Volumes - Lesson 5

Volume of a Sphere - Non-Calculator

LI

- Calculate the Volume of a Sphere without using a calculator.

SC

- Sphere formula.

Jan 10-12:11

Volume of a Sphere

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

(r is radius of sphere)

Remember, r^3 means $r \times r \times r$

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

Jun 18-08:10

For this lesson, we will approximate

π as 3 . 141

Useful calculation for this lesson ($\pi \div 3$) :

$$\begin{array}{r|l} & 1 \cdot 0\ 4\ 7 \\ \hline 3 & 3 \cdot 1\ \overset{1}{4}\ \overset{2}{1} \end{array}$$

Example 1

Calculate the volume of a sphere of radius 2 cm.

Take $\pi = 3.141$.

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

$$V = 4 \times 3.141 \times 2^3 \div 3$$

$$V = 4 \times 1.047 \times 8$$

$$V = 4.188 \times 8$$

$$\boxed{V = 33.504 \text{ cm}^3}$$

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Example 2

Calculate the volume of a sphere of radius 10 cm.

Take $\pi = 3.141$.

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

$$V = 4 \times 3.141 \times 10^3 \div 3$$

$$V = 4 \times 1.047 \times 1\,000$$

$$V = 4.188 \times 1\,000$$

$$\boxed{V = 4\,188 \text{ cm}^3}$$

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Example 3

Calculate the exact volume (meaning leave your answer in terms of π) of a sphere of radius 3 cm.

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

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

$$V = 4 \times \pi \times 27 \div 3$$

$$V = 4 \times \pi \times 9$$

$$\boxed{V = 36\pi \text{ cm}^3}$$

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Example 4

Calculate the exact volume (meaning leave your answer in terms of π) of a sphere of radius 6 cm.

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

$$V = 4 \times \pi \times 6^3 \div 3$$

$$V = 4 \times \pi \times 216 \div 3$$

$$V = 4 \times \pi \times 72$$

$$\boxed{V = 288\,\pi\ cm^3}$$

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Calculate the volumes of these spheres :

Take $\pi = 3.141$	Exact volume (answer in terms of π)
1) $r = 1$ cm	5) $r = 2$ cm
2) $r = 100$ cm	6) $r = 9$ cm
3) $r = 1/2$ cm	7) $r = 4$ cm
4) $r = 1/10$ cm	8) $r = 5$ cm

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Calculate the volumes of these spheres :

Take $\pi = 3.141$	Exact volume (answer in terms of π)
1) $4.188\ cm^3$	5) $32\pi/3\ cm^3$
2) $4\,188\,000\ cm^3$	6) $972\pi\ cm^3$
3) $0.5235\ cm^3$	7) $256\pi/3\ cm^3$
4) $0.004\,188\ cm^3$	8) $500\pi/3\ cm^3$