Area and Perimeter Prior Learning Assessment Q6

Objective: I can suggest strategies to solve problems and suggest different lines of enquiry from what I find out.

Teacher Notes:

Q6 of the prior learning assessment presented a problem where the children were required to use their knowledge or area and perimeter to solve the problem using relevant information. Majority of the mastery tasks presented in Q1 to Q10 present problem solving tasks where the children are required to apply knowledge of area, volume and perimeter to solve the problem. If the children have made errors in this question, ensure that opportunities to solve problems including these are selected from the mastery tasks.

The problems suggested below are ones that will need at least a whole lesson and require the children to go into depth to solve the problem. They will not be able to rely solely on using the information presented to select a calculation to perform. The children will need to plan a starting point, decide how to work through the problem, alter their strategies or line of enquiry when they notice patterns, find a solution through trial and improvement and select resources to help them to solve the problem.

The notes below support you through presenting, prompting and solving each problem.

Larger Problem Solving Tasks:

Mastery 1:

You may want to bring in some apples with approximately 10cm diameter or make a paper representation of them. The children could use strips of 1m paper too to work out how to cut this up.

Share the problem with the children and encourage the children think about how they are going to start this investigation. What will they need to work it out? What idea should they try first? Why do they feel that their idea will work? Allow children to work in groups and encourage the children to share each idea.

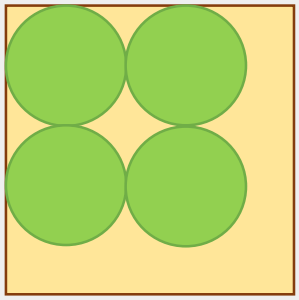
Take suggestions from different groups and allow the children time to explore. Some children may suggest using objects to try out different measurements to cut the 1m piece of wood. How are they going to record their findings? What information will they need to record? What are they hoping to find?

Some children may start by cutting a metre strip of paper into lengths. What length will you cut first? What if you cut 5cm, 5cm and 45 cm and 45 cm? How many apples can you

fit in the base? What do all the measurements need to add up to? What do you know about quadrilaterals? What if you try 10 cm, 10 cm, 40 cm and 40cm? Is this better? What have you noticed? What are you going to try next? Why? What are you using to help you make sure your measurements are accurate?

Some children may be able to draw images to work this out and some children will work better by using objects. Some children may suggest finding the area of different quadrilaterals, however encourage the children to think about how the apples can be positioned.

Examples of the lines of enquiry the children may explore:



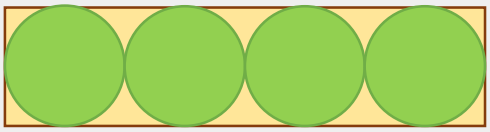
Children may explore cutting the 1m piece of wood equally to make a square. 4 apples can fit in here. The children then may move onto exploring a rectangle shaped base.

25cm

25cm

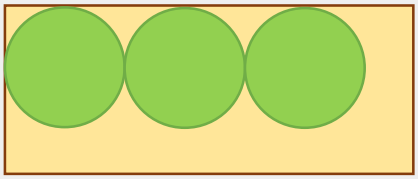
5cm  apple is too big. Diameter is 10cm.

45cm



10 cm 10+ 10 + 40 +40 = 1m will hold 4 apples

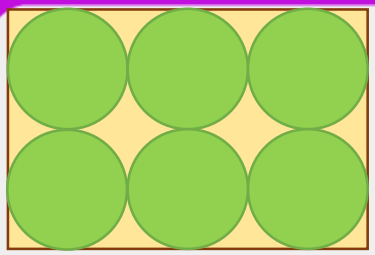
40cm



15cm 15 + 15 + 35 + 35 = 1m will only hold 3 apples

5cm wastage on each side. More apples can fit if use multiples of 10.

35cm



20cm

20 +20 + 30 +30 = 1m will hold 6 apples

30cm

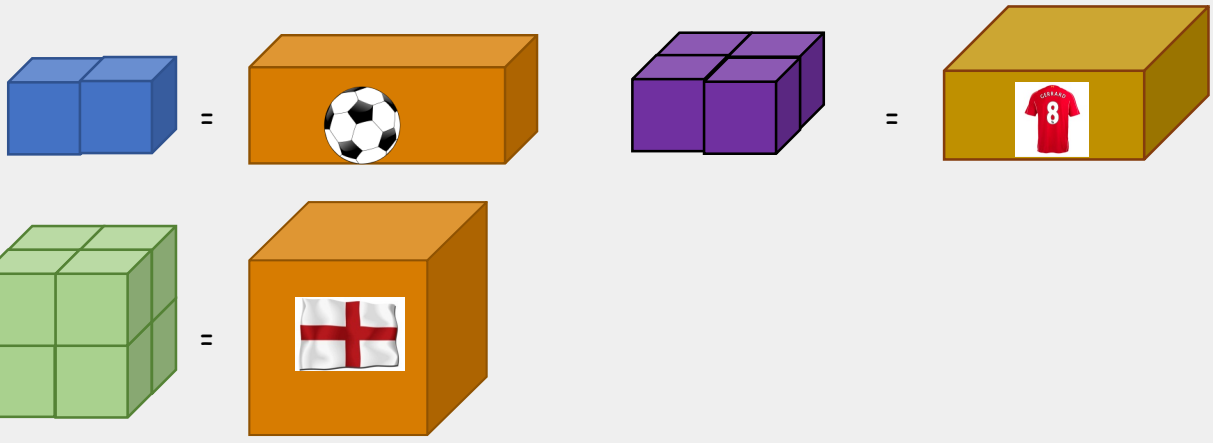
When the children how found this, and can prove there is no better way, the children could compare the perimeter of each tray and the area of the base of each tray to help them to further explain that although the perimeter is the same the area of each one is different. The children may also be able to explain that the area is a multiple of 10 and link to the diameter of the apples.

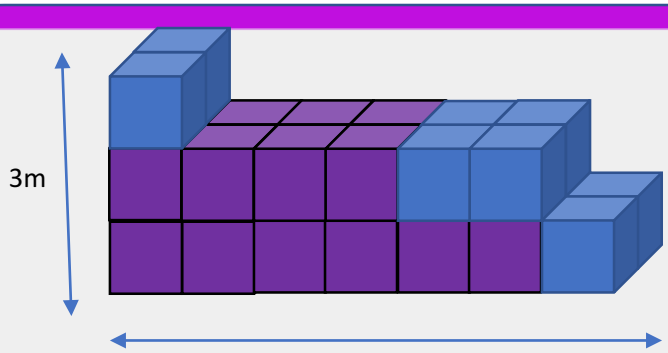
If you would like the children to further apply skills, the children could think about the volume, extending the children to think about what if we wanted to make a box rather than a tray for the apples? How much wood will we need for the rest of the box? What will the volume of the box be?

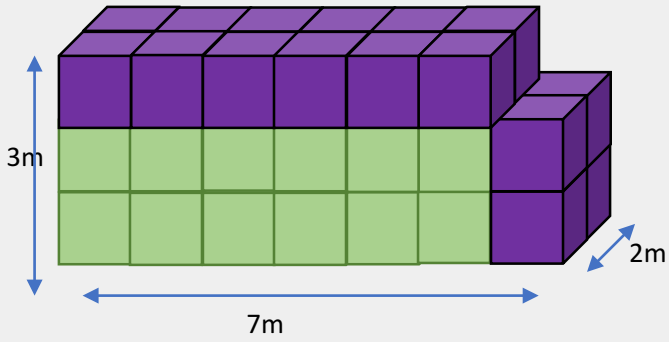
Mastery 2: The children may want to use cm cubes for this activity, or make their own nets for the different cuboids stated in the problem. This will also require the children to apply shape and measure knowledge to make a 3D shape using their own net with accurate measurements. The children may find it most useful to make the cuboid for the cargo so that they can fit the smaller boxes or cm cubes inside.

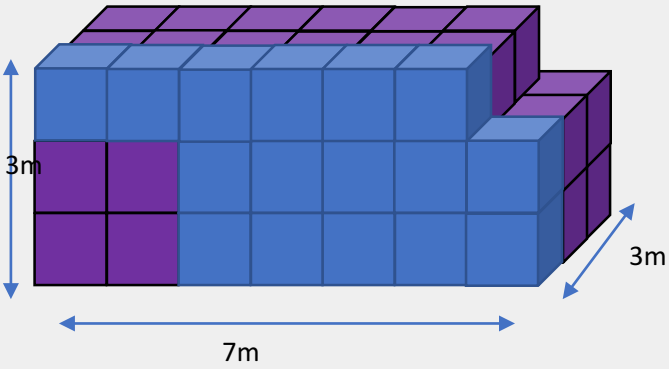
Again, encourage the children to suggest starting points, strategies for how to work this out and resources/ideas that they could use.

Suggested ideas: children could make the large cargo container to place models of the boxes in the problem made from cm cubes. 1 cm cube could represent 1m cubed (applying knowledge of scale).









Children may start exploring one type of box first and stack them up to see how much of the cargo they take up. For example, 5 purple boxes. Then the children may explore other boxes that can fit in too. Encourage children to use findings from their first attempt to suggest other ideas to help them to find the best way.

The children will then lead onto placing the larger boxes in first and explore placing the other boxes in different positions and orientations to fit the remaining space. 3 boxes of flags can fit in and 4 boxes of shirts.

The children then may explore fitting more in to fill the remaining space of the container.

Encourage the children to notice that the boxes for the flags are big and that they only ever can fit 3 of these in one container. So therefore, all the boxes do not fit the container. They should then prove that they have found the best way to fit as many boxes as they can in to this.

Ask children to suggest their own lines of enquiry to investigate. Such as what if I only used one type of box, what is the best type of box to use? Can I fit all the merchandise in the cargo if only one type of box was used? How much bigger does the cargo container need to be to fit all the merchandise in?

Mastery 3:

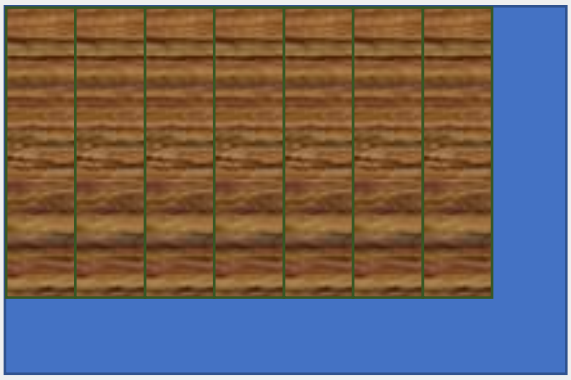
This could be done practically with the children, with a purpose of having a class party and the school tables need covering. Measure the school tables and measure the large fabric that you have instead of using the ones suggested on the task sheet.

The children may initially use their knowledge of measure and area by calculating the area of the fabric and the area of one table. They then may suggest finding the area of 7 tables to prove that the fabric is large enough to cover all 7 tables.

The children then need to further explore how the fabric should be cut to ensure that the wastage left would be most useful (such as covering another table or making something else out of it).

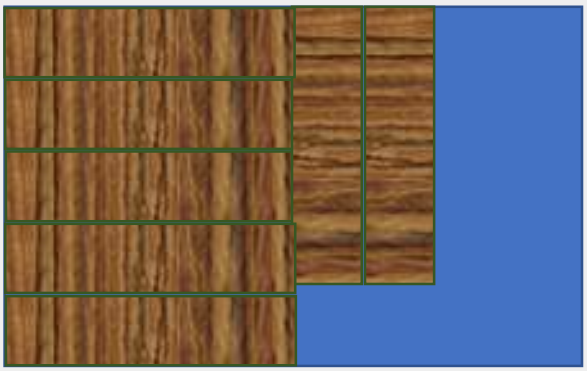
Encourage children to think of /plan how they are going to approach this. Children may want to recreate this with actual large paper/fabric and measure it out to help them to see visually. Some children may want to create images on a reduced scale to help them to investigate.

Possible suggestions:

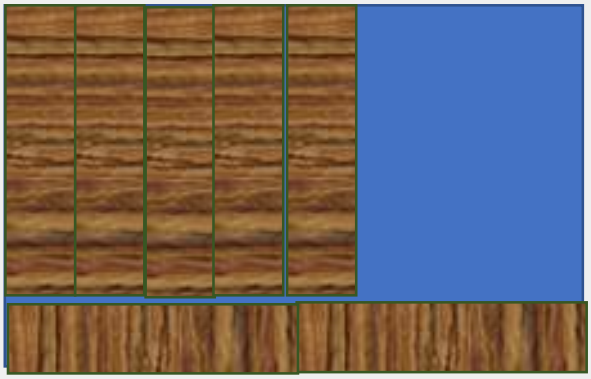


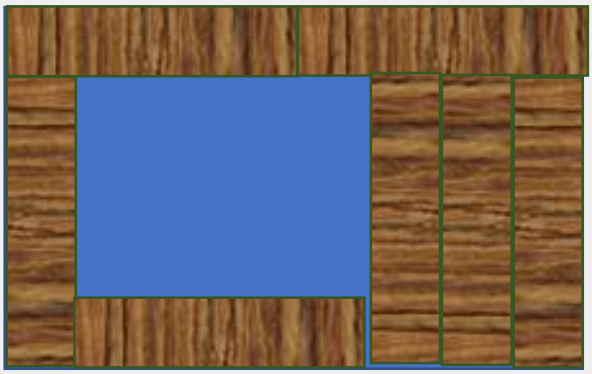
Long L shaped fabric. Could this be used again?

What is the area of this? How would you work it out?



What is the area of this? Which fabric wastage would be most useful to create something else?





What is the area of this? Which fabric wastage would be most useful to create something else?

Prove you have found the best way. What do you notice about the area of each fabric left? Why do you think this is? How did you select your final answer?

BRICKWORK Mathematics

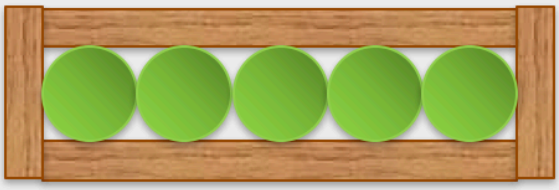
Mastery 1

Larger Problem Solving

Samantha has one piece of wood that she would like to use to make the edge of a tray to hold some apples.

1 metre

The apples she buys have the approximate diameter of 10cm. What measurements does Samantha need to cut the wood to make a quadrilateral based tray, which holds the largest number of apples possible?



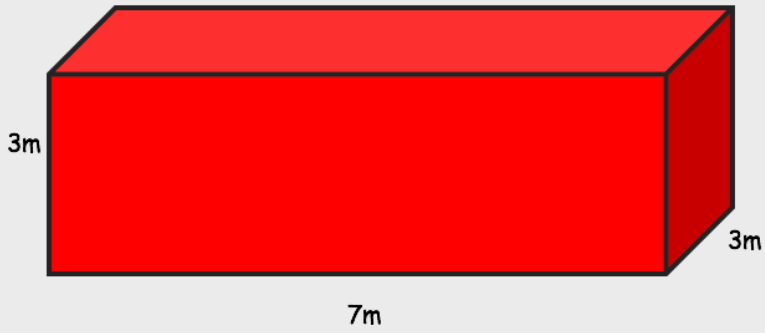
Discuss your ideas and plan how you might approach this problem.
Do you need any resources to help you investigate?
How are you going to record your findings?

BRICKWORK Mathematics

Mastery 2

Larger Problem Solving

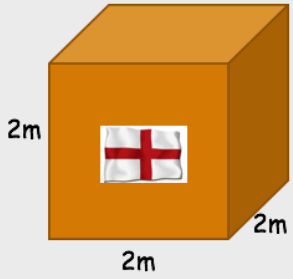
For the 2018 World Cup, England merchandise needs to be sent over to Russia. Here is the cargo container that it will be sent in:



There are boxes packed with different merchandise that need to be placed inside the cargo container.

8 boxes

6 boxes



5 boxes

Can all the boxes fit in to one cargo container?

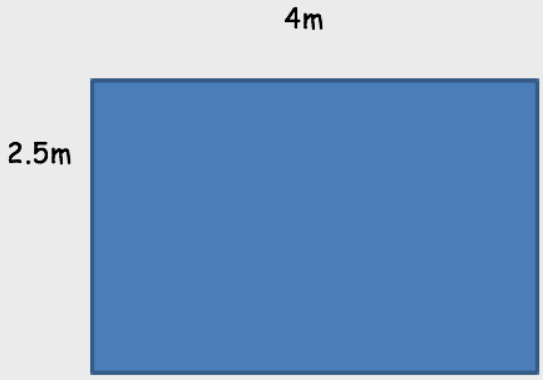
What is the best way to fit in the most number of boxes?

BRICKWORK Mathematics

Mastery 3

Larger Problem Solving

Sophie is having a party. She has one large piece of fabric that she wants to cut up to cover all the tables.



Here is each table:

Sophie has 7 tables to cover. Prove to her that she has enough fabric.

Challenge: How is she best to cut the fabric to reduce wastage so that the left-over fabric could be used again?