

Area and Perimeter Prior Learning Assessment Q 9 and 10

Objective: Objective: I can find the volume of cubes and cuboids.

NC: M7 calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units [for example, mm³ and km³].

Teacher Input Ideas:

Give the children cm cubes to create cubes and cuboids. Allow the children time to explore the different cubes and cuboids that they can make with the cm cubes. Record the children's measurements they used to create the shapes. Ensure here that the children are not making hollow shapes and focusing on the faces, but building up layers of cubes. Establish with the children what the volume is. Ask the children to find out the volume of their shape. Some children may count the cubes to find the total volume of the shape.

With the children, record the measurements used for the length, width and depth. Discuss why these measurements are important and how they can be used to find the volume if we didn't have any cubes. Using the models that the children have made with cubes, model and explain what the length, width and depth is showing you and how they all are needed to find the volume. Some children may need images of cubes and cuboids to help them to see the link if they made errors in Q10 before understanding how the formula is used.

Now show images such as in Q9 where we are given the measurements but not any cubes or images of cubes. Model how the formula can be used:

$$L \times W \times D$$

Together work out the volume of the image in Q9 using the measurements in the formula. Discuss other examples together.

Practice Activities

Purple Practice: Most suited for children that made errors in Question 10 of the prior learning assessment and would benefit from securing visualising skills.

The activity has images of 3D shapes for the children to work out the volume from visualising the cubes. Some children may benefit from recreating the shape out of cm cubes to help them to work out the answers. After a few examples, you may want to encourage the children to work out the answers by visualising the cubes that cannot be seen in the image.

Green Practice: Most suited for children that made errors in Question 9 of the prior learning assessment and would benefit from securing the use of the formula for volume.

When the children are presented with the activity, ask the children to estimate which shape will have the largest volume. The children should be encouraged to look at the measurements and predict which one. The children are then required to use the images of cubes/cuboids and the measurements to calculate the volume of each shape.

After the children have completed the activity, encourage the children to look back to see if their predication was right and to order the shapes from largest to smallest volume.

Yellow Practice: Most suited for children who can use the formula to work out the volume of a cube or cuboid and are ready to apply other skills such as measuring.

Practical: provide the children with a variety of boxes that are cube and cuboid shape. Try to provide a variety of different ones, such as long and thin, wide and flat and cubes. Inform the children that you have polystyrene balls/pasta or something to fill the box with. Give the children criteria such as the box needs to hold ... cm³. Children to estimate which box they think will hold the most and which ones they think will hold the required amount. Children to suggest how they are going to work out the volume of each box to sort which are suitable and which are not. Children to apply measuring skills to work out the measurements needed. The children may have some measurements that are in decimals if they are working in cm or m. Decide together if the children are going to work in cm, m or mm. The children should be able to multiply a decimal by a whole amount, but are not yet required to multiply a decimal by a decimal, so some measurements may need rounding.

Mastery: Encourage the children to suggest how they are going to test this statement. Some children may suggest, working form 1 and finding 1x1x1, then repeating with 2x2x2, working systematically to see what is made each time until they feel they have enough evidence to agree or disagree with the statement. Some children may want to prove their answers using isometric paper or some may explore the statement through using cm cubes to create the cubes. Encourage the children to use vocabulary such as equal sides, cube, length, depth, width, formula, volume, cm³ to help the children to explain and prove that they agree with the statement.

Answers:

Purple:

- | | | |
|----------------------|----------------------|-----------------------|
| 1) 10cm ³ | 2) 16cm ³ | 3) 27cm ³ |
| 4) 18cm ³ | 5) 24cm ³ | 6) 24 cm ³ |

Green:

- | | | |
|--------------------------|-----------------------|----------------------|
| 1) a) 192cm ³ | b) 125cm ³ | c) 225m ³ |
| d) 84,000mm ³ | e) 125cm ³ | f) 22m ³ |

- 2) the volume of the shape they have drawn will be
122.5 cm³

Yellow:

Encourage the children to share answers amongst the group to check if they are correct and to spot any misconceptions. You may want to work out the volume of the boxes before they are given to the children and keep the answers in special envelopes for the children to check during the activity.

Mastery:

The children to prove with examples either using images or models and calculations that when the same number is used in the formula for volume, a cube is always created as all the measurements are equal.

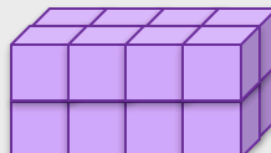
LO: I can find the volume of shapes from images.

Look at each drawing of the cubes and cuboids below. Work out the volume of each shape. You may want to use cm cubes to make the 3D models from the images below.

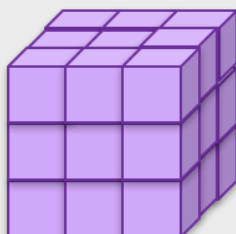
1)



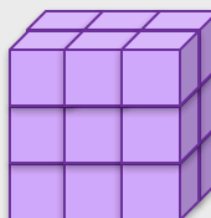
2)



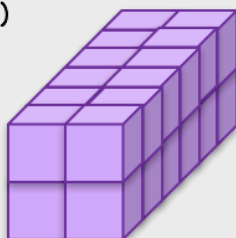
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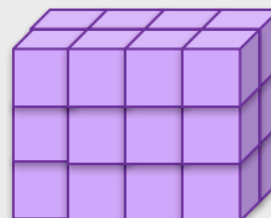
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5)



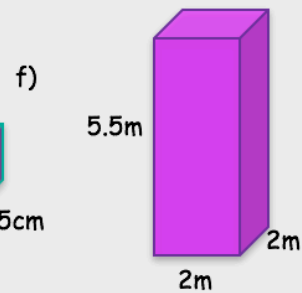
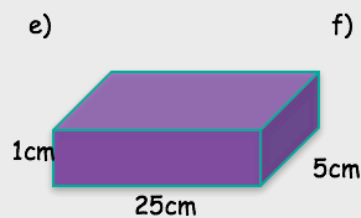
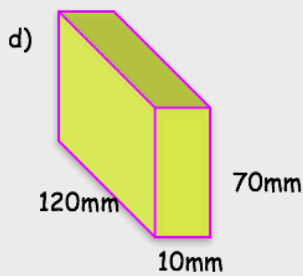
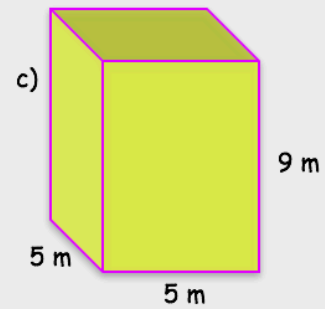
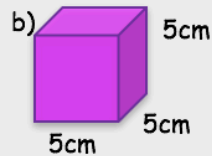
6)



Challenge: using 36 cm cubes, create your own cuboid.

Lo: I can use the formula for volume to calculate the volume of cuboids and cubes.

1) Use the formula for finding the volume to work out the answer to each question.



2) Draw your own cuboid using the dimensions below:

5 cm by 7 cm by 3.5 cm

Work out the volume of the cuboid you have drawn.

Sheeka says:

A cube will always be made when you use the same number in the formula for volume.
For example: $2 \times 2 \times 2$

Circle if you agree or disagree:

agree / disagree

prove your point of view: (you may want to use examples, models or images to further support your point of view).