Name & Surname: _____ Class: _____ Date: _____

Volume of Cylinders

Use $V = \pi r^2 h$ to solve real problems

About 50 minutes Level ★★★☆☆



Volume of a Cylinder

A cylinder has two circular bases. Its **volume** is the space inside it, measured in cubic units.



- Halve the **diameter** to get the radius: $r = d \div 2$.
- Work out base area: $\pi \times r^2$. Use 3.14 for π.
- Multiply by height: $V = \pi r^2 h$. Give the answer in cubic units, like cm^3 or in^3.

Task A

/6

Box the command word, underline the topic, count the marks, then plan and answer.

1. Box the command word **2. Underline** the topic **3. Count** the marks: how many points? **4. Plan**, then write

Explain why $V = \pi r^2 h$ gives the volume of a cylinder, then work out the volume of a cylinder with radius 4 cm and height 10 cm. Use 3.14 for π. (6)

Command word	Topic	Points I need
.....	.....	.....

Say volume = area of circular base × height → State area of base = πr^2 → Show substitution: 3.14 × 4^2 × 10 → Give answer 502.4 cm^3 with cubic units

My answer

.....

.....

.....

.....

.....

.....

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Build Cylinder Skills

Practice finding the volume of cylinders.

Key words

volume: amount of space inside a 3D shape

diameter: distance across a circle through the center

pi: about 3.14, circumference divided by diameter

radius: distance from center to edge of a circle

height: distance between the two bases

cylinder: 3D shape with two circular bases

Task B /12

Find each volume. Use 3.14 for π and include cubic units.

WARM UP

1. A cylinder has radius 3 cm and height 5 cm. Work out the **volume**. Use $3.14 \times 3^2 \times 5$.

   Answer: _____

2. A cylinder has radius 2 in and height 10 in. Work out the **volume**.

   Answer: _____

3. A cylinder has radius 4 cm and height 7 cm. Work out the **volume**.

   Answer: _____

4. A cylinder has diameter 6 cm and height 8 cm. Work out the **volume**.

   Answer: _____

PRACTICE

5. A cylinder has diameter 10 in and height 12 in. Work out the **volume**.

   Answer: _____

6. A cylinder has radius 5 m and height 6 m. Work out the **volume**.

   Answer: _____

7. A cylinder has radius 2.5 cm and height 8 cm. Work out the **volume**.

   Answer: _____

8. A cylinder has **volume** 314 ft^3 and radius 5 ft. Work out the height.

   Answer: _____

PROBLEM SOLVING

9. A soup can has radius 4 cm and height 11 cm. Work out its **volume**.

   Answer: _____

10. A water tank is a cylinder with radius 3 ft and height 10 ft. Work out its **volume**.

    Answer: _____

11. A cylinder has **volume** 226.08 in^3 and height 8 in. Work out the radius.

    Answer: _____

12. If the height of a cylinder doubles but the radius stays the same, what happens to the **volume**? Explain how you know.

    Answer: _____

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Spot the Mistakes

Find the wrong step in each solution.

Task C /6

Find the wrong step and explain the error in each solution.



Student A

Work out the volume of a cylinder with diameter 8 cm and height 10 cm. Use 3.14 for π.

1. r = 8 ÷ 2 = 4 cm
2. V = 3.14 × 4^2 × 10
3. = 3.14 × 8 × 10
4. = 251.2 cm^3

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student B

Work out the volume of a cylinder with radius 5 in and height 6 in. Use 3.14 for π.

1. V = 3.14 × 5^2 × 6
2. = 3.14 × 25 × 6
3. = 471 in^2

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student C

Work out the volume of a cylinder with diameter 6 m and height 9 m. Use 3.14 for π.

1. V = 3.14 × 6^2 × 9
2. = 3.14 × 36 × 9
3. = 1017.36 m^3

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____

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Solve Real Problems

Tackle harder two-step and real-world problems.

Task D /12

Solve each volume problem. Use 3.14 for π.

WARM UP

1 A cylinder has radius 1 in and height 9 in. Work out the **volume**.

Answer: _____

2 A cylinder has radius 10 cm and height 4 cm. Work out the **volume**.

Answer: _____

3 A cylinder has diameter 8 ft and height 5 ft. Work out the **volume**.

Answer: _____

4 A cylinder has radius 7 cm and height 3 cm. Work out the **volume**.

Answer: _____

PRACTICE

5 A cylinder has **volume** 1256 ft³ and radius 10 ft. Work out the height.

Answer: _____

6 A cylinder has **volume** 282.6 m³ and height 10 m. Work out the radius.

Answer: _____

7 Cylinder A has radius 4 cm and height 10 cm. Cylinder B has radius 5 cm and height 6 cm. How much greater is the greater **volume**?

Answer: _____

8 A cylinder has diameter 12 in and height 7 in. Work out the **volume**.

Answer: _____

PROBLEM SOLVING

9 A paint can is a cylinder with radius 6 in and height 8 in. Work out its **volume**.

Answer: _____

10 A storage tank is a cylinder with diameter 4 m and height 9 m. Work out its **volume**.

Answer: _____

11 A cylindrical cup holds 1130.4 cm³. Its radius is 6 cm. Work out its **height**.

Answer: _____

12 A student says doubling the radius doubles the **volume**. Explain how you know this is wrong.

Answer: _____

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Sort and Solve

Sort the units, then use a function machine.

↑↓ Task E

Example done for you

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Sort each unit into volume or area units.

mm² | ft² | in² | ft³ | mm³ | ~~cm³~~ | m³ | in³ | cm² | m²

Cubic units for volume	Square units for area
cm³	

⊸ Task F

/5

This machine finds volume from base area for 10-cm-tall cylinders.

IN → × 10 → OUT

In	Out
12	
25	
7.5	
	180
	320

How did I do?

Circle a face for each line.

I can find the volume of a cylinder using $V = \pi r^2 h$. ☹ 😐 ☺

I can find a missing radius or height from the volume. ☹ 😐 ☺

I can solve real-world volume problems. ☹ 😐 ☺

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Answer sheet: Volume of Cylinders

Task A

Command word: Explain

Topic: volume of cylinders

Points: Say volume = area of circular base × height; State area of base = πr^2; Show substitution: $3.14 \times 4^2 \times 10$; Give answer 502.4 cm^3 with cubic units

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Task B

1. 141.3 cm^3
2. 125.6 in^3
3. 351.68 cm^3
4. 226.08 cm^3
5. 942 in^3
6. 471 m^3
7. 157 cm^3
8. h = 4 ft
9. 552.64 cm^3
10. 282.6 ft^3
11. r = 3 in
12. The volume doubles, because volume = base area × height, so twice the height gives twice the volume.

Task C

1. Step 3 is wrong: They did $4^2 = 8$. It should be $4 \times 4 = 16$. You must square before you multiply. Correct answer: 502.4 cm^3
2. Step 3 is wrong: The number is right but the units are wrong. Volume is measured in cubic units, not square units. Correct answer: 471 in^3
3. Step 1 is wrong: They used the diameter as the radius. Halve it first: $r = 6 \div 2 = 3$ m. Correct answer: 254.34 m^3

Task D

1. 28.26 in^3
2. 1256 cm^3
3. 251.2 ft^3
4. 461.58 cm^3
5. h = 4 ft
6. r = 3 m
7. 31.4 cm^3
8. 791.28 in^3
9. 904.32 in^3
10. 113.04 m^3
11. h = 10 cm
12. It quadruples the volume, because the radius is squared, so $2^2 = 4$ times the base area.

Task E

Cubic units for volume: cm^3, in^3, m^3, ft^3, mm^3

Square units for area: cm^2, in^2, m^2, ft^2, mm^2

Task F

12 → 120; 25 → 250; 7.5 → 75; 18 → 180; 32 → 320

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