Released April 2018

Year 5

Small Steps Guidance and Examples

Block 5 – Measures: Volume

White Rose Maths

Year 5 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction		Statistics		Number – Multiplication and Division		Perimeter and Area		Consolidation
Spring	Number – Multiplication and Division			Number – Fractions						Number – Decimals & Percentages		Consolidation
Summer	Number – Decimals				Geometry- Properties of Shapes			Geometry- Position and Direction	Measurement- Converting Units		Measures Volume	Consolidation

Week 11 – Measurement: Volume

Overview

Small Steps

- What is volume?
- Compare volume
- Estimate volume
- Estimate capacity

NC Objectives

Estimate volume [for example using 1cm^3 blocks to build cuboids (including cubes)] and capacity [for example, using water]

Use all four operations to solve problems involving measure.

What is Volume?

Notes and Guidance

Children understand that volume is the amount of space something takes up. They look at how this is different to capacity, as capacity related to the amount a container can hold.
Children use centimetre cubes to make solids of different volumes. Through this they recognise the conservation of volume by building different solids using the same amount of centimetre cubes.

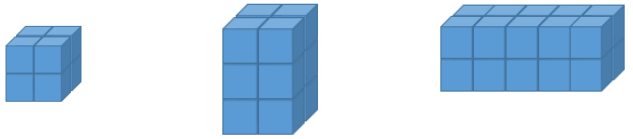
Mathematical Talk

Does your shape always have 4 cm cubes? Do they take up the same amount of space?
How can this help us understand what volume is?
If this is a 1 cm cube, it has three dimensions (length, width and height). What is the length, height and width of shape A? How does this differ from shape B?
Identify how many layers my shape has.
How is capacity different to volume?

Varied Fluency

1 Take 4 cm cubes. How many different solids can you make? What's the same? What's different?

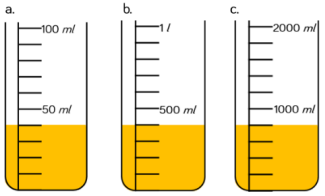
2 Make these shapes.



Complete the table to describe your shapes.

Shape	Width	Height	Length	Volume (cm^3)
A				
B				
C				

3 Compare the capacity and the volume. Use the sentence stems to help you.



Container ___ has a capacity of ____ ml
The volume of juice in container ___ is ___ cm^3

What is Volume?

Reasoning and Problem Solving

Sam has built a shape that has a volume of 12 cm^3

Using 1 cm^3 blocks, build a shape that has:

- The same volume as Sam's.
- Half the volume of Sam's.
- Three times the volume of Sam's.

Possible solutions:

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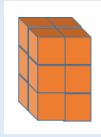
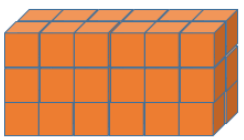
- 
- 

My shape is made up of 10 centimetre cubes.

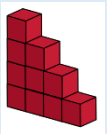
The height and length are the same size.

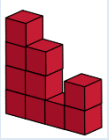
Three layers have at least 1 centimetre cube.

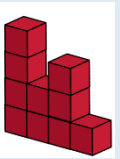
What could my shape look like?

Create your own shape and write some clues for a partner.

Possible solutions:







Compare Volume

Notes and Guidance

Children use their understanding of volume to compare and order different solids that are made of cubes.

They develop their understanding of volume by building shapes made from centimetre cubes and directly comparing two or more shapes.

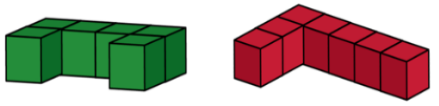
Mathematical Talk

What does volume mean?
What does cm^3 mean?
How can we find the volume of this shape?
Which volume occupies the most space?
Which volume occupies the least space?
Do we always have to count the cubes to find the volume?

Varied Fluency

1 Work out the volume of each solid.

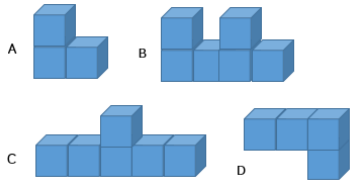
Shape A Shape B



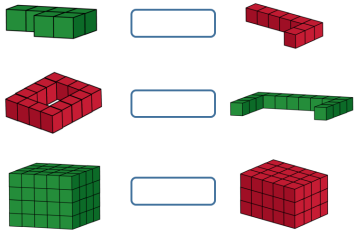
Shape A has a volume of ___ cm^3
Shape B has a volume of ___ cm^3

Which has the greatest volume?

2 Look at the 4 solids below. Put the shapes in ascending order based on their volume.



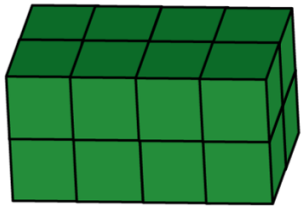
3 Count the cubes to find the volume of the shapes and use 'greater than', 'less than' or 'equal to' to make the statements correct.



Compare Volume

Reasoning and Problem Solving

Laura has made a shape from centimetre cubes.

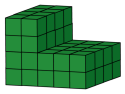


How many other shapes can you make that have the same volume?

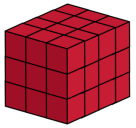
Children can build any shape with a volume of 16 cm^3

David, Jennifer and Owen have all build a shape using cubes.
Owen has lost his shape, but knows that it's volume was greater than Jennifer's, but less than David's.

David's



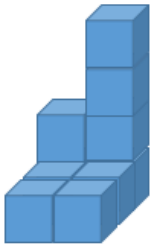
Jennifer's



What could the volume of Owen's shape be?

David's volume is 56 cm^3
Jennifer's volume is 36 cm^3
Owen's can be anywhere between.

Lucy has built this solid:



Tom has built this solid:

Lucy thinks that her shape must have the greatest volume because it is taller.
Do you agree?
Explain your answer.

Lucy is incorrect, both solids have an equal volume of 10 cm^3
Children might want to build this to see it.

Estimate Volume

Notes and Guidance

Children estimate volume and capacity of different solids and objects.
They build cubes and cuboids to aid their estimations.
Children need to choose the most suitable unit of measure for different objects.

Mathematical Talk

What is the difference between volume and capacity?

What could we use to help estimate the volume and capacity of the chocolate boxes?

Would you use the same unit to measure the volume of the classroom?

Varied Fluency

1 Estimate and match the object to the correct volume.

3,600 cm^3	1,000 cm^3	187,500 cm^3

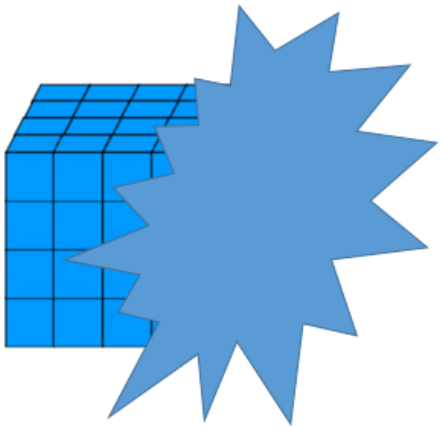
2 Take 3 different chocolate boxes.

Use cubes to estimate the volume and capacity of each box.

3 Estimate then work out the volume of your classroom.

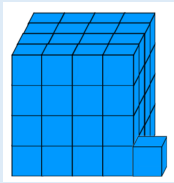
Estimate Volume

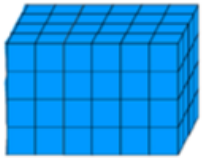
Reasoning and Problem Solving



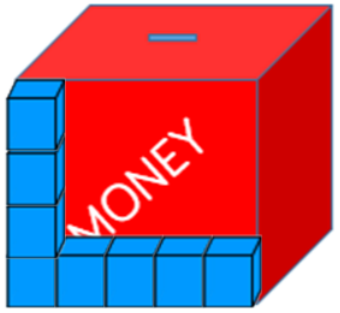
Each cube has a volume of 1 m^3
The volume of the whole shape is between 64 m^3 and 96 m^3
What could the shape look like?

Any variation of cubes drawn between the following.





Stephen is using cubes to estimate the volume of his money box.



He says the volume will be 20 cm^3

Do you agree with Stephen?
Explain your answer.

What would the approximate volume of the money box be?

Stephen is incorrect because he has not taken into account the depth of the money box.

The approximate volume would be 60 cm^3

Estimate Capacity

Notes and Guidance

Children estimate capacity using practical equipment such as water and rice.

Children explore how containers can be different shapes but still hold the same capacity.

Mathematical Talk

Can I fill the tumbler so it is ___ full?
Which tumbler has more/less volume? Do they have the same capacity?
Which container has the largest/smallest capacity?

Can we order the containers?

If I had ___ *ml/l* which container would I need and why?

How much rice/water is this container? How do you know?

Varied Fluency

1 Use five tumblers and rice.
- Fill a tumbler half full.
- Fill a tumbler one quarter full.
- Full a tumbler three quarters full.
- Fill a tumbler, leaving one third empty.
- Fill a tumbler that has more than the first but less than the third, what fraction could be filled?

2 Show children 5 different containers.
Which containers has the largest/smallest capacity?
Can we order the containers?
If I had ___ ml/l, which container would I need and why?
Fill each container with rice/water and estimate then measure how much each holds.

3 Match the containers to their estimated capacity.

Use this to help you compare other containers. Use 'more' and 'less' to help you.

Estimate Capacity

Reasoning and Problem Solving

Give children a container. Using rice, water and cotton wool balls, can children estimate how much of each they will need to fill it? Discuss what' the same? What's different? Will everyone's amount of cotton wool be the same? Will everyone have the same amount of rice? Will everyone have the same amount of water?	Possible response; Explore how cotton wool can be squashed and does not fill the space, whereas water and rice fill the container more.

Give children a container. Using rice/water and a different container e.g. cups, discuss how many cups of rice/water we will need to fill the containers. Link this to the capacity of the containers.	Various different answers.