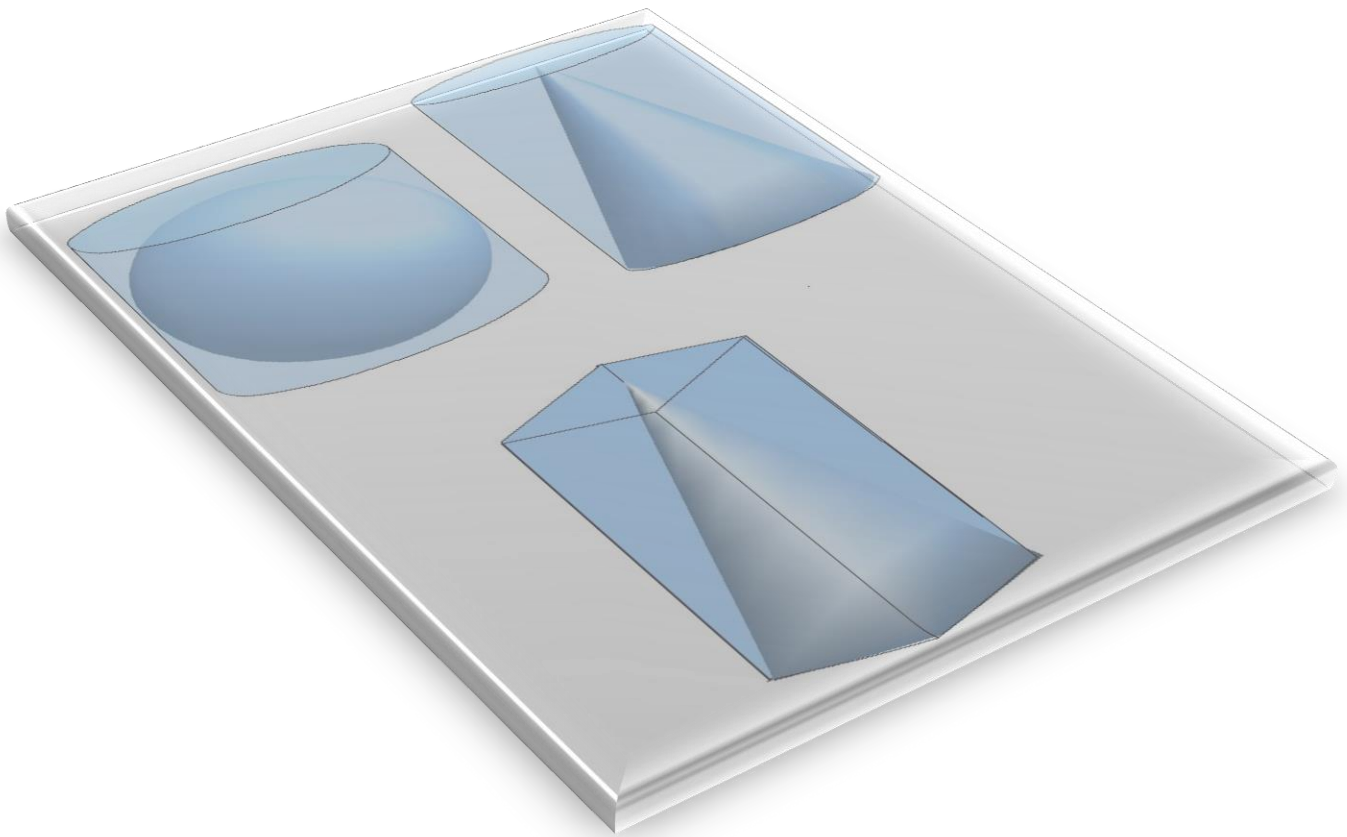


# Volume of Solids



Name: \_\_\_\_\_

*To be able to calculate the volume of spheres, pyramids and cones*

*Calculators allowed*

## SPHERE

### Example



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

A sphere has radius 5cm. Find the volume.

$$r = 5$$

$$V = 4 \times \pi \times 5^3 \div 3$$

$$V = 4 \times \pi \times 125 \div 3$$

$$V = 500 \pi \div 3 = \underline{523.60} \text{ (2dp)}$$

*Notes*

### QUESTIONS

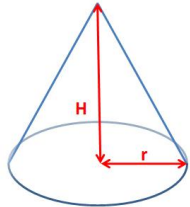
<p><b>1. r = 4</b></p> $V = 4 \times \pi \times 4^3 \div 3$ $V = 4 \times \pi \times 64 \div 3$ $V = 256 \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>2. r = 10</b></p> $V = 4 \times \pi \times 10^3 \div 3$ $V = 4 \times \pi \times 1000 \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$
<p><b>3. r = 7</b></p> $V = 4 \times \pi \times 7^3 \div 3$ $V = 4 \times \pi \times \underline{\hspace{2cm}} \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>4. r = 6</b></p> $V = 4 \times \pi \times \underline{\hspace{2cm}}^3 \div 3$ $V = 4 \times \pi \times \underline{\hspace{2cm}} \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$
<p><b>5. r = 11</b></p> $V = 4 \times \pi \times \underline{\hspace{2cm}}^3 \div \underline{\hspace{2cm}}$ $V = 4 \times \pi \times \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$ $V = \underline{\hspace{2cm}} \pi \div \underline{\hspace{2cm}}$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>6. r = 8</b></p> $V = \underline{\hspace{2cm}} \times \pi \times \underline{\hspace{2cm}}^3 \div \underline{\hspace{2cm}}$ $V = \underline{\hspace{2cm}} \times \pi \times \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$ $V = \underline{\hspace{2cm}} \pi \div \underline{\hspace{2cm}}$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$

*Extension*

*Find the volume of a sphere with radius 13cm*

## CONE

### Example



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

A cone has radius 5cm and height 4cm. Find the volume.

$$r = 5, h = 4$$

$$V = \pi \times 5^2 \times 4 \div 3$$

$$V = \pi \times 25 \times 4 \div 3$$

$$V = 100 \pi \div 3 = \underline{104.72} \text{ (2dp)}$$

### Hints

The  $\pi \times r^2$  bit comes from the area of the base

Sketch the cone if you have trouble remembering which measurement goes where.

### QUESTIONS

<p><b>1. r = 4, h = 7</b></p> $V = \pi \times 4^2 \times 7 \div 3$ $V = \pi \times 16 \times 7 \div 3$ $V = 112 \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>2. r = 10, h = 7</b></p> $V = \pi \times 10^2 \times 7 \div 3$ $V = \pi \times 100 \times 7 \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$
<p><b>3. r = 9, h = 2</b></p> $V = \pi \times 9^2 \times 2 \div 3$ $V = \pi \times \underline{\hspace{2cm}} \times 2 \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>4. r = 6, h = 12</b></p> $V = \pi \times \underline{\hspace{2cm}}^2 \times 12 \div 3$ $V = \pi \times \underline{\hspace{2cm}} \times 12 \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$
<p><b>5. r = 11, h = 5</b></p> $V = \pi \times \underline{\hspace{2cm}}^2 \times 5 \div 3$ $V = \pi \times \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$	<p><b>6. r = 11, h = 8</b></p> $V = \pi \times \underline{\hspace{2cm}}^2 \times \underline{\hspace{2cm}} \div 3$ $V = \pi \times \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \div 3$ $V = \underline{\hspace{2cm}} \pi \div 3$ $V = \underline{\hspace{2cm}} \text{ (2dp)}$

### Extension

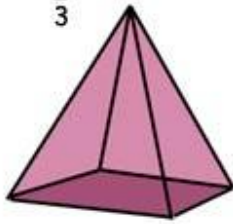
Find the volume of a cone with radius 13cm and height 10cm

## PYRAMID

### Example

A pyramid has a 5cm square base and height 7cm. Find the volume.

$$\text{volume} = \frac{1}{3} \text{ base area} \times \text{height} \quad \text{Base} = 5 \times 5 = 25$$



$$H = 7$$

$$V = 25 \times 7 \div 3$$

$$V = 175 \div 3$$

$$V = \underline{58.33} \text{ (2dp)}$$

### Hints

The base can be any 2D shape, you will need to adjust your calculation to fit.

Sketch the pyramid if you have trouble visualizing the base shape.

## QUESTIONS

<p><b>1. h = 5</b>  <b>Base = 4 by 6 rectangle</b>                      Base = <math>4 \times 6 = 24</math>  <math>V = 24 \times 5 \div 3</math>  <math>V = 120 \div 3</math>  <math>V = \underline{\quad\quad} \text{ (2dp)}</math></p>	<p><b>2. h = 8</b>  <b>Base = 7 by 4 rectangle</b>                      Base = <math>7 \times 4 = \underline{\quad\quad}</math>  <math>V = \underline{\quad\quad} \times 8 \div 3</math>  <math>V = \underline{\quad\quad} \div 3</math>  <math>V = \underline{\quad\quad} \text{ (2dp)}</math></p>
<p><b>3. h = 10</b>  <b>Base = 9 by 4 triangle</b>                      Base = <math>9 \times 4 \div 2 = \underline{\quad\quad}</math>  <math>V = \underline{\quad\quad} \times \underline{\quad\quad} \div 3</math>  <math>V = \underline{\quad\quad} \div 3</math>  <math>V = \underline{\quad\quad} \text{ (2dp)}</math></p>	<p><b>4. h = 5</b>  <b>Base = 12 by 6 triangle</b>                      Base = <math>12 \times \underline{\quad\quad} \div 2 = \underline{\quad\quad}</math>  <math>V = \underline{\quad\quad} \times \underline{\quad\quad} \div 3</math>  <math>V = \underline{\quad\quad} \div 3</math>  <math>V = \underline{\quad\quad} \text{ (2dp)}</math></p>

### Extension

Find the volume of a pyramid with height 10cm and a triangular base. The triangle is right angled with sides 3, 4, 5cm