Investigating Cuboids Checklist

Name: ________________

By the end of the lesson you should have completed:

- ☐ Accurately construct a 1 by 2 by 3 cuboid on dotty paper.
  (follow the instructions)
- ☐ Find the volume of this 1 by 2 by 3 cuboid.
  (total number of cubes required to fill it, or use $L \times W \times H$)
- ☐ Draw the plan view, side elevation and front elevation of this 1 by 2 by 3 cuboid on squared paper.
  (plan view is the view from directly above, side elevation looking from one side, front elevation from right in front)
- ☐ Use your three views to calculate the surface area.
  (total number of squares required to cover it, or find the area of all six faces: top, bottom, front, back, left, right)

Repeat the process with a 2 by 3 by 4 cuboid:

- ☐ 3D diagram on dotty paper
- ☐ Volume
- ☐ Plan view, side elevation, front elevation on squared paper
- ☐ Surface Area

- ☐ Work out how much bigger the volume is for this one.
  (Divide the volume of this cuboid by your first one)
- ☐ Work out how much bigger the surface area is for this one.
  (Do you notice anything strange compared to the volume?)

Investigating Cuboids Notes & Calculations

Use this space to list your results or calculations:

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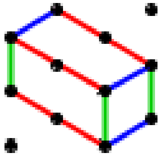


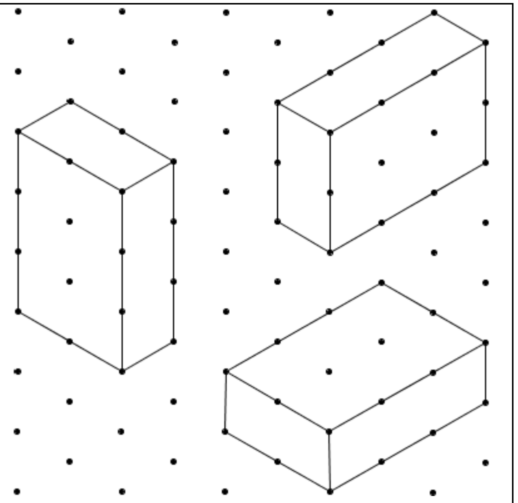
Investigating Cuboids SOLUTIONS

The **1 by 2 by 3 cuboid** should look something like one of these:

(there are a few different ways you could draw this.)

Volume: $1 \times 2 \times 3 = \mathbf{6cm^3}$

(2 layers of 3 rows of 1, or 3 layers of 1 row of 2, etc)



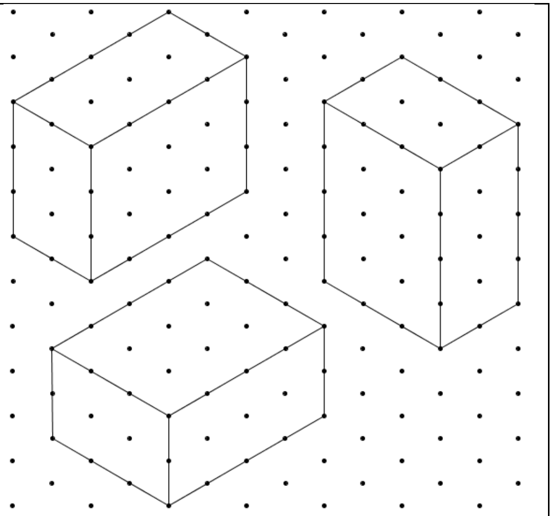
The **2 by 3 by 4** cuboid should look something like one of these:

Volume:

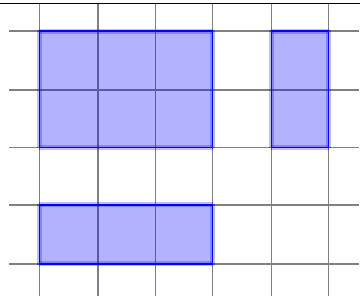
$2 \times 3 \times 4 = \mathbf{24cm^3}$

(2 layers of 3 rows of 4, or 3 layers of 4 rows of 2, etc)

That's 4 times the volume of the smaller one.



The **1 by 2 by 3** plan view, side elevation and front elevation:



Note: if your 3-D shape is oriented differently, 'plan' may change into 'front', etc. However, you should still have these 3 shapes.

These three faces have a total area of:

$$(2 \times 3) + (2 \times 1) + (3 \times 1) = 11cm^2$$

Since the cuboid has another three faces (the opposite ones):

$$Surface\ Area = 2 \times 11 = \mathbf{22cm^2}$$

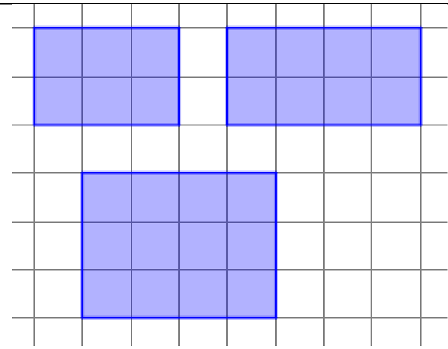
The **2 by 3 by 4** plan view, side elevation and front elevation:

Total area of these three:

$$6 + 8 + 12 = 26cm^2$$

$$Total\ SA = 2 \times 26 = \mathbf{52cm^2}$$

That's about 2.4 times the surface area of the smaller one.



Imagine stacking four of the smaller cuboids together. *Wherever the shapes join, you can leave out the two joining faces, so you save on surface area.*

In this case, we save six 2 by 3 faces; a total of $36cm^2$, compared to having four separate cuboids. The surface area of the stack is $56cm^2$ instead of $88cm^2$.