Year 6: Measurement

Area

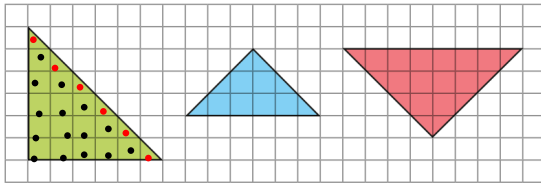
- In Year 6, the new focus is finding the area of triangles and parallelograms using the knowledge that we have from Y5.
- Children will be exposed to the new formulas to work out the area of these shapes.

Children are introduced to finding the area of a triangle by counting squares.

They estimated area in Year 5, but may need to be reminded of efficient strategies for calculating and estimating areas of shapes.

Children first find the areas of triangles that require them to only count full and half squares. They can calculate these separately and then combine them to find the area.

Complete the sentences to find the area of the triangles.



The triangle has 15 full squares.

The triangle has 6 half squares.

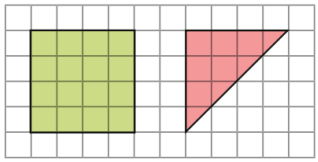
15 + 3 = 4

The total area of the triangle is 18 cm²

Things to look out for

- Children may count half squares as full squares.
- Without an efficient method, children may not count squares accurately.
- Children may find it difficult to draw a triangle with a specific area.
- If a triangle is not placed on a line, children may believe it is impossible to estimate its area.

- Work out the area of each shape by counting squares.



What do you notice about the area of the triangle compared to the area of the square? It is $\frac{1}{2}$

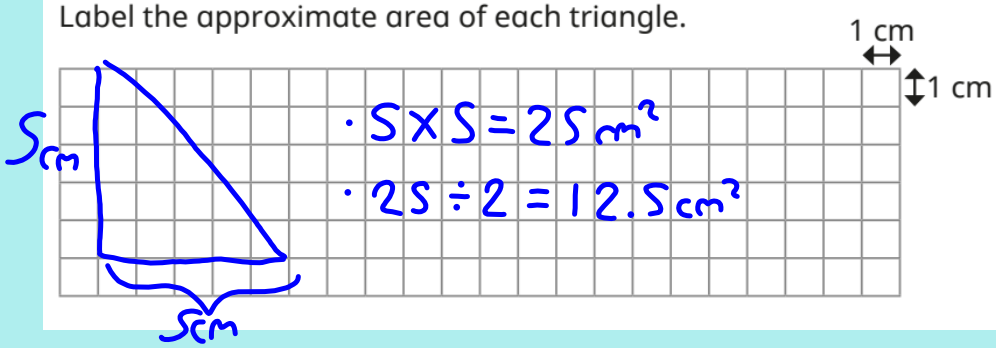
Does this always happen? No

Draw a rectangle and a triangle to explore the pattern.

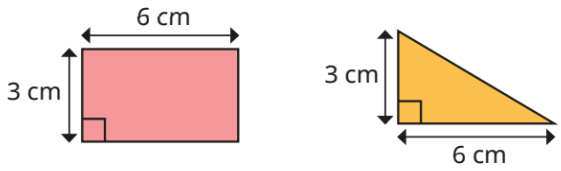
Instructions on how to find the area of a triangle.

Draw three different triangles that have an area between 5 cm² and 15 cm²

Label the approximate area of each triangle.



- Here is a rectangle and a triangle.



- What is the area of the rectangle?
- What is the area of the triangle?
- How do you work out the area of a right-angled triangle?

3 x 6 = 18 cm²

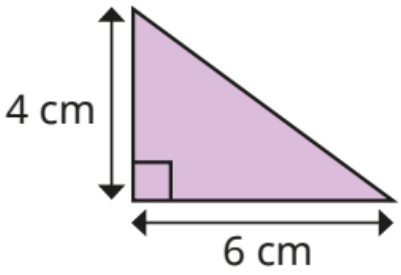
3 x 6 = 18 cm²
18 ÷ 2 = 9 cm²

$$\text{area} = \frac{1}{2} \times \text{base} \times \text{perpendicular height}$$

An easier way of saying this is: B X H ÷ 2

Base Height divided by 2

Scott uses the formula to work out the area of this right-angled triangle.

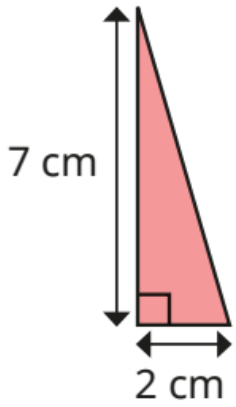


$$\text{area} = \frac{1}{2} \times \text{base} \times \text{perpendicular height}$$

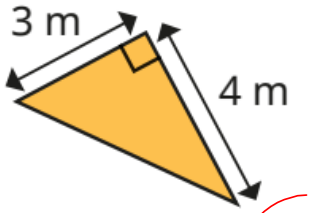
$$\text{area} = \frac{1}{2} \times 6 \times 4 = \frac{1}{2} \times 24 = 12 \text{ cm}^2$$

Use the formula to find the areas of the triangles.

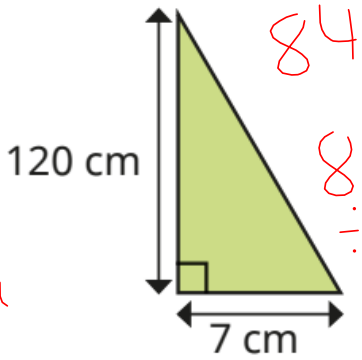
120 x 7 = 840



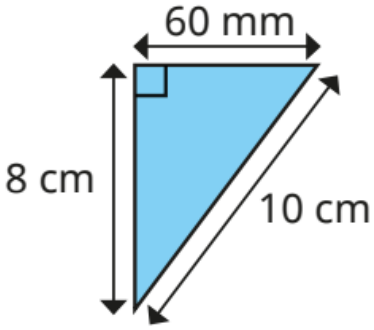
7cm²

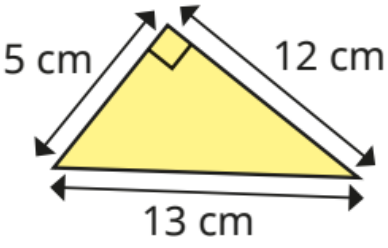


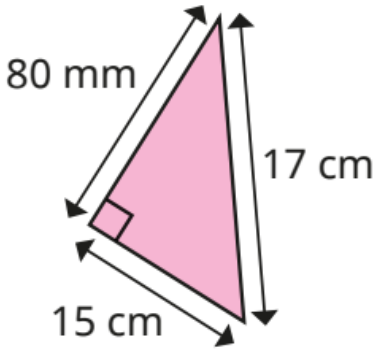
6cm²



840 ÷ 2 = 420cm²







The area of a Parallelogram

Children explore the area of a parallelogram, identifying and using a formula.

Children look at the properties of a parallelogram and compare to a rectangle.

Using the “cut-and-move method”, they explore how the parts of the parallelogram can be rearranged to make a rectangle in which the length and width correspond to the base and perpendicular height of the parallelogram.

Through this, they recognise that the area of a parallelogram can be found by using the formula

area = base × perpendicular height.

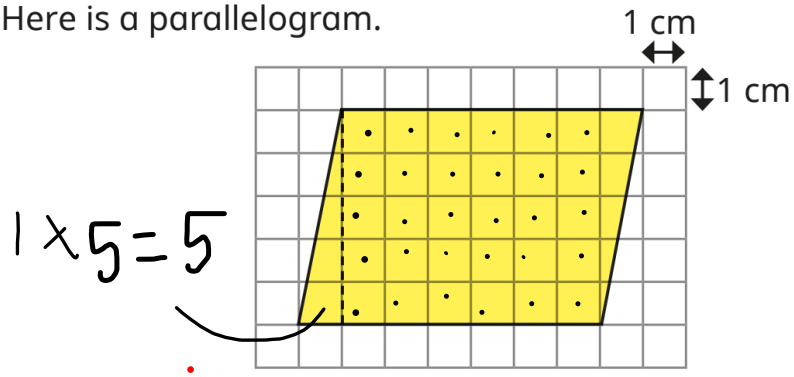
Things to look out for

- When finding the area of a parallelogram, children may try to use the formula for finding the area of a rectangle or a triangle.
- Children may struggle to identify the base and perpendicular height.

Possible sentence stems

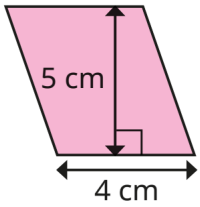
- The base of the parallelogram is _____ cm.
  The perpendicular height of the parallelogram is _____ cm.
  The area of the parallelogram is _____ × _____ = _____ cm^2

Here is a parallelogram.



- Copy the parallelogram onto centimetre squared paper.
  Estimate its area by counting squares.
- Now cut along the dotted line.
  Move the triangle to make a rectangle.
  What is the area of the rectangle? 35 cm^2
  What do you notice?

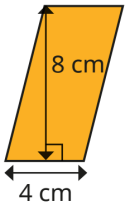
nnie has worked out the area of this parallelogram.

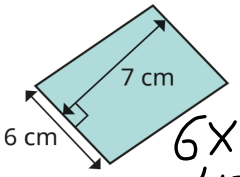


area = base × perpendicular height
= 4 cm × 5 cm
= 20 cm²

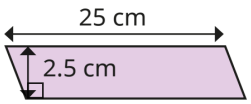
4 × 8 = 32 cm²

Use Annie's method to find the areas of the parallelograms.





6 × 7 =
42 cm²

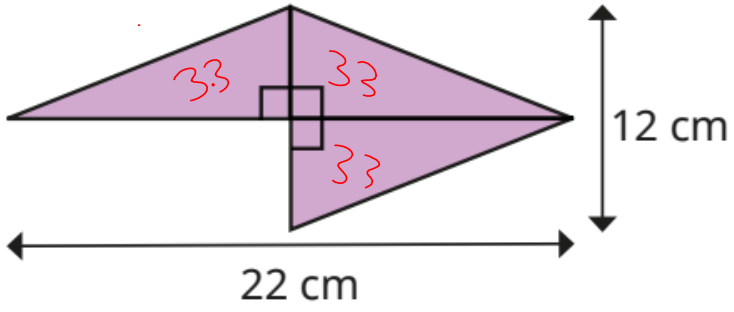


25 × 5 =
125

125 ÷ 2 =
62.5

RPS - Area question

This shape is made up of three identical triangles.



What is the area of the shape?

1 Triangle =
B = 6cm
H = 11cm

6 x 11 = 66cm²
(B) x (H)

66 ÷ 2 = 33cm²
33 x 3 = 99cm²

Perimeter

Year 6

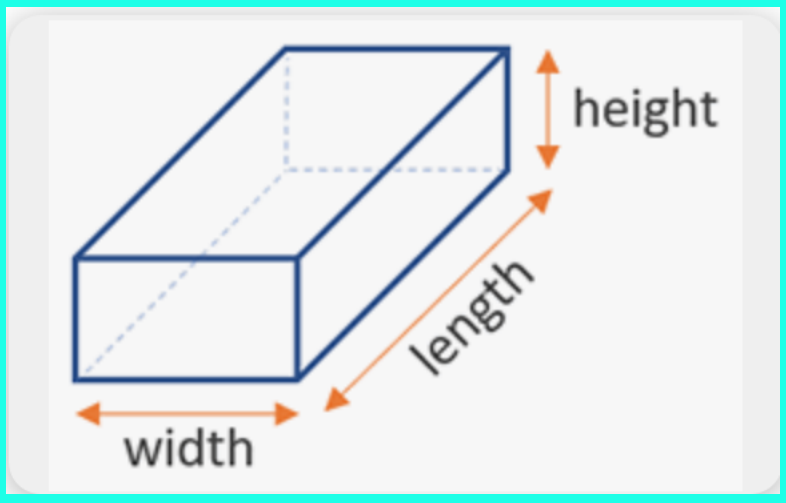
- Find the perimeters of rectangles by measuring the sides and by calculation.
- Explore different methods of finding the perimeter eg add all four sides, add length and width and then double the answer.
- Use an efficient method to find the perimeter.

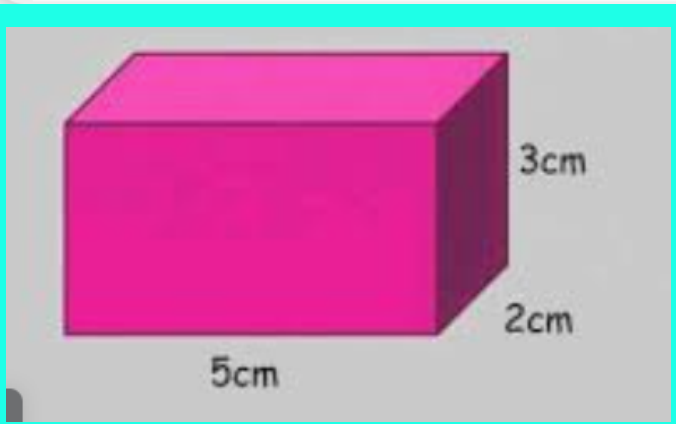
Revision and ensuring your child is secure in this area.

Volume

In Year 6, the children are introduced the formula to calculate volume in 3-D shapes.

L x W x H



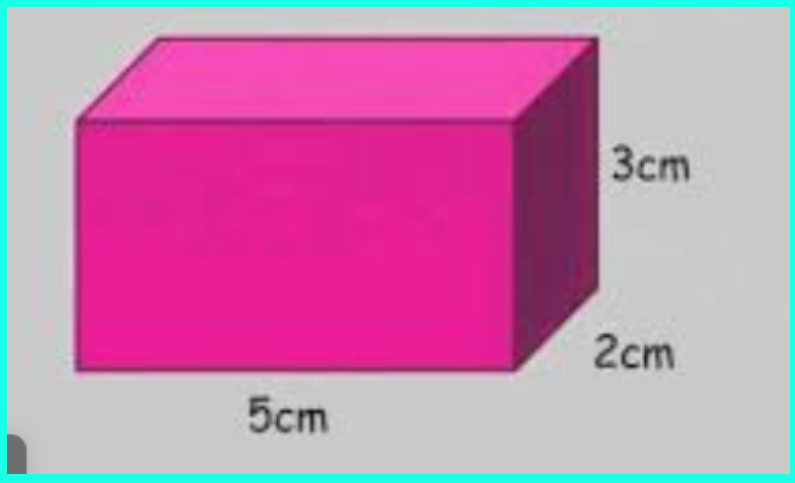


5cm X 2cm = 10cm

10cm x3cm = **30cm**

It does not matter which order we multiply in as we will get the same answer.

L x W x H

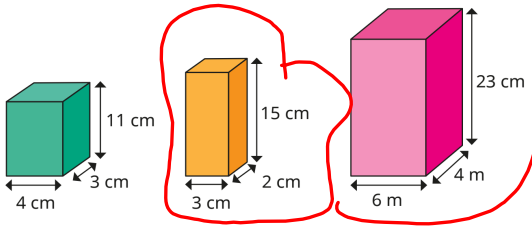


3 x 2 = 6

6 x 5 = 30cm

volume = length × width × height

Use the formula to find the volumes of the cuboids.



Does it matter in which order you multiply the numbers?

L x W x H

3cm x 2cm = 6cm

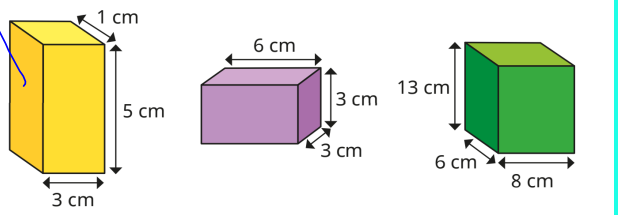
6cm x 15cm = 90cm

L x W x H

3 x 1 x 5 =

3 x 5 = 15cm³

- Find the volumes of the cuboids.



Geometry

In year 6 ...

Vertically opposite angles

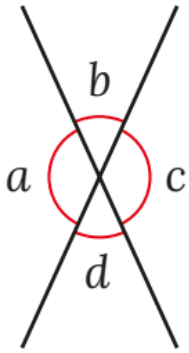
- Vertically opposite angles are equal.
- What are vertical angles = two straight lines that intersect at a point = four angles are created.
- Through investigation, children see that there are two pairs of equal angles.

Key learning

- Take a piece of paper and draw a large "X".
  - Mark the angles on as shown.
  - Measure each angle.
  - What do you notice about angles b and d?

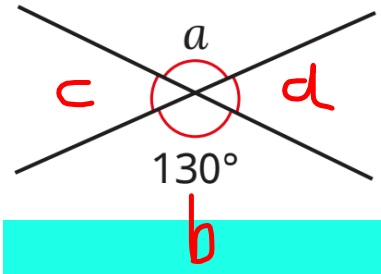
    What do you notice about angles a and c?

    Is this always the case? Draw other "X" shapes to investigate.

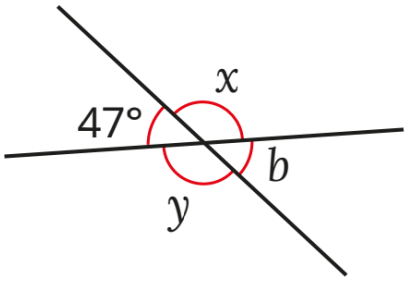


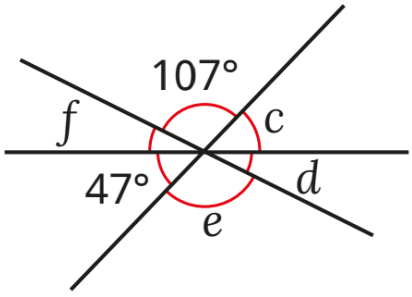
Key knowledge needed:
- Angles on a straight line add up to 180.
- Angles around a point add up to 360.

Work out the sizes of the angles marked with letters.



c
d
b

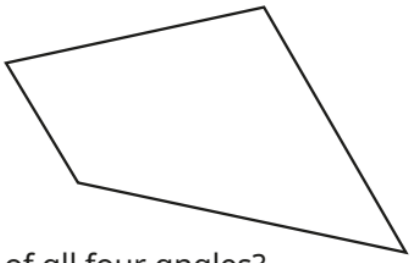




Angles in a quadrilateral

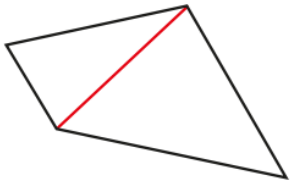
Key learning

- Measure the angles of the quadrilateral.



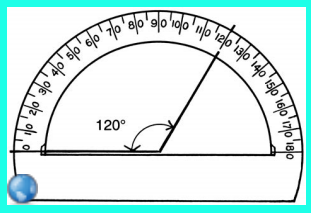
What is the sum of all four angles?

Huan draws a line on the quadrilateral to prove that the angles in any quadrilateral add up to 360°.



Explain Huan's reasoning.

Key knowledge
Sum of angles = 360



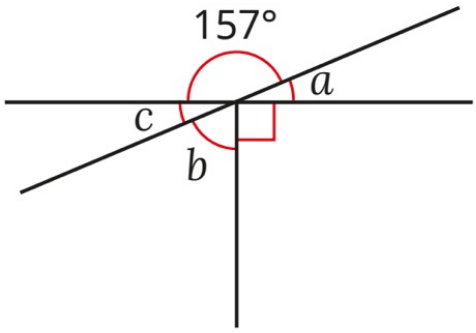
We encourage the children to use protractors and measure each interior angle.

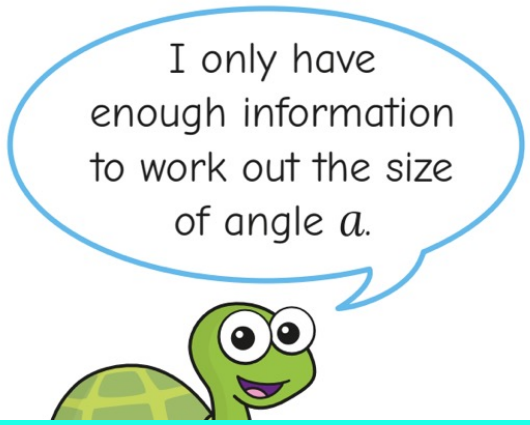
If we know that angles in a triangle add up to 180 we can apply that knowledge when calculating quadrilaterals' interior angles.

RPS - Angles

Key knowledge needed:
- Angles on a straight line add up to 180.
- Angles around a point add up to 360.

This diagram is drawn using three straight lines.





180 - 157 = 23

a and c are vertically opposite therefore

c =23

180 -113= 67

No

$a = 23°$

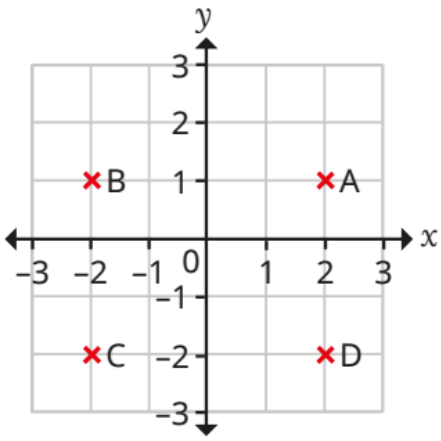
$b = 67°$

$c = 23°$

Position and direction.

The four quadrants

- What are the coordinates of the four points?



How did you work them out?

Key knowledge needed:

Start at the origin (0) .

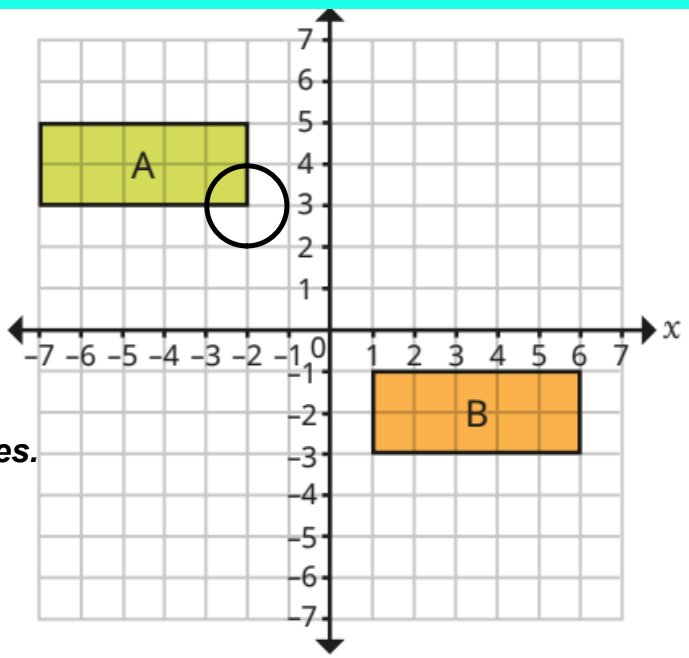
Move along the x axis first. ('Down the coridoor')

Then move up or down the Y axis (Up or down the stairs')

A = (2,1) B= (-2,1) C (-2,-2) D=(2,-2)

Translations

- Describe the translation from shape A to shape B.



Translation = movement.

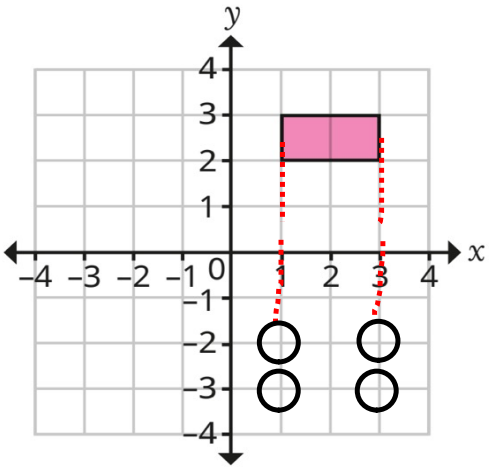
Choose one vertex eg

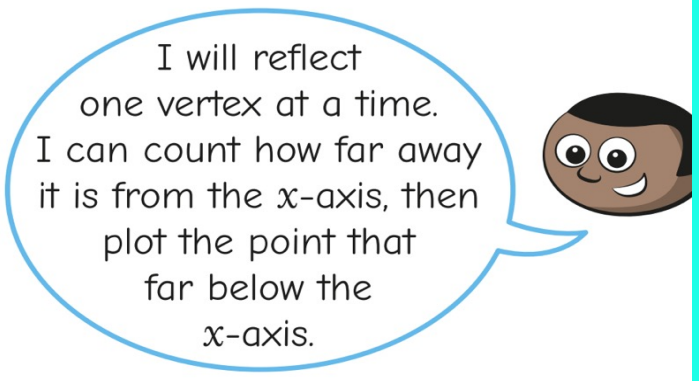
lower right of shape A.

8 squares to the right, down 6 squares.

Reflections

- Mo is reflecting this rectangle in the x-axis.





Use Mo's method to complete the reflection.

What are the coordinates of each vertex of the reflected rectangle

Top left = **(1,-2)** Top right = **(3,-2)**

Bottom left = **(1,-3)** Bottom right **(3,-3)**