BOWLAND MATHS
Assessment Tasks

Smoothie Box

Task description

Pupils measure a bottle and then design a box that will hold 12 of them.

Suitability National Curriculum levels 6 to 7

Time 30 minutes to 1 hour

Resources Ruler, pencil, and paper; scissors available (if requested by pupils)

Key Processes involved

- **Representing:** Identify the significant parts of the bottle to measure and formulate a suitable box design.
- **Analysing:** Translate the appropriate measurements to a net.
- **Interpreting and evaluating**: After designing the net, imagine it folded
- **Communicating and reflecting**: Draw the box design clearly and label it well

Teacher guidance

Check that pupils understand the context, for example, you could bring in a bottle to help them visualise the problem. It may also be helpful to have some rectangular boxes folded from nets. Comments could be as follows:

- *The diagrams on your sheet show two views of the bottle drawn accurately full size*
- *The left hand diagram shows a view of the bottle from the top.*
- *What is the diameter of the cap?*
- *The diagram shows the bottle from one side. Why is there no diagram of the bottle from another side?*
- *What is a net?*

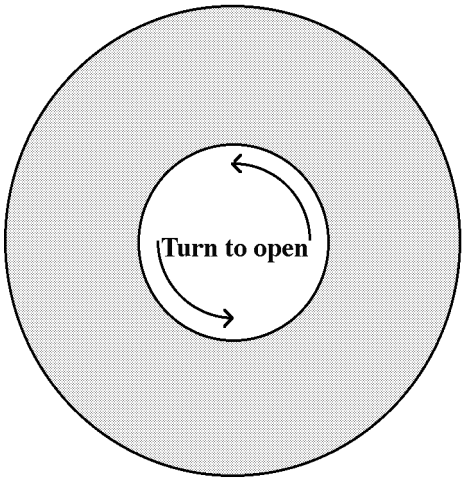
Pupils can tackle this task in different ways, but they might be expected to:

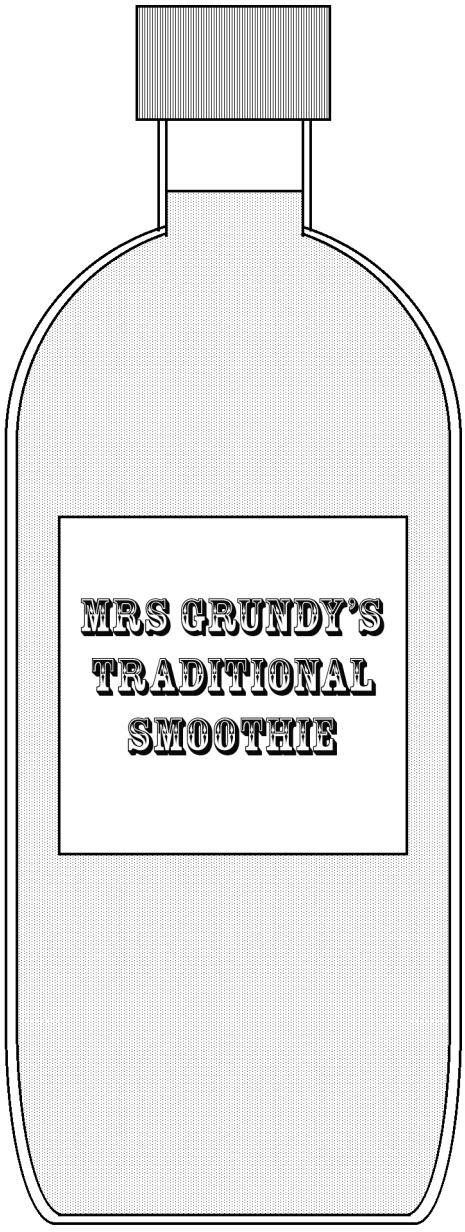
- *recognise and use common 2D representations of 3D objects*

Smoothie Box

Mrs. Grundy wants to pack her special home-made smoothies into boxes. The pictures show the top and side views of the bottles. They are drawn accurately and full size.

Top View





Side view

Design a net for a box that will hold **twelve** of these bottles. It should be a tight fit, so the bottles do not rattle about, and it also needs a lid.

You do not need to draw the net accurately, but label it to show all the measurements.

Assessment guidance

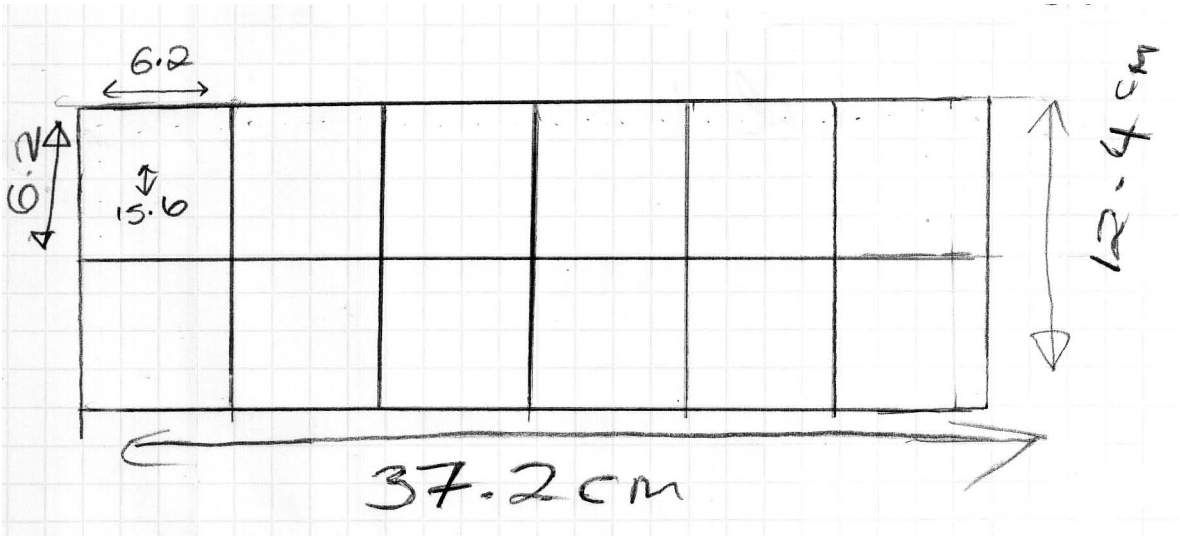
Progression in Key Processes

PROGRESSION

Representing	Analysing	Interpreting and evaluating	Communicating and reflecting
Choices about what to measure and to draw	Appropriateness and completeness of measurements made and transferred to box design	Quality of visualisation in two and three dimensions	Completeness and clarity of drawing including labels
Draws a simple view of the box from the side or top Pupil A	Takes measurements of the bottle and transfers some of them e.g. to a plan view Pupil A	Visualises the box from the top or side Pupil A	Draws a simple diagram with some measurements added Pupil A
Identifies the parts of the bottle to measure and formulates some of the parts of a box design e.g. plan and side view Pupil B	Transfers most of the measurements to a net e.g. to top and side view Pupil B	Visualises the box from the top and side Pupil B	Draws and labels a diagram but not a complete net Pupil B
Identifies the parts of the bottle to measure and formulates most of the box design (eg may omit the lid) Pupil C	Translates the appropriate measurements to a net, but with one or more wrong sizes Pupil C	Net design suggests that it was not visualised folded - and may be missing a part such as a lid Pupil C	Draws and labels a net, but not complete Pupil C
Identifies all the parts of the bottle to measure and formulates a suitable net for the box Pupil D	Translates the appropriate measurements to the net for the box Pupil D	After designing the net, imagines it folded as a box Pupil D	Completes a drawing of the net which is well labelled Pupil D

Sample responses

Pupil A



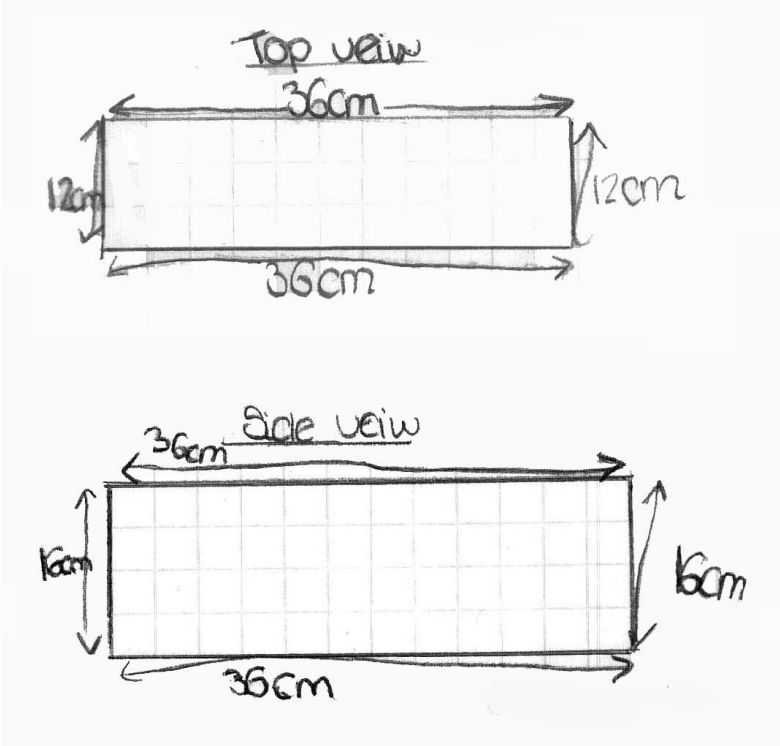
Comments

Pupil A has drawn a plan view of a suitable box. The measurements on the plan show that she has correctly measured the bottle. She does not attempt to draw a net.

Probing questions and feedback

- *Look at one of the boxes I have brought in. How many sides does the box have?*
- *Now unfold the box so that it lies flat. How many different sides does it have?*
- *Imagine a box that can hold 12 bottles. Which part of the net have you drawn? Now draw the other parts of the box to complete your net.*

Pupil B



Comments

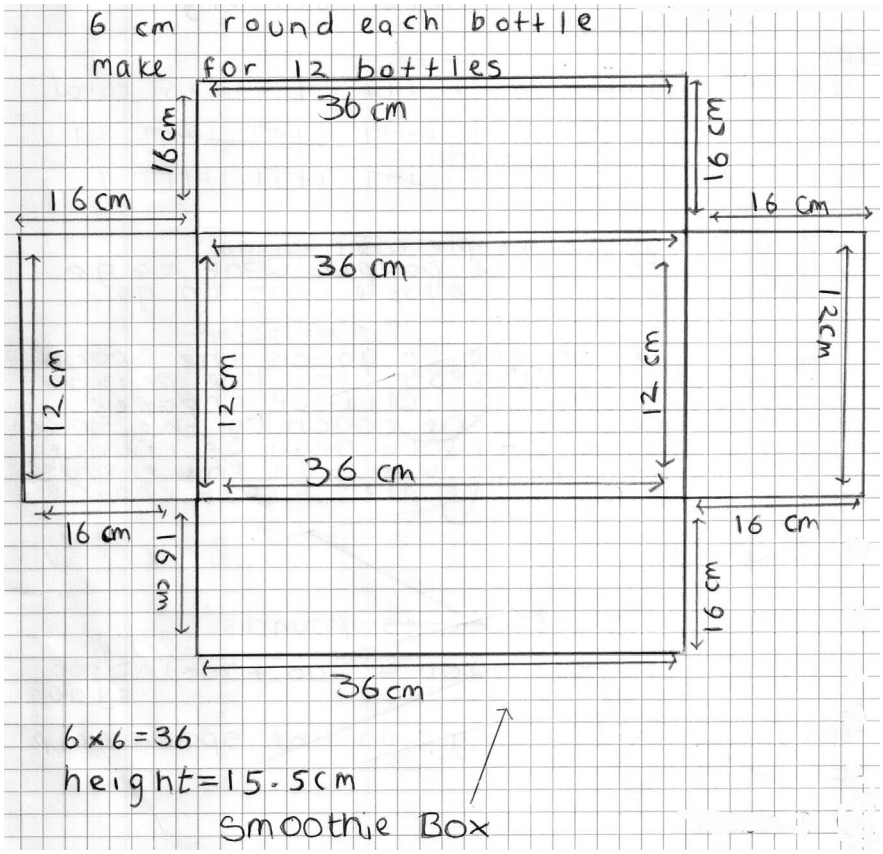
From the measurements of the top view and the side view, we can see that Pupil B has correctly measured the diagram of the bottle. She does not attempt to draw a net.

Probing questions and feedback

- *Imagine a box with the top view and side view you have drawn. How many more sides do you need to draw to complete the net?*
- *How many **different** sides does a box have?*

This pupil would benefit from unfolding a box so that she can see that the net of a box consists of six rectangles.

Pupil C



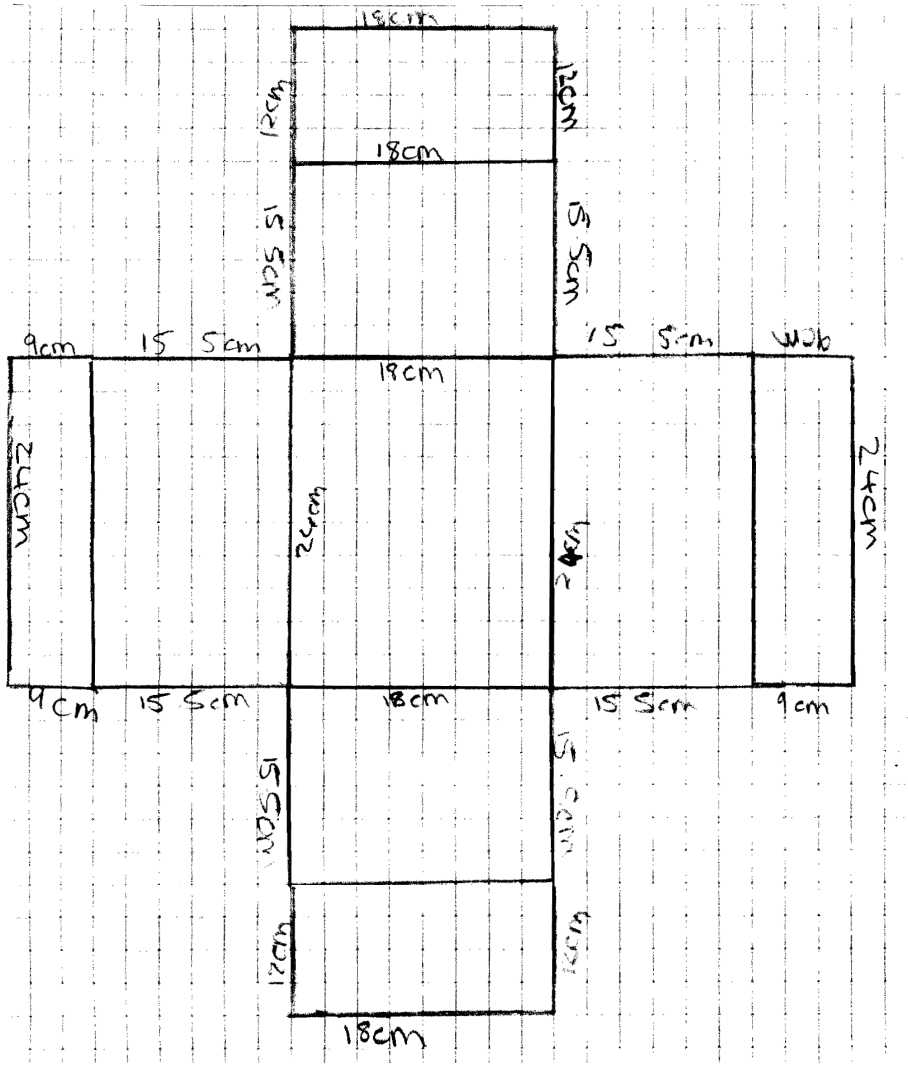
Comments

From his net of an open box, we can see that Pupil C has correctly measured the diagram of the bottle. He has arranged the bottles in a 2 by 6 array, but his box does not have a lid.

Probing questions and feedback

- *Imagine your net folded. Is there a bit missing? What must be added to the net to complete it?*
- *What other arrangement of bottles could you have used?*
- *Would this use more or less material?*

Pupil D



Comments

This pupil's net of a closed box, shows that Pupil D has correctly measured the bottle. His closed box has two tops; one overlaps the other. He has arranged the bottles in a 3 by 4 array. His diagram clearly shows the dimensions of his net.

Probing questions and feedback

- *If the box needed flaps so that it could be glued together, where would you put the flaps on the net?*
- *Would more or less material be needed for an array of 2 by 6 bottles?*