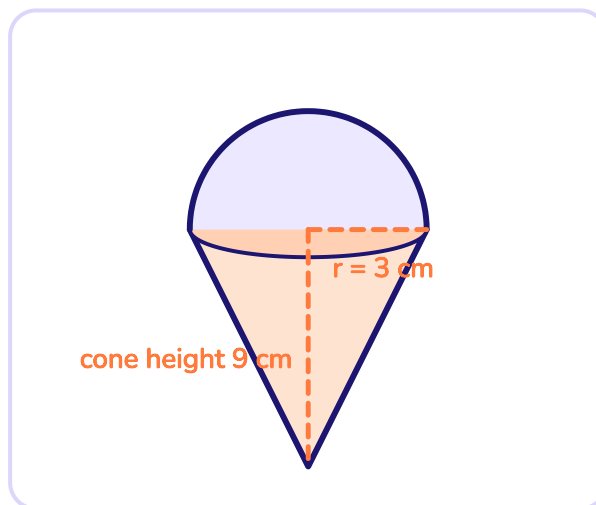
★★★

A straight stack of 40 coins, each 0.2 cm thick with radius 1.2 cm, is pushed into a leaning stack of the same height. Use Cavalieri's principle to find the volume of the leaning stack, to the nearest hundredth.

20 An ice cream treat

★★★

A scoop of ice cream is a hemisphere of radius 3 cm resting on a cone of radius 3 cm and height 9 cm, as shown. Find the total volume that the cone and the scoop contain, to the nearest hundredth.

**21 Scaling similar cones**

★★★

Two similar cones have heights in the ratio 2 : 3. The smaller cone has volume 40 cm^3 and surface area 50 cm^2 . Find the volume and surface area of the larger cone.

22

A grain silo

★★★

A silo is a cylinder of radius 6 ft and height 20 ft topped by a hemisphere of the same radius. It is filled to 80% of its total volume with wheat of density 48 lb/ft³. Find the mass of the wheat to the nearest 10 pounds.

23

Designing a can

★★★

A beverage can must hold 355 cm³ and is 12 cm tall. Find its radius to the nearest hundredth of a centimeter.

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