Unit 6 MEASUREMENT

During the last school holidays, Langgi and his sister helped their father to work on his ornamental fish enclosures.

How is the size of the enclosure measured?

Area

The size of a place or surface is called **area**.

Area is measured using a measuring tool and is expressed in a suitable unit. Let us look at the objects below and their units of measurement.

The area of a book can be expressed in **square centimetre** or written as cm^2.

The area of a mat can be expressed in **square metre** or written as m^2.

The area of Sabah can be expressed in **square kilometre** or written as km^2.

What is the suitable unit for the area of these objects?

6.1.1

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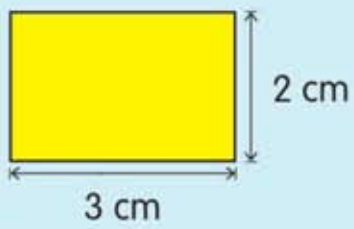
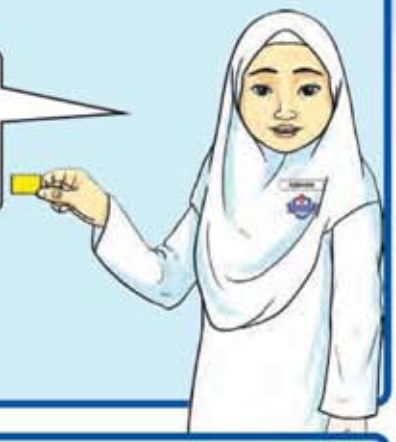
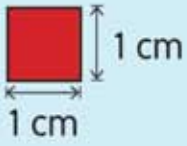
Measuring the Area of Regular Surfaces

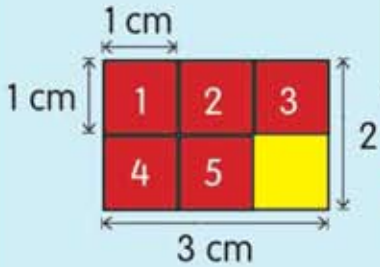
The area of a regular surface of an object can be measured using a paper square or graph paper.







A paper square of 1 cm x 1 cm is the same as 1 cm².



The area of the surface is 6 cm², as six 1 cm² paper squares are needed to fill the area of the card.

6.1.2

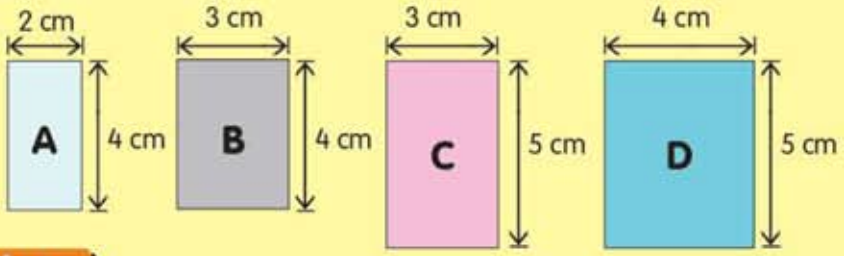
Activity Book
Pages
54-55

Let's Test Measuring the Area of Regular Surfaces

ACTIVITY GROUP

Apparatus and Materials

- glue
- 1 cm x 1 cm paper squares
- 1 set of cards (put into an envelope)



Steps

1. Each group picks a card from the envelope containing the set of cards. Arrange and paste the paper squares onto the selected card.
2. Count and record the area of the card pasted with paper squares as in Table A.

Table A

Group name	Selected card	Number of paper squares used	Area of card (cm^2)

3. Go to another group and compare your completed work.
4. Discuss the results of the areas of cards with the other groups in the class.

Questions

1. How do we find the area of a card using 1 cm x 1 cm paper squares?
2. Which card needs the most 1 cm x 1 cm paper squares? Why?

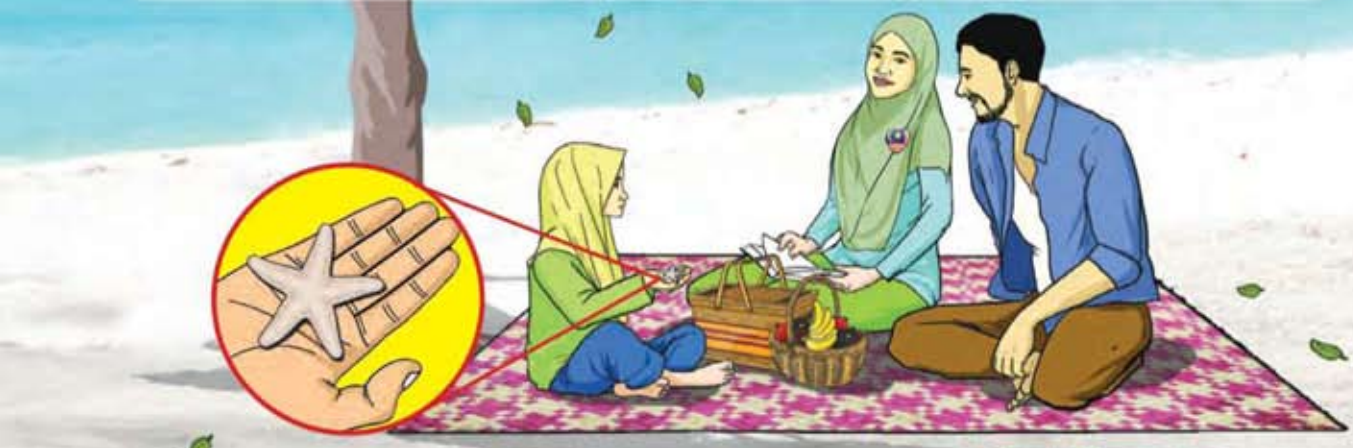
TEACHER'S NOTES

- The activity above is carried out using the Station method of the 21st Century Learning Skills.

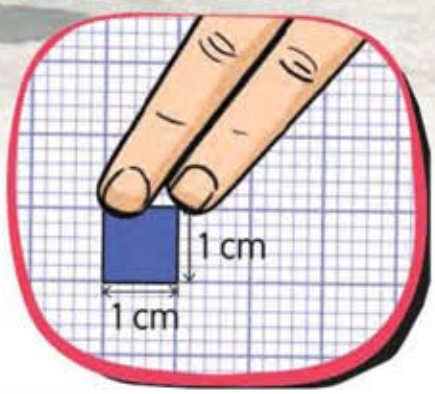
Activity Book Pages: **54-55**

Estimating the Area of Irregular Surfaces

There are various objects around us that have irregular surface areas. State the objects that have irregular surfaces in the situation below.



We can estimate the area of an irregular surface by using 1 cm x 1 cm paper squares or graph paper.



Graph paper is filled with squares and lines. We can use the 1 cm x 1 cm squares on graph paper to estimate the area of an irregular surface.

Do you know that measurement is important in our daily lives because it can prevent wastage? Can you give an example?

6.1.3

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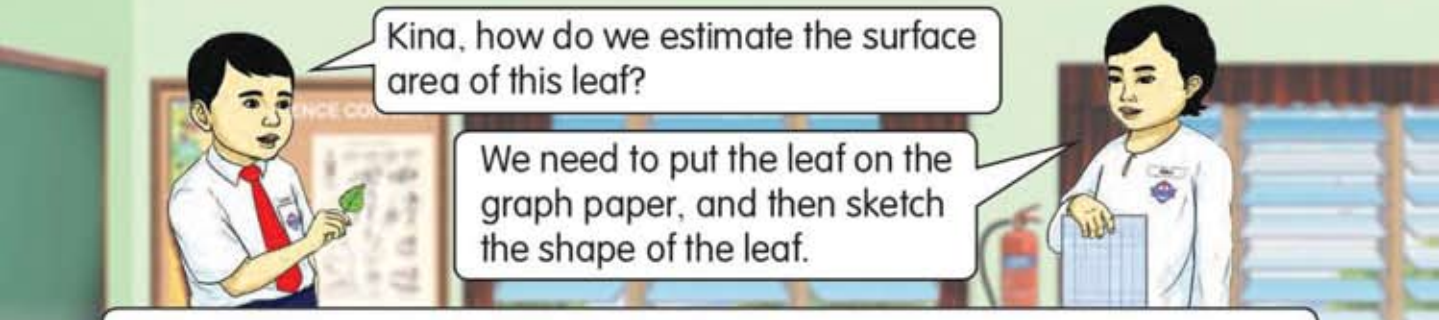
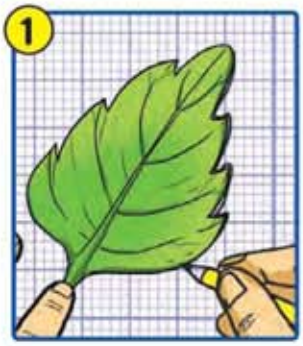
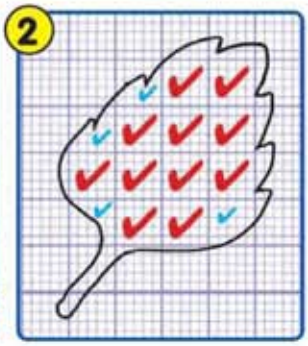
56

Langgi and Kina want to estimate the surface area of a leaf.







Tick (✔) each full square, (✔) each half square, and more than half full square.

Count all the (✔) and (✔).

The estimated surface area of this leaf is 15 square centimetres.

Let's Test Estimating the Area of Irregular Surfaces

ACTIVITY PAIRWORK

Apparatus and Materials

- graph paper
- heart, starfish, and butterfly-shaped cards

Steps

1. Sketch the heart-shaped card on the graph paper.
2. Tick (✔) the area that covers the graph paper.
3. Repeat steps 1 and 2 with the starfish and butterfly-shaped cards.
4. Count the number of (✔) and record them as in Table A.

Table A

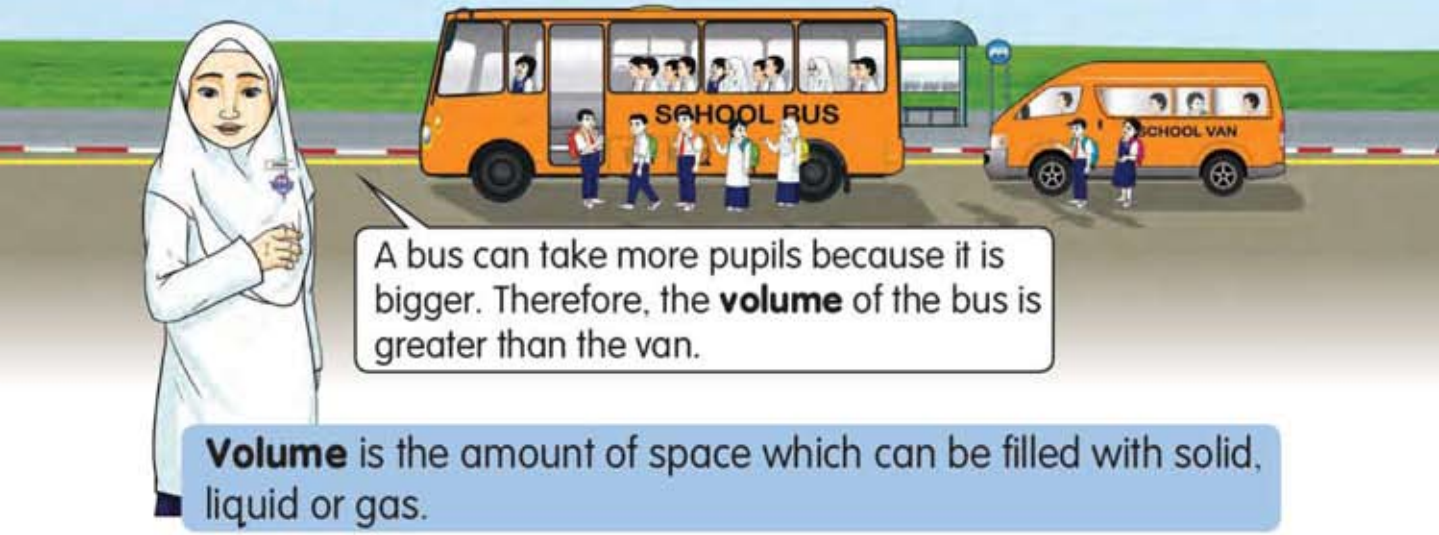
Card shape	Estimated area of card (cm^2)
Heart	
Starfish	
Butterfly	

Question

How do you solve the problem of estimating the area of an irregular surface?

Volume

Which vehicle can take more pupils?



A bus can take more pupils because it is bigger. Therefore, the **volume** of the bus is greater than the van.

Volume is the amount of space which can be filled with solid, liquid or gas.

Volume is measured using measuring tools and is expressed in suitable units. Observe the objects below and their units.

The volume of a carton of milk is expressed in **millilitre** or written as mℓ.

The volume of a bottle of water is expressed in **litre** or written as ℓ.

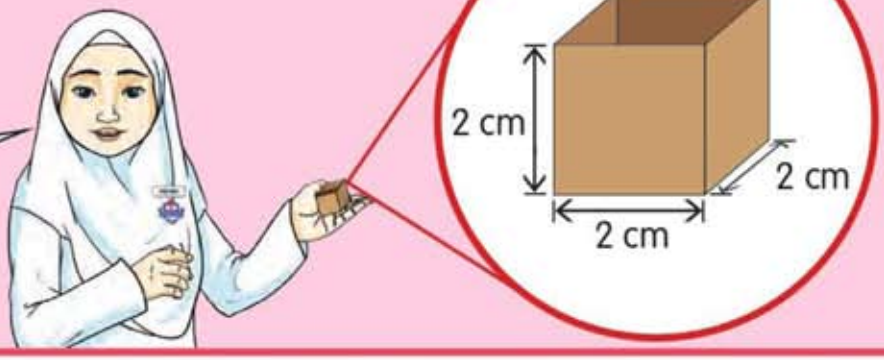
The volume of a water tank is expressed in **cubic metre** or written as m^3.

What is the unit of measurement for liquids in the objects shown?

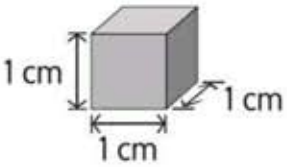
6.1.1

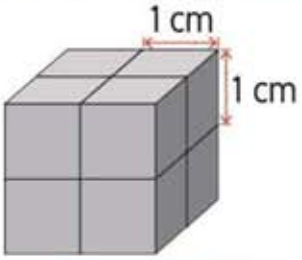
Measuring the Volume of Hollow Boxes

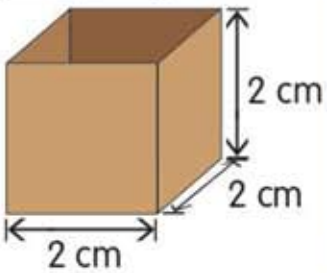
Can we measure the volume of hollow boxes? How?



We can measure the volume of hollow boxes using 1 cubic centimetre cubes.







The volume of the hollow box is equal to the number of 1 cubic centimetre cubes that fill the hollow space.

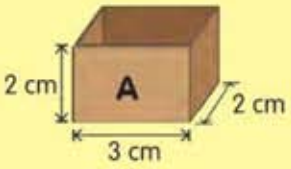
The box needs eight 1 cubic centimetre cubes to fill the hollow space.
Thus, the volume of the hollow box is 8 cubic centimetres.

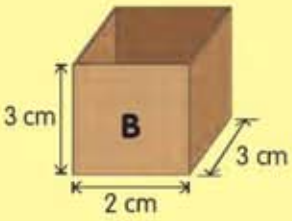
Let's Test Measuring the Volume of Hollow Boxes

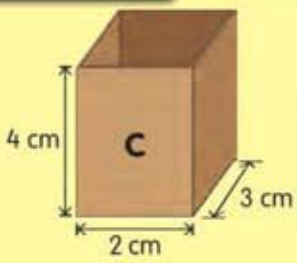
ACTIVITY GROUP

Apparatus and Materials

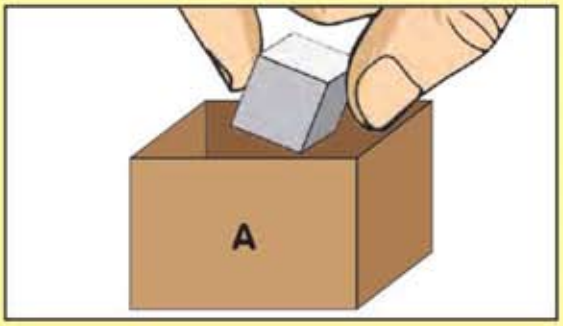
- 24 cubes of 1 cm^3-sized cubes
- hollow boxes



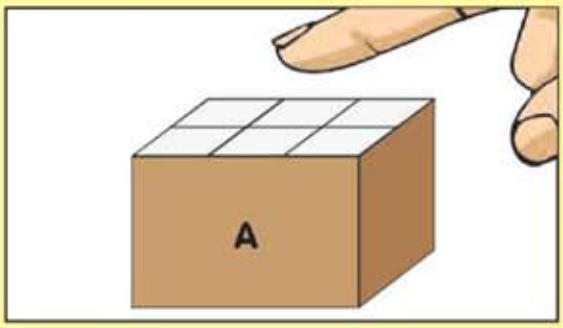




Steps



1. Fill the hollow box A with 1 cm^3-sized cubes.



2. Count the number of 1 cm^3-sized cubes that fill the box completely.

3. Record the results as in Table A.

Table A

Hollow box	A	B	C
Number of 1 cm^3-sized cubes used			
Volume of hollow box (cm^3)			

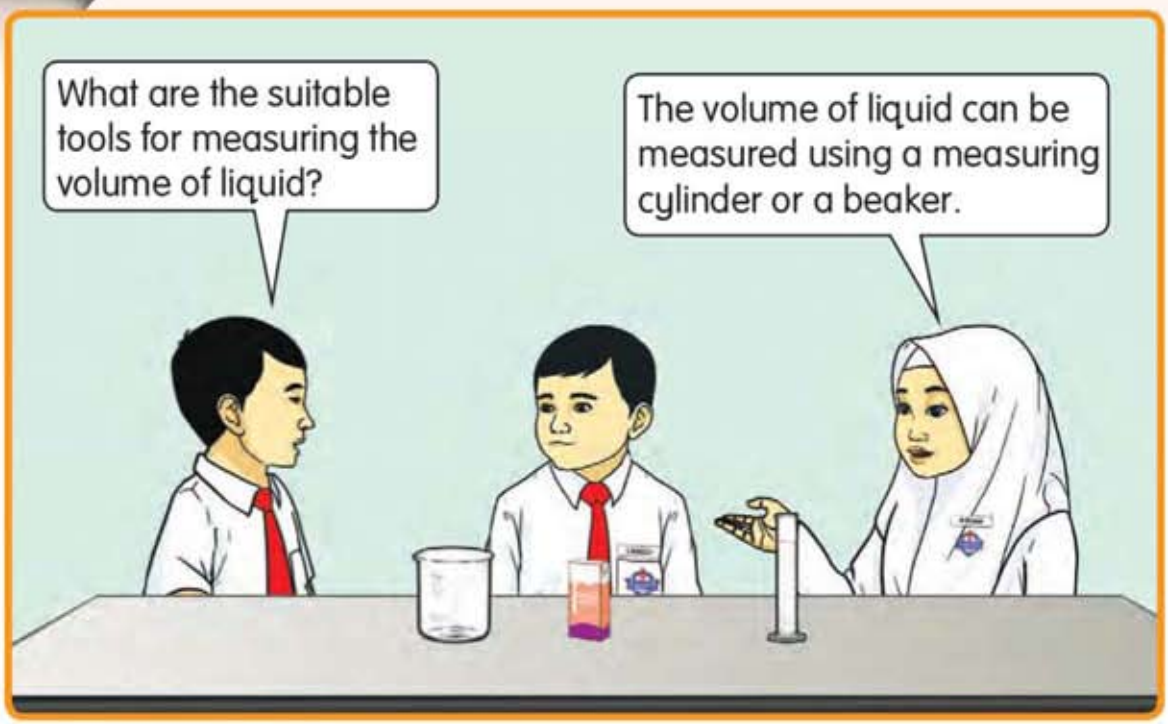
4. Repeat steps 1 to 3 for hollow boxes B and C.

Questions

1. Which hollow box has the most number of 1 cm^3-sized cubes?
2. If a total of 90 cubes of 1 cm^3-sized cubes are required to fill a hollow box, what is the volume of the hollow box?
3. How do we measure the volume of a hollow box?

Measuring the Volume of Liquid

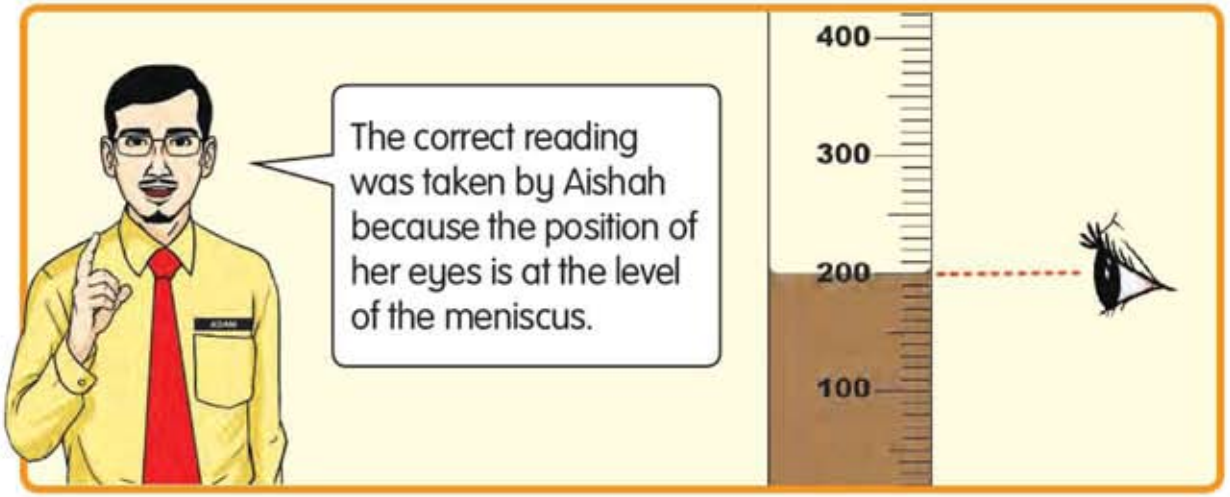
Lim, Langgi, and Aishah bought a carton of milk. They want to know whether the volume of the carton of milk is the same as the label on the carton.



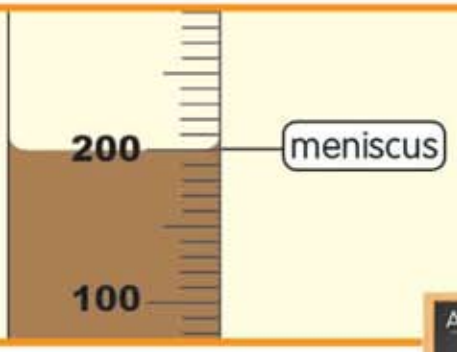
6.1.5

Lim, Langgi, and Aishah measure the volume of the carton of milk.

Who has the correct volume reading? Why?



The **meniscus** is the curve on the surface of the liquid in a container.



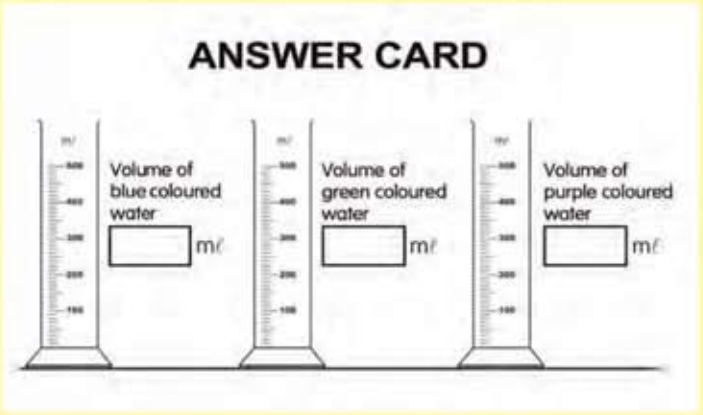
Activity Book Pages: 58-60

Let's Test Measuring the Volume of Coloured Water

ACTIVITY GROUP

Apparatus and Materials

- measuring cylinder
- answer card
- blue coloured water
- green coloured water
- purple coloured water



sample of answer card

Steps

1. Each group prepares the answer card as above.
2. Move to each station, record the volume of coloured water, and write it on the answer card.

Station 1
Measuring cylinder with blue coloured water.

Station 2
Measuring cylinder with green coloured water.

Station 3
Measuring cylinder with purple coloured water.

3. After completing the activity at all stations, discuss the answers based on the answer card.

Questions

Does the coloured water level marked on your answer card differ from other groups? Why?

6.1.5
6.1.7

TEACHER'S NOTES

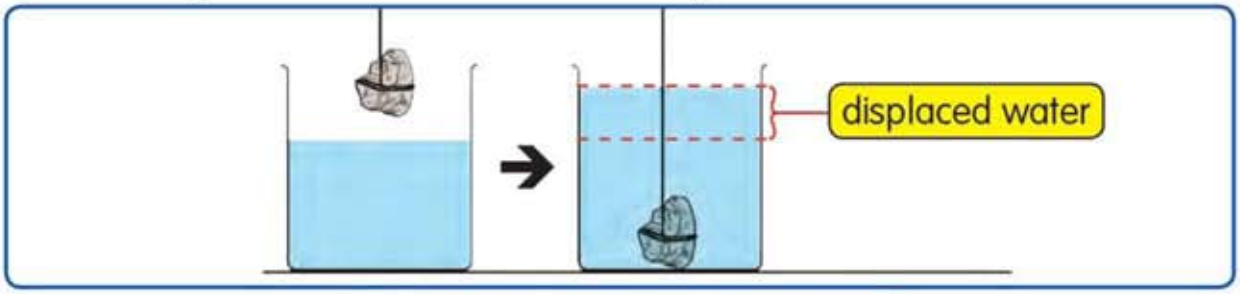
- The activity above is carried out using the Station method of the 21st Century Learning Skills.
- Answer card can be obtained by scanning the QR Code. Teachers are advised to print the card before the activity.

Activity Book Pages: 59-60

The Volume of an Irregular Shaped Solid

How do we find out the volume of an irregular shaped solid?

The volume of an irregular shaped solid is determined by the **water displacement** method. The volume of the displaced water equals to the volume of the object.

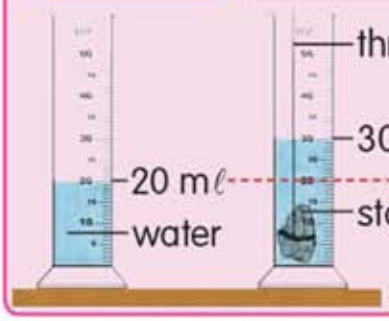


Water Displacement Methods

Method 1

Initial volume

Final volume



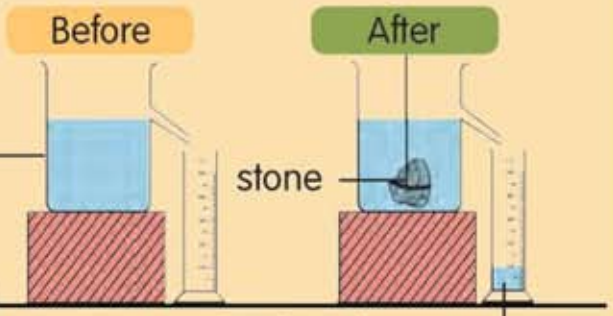
Volume of the stone = Final volume − Initial volume

= 30 mℓ − 20 mℓ

= 10 mℓ

Method 2

Eureka can



Volume of displaced water = Volume of stone

6.1.6

Activity Book Pages: 61-62

KPM

Let's Test

Determining the Volume of Irregular Shaped Solids

ACTIVITY PAIRWORK

Apparatus and Materials

- measuring cylinder
- thread
- water

- key

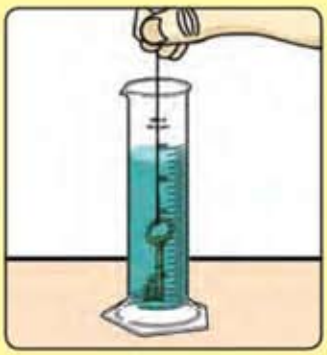
- padlock

- rubber

Steps

1. Fill the measuring cylinder with 30 mℓ of water. Record the initial volume as in Table A.

2. Tie the key with the thread and immerse it in the water in the measuring cylinder.



3. Observe the difference in the water level of the measuring cylinder. Record the final volume as in Table A.

Table A

Object	Initial Volume (mℓ)	Final Volume (mℓ)	Volume of Object (cm^3)
Key			
Padlock			
Rubber			

4. Repeat steps 1 to 3 with the padlock and the rubber.

Question

What is the method used to determine the volume of irregular shaped solids?

TEACHER'S NOTES

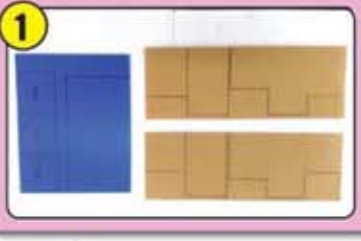
- This activity should be carried out on a flat surface.
- Besides the objects shown above, teachers may also replace them with other suitable objects.

Activity Book Pages: 61-62

Leisure Science — My Coin Box

Steps

Create coin boxes of various sizes with used materials. Use your knowledge in measurement that you have learnt to create the coin boxes.

1 

2 

3 

Let's Remember

1. The measuring units for area and volume are:

Area	
Unit	**Symbol**
square centimetre	cm^2
square metre	m^2
square kilometre	km^2

Volume	
Unit	**Symbol**
millilitre	$m\ell$
litre	ℓ
cubic centimetre	cm^3
cubic metre	m^3

2. There are two types of surface areas:
   (i) regular surface (ii) irregular surface
3. Area is measured using:
   (i) 1 cm x 1 cm paper squares (ii) graph paper
4. The volume of a hollow box is measured using 1 cm x 1 cm x 1 cm-sized cubes.
5. The volume of an irregular shaped solid is measured by the water displacement method.
6. The volume of liquid is read with the position of the eyes at the level of the meniscus.
7. Measurement is important in daily life to calculate areas and volumes accurately to avoid wastage.

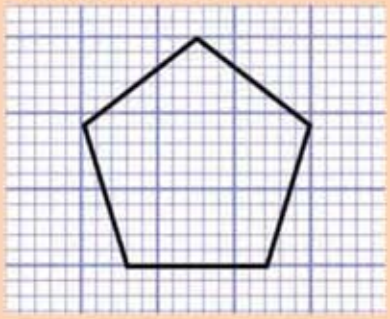
Let's Answer

Answer all the questions in the Science exercise book.

1. Write the following area and volume in words.
   (i) 2 cm^2
   (ii) 10 cm^3

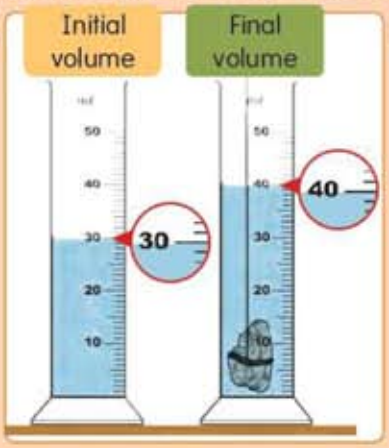
2. Surface area can be measured using _____ paper and 1 cm x 1 cm paper _____.

3. Estimate the surface area of the object below.

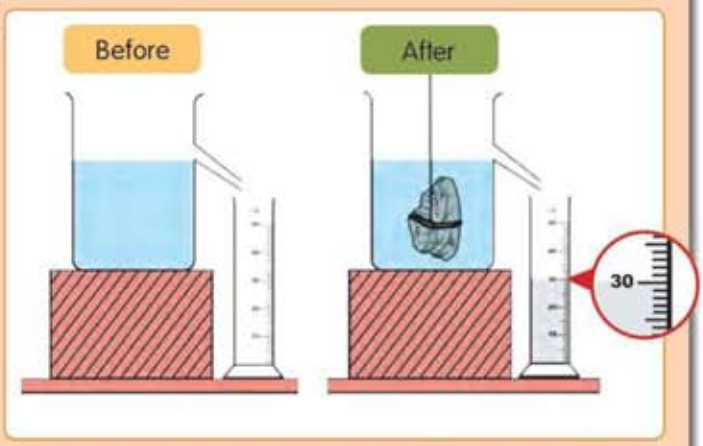


4. Calculate the volume of the object below.

(i)

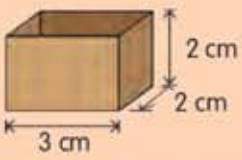


(ii)

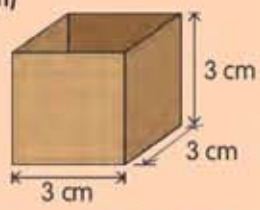


5. Calculate the volume of the hollow boxes.

(i)



(ii)



6. Lim's father wants to install tiles on the floor of his house. What will happen if Lim's father does not measure the floor of his house?

HOTS

How do we measure the volume of a nail using the apparatus below?

full glass of water | basin

syringe | nail | thread