Reasoning and Problem Solving
Volume Consolidation – Year 5

About This Resource

This resource is aimed at Year 5 Expected and has been designed to give children the opportunity to consolidate the skills they have learned in Summer Block 5 Volume.

The questions are based on a selection of the same 'small steps' that are addressed in the block, but are presented in a different way so children can work through the pack independently and demonstrate their understanding and skills.

Small Steps

What is volume?
Compare volume
Estimate volume
Estimate capacity

National Curriculum Objectives

Mathematics Year 5: (5M8) Estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]
Mathematics Year 5: (5M9d) Use all four operations to solve problems involving measure [for example, volume] using decimal notation, including scaling

Did you like this resource? Don't forget to review it on our website.

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Leo, Keira and Chaz are representing their school at the West Valley Design and Technology Competition.
Each student has designed a potential entry for each round.
Decide which design should be used in each round so they have the best change at winning the prestigious West Valley D&T Trophy!



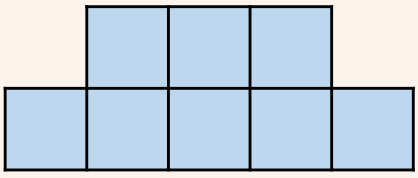
Round 1

For their first task, each team is given twenty 1cm blocks to build the tallest solid shape they can. Every layer of each shape must be identical, and they must use as many blocks as possible; however, they only have ten seconds to build their shape.

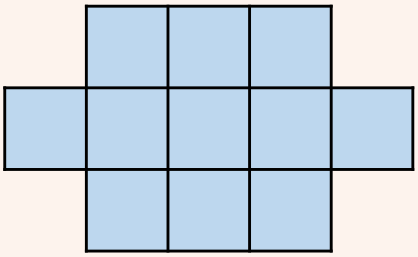
1. These are the top views of the shapes each child has designed for this round. If everyone used as many blocks as possible, who built the tallest shape?



Leo



Keira



Chaz

2. Leo's shape's volume is $20cm^3$. Chaz's is $11cm^3$. Keira's shape's volume is greater than Chaz's but smaller than Leo's. What is the volume of Keira's shape?

3. Who's design should the team submit for this round? Why?

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Leo's design has won the point for this round!
His friends are so pleased with his quick thinking.

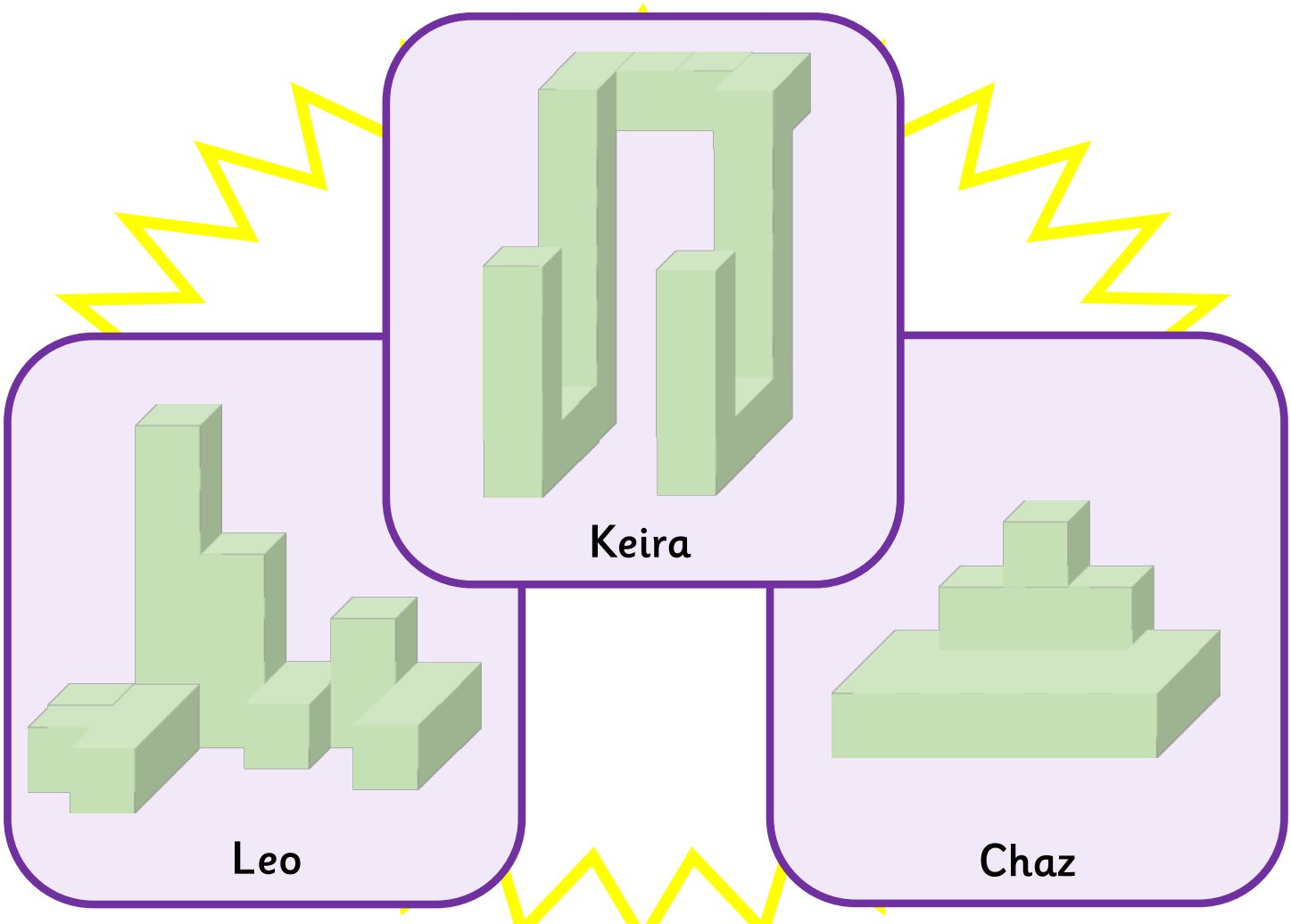
Round 2

For this round, the teams are given thirty seconds to build whatever shape they like. The children build their designs as fast as they can, but in no time at all, the buzzer sounds.

"Attention students: choose the shape with the largest volume. You have five seconds to submit your team's entry; estimate quickly!" the judge says over the loudspeaker.

4. Estimate the volume of each shape. Put them in order from smallest to largest.

5. Which design should the team submit for this round?



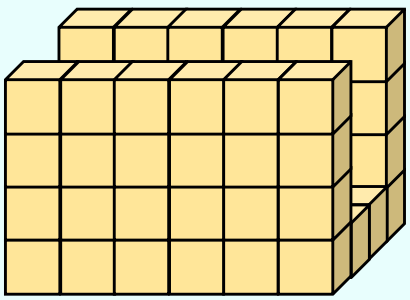
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"It has to be Keira's design!" Chaz says. Sure enough, the team win another point for their estimating skills!

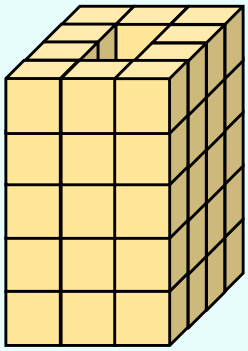
Round 3

Round 3 is the infamous 'Cup Challenge'. Using 1cm cubes, all teams must build a container that will carry a jug full of water across the classroom. The children get started building their containers. They must consider height and length when building their containers.

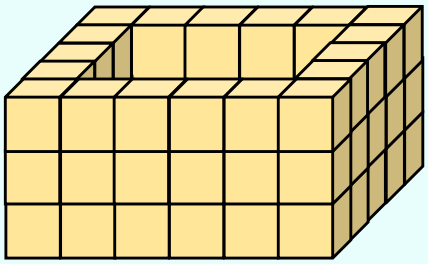




Leo



Keira



Chaz

Suddenly, the timer goes. It's time to test the cups!

6. Which child hasn't finished their shape?

"Don't worry, we still have a good chance at winning!" Keira says. "Which of the other two cups should we choose? It has to fit a whole jug of water!"

7. Which cup should they use as their entry?

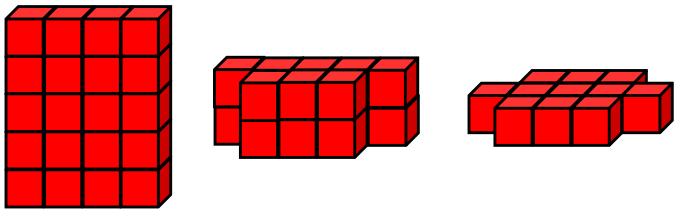
The team nervously bring their cup forward. "Here goes!" Chaz says as he pours in the whole jug of water. It fills the cup to the brim, but not a drop spills over!

"We did it!" they cheer. The three friends head towards the podium to pose with their trophy and collect their prize.

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Reasoning and Problem Solving – Volume – Year 5

1. Leo built the tallest shape. If there are only 20 cubes, he can have 5 layers of 4. At most, Keira can have 2 layers of 9, and Chaz can have 1 layer of 11.



2. $16cm^3$

3. They should submit Leo's shape because it is the tallest.

4. Estimates should reflect: Keira's shape at $28cm^3$; Leo's shape at $20cm^3$; Chaz's shape: $19cm^3$

5. They should submit Keira's shape because it has the biggest volume.

6. Leo's shape is unfinished; it has no sides, so it would not hold water.

7. They should use Chaz's cup as it will hold more water than Keira's.

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