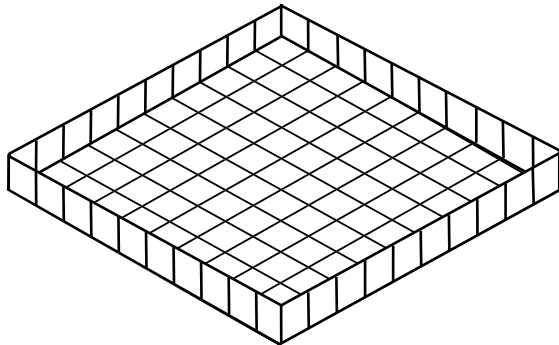
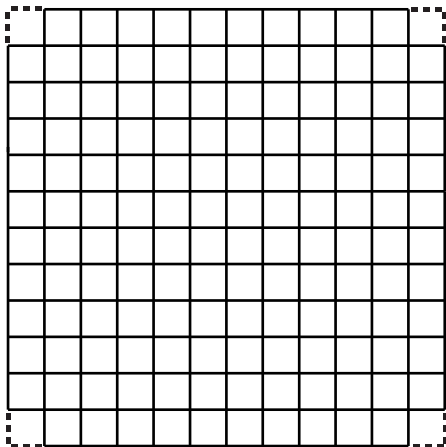
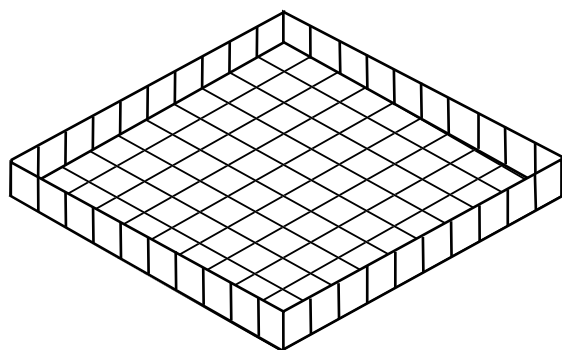


<b>Roomy boxes</b>	<b>Skills practised:</b>	
<i>Children cut squares from a square piece of paper, fold up the sides to form an open cuboid and find out which size will hold the most <math>\text{cm}^3</math> cubes.</i>	<ul style="list-style-type: none"><li>• Finding volumes of cuboids</li><li>• Multiplying three numbers together</li><li>• Recording results in a table</li></ul>	
<p><b>Conjecture:</b> <i>The cuboid which will hold the greatest volume by taking squares out of the corner of a square piece of paper and folding the resulting net, will be an open cube.</i></p> <p><i>(Note to teachers: This is actually false! Your children might like to prove it to be wrong!)</i></p>		
<b>What to do:</b>		
<i>Children work individually or in pairs.</i>		
<ol style="list-style-type: none"><li>1. Cut out a 12cm by 12cm square from a sheet of <math>\text{cm}^2</math> paper.</li><li>2. Cut a square centimetre from each corner.</li></ol>		
<div></div>		
<ol style="list-style-type: none"><li>3. Now fold it to form an open cuboid.</li><li>4. Work out how many <math>1\text{cm}^3</math> cubes this box could hold.</li><li>5. Now cut a larger square from each corner so that the missing piece is a 2cm by 2cm square. Fold the sides up again to form an open cuboid. Work out how many <math>1\text{cm}^3</math> cubes this box could hold.</li><li>6. Repeat, so that this time the missing piece from each corner is a 3cm by 3cm square.</li><li>7. Keep on going. Record your results in a table.</li><li>8. Which box could hold the greatest number of <math>1\text{cm}^3</math> cubes?</li></ol>		
<p>Try starting with other size squares, e.g. 15cm by 15cm and then 20cm by 20cm. Can you predict which cuboid will hold the greatest volume of <math>1\text{cm}^3</math> cubes? Instead of cutting squares out with whole number of cm sides, you could try cutting out squares with lengths, <math>\frac{1}{2}\text{cm}</math>, <math>1\text{cm}</math>, <math>1\frac{1}{2}\text{cm}</math>, <math>2\text{cm}</math>, <math>2\frac{1}{2}\text{cm}</math>... You might like to draw line graphs to show your results, with the height of the cuboid on the x-axis and the column on the y-axis. Before you do, what shape you think the line graph will be?</p>		
<b>Aim:</b> <ul style="list-style-type: none"><li>– To make and test predictions</li><li>– To decide how best to records results</li></ul>	<b>Minimum number of calculations expected</b> 12	

$$\angle + ? = \times \text{cm}^3 \frac{1}{2} \div \pounds \frac{1}{3} > \text{m}^2 + \% < \frac{5}{6} - \text{cm} ? \times \div \frac{1}{3}$$

- $$\begin{array}{c} \times \\ m^2 \\ \wedge \\ \frac{1}{3} \\ \text{E} \\ \div \\ \frac{1}{2} \\ cm^3 \\ \times \\ = \\ \div \\ \times \\ ? \\ cm \\ - \\ \frac{5}{6} \\ \vee \\ \% \\ + \\ m^2 \\ \wedge \\ \frac{1}{2} \\ \text{E} \\ \div \\ \frac{1}{2} \\ cm^3 \\ \times \\ = \\ ? \end{array}$$

[illegible]

3. Work out how many  $1\text{cm}^3$  cubes this box could hold.
4. Now cut a larger square from each corner so that the missing pieces are  $2\text{cm}$  by  $2\text{cm}$  square. Fold the sides up again to form an open cuboid. Work out how many  $1\text{cm}^3$  cubes this box could hold.
5. Repeat, so that this time the missing piece from each corner is a  $3\text{cm}$  by  $3\text{cm}$  square.
6. Keep on going. Record your results in a table.
7. Which box holds the greatest number of  $1\text{cm}^3$  cubes?

Try starting with different size squares, e.g. 15cm by 15cm and then 20cm by 20cm. Can you predict which cuboid will hold the greatest volume of  $1\text{cm}^3$  cubes? Instead of cutting squares out with whole number of cm sides, you could try cutting out squares with lengths,  $\frac{1}{2}\text{cm}$ ,  $1\text{cm}$ ,  $1\frac{1}{2}\text{cm}$ ,  $2\text{cm}$ ,  $2\frac{1}{2}\text{cm}$  and so on. Draw line graphs to show your results, with the height of the cuboid on the x-axis and the volume on the y-axis. Before you do, what shape do you think line graph will be?