

## Enlargements with Negative Scale Factors

**E.g. 1** Enlarge the triangle with vertices  $A(5, 2)$ ,  $B(7, 1)$  and  $C(4, 1)$  with scale factor  $-2$  about  $(5, 3)$ .

**Working:**

**Step 1:** Draw the construction lines (**Diagram 1**).

**Step 2:** Point A is one square down *from the centre of enlargement*. Multiply this by  $-2$  so we count 2 squares up *from the centre of enlargement* (**Diagram 2**).

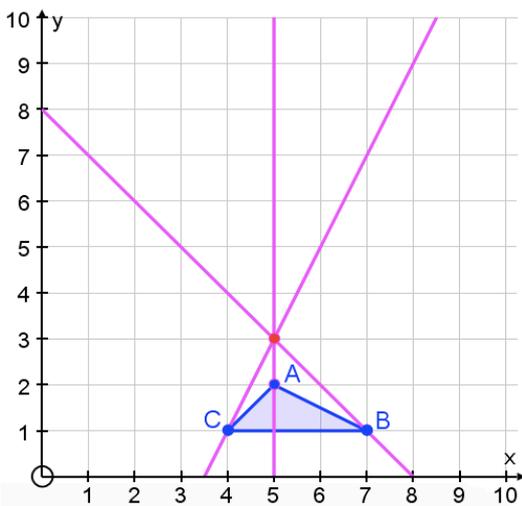
**Step 3:** Repeat step 2 for points B and C (**Diagram 3**).

Point B: **From the CoE** to B is 2 squares **right** and 2 **down**.  
Multiply this by  $-2$   
So measure 4 squares **left** and 4 **up from the CoE**

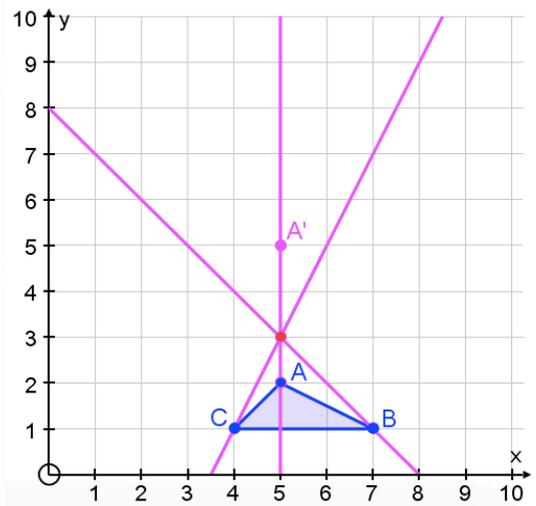
Point C: **From the CoE** to C is 1 square **left** and 2 **down**.  
Multiply this by  $-2$   
So measure 2 squares **right** and 4 **up from the CoE**

**Step 4:** Join the dots up (**Diagram 4**).

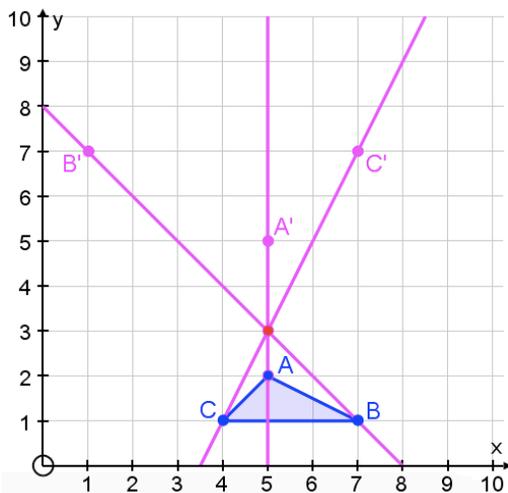
**Diagram 1**



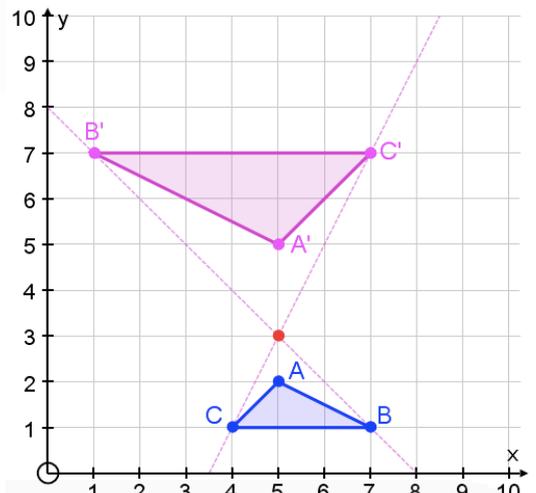
**Diagram 2**



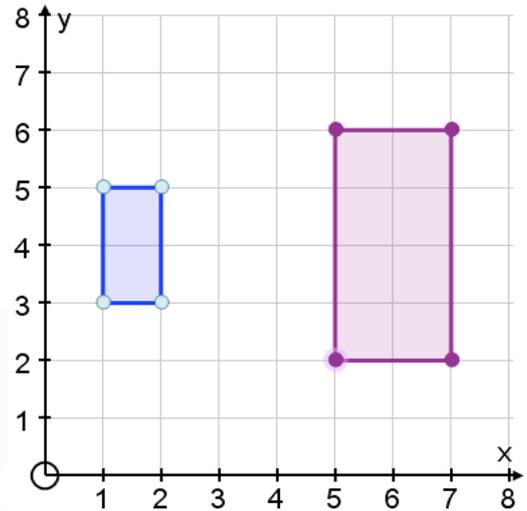
**Diagram 3**



**Diagram 4 (final answer)**



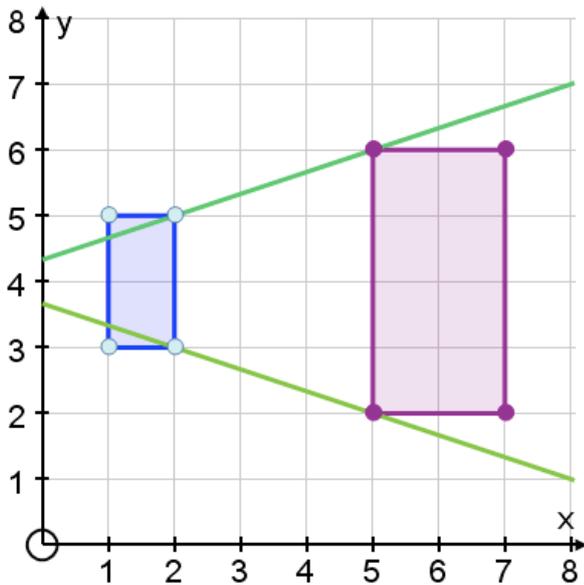
**E.g. 2** Given that the enlargement in the diagram has a negative scale factor, find the coordinates of the centre of enlargement. In addition, state the scale factor of enlargement.



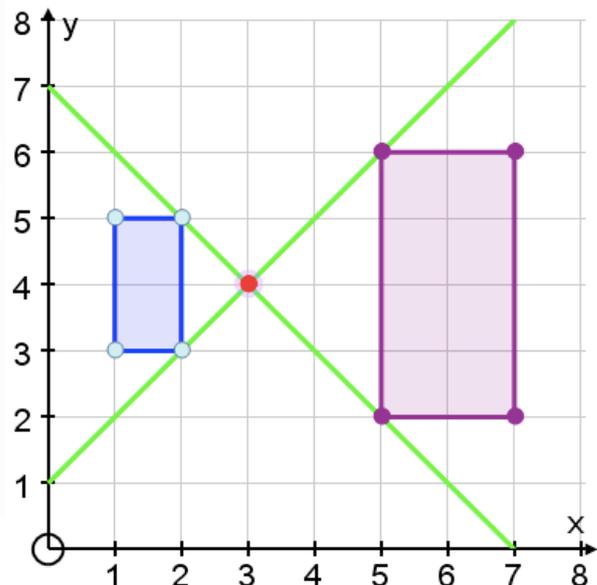
**Working:**

With negative enlargements the problem can be with rectangles when we forgot that the shape has rotated  $180^\circ$ . In **Diagram 5** below, the lines do not intersect so the points on the object are not mapped to corresponding points on the image. In **Diagram 6**, we recognise that the image has rotated  $180^\circ$  and now the lines intersect. The centre of enlargement is  $(3, 4)$ . Since the lengths on the image are twice as long, the scale factor is  $-2$ .

**Diagram 5 (incorrect)**



**Diagram 6 (correct)**



Video:  
Video:

[Finding the centre of enlargement Enlargements \(negative scale factors\)](#)

[Solutions to Starter and E.g.s](#)

**Exercise**

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|----------------------|------------------|
| 9-1 class textbook:  | p288 E9.1 Qu 1-7 |
| A*-G class textbook: | p250 E9.1 Qu 1-7 |
| 9-1 homework book:   | p99 E9.1 Qu 1-4  |
| A*-G homework book:  | p71 E9.1 Qu 1-4  |

[Homework book answers \(only available during a lockdown\)](#)