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**Step 1:** Cl the following li download for PC/ Mac (or se ch 'Ado Acro t Re r' on Go e Pla r the A S re). Open the down ded file and A bat Re r all aut tically. the best experienc ve recommend us PC/Ma

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**Remember:** Saving your PDF will overwrite the original file, so be sure to create a copy before starting if you wish to keep a blank copy of the resource on your device.

We hope you have found this information useful. If you experience any problems in following the instructions above, please contact the Beyond team at and we will do our best to help with your query.

# Surface Area of Cubes and Cuboids

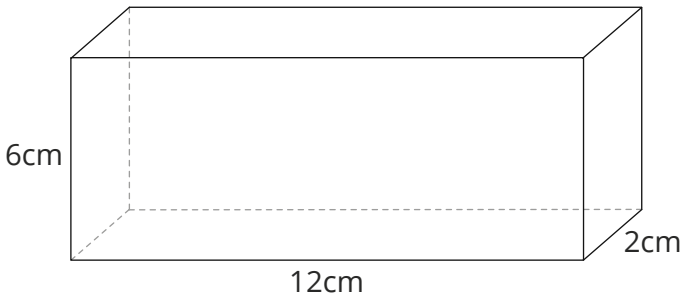
**Prior Knowledge:**

- How to calculate the area of 2D shapes.
- Be able to count and identify the faces of a cube and cuboid.
- Convert between metric units of measure for length.

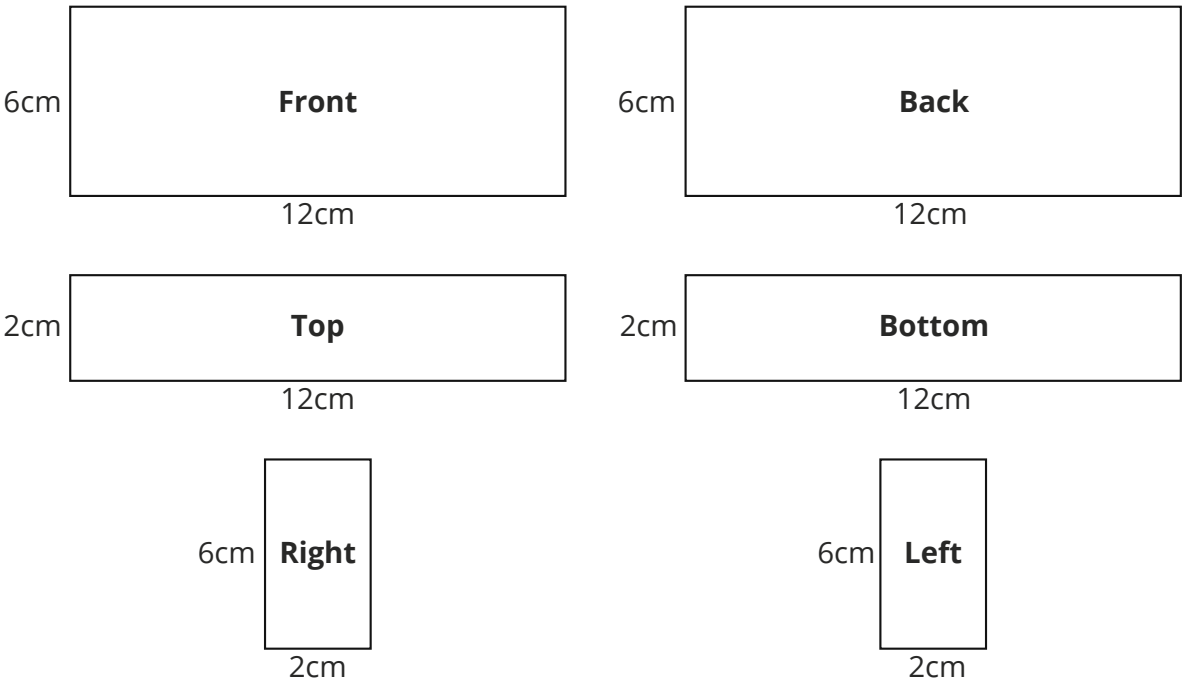
The surface area of a 3D object is the **total area** of the surfaces of that object. Like other areas, it is measured in square units (for example, $m^2$, $cm^2$). We find the surface area of an object by adding together the areas of each of its faces. We can think of finding the surface area of a solid as finding the area of its net (the net being the 3D shape folded out flat).

**Example 1**

**Find the total surface area of the following shape.**

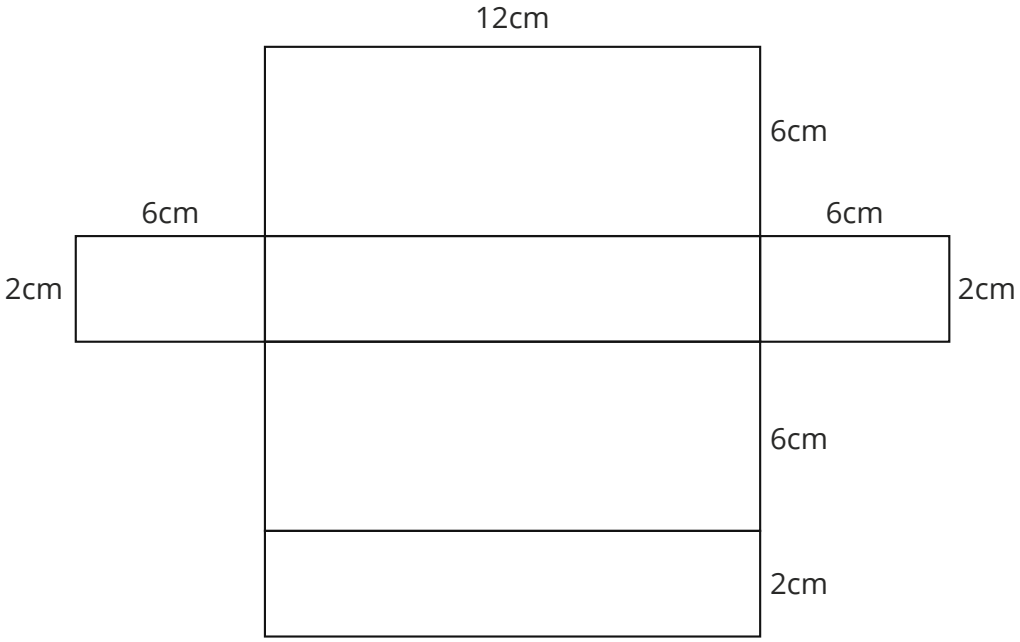



There are 6 faces to a cuboid. Begin by drawing/sketching these out. It can be challenging to picture all the faces, so it may help to label the sides to make sure you get them all:

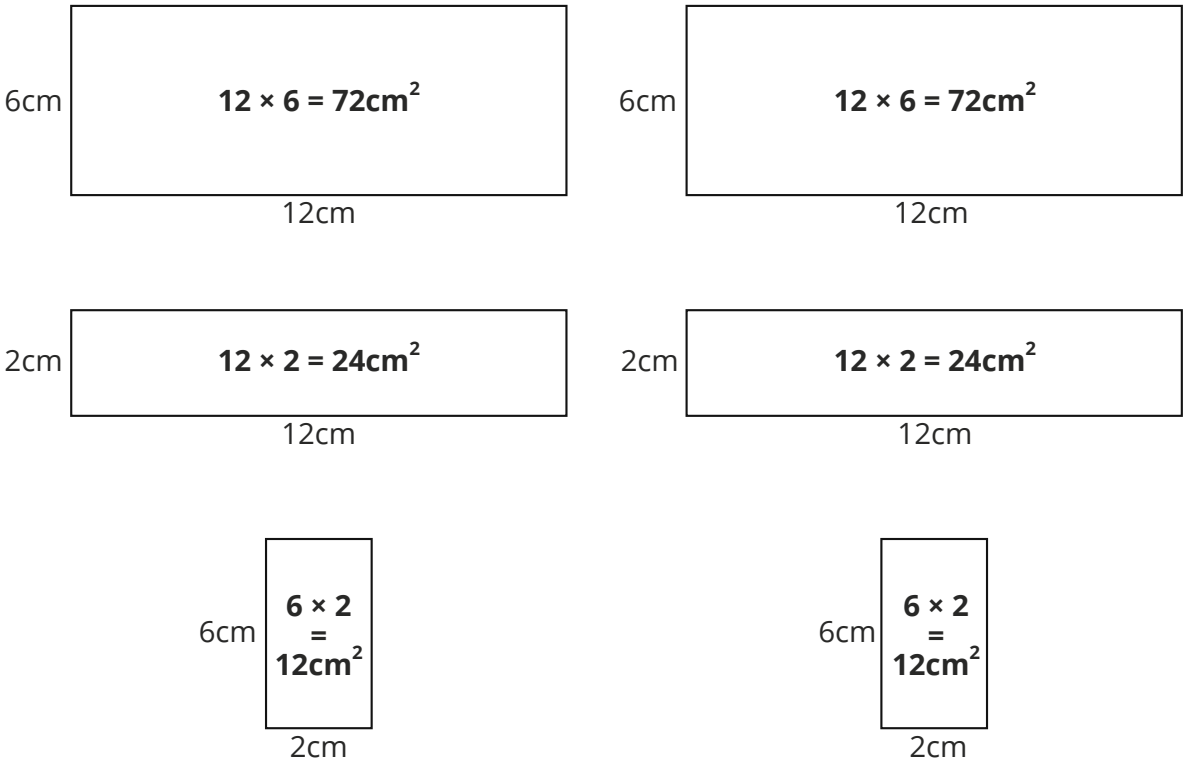



Notice that the faces are in pairs – the area of the front is the same as the area of the back, etc. In an image of a cuboid you will only be able to see one out of each pair.

Alternatively, you could sketch out the net of the cuboid:




However you choose to start, we now calculate the area of each face.

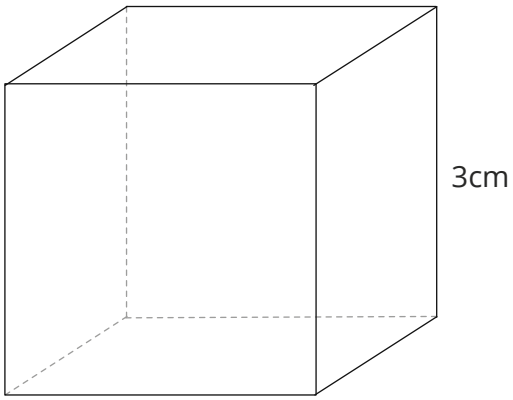



Finally, to find the total surface area, add together the area of each individual face.

$72 + 72 + 24 + 24 + 12 + 12 = 216\text{cm}^2$.

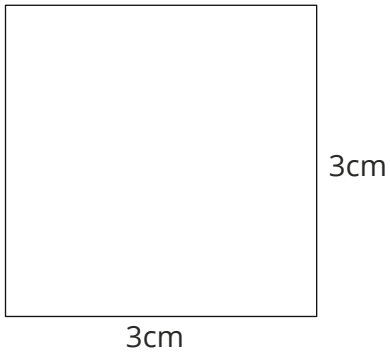
**Example 2**

**Calculate the total surface area of the cube.**




The faces of a cube are congruent. This means that all the faces have the same size and it makes working out the surface area of the cube relatively simple.

Each face on the cube in the example has the following measurements:




The area of one face is $3 \times 3 = 9\text{cm}^2$.

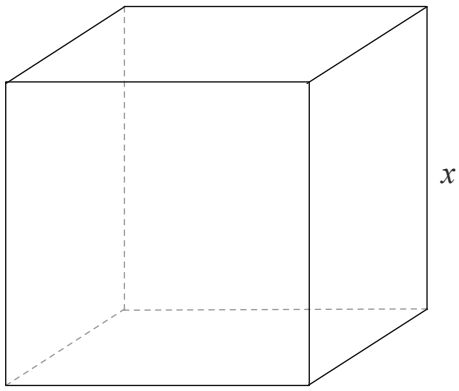
As the faces are congruent, we can simply multiply $9\text{cm}^2$ by 6 (as a cube has 6 faces).

$9 \times 6 = 54$

The total surface area of the cube is $54\text{cm}^2$.

**Example 3**

**If the cube has a surface area of $150\text{cm}^2$, find the value of $x$.**




This time, we have been given the total surface area and are being asked to find the height. We have been told that this is a cube, so we know that the length of each side is going to be the same.

We can begin by dividing $150\text{cm}^2$ by 6 (as there are 6 congruent faces to the cube):

$150 \div 6 = 25\text{cm}^2$

So, each individual face has an area of $25\text{cm}^2$.

As the shape is a cube, each of its faces is a square. This means that we can square root the area to find the length of the sides.

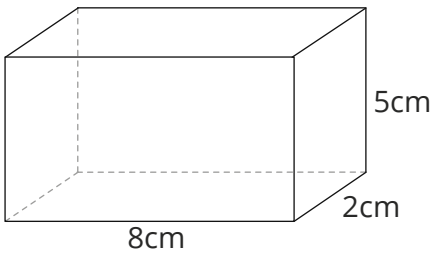
$\sqrt{25} = 5$

$x = 5\text{cm}$

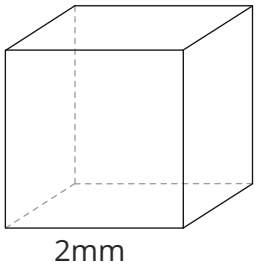
## Your Turn

1. For each question, calculate the total surface area.

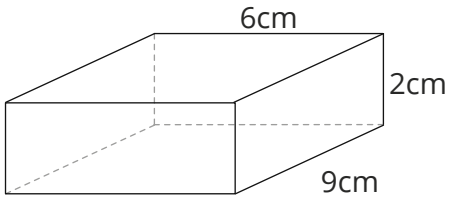
a.



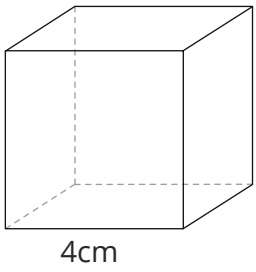

b.



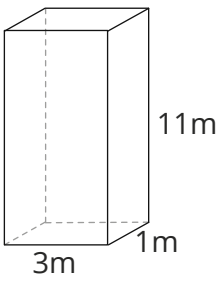

c.




d.



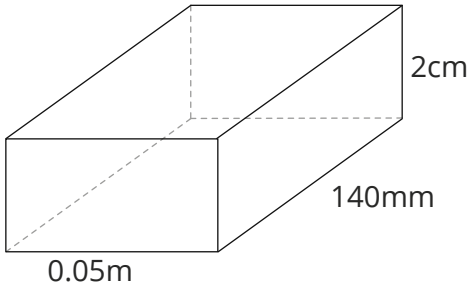

e.



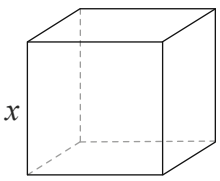
2. Calculate the total surface area of a cube with a side length of 11cm.

3. Calculate the total surface area of a cube with a side length of $\frac{1}{2}$cm.

4. Find the total surface area of the shape, giving your answer in square centimetres.




5. If the cube has a surface area of 54cm$^2$, find the value of $x$.




**Challenge**

A cube has a volume of 1000cm$^3$. Calculate its total surface area.

# Surface Area of Cubes and Cuboids

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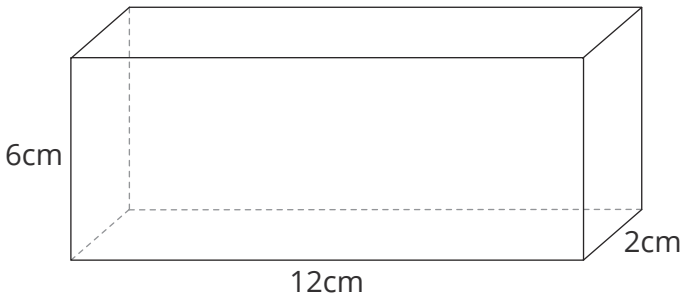


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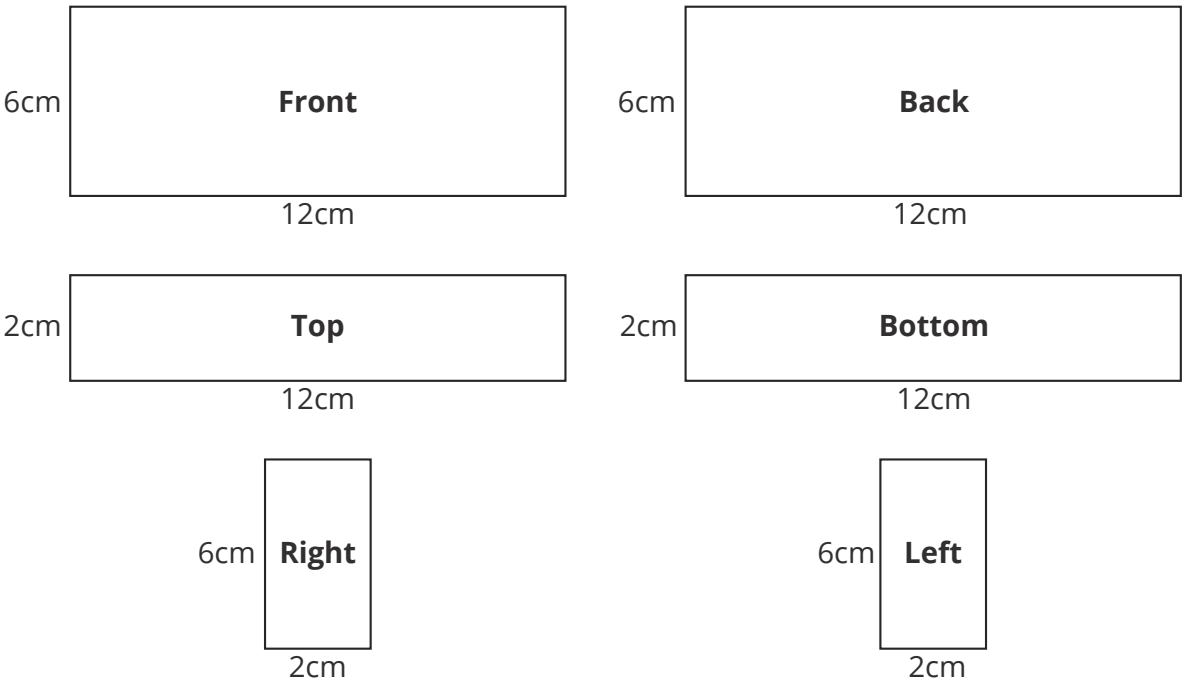


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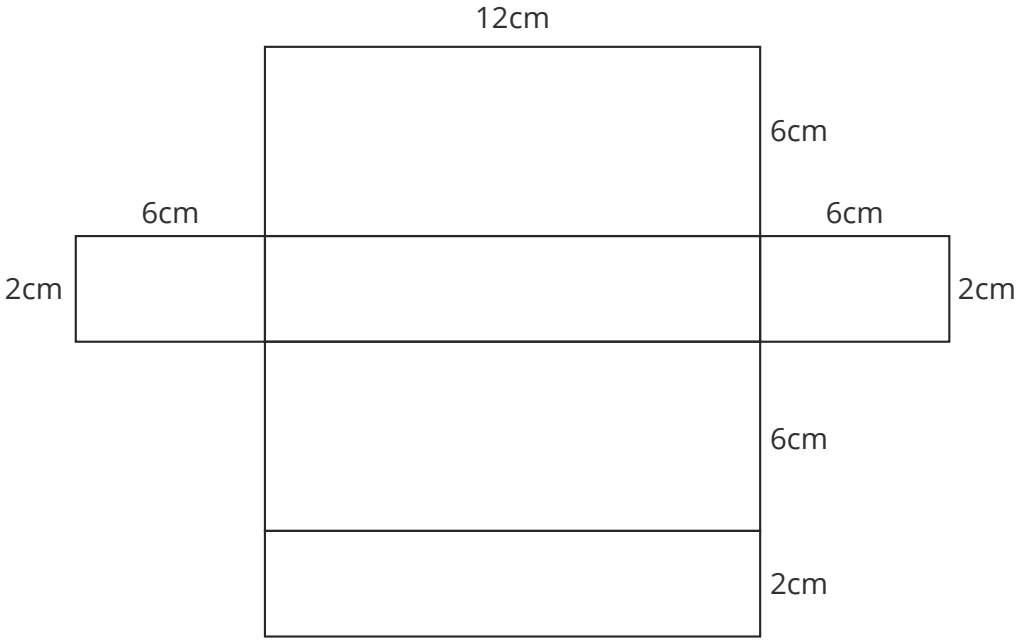


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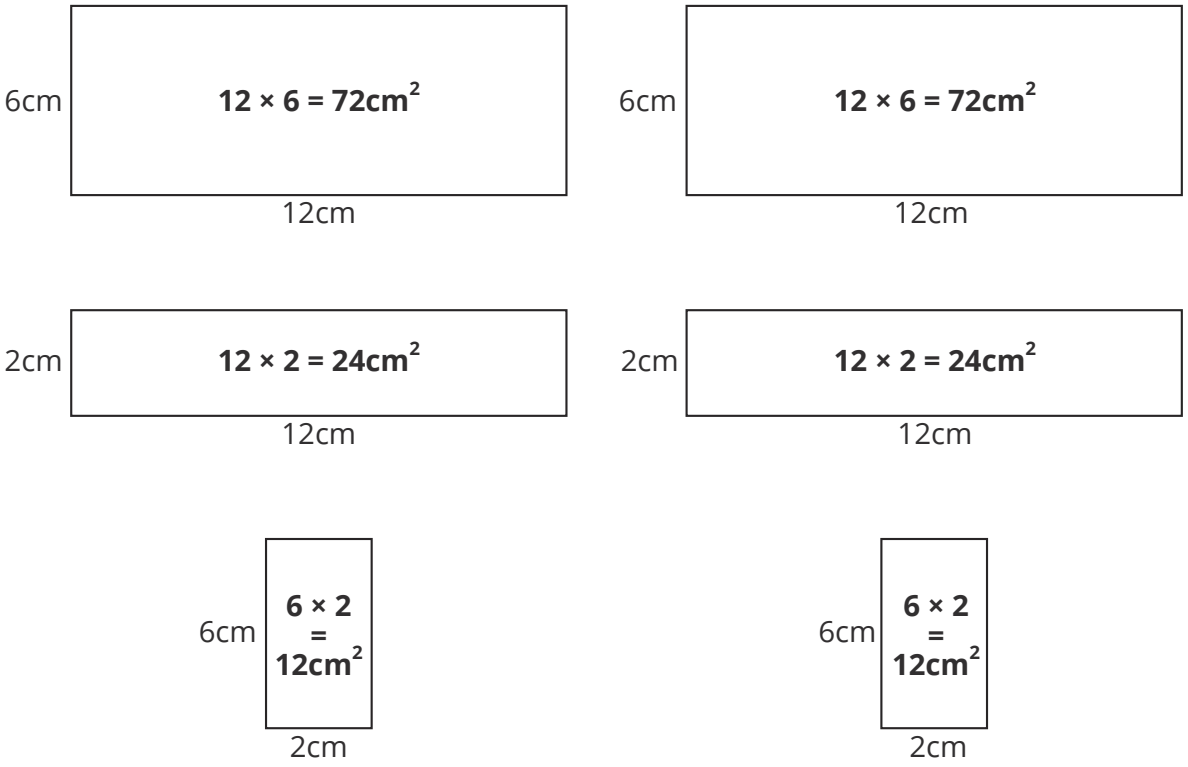


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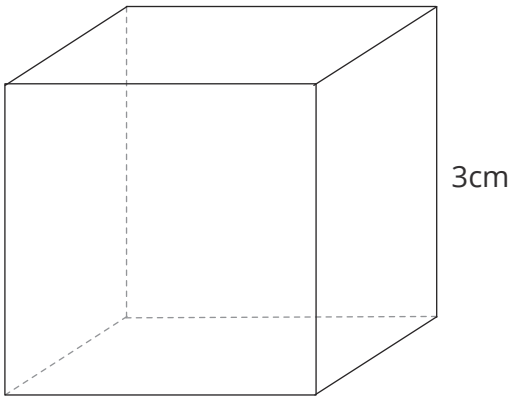
**Example 2**

**Calculate the total surface area of the cube.**

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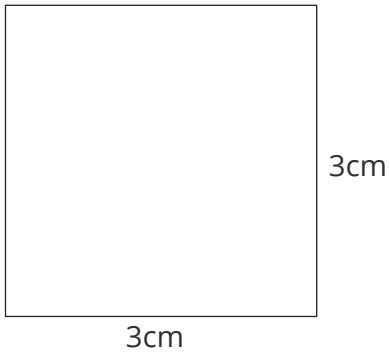


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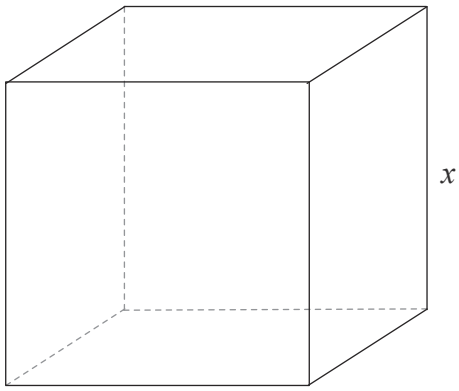
**Example 3**

**If the cube has a surface area of $150\text{cm}^2$, find the value of $x$.**

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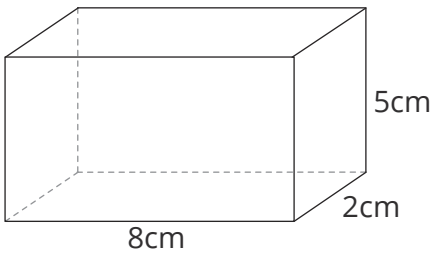
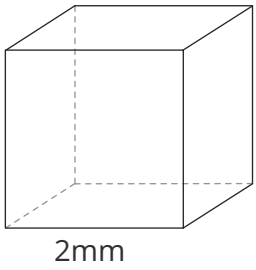
## Your Turn

1. For each question, calculate the total surface area.

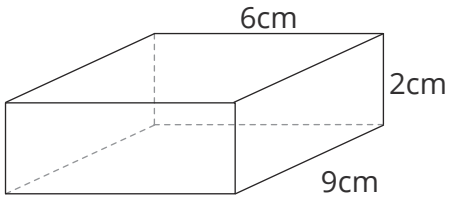
a.



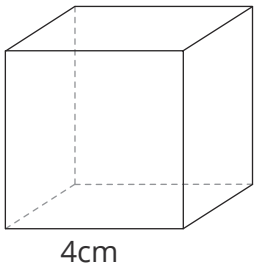

b.



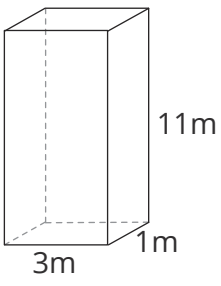

c.




d.



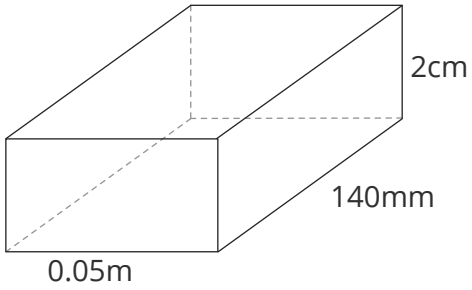

e.



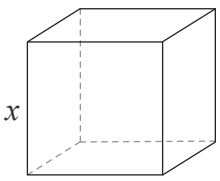
2. Calculate the total surface area of a cube with a side length of 11cm.

3. Calculate the total surface area of a cube with a side length of $\frac{1}{2}$cm.

4. Find the total surface area of the shape, giving your answer in square centimetres.




5. If the cube has a surface area of 54cm$^2$, find the value of $x$.




**Challenge**

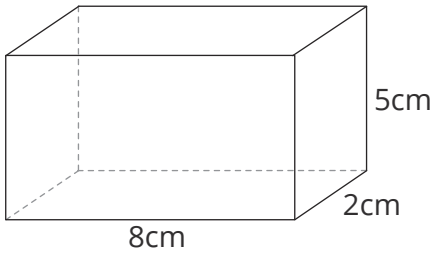
A cube has a volume of 1000cm$^3$. Calculate its total surface area.

# Surface Area of Cubes and Cuboids **Answers**

## Your Turn

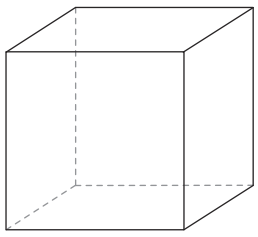
1. For each question, calculate the total surface area.

a.



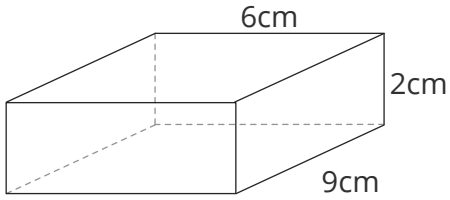

**8 × 5 = 40cm²**
**8 × 5 = 40cm²**
**8 × 2 = 16cm²**
**8 × 2 = 16cm²**
**5 × 2 = 10cm²**
**5 × 2 = 10cm²**
**40 + 40 + 16 + 16 + 10 + 10 = 132cm²**

b.



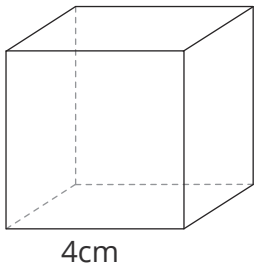

**2 × 2 × 6 = 24mm²**

c.



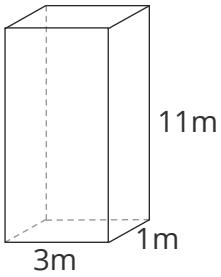

**6 × 2 = 12cm²**
**6 × 2 = 12cm²**
**9 × 2 = 18cm²**
**9 × 2 = 18cm²**
**6 × 9 = 54cm²**
**6 × 9 = 54cm²**
**12 + 12 + 18 + 18 + 54 + 54 = 168cm²**

d.




**4 × 4 × 6 = 96cm²**

e.




**3 × 11 = 33m²**
**3 × 11 = 33m²**
**11 × 1 = 11m²**
**11 × 1 = 11m²**
**3 × 1 = 3m²**
**3 × 1 = 3m²**
**33 + 33 + 11 + 11 + 3 + 3 = 94m²**

2. Calculate the total surface area of a cube with a side length of 11cm.

   **$11 \times 11 \times 6 = 726\text{cm}^2$**

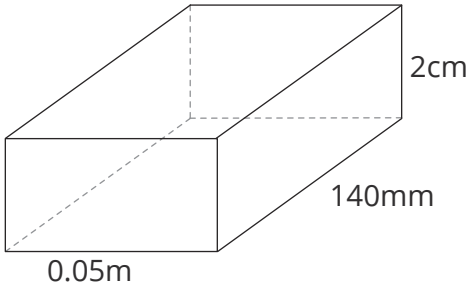
3. Calculate the total surface area of a cube with a side length of $\frac{1}{2}$cm.

   **$0.5 \times 0.5 \times 6 = 1.5\text{cm}^2$**

   **Or**

   **$\frac{1}{2} \times \frac{1}{2} \times 6 = \frac{3}{2}\text{cm}^2$ or $1\frac{1}{2}\text{cm}^2$**

4. Find the total surface area of the shape, giving your answer in square centimetres.




**140mm = 14cm**

**0.05m = 5cm**

**$14 \times 2 = 28\text{cm}^2$**

**$14 \times 2 = 28\text{cm}^2$**

**$14 \times 5 = 70\text{cm}^2$**

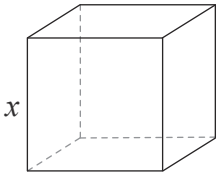
**$14 \times 5 = 70\text{cm}^2$**

**$5 \times 2 = 10\text{cm}^2$**

**$5 \times 2 = 10\text{cm}^2$**

**$28 + 28 + 70 + 70 + 10 + 10 = 216\text{cm}^2$**

5. If the cube has a surface area of 54cm$^2$, find the value of $x$.




**$54 \div 6 = 9\text{cm}^2$**

**$\sqrt{9} = 3$**

**$x = 3\text{cm}$**

**Challenge**

A cube has a volume of 1000cm$^3$. Calculate its total surface area.

**$\sqrt[3]{1000} = 10$**

**$10 \times 10 \times 6 = 600\text{cm}^2$**