



Helping With Math

Solving Volume of Solid Figures

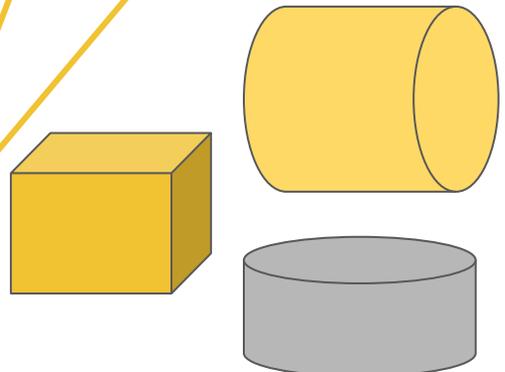
GRADE 5



Volume refers to the capacity (amount) of a space occupies with a 3 dimensional objects.



Hi! I am Captain Jim!
Welcome to HWM Airlines!
Today, we will learn about
solving the volume of solid
figures. Come and join us!



Solving Volume of Solid Figures

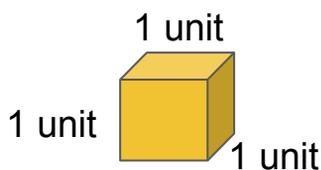


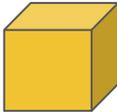
DEFINITION OF VOLUME

VOLUME



Volume is measured in "cubic" units. The volume of a figure is equal to the number of cubes required to fill it completely, like blocks in a box.

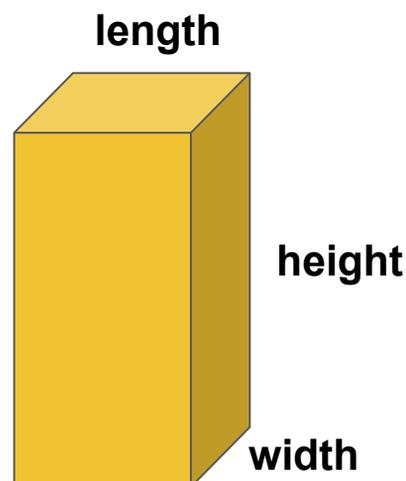
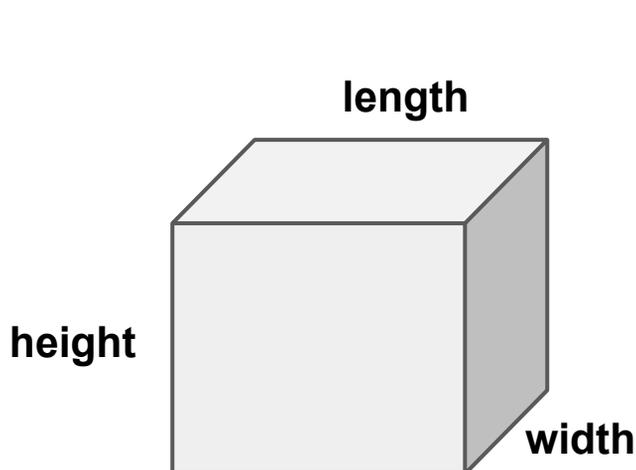


How many of this  can fit in a cube whose dimensions are 12 ft, 10 ft, and 5 ft?

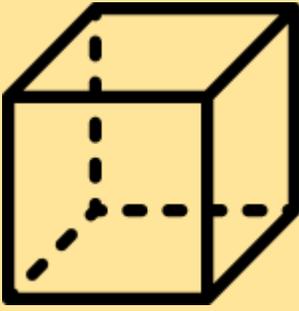
SOLID FIGURES



Solid figures are three-dimensional figures that have length, width and height.



SOLID FIGURES



Cube

A solid object bounded by six square faces, facets or sides, with three meeting at each vertex.

$$V = s^3$$

where s is equal to the measurement of a side of the cube.



Rectangular Prism

It is a polyhedron with exactly two rectangular faces/bases that are congruent and parallel. Other faces are called lateral faces.

$$V = LWH$$

where L = length, W = width, and H = height.



Pyramid

It is a polyhedron in which one face, can be any polygon. The other faces are triangular sides that meet at a common vertex.

$$V = \frac{1}{3} BH$$

Where B = area of the base and H = height



SOLID FIGURES



Cone

It is a solid figure that has a circular base connected to a vertex.

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

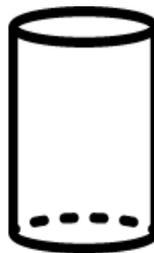
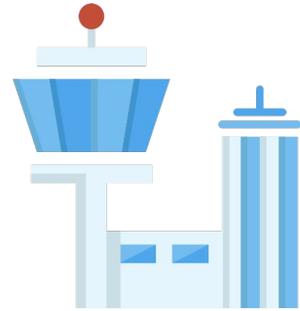
where r = length of the radius and h = height.



Sphere

$$V = \frac{4}{3}(\pi r^3)$$

It is a figure with a curved surface in which all points on the surface are equidistant from the center.



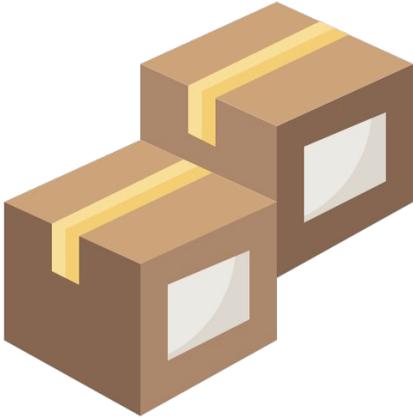
$$V = \pi r^2 h$$

Cylinder

It is a solid figure that has two congruent or equal circular bases that are parallel.

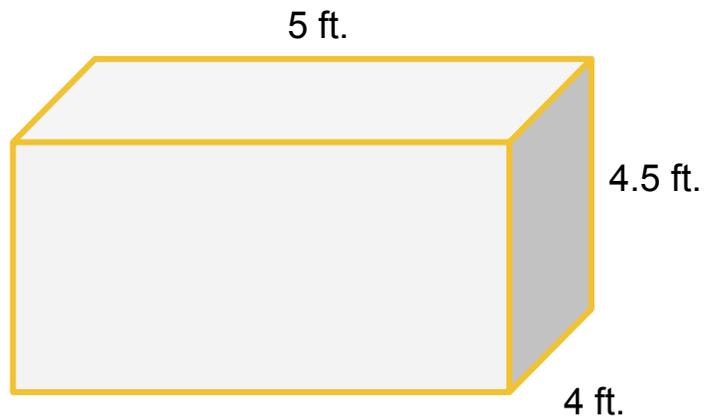
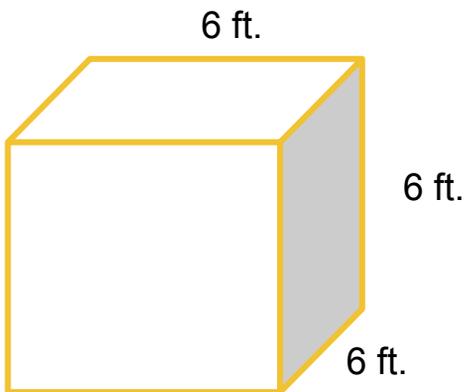


ILLUSTRATIVE EXAMPLES



Two cargo boxes arrived at the HWM airport. One cargo is a cube-shaped box with a side that measures 6 ft. The other one is shaped like a rectangular prism with the following dimensions, 4 ft, 5 ft, 4.5 ft.

A. Sketch the two cargo boxes with their corresponding dimensions.



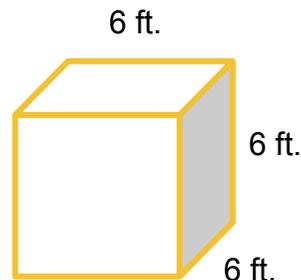
B. Solve for the volume of the two cargo boxes.

The first cargo is a cube so the formula to be used is $V = s \times s \times s$ or s^3

Since $s = 6$ ft,

$$V = 6 \text{ ft} \times 6 \text{ ft} \times 6 \text{ ft} = 216 \text{ ft}^3$$

The volume of the cargo is 216 ft^3 .



ILLUSTRATIVE EXAMPLES

B. Solve for the volume of the two cargo boxes.

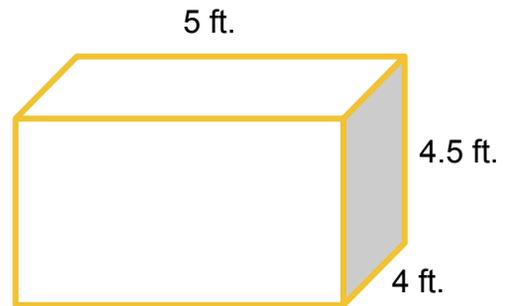
The second cargo is a rectangular prism so the formula to be used is

$$V = L \times W \times H.$$

Since $L = 5$ ft, $W = 4$ ft, $H = 4.5$ ft

$$V = 5 \text{ ft} \times 4 \text{ ft} \times 4.5 \text{ ft} = 90 \text{ ft}^3$$

The volume of the cargo is **90 ft³**.

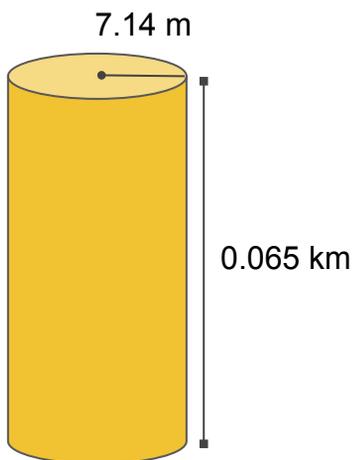


Another example:



The airport's lighthouse lower base is cylindrical in shape. Its radius measures 7.14 m and its height is 0.065 km. Compute how many metric feet the cylindrical lighthouse can handle.

Let $r = 7.14$ m and $h = 0.065$ km or 65 m, $\pi = 3.14$



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

$$V = (3.14)(7.14 \text{ m})^2 (65 \text{ m})$$

$$V = 10,404.94 \text{ m}^3$$

The volume of the cylindrical lower base of the lighthouse is **10,404.94 m³**

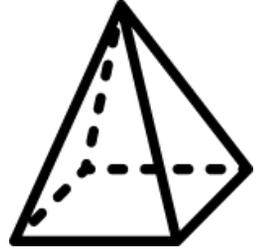


PRACTICE EXERCISES

Solve for the volume of the following solid figures.



The area of the base is 30 sq cm and the height is 25 cm.



The radius of the sphere is 11.25 ft.

The radius is 17 in and the height is 45 in.



TABLE OF ACTIVITIES

1. Welcome to HWM Airport
2. Airline Security Guard
3. Ready for Take-Off
4. Cabin Crew
5. The Monitoring Tower
6. Be Careful with the Scanner
7. The Hardworking Flight Attendants
8. Pilot's Cabin
9. Safe Landing
10. Departure Area



WELCOME TO THE HWM AIRPORT

Welcome to the top-rated airport in the world! Experience its one of a kind services by naming which solid figure is being described on each given.

1. A solid object bounded by six square faces, facets or sides, with three meeting at each vertex.

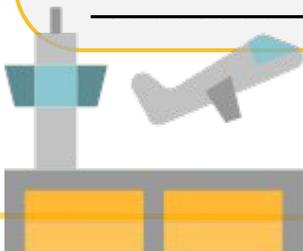
2. It is a figure, its face can be any polygon. The other faces are triangular sides that meet at a common vertex.

3. It is a solid figure that has two congruent or equal circular bases that are parallel.

4. It is a polyhedron with exactly two rectangular faces/bases that are congruent and parallel. Other faces are called lateral faces.

5. It is a figure with a curved surface in which all points on the surface are equidistant from the center.

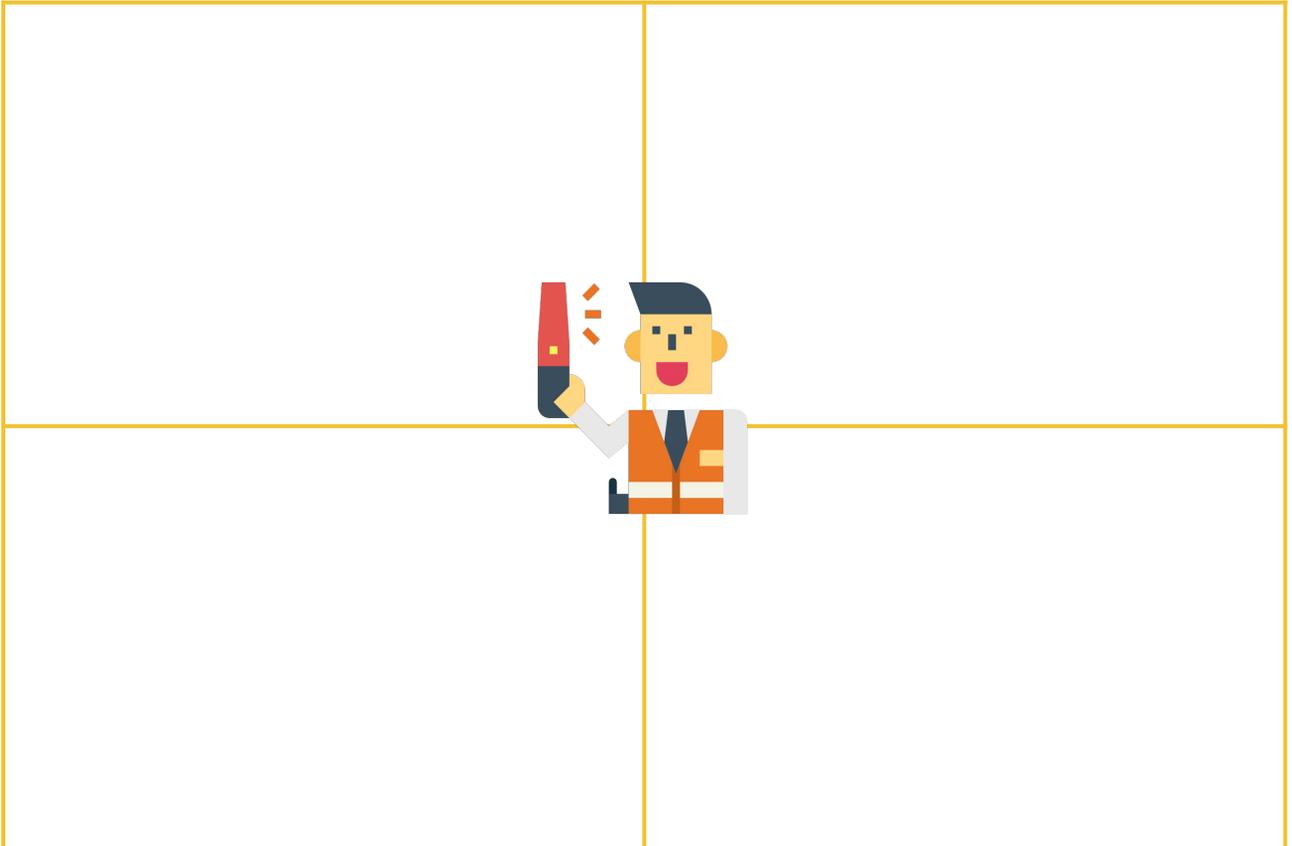
6. It is a solid figure that has a circular base connected to a vertex.



AIRLINE SECURITY GUARD

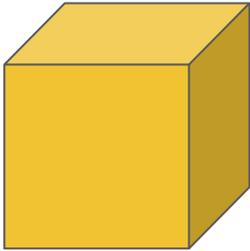
Complete this mandatory inspection of the airline security guard by constructing the different solid figures with their corresponding dimensions.

Solid Figures	Dimensions
1. Rectangular Prism	$L = 35 \text{ in}$ $W = 12 \text{ in}$ $H = 19.5 \text{ in}$
2. Cone	$r = 2.76 \text{ m}$ $h = 5.19 \text{ m}$
3. Pyramid	Base is a square = 16 sq. m $h = 20 \text{ m}$
4. Cylinder	$r = 14 \text{ ft}$ $h = 55 \text{ ft}$



READY FOR TAKE-OFF

Let's get ready for take-off by solving for the volume of cube.



1. What is the volume of the cube if its side measures 7 ft.

2. The area of one face of the cube is 12.25 sq m. Compute for its volume.

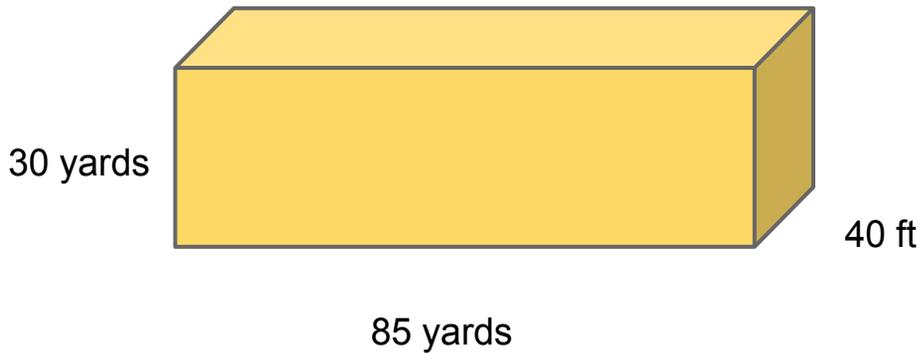


3. If the volume of a cube is 512 cubic ft, what is the equivalent of its side in inches? What is the perimeter of each face?



CABIN CREW

Meet the cabin crew of HWM Airlines! Help them complete their task by finding the volume of rectangular prism.



1. What is the volume of the solid figure above? Express your answer in yards.



2. If the volume of the rectangular prism is 980 cubic feet, what should be its height of the length and the width is 12 and 28 feet, respectively?



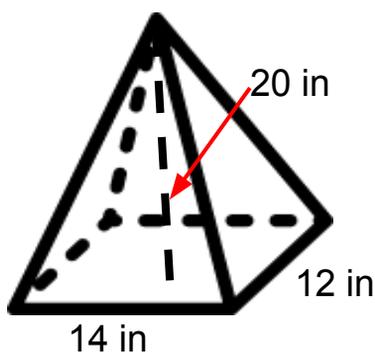
THE MONITORING TOWER

The monitoring tower is always on task! Work with them to compute for the volume of these pyramids.



1. A triangular pyramid has a base with a perimeter of 30 inches and an area of 43.3 sq. in. If its height is 15 inches, what is its volume?

2. Sketch a pyramid whose base is a square. The area of the base is 49 sq. ft and its height is 55 ft. Then compute for its volume.



3. The base of the pyramid is a rectangle. Compute for its volume.



BE CAREFUL WITH THE SCANNER

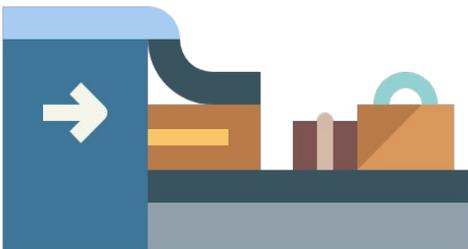
Be careful with the scanner in checking your belongings! Look for the volume of the following cones to avoid flight inconvenience.



1. The diameter of this cone is 18 ft. Its height is 45 ft. What is its volume?

2. The height of a cone-like figure is 18 inches. The volume of the figure is 301.44 cu. in. What is the measurement of its radius?

3. Compare the volume of a cone if the radius has doubled in length.



THE HARDWORKING FLIGHT ATTENDANTS

Say hello to these hardworking flight attendants by solving the volume of sphere.

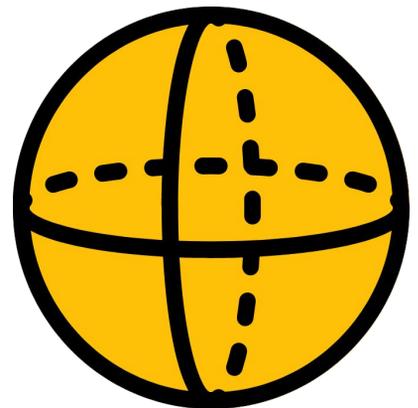
1. The radius of the given sphere is 7 in. Compute for its volume.



2. What is the radius of a sphere whose volume is 7,234.56 cubic cm?

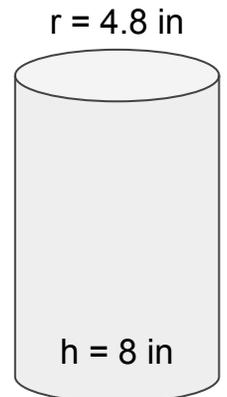
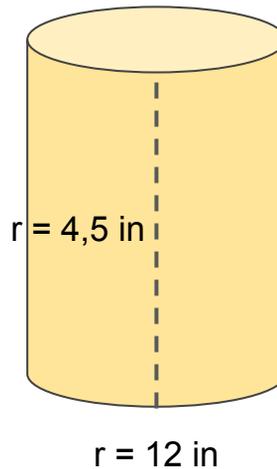
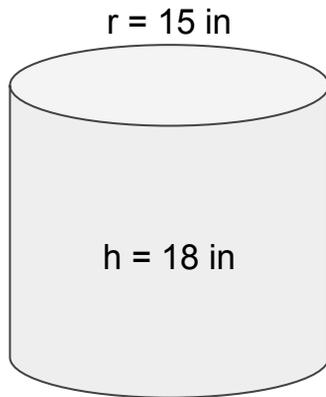
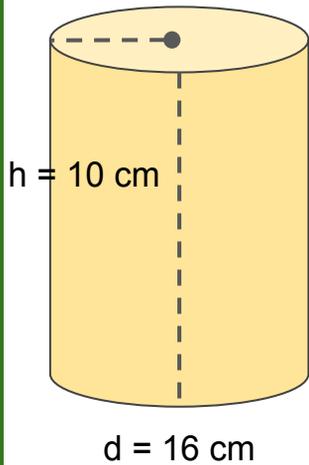


3. The diameter of the given sphere is 5 cm. Compute for its volume.



PILOT'S CABIN

The pilot's cabin is in need of your understanding in solving the volume of these cylinders. Help them out!



1.

2.



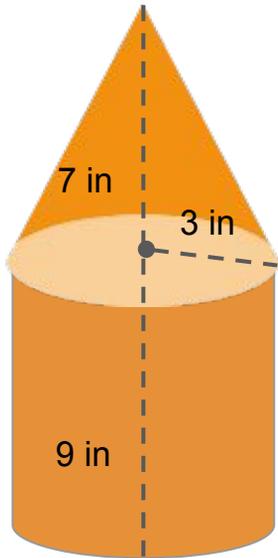
3.

4.



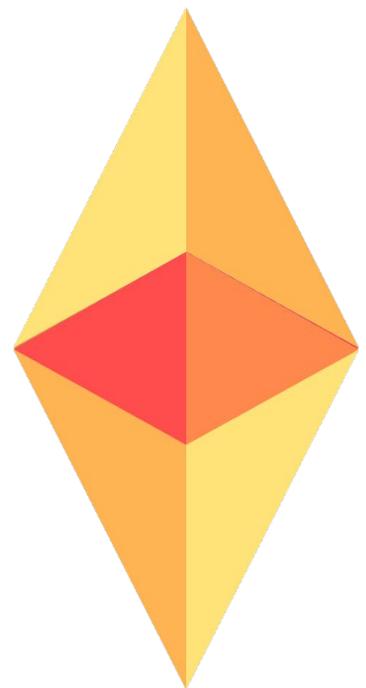
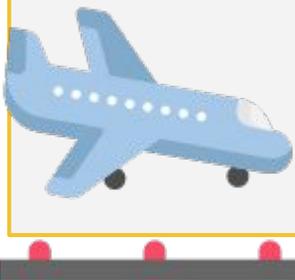
SAFE LANDING

Make sure to land safely by answering these volume-related problems.



1. What two solid figures this given image composed of? _____
2. Compute for the total volume of the figure.

2. Two congruent cones are combined together base-to-base. The height of the newly-formed figure is 25 m. Its base is a square whose side measures 3.5 m. Find the total volume.



DEPARTURE AREA

The departure area is ready for some word problems about volume. Make sure to answer them all!

1. A rectangular pyramid is enclosed in a box. The space around the box is filled with styrofoam. The rectangular base of the pyramid has a dimension of 12×16 sq. cm and its height is 23 cm. The rectangular box is $10 \times 15 \times 18$ cu. cm. Compute for the volume of the space occupied by the styrofoam.

2. Look for a small empty box, medium-sized box, and a large-sized box at your house. Get their dimensions and compare their volume.

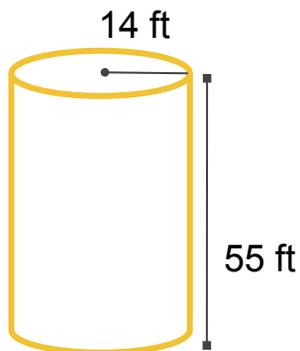
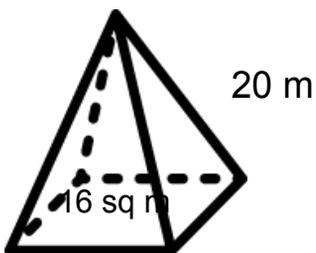
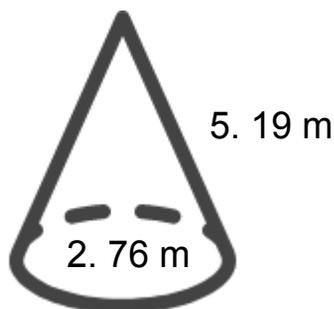
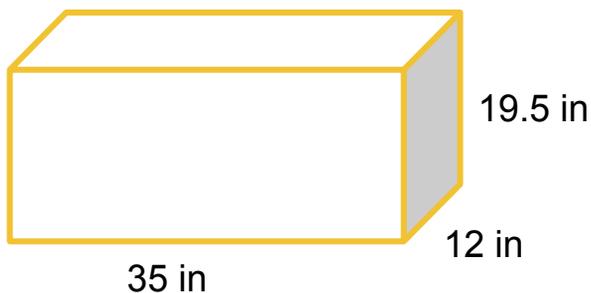


ANSWER GUIDE

Activity 1

- | | | |
|----------|------------|-------------|
| 1. Cube | 2. Pyramid | 3. Cylinder |
| 4. Prism | 5. Sphere | 6. Cone |

Activity 2



Activity 3

- | | | |
|---------------|-----------------|------------------|
| 1. 343 cu. ft | 2. 42.875 cu. m | 3. 96 in, 384 in |
|---------------|-----------------|------------------|

Activity 4

- | | |
|----------------------|------------|
| 1. 33, 991 cu. yards | 2. 2.92 ft |
|----------------------|------------|



ANSWER GUIDE

Activity 5

1. 216.5 cu. in 2. 898.33 cu. ft 3. 1120 cu. in

Activity 6

1. 3815 cu. ft 2. $r = 4$ in 3. The volume is four times bigger when the radius is doubled.

Activity 7

1. 1,436.03 cu.in 2. 12 cm 3. 523.3 cu. cm

Activity 8

1. 2009.6 cu. cm 2. 3179.25 cu. in
3. 763.02 cu. in 4. 578.76 cubic inches

Activity 9

1. $65.94 + 254.34 = 320.28$ cubic inches
2. $102.08 \times 2 = 204.16$ cu. m

Activity 10

1. V of pyramid = 1472 cu cm V of box = 2700 cu cm
 V of the styro = $2700 - 1472 = 1228$ cu cm
2. Answers may vary



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