LESSON MAKER PRO

Volume by Displacement

Measure irregular objects with water

HIGH SCHOOL · FSL.3A.3

FSL.3A.3 "Demonstrate the proper use of safety procedures and scientific laboratory equipment. Select and use appropriate tools and instruments to collect qualitative and quantitative data."

NAME _____ DATE _____

MEASURE THE RISE

Wear safety goggles and lower a nonporous object gently into a graduated cylinder. Read the bottom of the water's curve at eye level before and after the object is fully submerged. Subtract the starting level from the ending level to find the object's volume: 1 mL of displaced water equals 1 cm^3.

WORKED EXAMPLE

Find the volume of the metal piece using the recorded water levels.

METAL PIECE

Reading	Water level (mL)
Before	17
After	29

1. Identify the starting level: 17 mL.
2. Identify the ending level: 29 mL.
3. Subtract: 29 mL - 17 mL = 12 mL.
4. Convert: 12 mL = 12 cm^3.

Answer: 12 cm^3

PRACTICE 6 problems

1 Find the volume of the metal washer in cm^3.

METAL WASHER

Reading	Water level (mL)
Before	20
After	28

ANSWER _____

2 Find the volume of the glass marble in cm^3.

GLASS MARBLE

Reading	Water level (mL)
Before	35
After	41

ANSWER _____

3 How many milliliters of water does the metal gear displace?

METAL GEAR

Reading	Water level (mL)
Before	46
After	59

ANSWER _____

4 Which tool produced these readings: a ruler, a thermometer, or a graduated cylinder? Find the metal bolt's volume in cm^3.

METAL BOLT

Reading	Water level (mL)
Before	21
After	36

ANSWER _____

5 Find the volume of the metal charm in cm^3.

METAL CHARM

Reading	Water level (mL)
Before	30
After	39

ANSWER _____

6 Find the metal knob's volume in cm^3. Name one safety action to take during this measurement.

METAL KNOB

Reading	Water level (mL)
Before	44
After	58

ANSWER _____

APPLY IT Show your work

1 You are building a small robot. You lower two identical metal wheels into a graduated cylinder at the same time. What is the volume of one wheel?

ROBOT WHEELS

Reading	Water level (mL)
Before	25
After	43

ANSWER _____

2 You want to store a metal keychain charm in a container that holds 65 mL. The container already has 61 mL of water. Use the cylinder readings to find the charm's volume. If you fully submerge the charm in the container, will the water overflow? By how much?

KEYCHAIN CHARM TEST

Reading	Water level (mL)
Before	61
After	70

ANSWER _____

CHALLENGE One step up

In trial A, you submerge a metal badge. In trial B, you submerge the same badge and a metal clip together. Each trial starts with fresh water. Find the clip's volume in cm^3, and explain why you subtract the trials' displaced volumes.

TWO DISPLACEMENT TRIALS

Trial	Objects	Before (mL)	After (mL)
A	Badge	26	33
B	Badge and clip	32	48

WORK SPACE AND ANSWER

ANSWER KEY

Volume by Displacement

HIGH SCHOOL · FSL.3A.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of the metal washer in cm^3.	**8 cm^3**
2	Find the volume of the glass marble in cm^3.	**6 cm^3**
3	How many milliliters of water does the metal gear displace?	**13 mL**
4	Which tool produced these readings: a ruler, a thermometer, or a graduated cylinder? Find the metal bolt's volume in cm^3.	**Graduated cylinder; 15 cm^3**
5	Find the volume of the metal charm in cm^3.	**9 cm^3**
6	Find the metal knob's volume in cm^3. Name one safety action to take during this measurement.	**14 cm^3; wear safety goggles.**

PART 2 · APPLY IT

1. **9 cm^3** The two wheels displace 43 - 25 = 18 mL. Divide by 2 to get 9 cm^3 per wheel.
2. **9 cm^3; yes, 5 mL will overflow.** The charm displaces 70 - 61 = 9 mL. It would raise the water from 61 mL to 70 mL, which is 5 mL above the container's capacity.

CHALLENGE

Trial A displaces 7 mL, and trial B displaces 16 mL. The clip's volume is 16 - 7 = 9 cm^3 because the badge is included in both trials.

Accept equivalent volume units because 1 mL = 1 cm^3. For problem 6, also accept lowering the knob gently as a valid safety action.