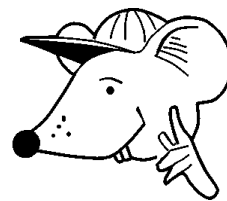


MATHEMATICS



N.S. Yr. 6 P.97

**Measure and calculate the perimeter
and area of simple shapes.**

Equipment

Paper, pencil, ruler.
Squared paper, dotty paper useful.

MathSphere

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Concepts

By year 6 children should have a secure understanding of the difference between perimeter and area. Many children can be confused as to the difference and will often work out area by measuring round a shape; misunderstanding the rule for calculating the area of a rectangle.

More complex shapes, or shapes which can be split into several rectangles, are also introduced, together with the surface area of boxes. With 3D shapes it is very helpful to have real objects handy to discuss the number of sides etc.

The area of right angled triangles is calculated by halving rectangles.

When giving answers it is still important to stress the need to write down what the unit of measurement is eg cm, m, cm^2 m^2 etc and not just to give a numerical answer.

There is an extension module on the circumference and area of circles.

Area of rectangles -revision

Remember that to find the area of a rectangle you can multiply the length by the width.

This can be written as $A = L \times W$ where A is the area, L the length and W the width.

Use this formula to work out the area of these rectangles:

1. A rectangle 6 cm long and 12 cm wide.
2. A rectangle 9 cm long and 15 cm wide.
3. A rectangle 20 cm long and 10 cm wide.
4. A 12 cm by 8 cm rectangle.
5. A 20 cm by 20 cm square.

When should a mouse carry
an umbrella?
When its raining cats and
dogs!



More problems to work out:

6. If the area of a rectangle is 300 sq cm and the length is 60 cm, what is the width of the rectangle.
7. If the area of a rectangle is 260 sq cm and the width is 13 cm, what is the length of the rectangle.
8. The width of a rectangle is 14 cm and the area is 252 sq cm. What is the length of the rectangle?

You may need to use trial and improvement to work these out:

9. A square has an area of 289 sq cm. What is the length of one side?
10. A square has an area of 196 sq cm. What is the length of one side?

Area of rectangles -revision

Remember that to find the area of a rectangle you can multiply the length by the width.

This can be written as $A = L \times W$ where A is the area, L the length and W the width.

Use this formula to work out the area of these rectangles:

1. A rectangle 8 cm long and 11 cm wide.
2. A rectangle 7 cm long and 20 cm wide.
3. A rectangle 30 cm long and 40 cm wide.
4. A 15 cm by 8 cm rectangle.
5. A 30 cm by 30 cm square.

Where does a general keep his armies?

Up his sleeves!



More problems to work out:

6. If the area of a rectangle is 400 sq cm and the width is 8 cm, what is the length of the rectangle.
7. If the area of a rectangle is 340 sq cm and the width is 17 cm, what is the length of the rectangle.
8. The width of a rectangle is 16 cm and the area is 304 sq cm. What is the length of the rectangle?

You may need to use trial and improvement to work these out:

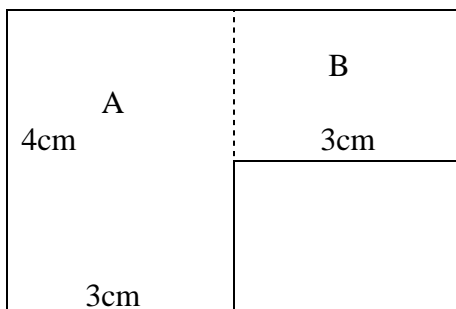
9. A square has an area of 324 cm^2 . What is the length of one side?
10. A square has an area of 576 cm^2 . What is the length of one side?

Finding the area of compound shapes



Sometimes shapes are made up of two or more rectangles. These shapes are known as compound or composite shapes.
 To find the area of a shape like this you need to divide it into rectangles.

Example:



2cm

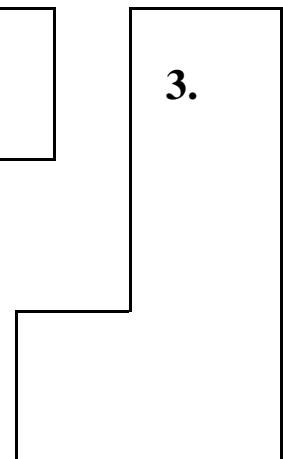
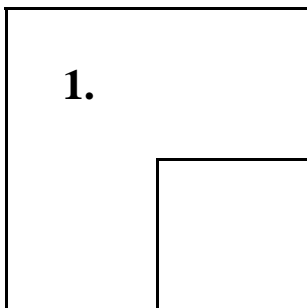
To find the area of this shape divide it into two rectangles.

$$\text{Area of rectangle A} = 3 \text{ cm} \times 4 \text{ cm} = 12 \text{ cm}^2$$

$$\text{Area of rectangle B} = 3 \text{ cm} \times 2 \text{ cm} = 6 \text{ cm}^2$$

$$\text{Total area} = 12 \text{ cm}^2 + 6 \text{ cm}^2 = 18 \text{ cm}^2$$

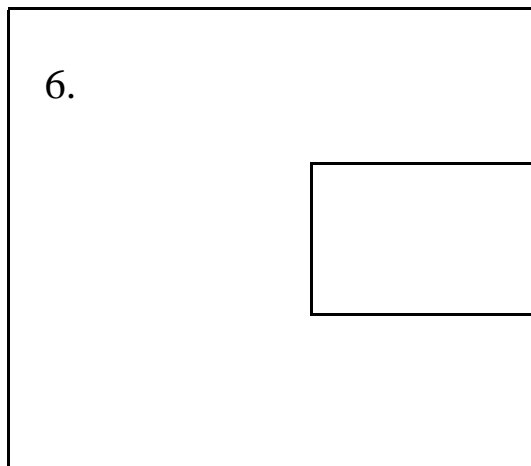
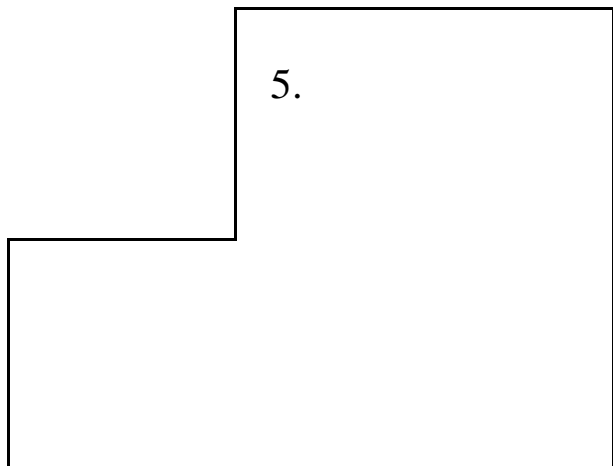
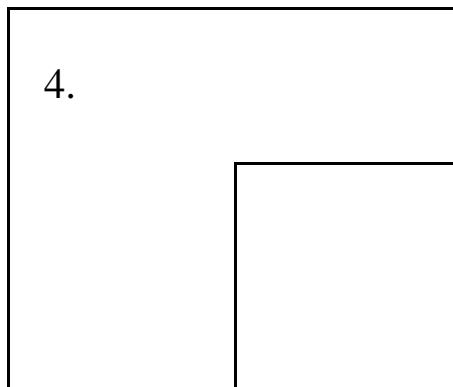
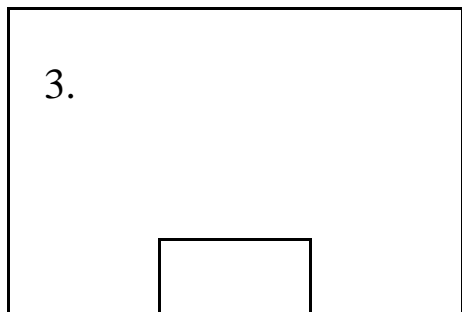
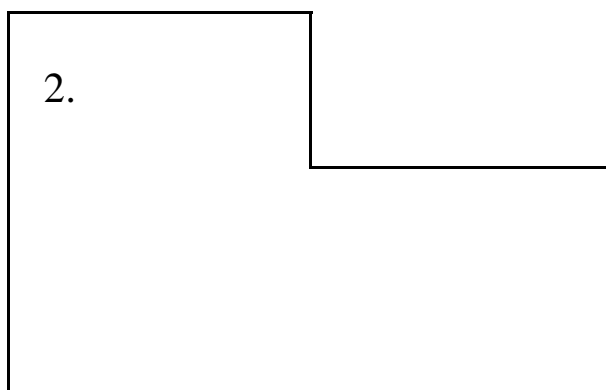
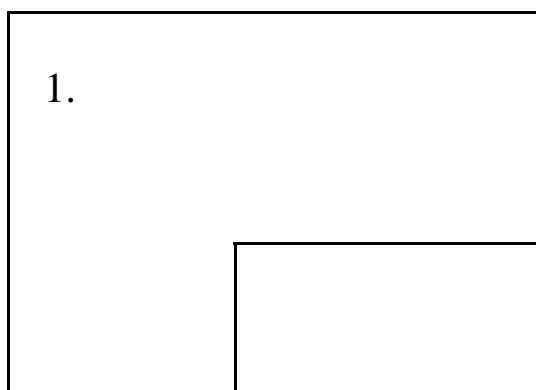
Try to find the area of these shapes; you will need to measure the lines:



Area of compound shapes



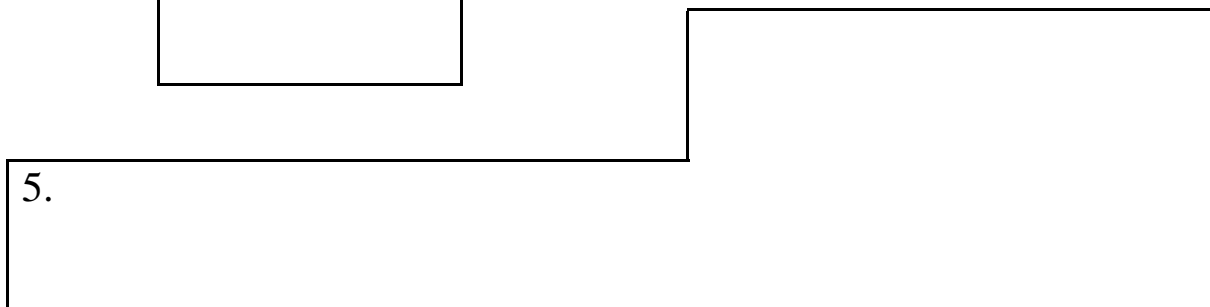
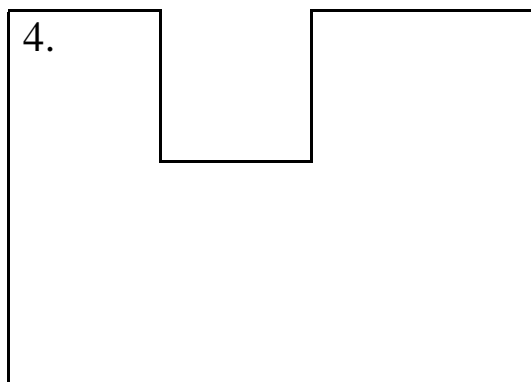
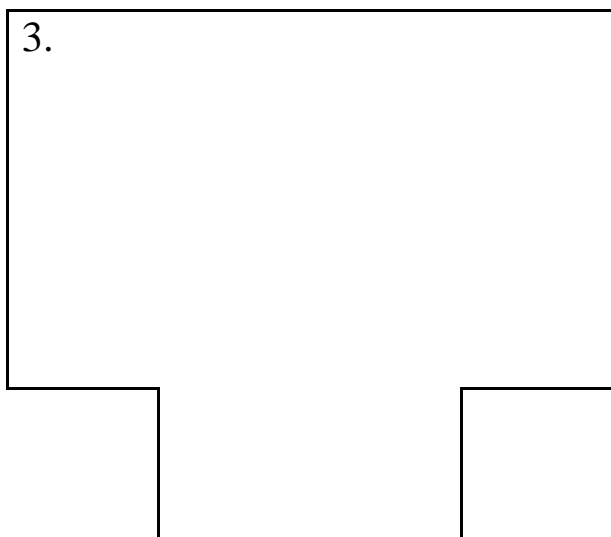
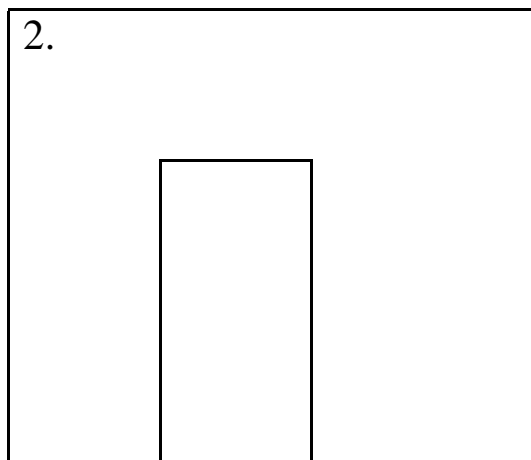
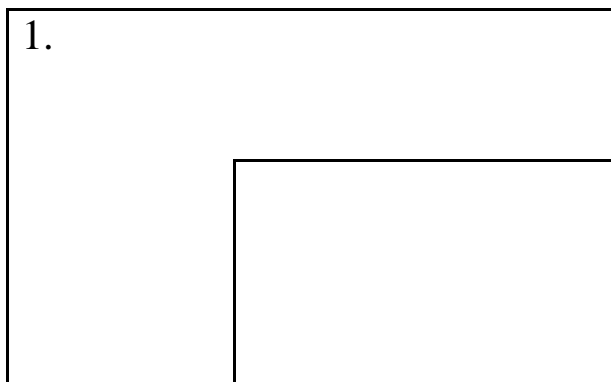
Find the area of these compound shapes.
Measure lines to nearest whole cm.



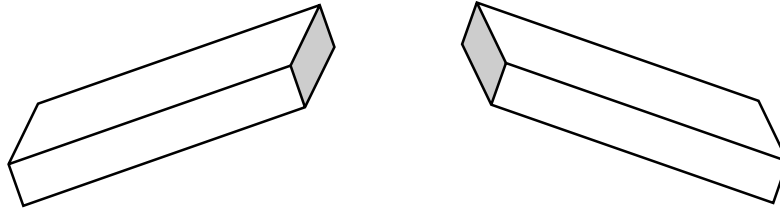
Area of compound shapes



Find the area of these compound shapes.
Measure lines to nearest whole cm.



Surface area of cuboids



When working out the surface area of a cuboid (box shape) you need to think that:

There are three pairs of opposite sides.

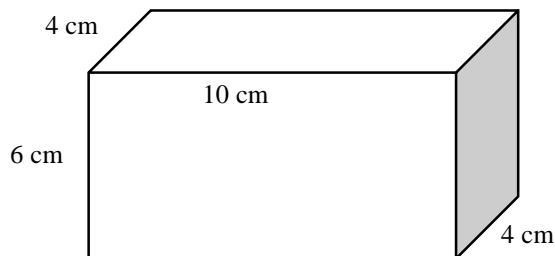
Each side of a pair will have the same area.

Work out the area of one side.

Do the same with the other two sides.

Add together the three totals and then double your answer:

Example: (not drawn to scale)



One side of this box is 10 cm long and 6 cm wide. (area = 60 cm^2)

One side of this box is 10 cm long and 4 cm wide. (area = 40 cm^2)

One side of this box (grey) is 6 cm long and 4 cm wide. (area = 24 cm^2)

Total area for three sides = $60 \text{ cm}^2 + 40 \text{ cm}^2 + 24 \text{ cm}^2 = 124 \text{ cm}^2$

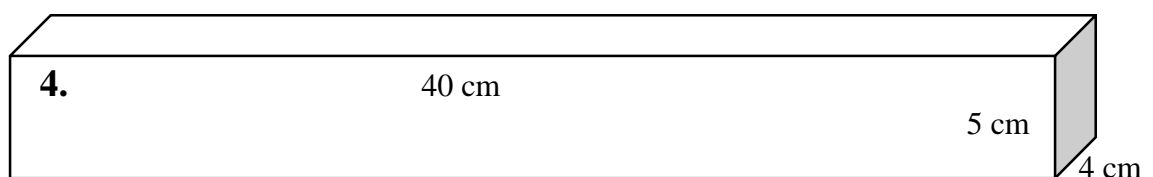
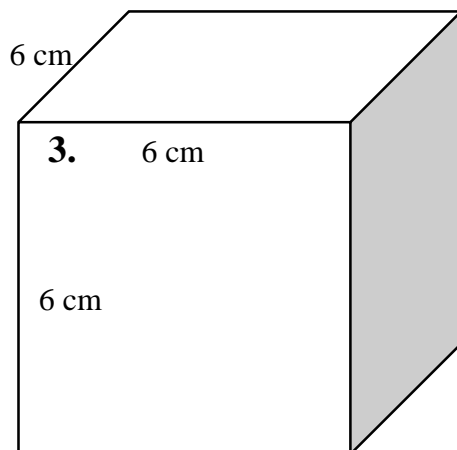
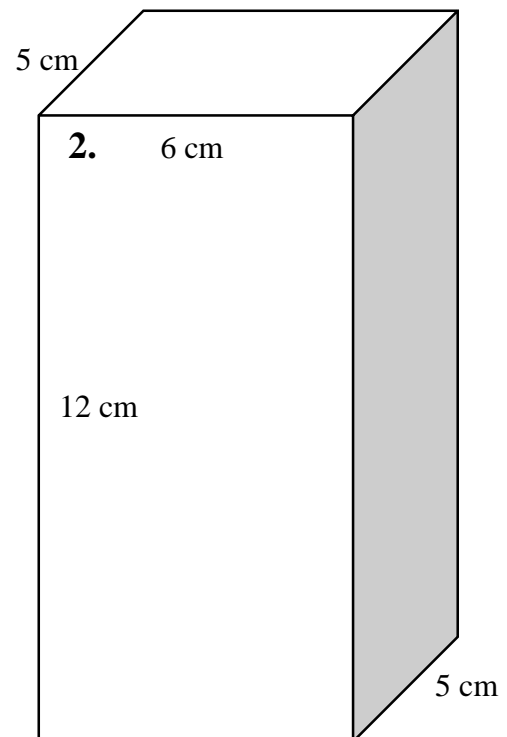
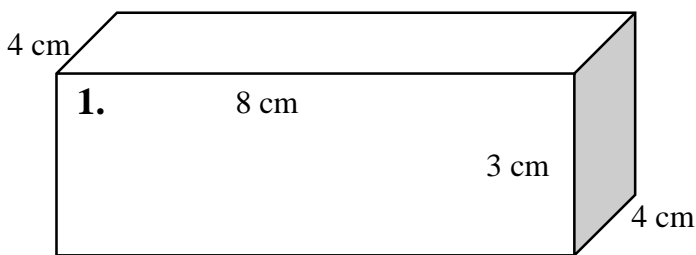
Total area for all six sides = $124 \text{ cm}^2 + 124 \text{ cm}^2 = 248 \text{ cm}^2$

Surface area of cuboids



Find the surface area of these boxes. Remember they have 6 sides and opposite sides will have the same area!

Note: boxes are not drawn to scale

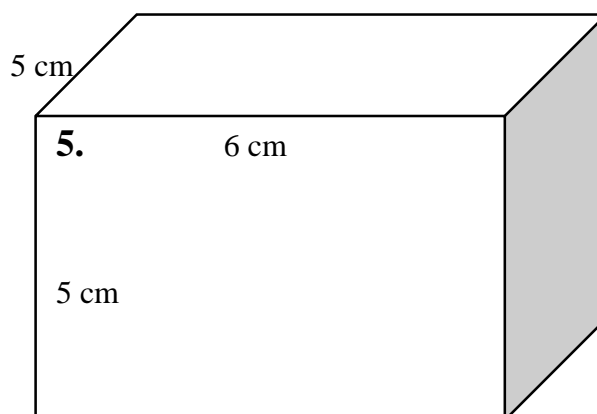
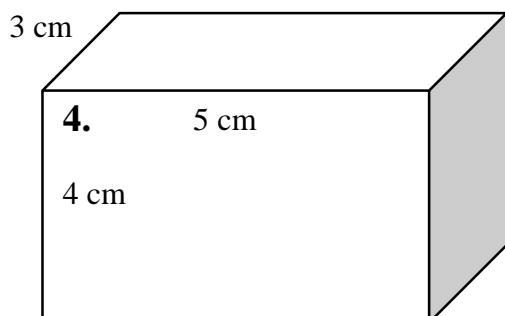
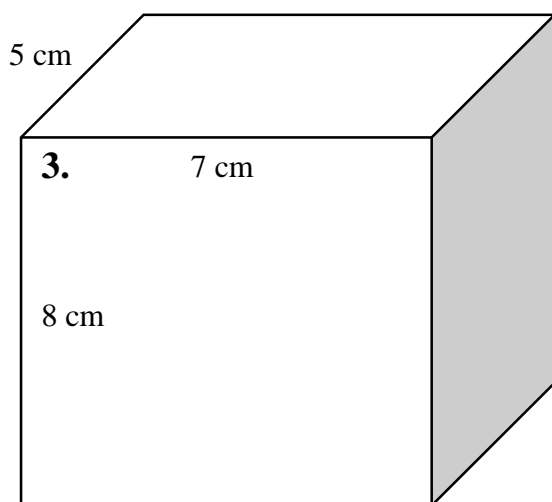
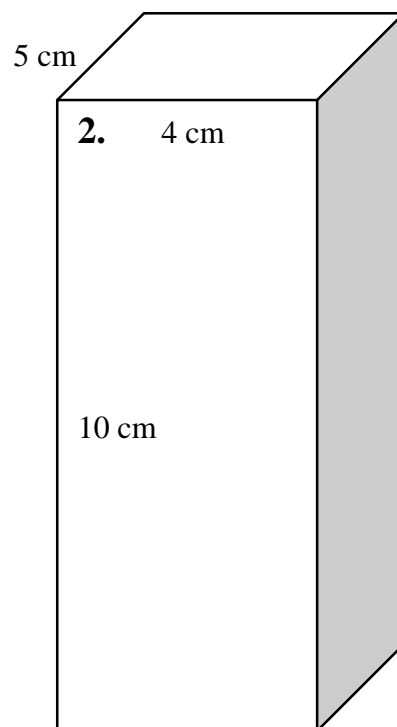
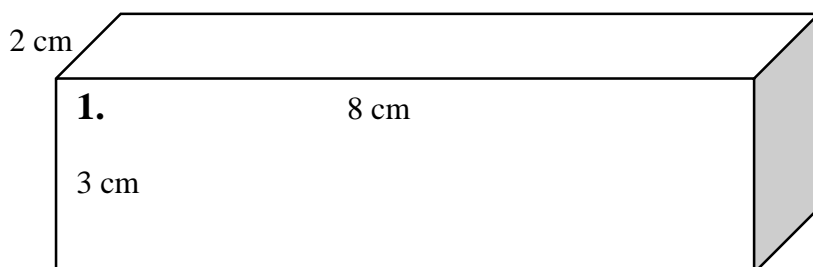


Surface area of cuboids



Find the surface area of these boxes. You might only be able to see three sides, but there are six in all!

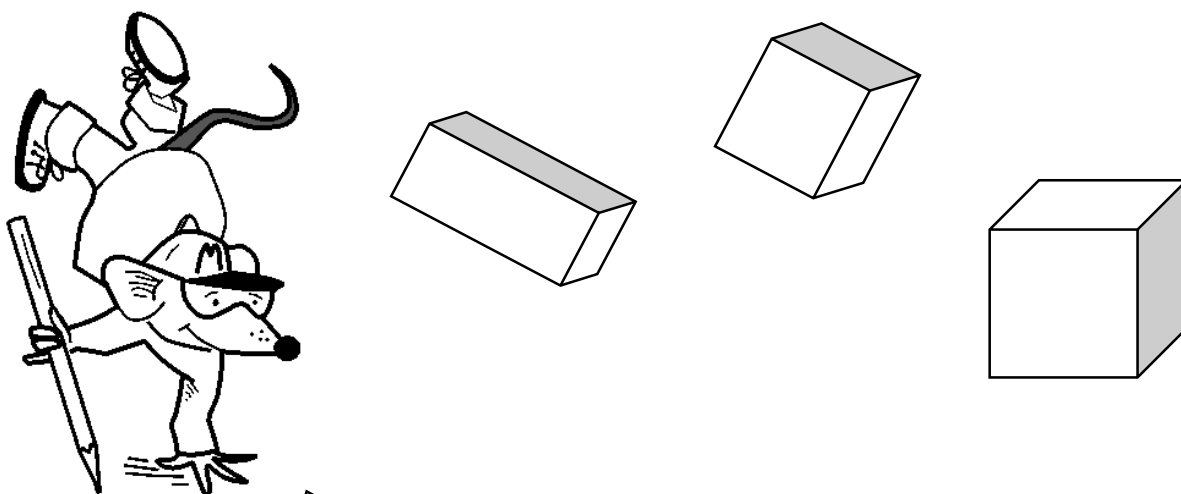
Note: boxes are not drawn to scale.



Surface area of cuboids

Find the surface area of these boxes or cuboids:

1. A cuboid with a length of 10 cm, width of 5 cm and height of 8 cm.
2. A cuboid with a length of 15 cm, width of 6 cm and height of 6 cm.
3. A cuboid with a length of 8 cm, width of 7 cm and height of 5 cm.
4. A cuboid with a length of 20 cm, width of 12 cm and height of 10 cm.
5. A cuboid with a length of 50 cm, width of 40 cm and height of 30 cm.



Find some cuboids, measure the sides and work out the surface area.

Try some tiny boxes - like matchboxes, and some medium size ones, like a CD case, and some larger ones, such as cardboard boxes.

Good luck.

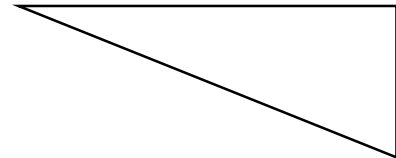
You could see how many you could cover with one piece of paper - investigate!

Finding the area of right angled triangles

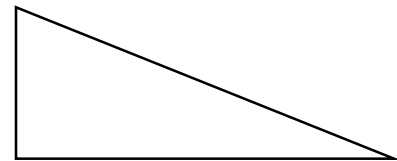
Finding the area of a right angled triangle might look difficult, but in fact it is quite easy.

This is a right angled triangle.

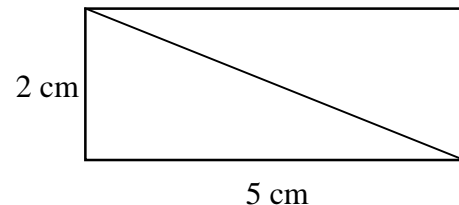
Its base is 5 cm long and its height is 2 cm.



Here is an exact copy of the triangle but it has been rotated.



If you move the two triangles together
You can make a rectangle which is
5 cm long and 2 cm high.



Now, the area of the rectangle is easy to work out:

$$2\text{cm} \times 5\text{ cm} = 10\text{ sq cm.}$$

But each triangle is exactly half the area of the rectangle so the area of each triangle is $\frac{1}{2}$ of $10\text{ sq cm} = 5\text{ sq cm}$

**On some cm square or dotty paper
draw a rectangle.**

Find its area.

**Draw a diagonal and work out the
area of the two right angled
triangles.**

Try 5 more.

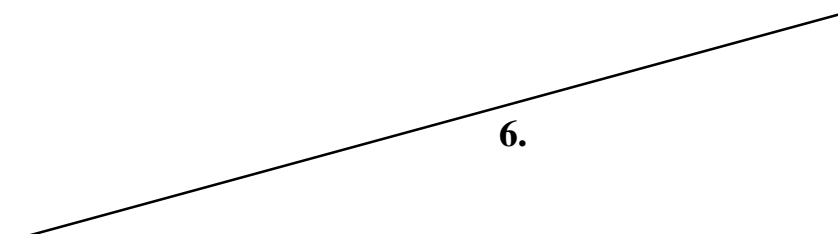
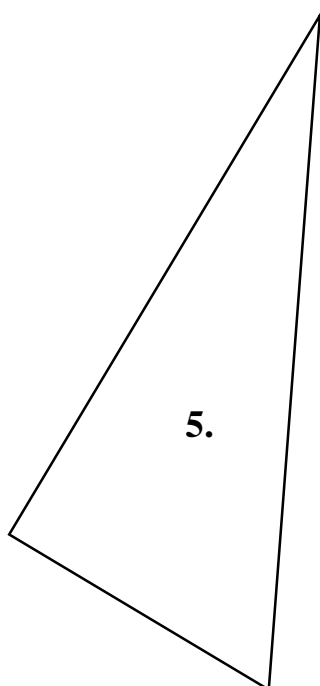
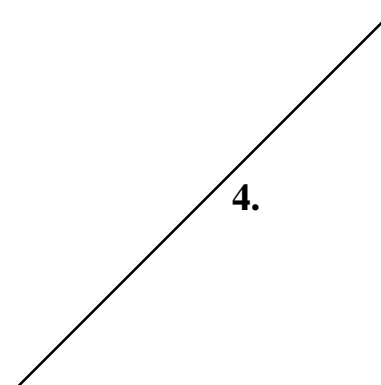
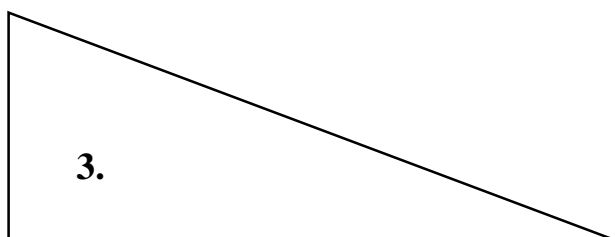
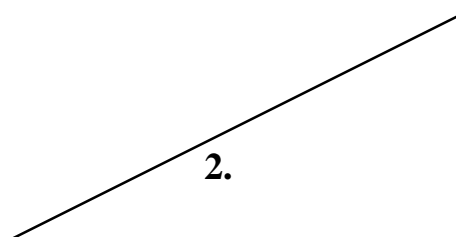
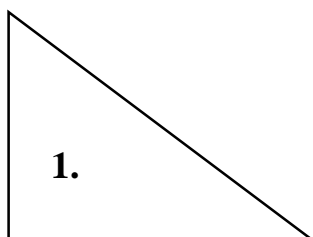
**Does it matter which diagonal you
draw?**



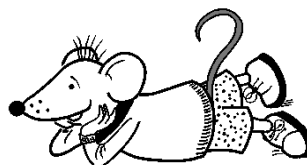
Area of right angled triangles

Measure the base and the height of these right angled triangles and work out the area.

Remember: area of a triangle equals half the base times the height or,
base times height divided by 2



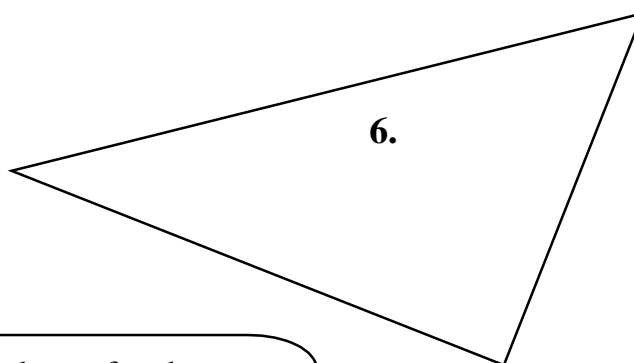
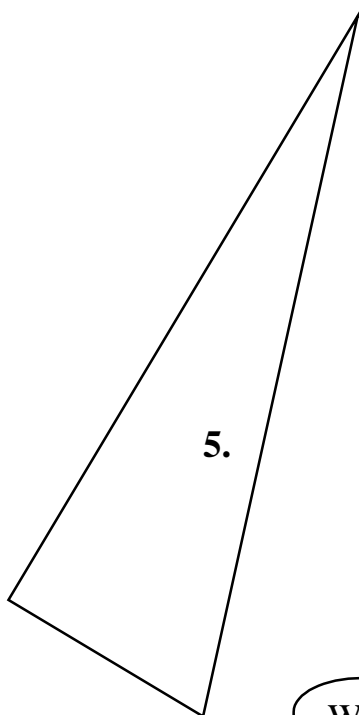
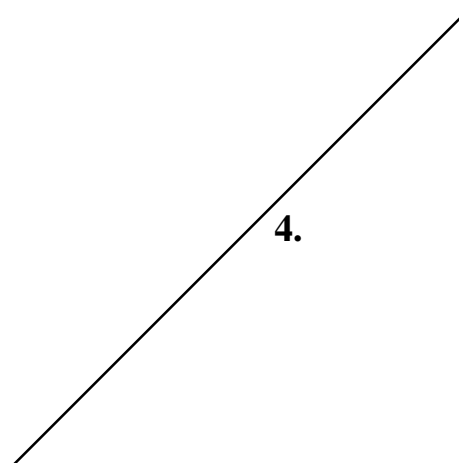
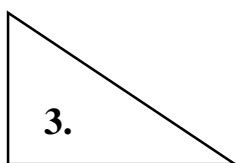
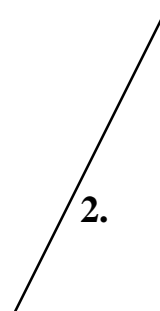
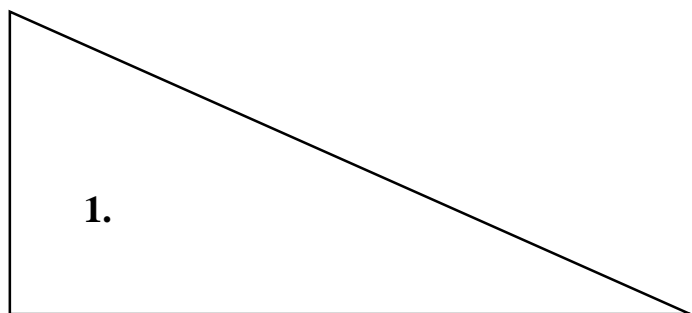
Watch out for the
height and base on
number 5.



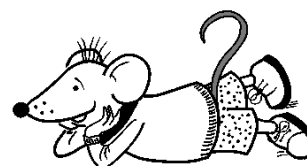
Area of right angled triangles

Measure the base and the height of these right angled triangles and work out the area.

Remember: area of a triangle equals half the base times the height.



Watch out for the
height and base on
number 5 and 6 !



Answers

Page 3

1. 72 cm^2 2. 135 cm^2 3. 200 cm^2 4. 96 cm^2 5. 400 cm^2
 6. 5 cm 7. 20 cm 8. 18 cm 9. 17 cm 10. 14 cm

Page 4

1. 88 cm^2 2. 140 cm^2 3. 1200 cm^2 4. 120 cm^2 5. 900 cm^2
 6. 50 cm 7. 20 cm 8. 19 cm 9. 18 cm 10. 24 cm

Page 5

1. 12 cm^2 2. 24 cm^2 3. 15 cm^2 4. 16 cm^2

Page 6

1. 27 cm^2 2. 32 cm^2 3. 22 cm^2 4. 21 cm^2 5. 39 cm^2 6. 36 cm^2

Page 7

1. 25 cm^2 2. 34 cm^2 3. 48 cm^2 4. 31 cm^2 5. 46 cm^2

Page 9

1. 136 cm^2 2. 324 cm^2 3. 216 cm^2 4. 760 cm^2

Page 10

1. 92 sq cm 2. 220 sq cm 3. 262 sq cm 4. 94 sq cm 5. 170 sq cm

Page 11

1. 340 sq cm 2. 432 sq cm 3. 262 sq cm 4. $1\,120 \text{ sq cm}$ 5. $9\,400 \text{ sq cm}$

Page 13

1. 6 sq cm 2. 9 sq cm 3. 12 sq cm 4. 12.5 sq cm 5. 16 sq cm 6. 16.5 sq cm

Page 14

1. 18 sq cm 2. 4 sq cm 3. 3 sq cm 4. 18 sq cm 5. 13.5 sq cm 6. 17.5 sq cm

Investigate

Draw some right angled triangles on the paper and work out their areas.

