Name:

Exam Style Questions

Invariant Points

Corbettmaths

Equipment needed: Pencil, ruler, tracing paper

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

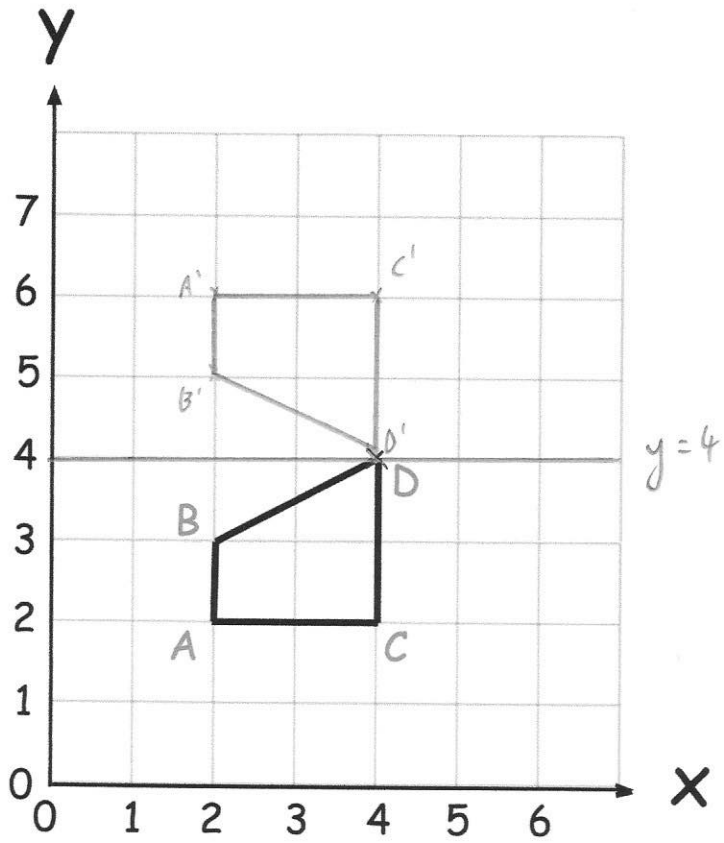
Video Tutorial

www.corbettmaths.com/contents

Video 392

Answers and Video Solutions

1. Shown below is trapezium ABCD.



(a) Reflect trapezium ABCD in the line $y = 4$

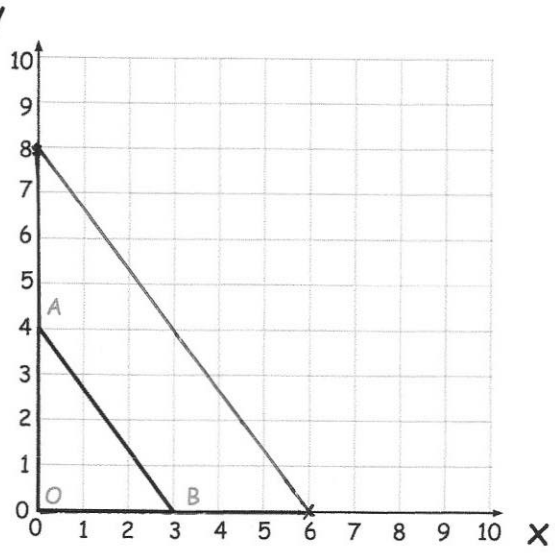
(1)

(b) Write down the coordinates of the invariant point.

(4, 4)

(1)

2. Triangle OAB is shown below.



OAB is enlarged by scale factor 2, using the origin as the centre of enlargement.

How many invariant points are there?

(0, 0)

1

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(1)

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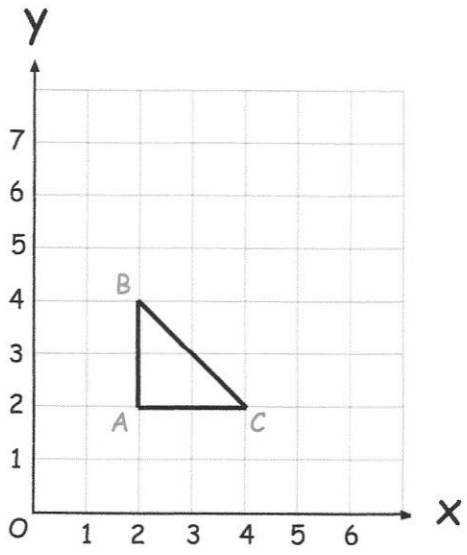
3. Triangle ABC is shown below.



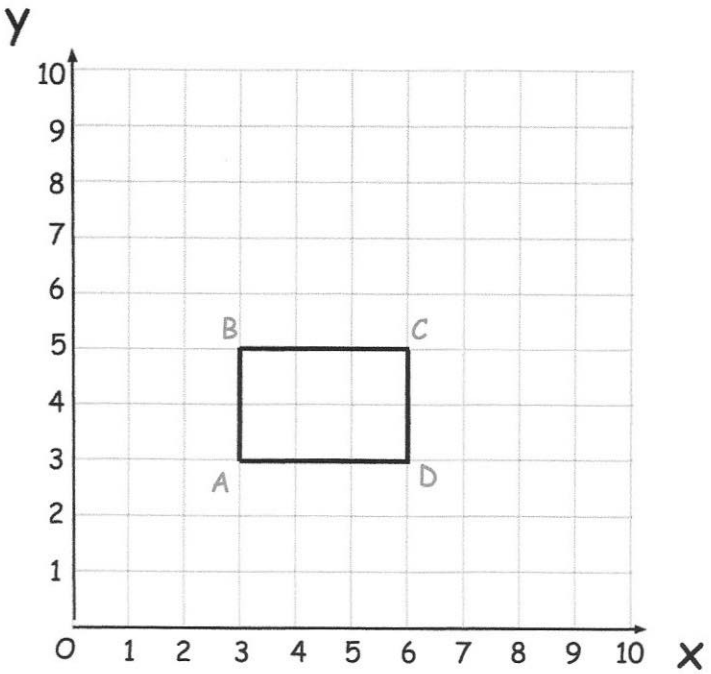
ABC is reflected in a line.
A and C are invariant points.

Circle the equation of the line.

$x = 2$ $x = 3$ $y = 2$ $y = 3$

(1)

4. Rectangle ABCD is shown below.



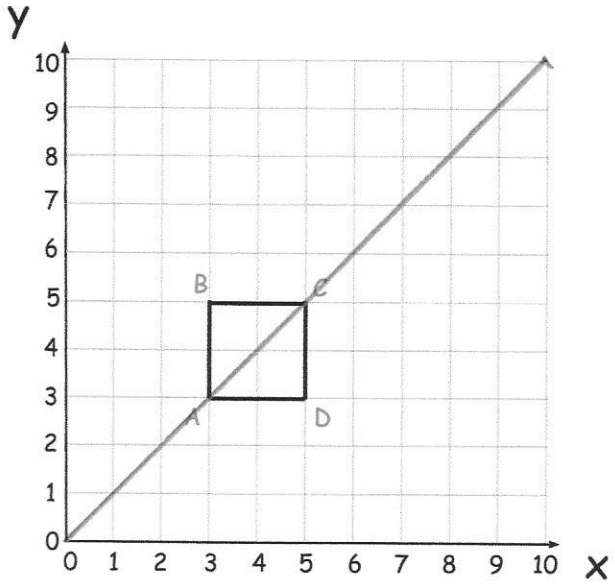
Describe a single transformation of the rectangle so that point B is invariant.

e.g. Rotation of 90° clockwise about the point (3,5)

or Enlargement, scale factor 2, centre of enlargement (3,5)

(2)

5. ABCD is a square.



ABCD is reflected in the line $y = x$

Write down the number of invariant points.

A & C

2

.....

(1)

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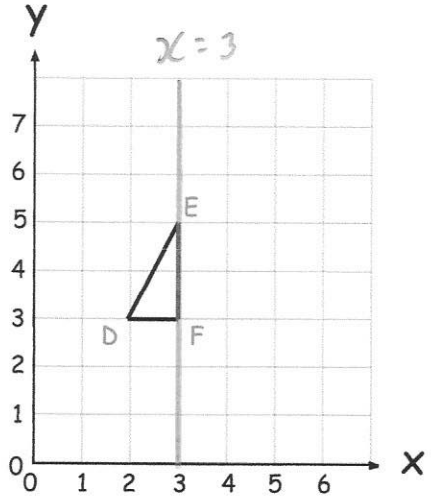
6. Triangle DEF is shown below.



Describe a single transformation of the triangle so that all the points on EF are invariant.

Reflection using mirror line $x = 3$.

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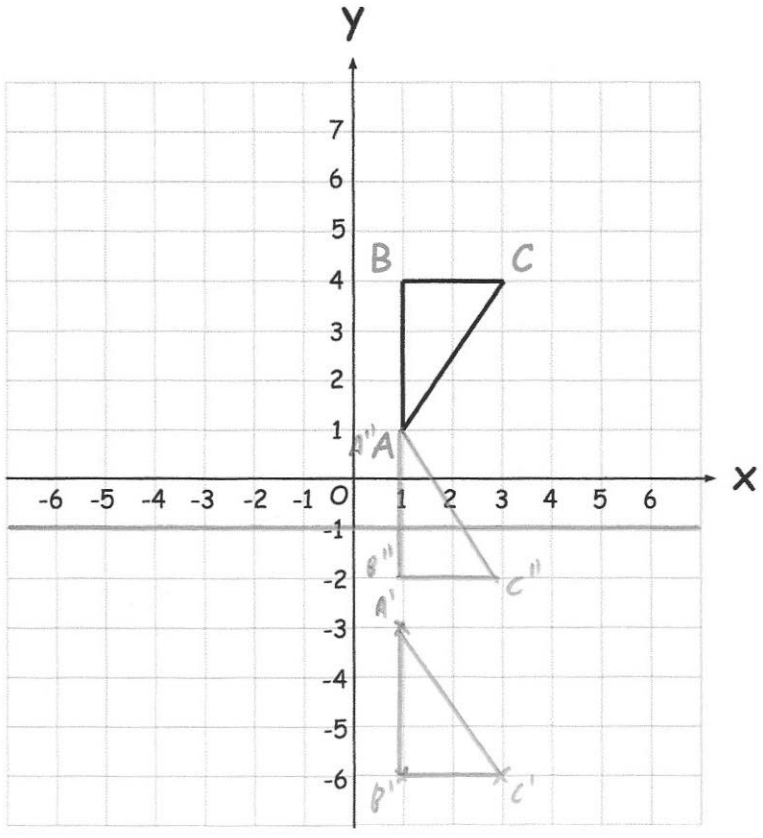
(1)

7. Shown below is triangle ABC.



ABC is transformed to $A'B'C'$ by reflection in the line $y = -1$

$A'B'C'$ is transformed to $A''B''C''$ by a translation using vector $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$ 4 up

Which one point on ABC is invariant under the combined transformation?

A

.....

(3)

8. Gavin translates a trapezium using vector $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ 3 right 2 up.

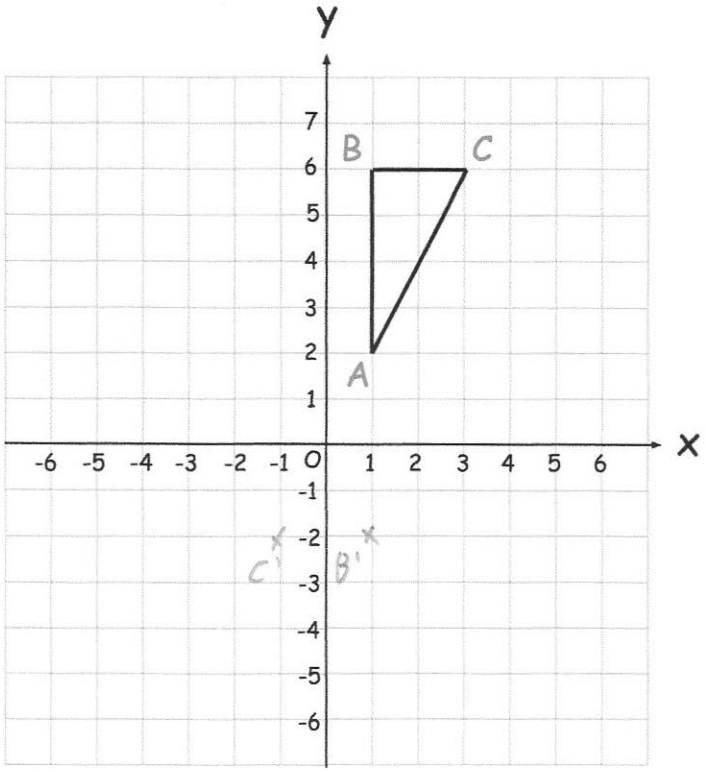
He says that there is an invariant point.

Explain why Gavin must be incorrect.

If a shape is translated 3 squares right and 2 squares up, there cannot be any invariant points.

(1)

9. Triangle ABC is shown on the grid below.



Describe a single transformation of the triangle such that

the point A is invariant

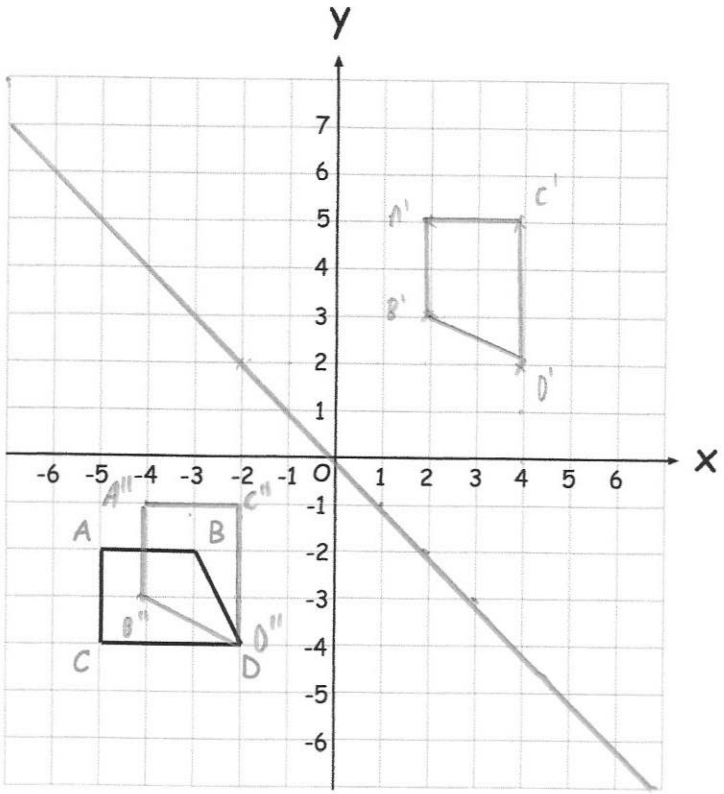
the point B moves to $(1, -2)$

the point C moves to $(-1, -2)$

Rotation of 180° about the point (1, 2)

(3)

10.



Trapezium $ABCD$ is transformed to $A'B'C'D'$ by a reflection in the line $y = -x$

$A'B'C'D'$ is transformed to $A''B''C''D''$ by a translation.

Vertex D is invariant under the combined transformation.

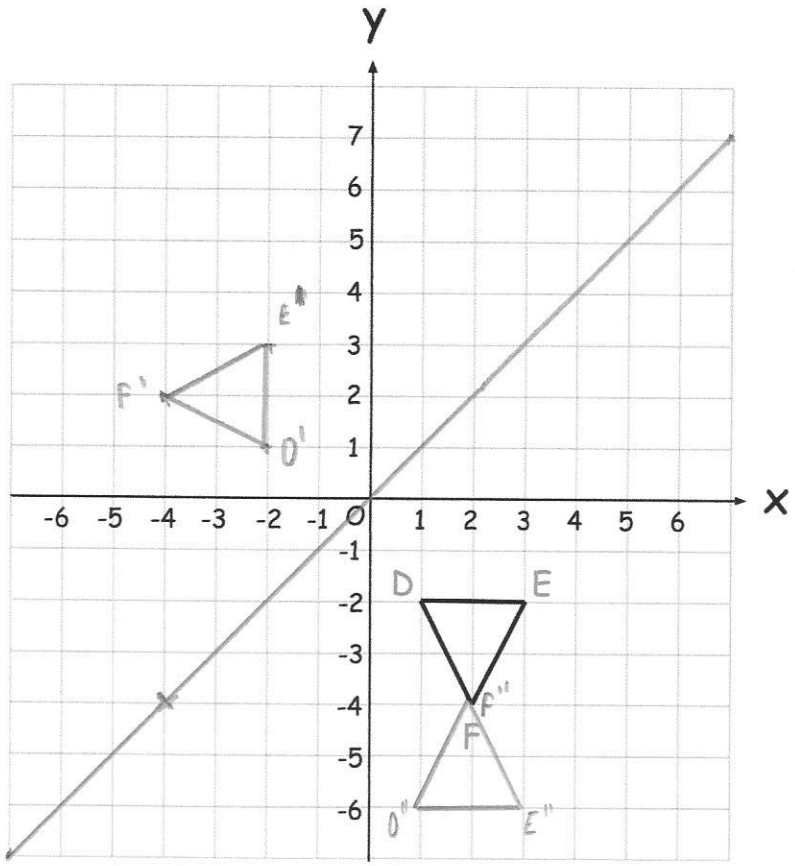
Write down the translation vector.

$\begin{pmatrix} -6 \\ -6 \end{pmatrix}$

.....

(3)

11. Shown below is triangle ABC.



DEF is transformed to $D'E'F'$ by reflection in the line $y = x$

$D'E'F'$ is transformed to $D''E''F''$ by a rotation $90°$ clockwise about $(-4, -4)$

Which one point on DEF is invariant under the combined transformation?

F

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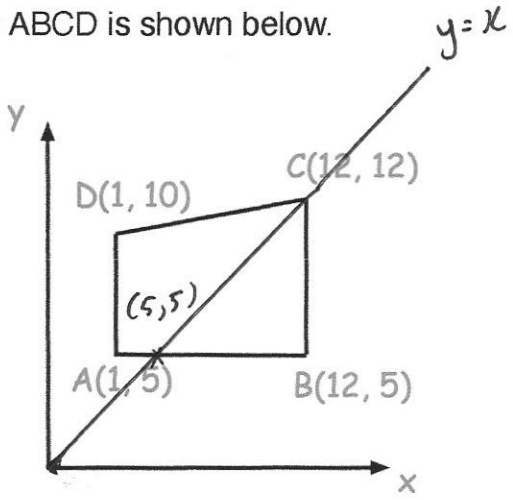
(3)

12. A sketch of Trapezium ABCD is shown below.



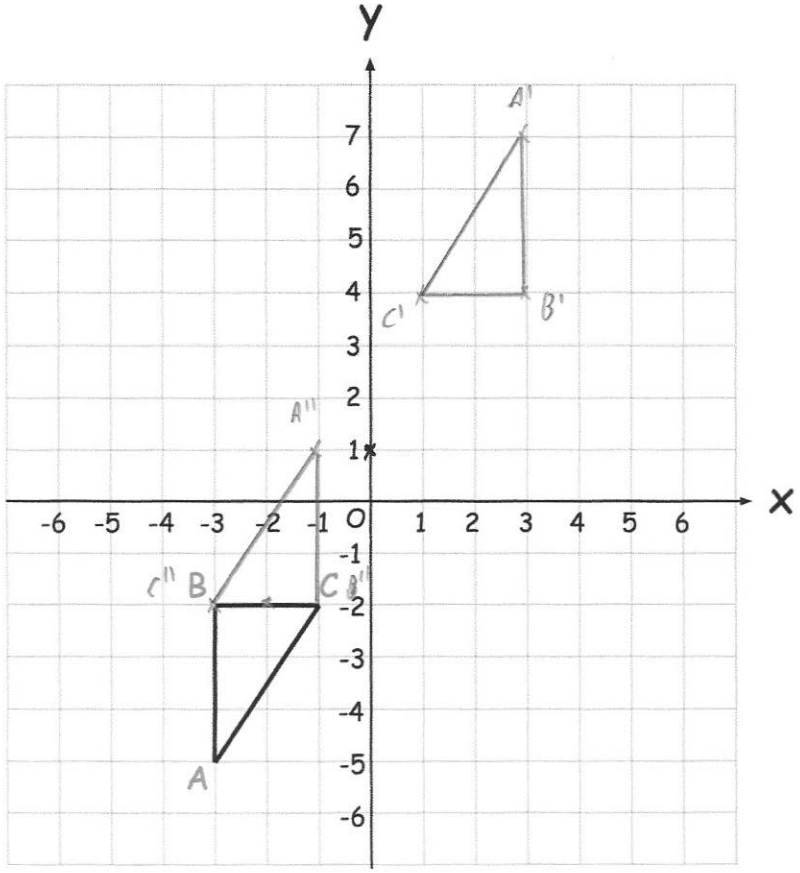
ABCD is reflected in the line $y = x$

Write down the coordinates of any invariant points.

(5,5) & (12,12)

(2)

13. Shown is triangle ABC.



ABC is rotated $180°$ about the point $(0, 1)$

and then translated by the vector $\begin{pmatrix} -4 \\ -6 \end{pmatrix}$ 4 left 6 down

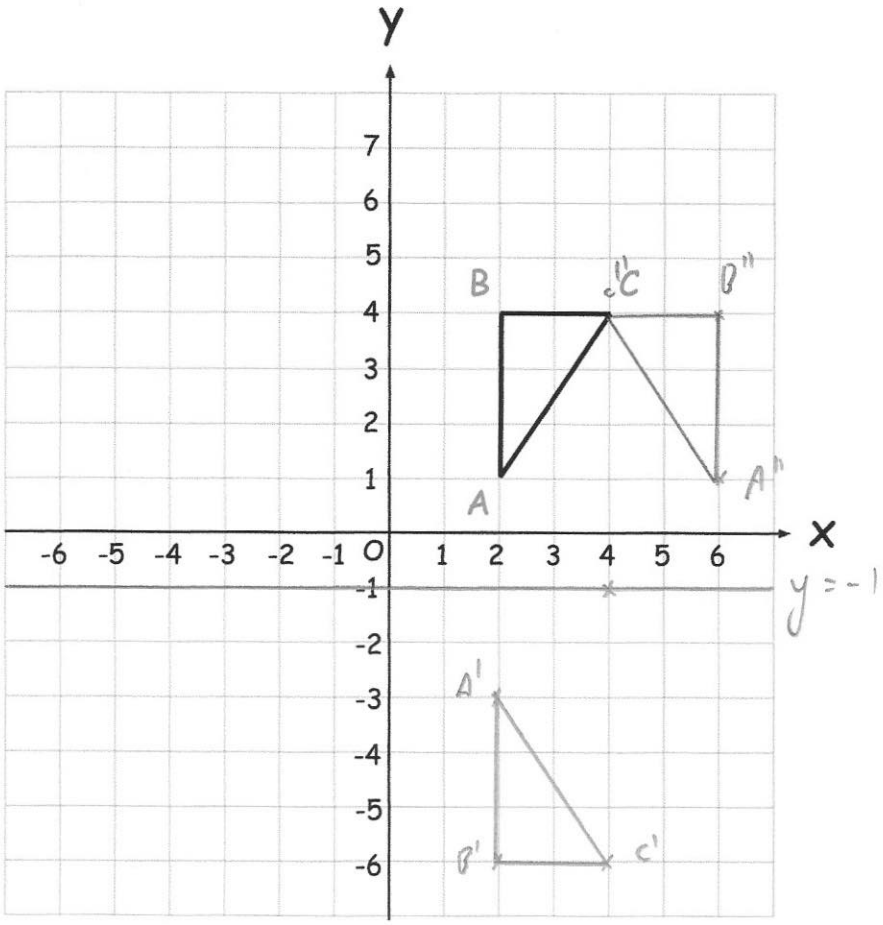
Write down the coordinates of the invariant point.

(-2, -2)

.....

(3)

14. Shown below is triangle ABC.



Triangle ABC is reflected in the line $y = -1$ and then rotated.

Vertex C is invariant.

Describe fully the possible rotation.

Rotation of 180° about (4, -1)

(2)