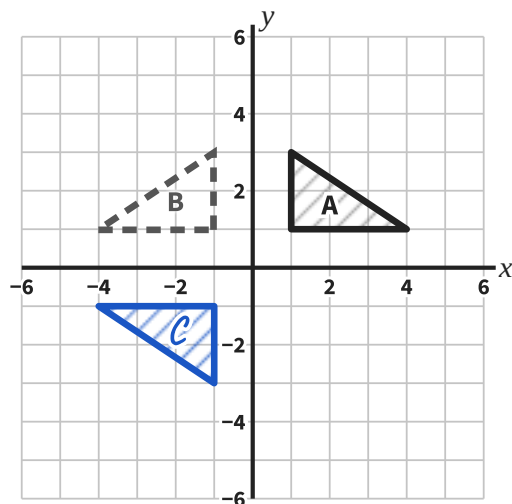


Combined Transformations

ANSWERS

1

two transformations can equal one

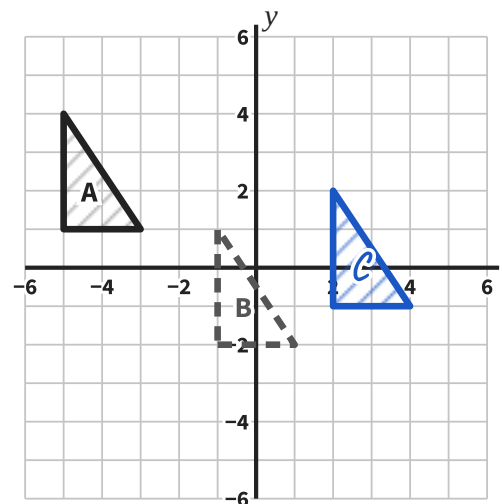


- 1 Reflect A in the **y-axis**. Label it B. (Done for you.)
- 2 Reflect B in the **x-axis**. Label it C.
- 3 Describe the **single** transformation from A to C.

reflection rotation translation

180° about (0, 0)

2

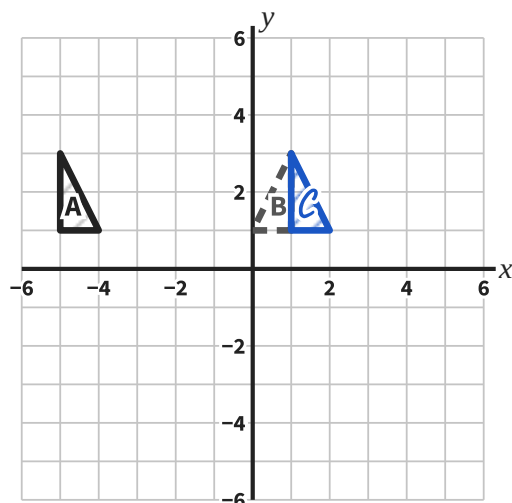


- 1 Translate A by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$. Label it B. (Done for you.)
- 2 Translate B by the vector $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$. Label it C.
- 3 Describe the **single** transformation from A to C.

reflection rotation translation

by the vector $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$

3

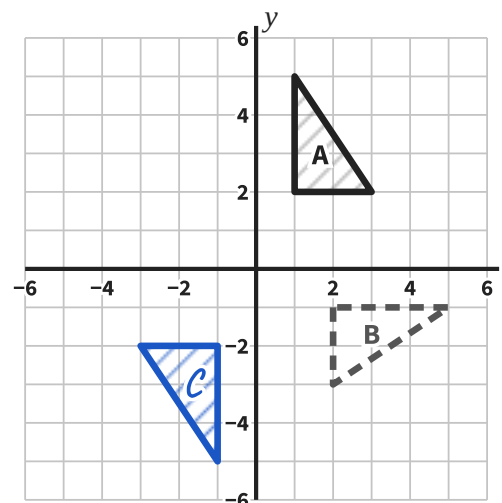


- 1 Reflect A in the line $x = -2$. Label it B. (Done for you.)
- 2 Reflect B in the line $x = 1$. Label it C.
- 3 Describe the **single** transformation from A to C.

reflection rotation translation

by the vector $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$

4



- 1 Rotate A **90° clockwise** about (0, 0). Label it B. (Done for you.)
- 2 Rotate B **90° clockwise** about (0, 0). Label it C.
- 3 Describe the **single** transformation from A to C.

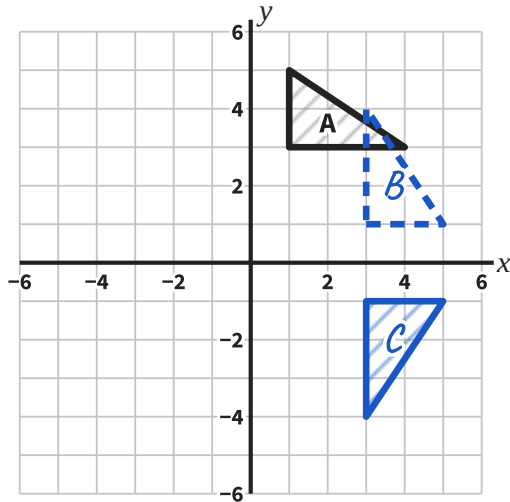
reflection rotation translation

180° about (0, 0)

Combined Transformations

ANSWERS

5 Notice the change!

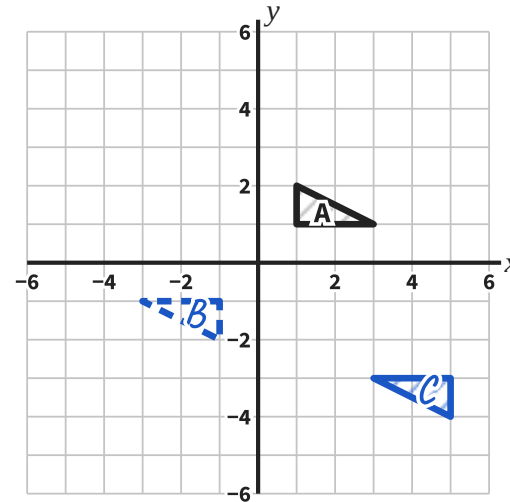


- 1 Reflect A in the line $y = x$. Label it B.
- 2 Reflect B in the **x-axis**. Label it C.
- 3 Describe the **single** transformation from A to C.

reflection rotation translation

90° clockwise about $(0, 0)$

6

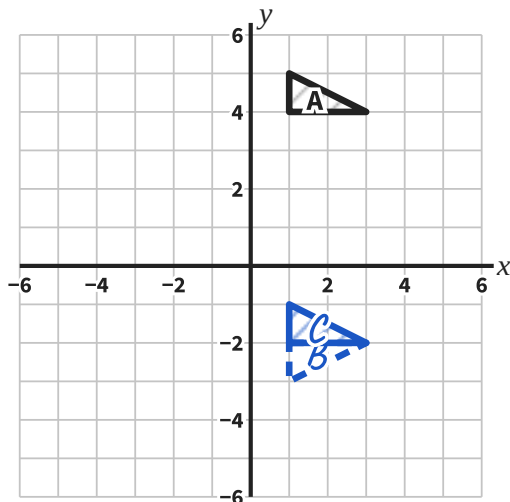


- 1 Rotate A 180° about $(0, 0)$. Label it B.
- 2 Translate B by the vector $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$. Label it C.
- 3 Describe the **single** transformation from A to C.

reflection rotation translation

180° about $(3, -1)$

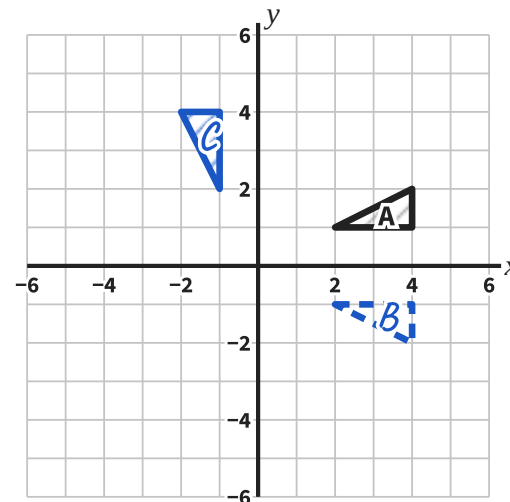
7



- 1 Reflect A in the line $y = 1$. Label it B.
- 2 Reflect B in the line $y = -2$. Label it C.
- 3 Describe the **single** transformation from A to C.

Translation by the vector $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$

8

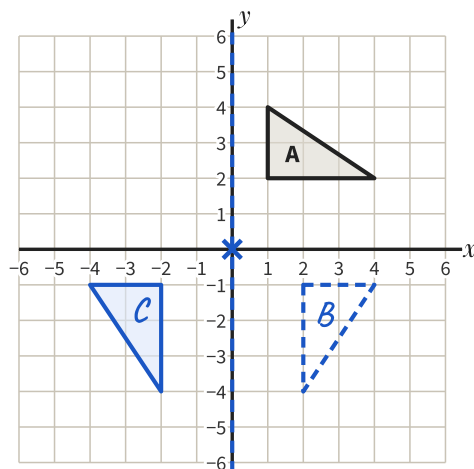


- 1 Reflect A in the **x-axis**. Label it B.
- 2 Reflect B in the line $y = x$. Label it C.
- 3 Describe the **single** transformation from A to C.

Rotation 90° anticlockwise

about $(0, 0)$

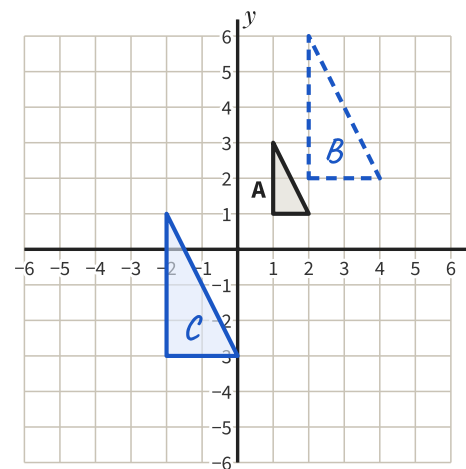
9



- 1 Rotate A 90° clockwise about (0, 0). Label it B.
- 2 Reflect B in the y -axis. Label it C.
- 3 Describe fully the **single** transformation that maps A onto C.

Reflection in the line $y = -x$

10



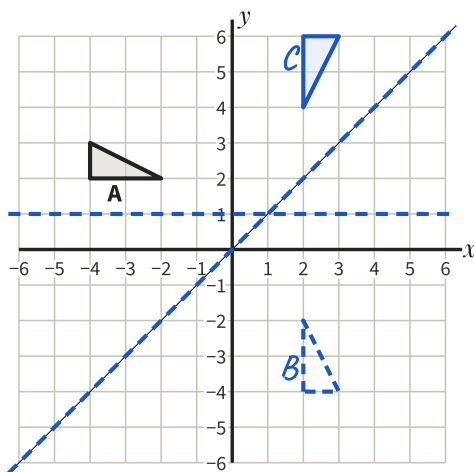
A phone app edits sticker A in two steps.

- 1 Enlarge A by scale factor 2 about (0, 0). Label it B.
- 2 Translate B by the vector $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$. Label it C.
- 3 Describe fully the **single** transformation that maps A onto C.

Enlargement, scale factor 2,

centre (4, 5)

11



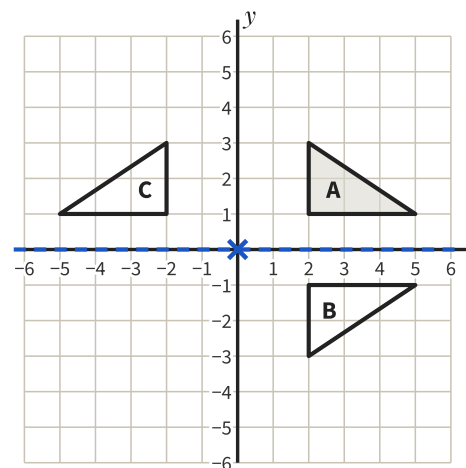
A kaleidoscope pattern is made with two mirror lines.

- 1 Reflect A in the line $y = x$. Label it B.
- 2 Reflect B in the line $y = 1$. Label it C.
- 3 Describe fully the **single** transformation that maps A onto C.

Rotation 90° clockwise

about (1, 1)

12



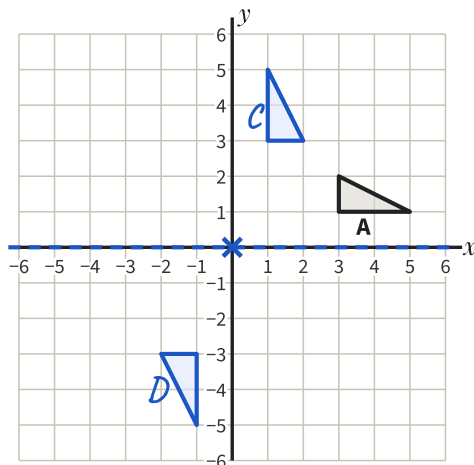
A is reflected in the x -axis to give B. Then B is transformed to give C.

- 1 Describe fully the transformation that maps B onto C.
- 2 Describe fully the **single** transformation that maps A onto C.

(1) Rotation 180° about (0, 0)

(2) Reflection in the y -axis

13

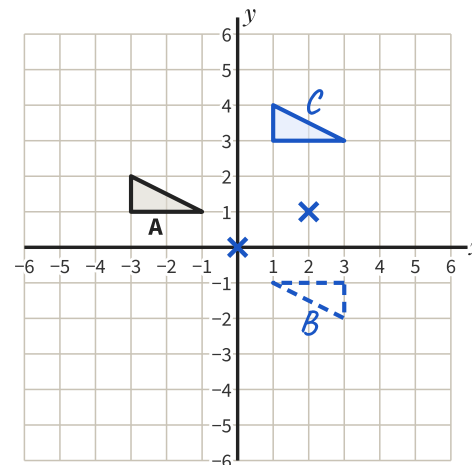


- 1 Rotate A **90° clockwise** about (0, 0). Then reflect the image in the x -axis. Label the final image C.
- 2 Start again from A. Do the same two steps in the other order. Label the final image D.
- 3 Are C and D the same? Describe fully the **single** transformation that maps A onto each.

No. C: reflection in $y = x$

D: reflection in $y = -x$

14

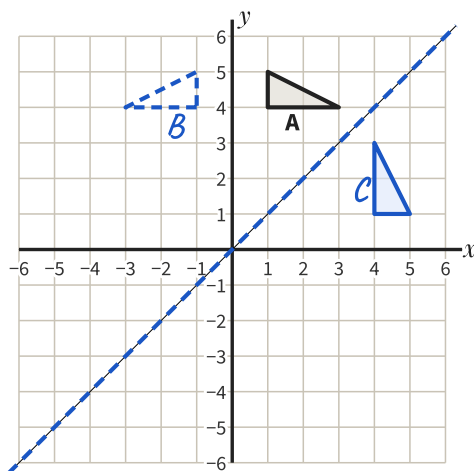


A robot on a floor plan makes two half turns.

- 1 Rotate A **180°** about (0, 0). Label it B.
- 2 Rotate B **180°** about (2, 1). Label it C.
- 3 Describe fully the **single** transformation that maps A onto C.

Translation by the vector $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$

15

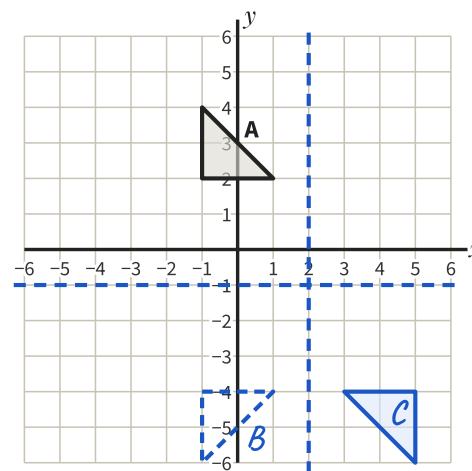


- 1 Reflect A in the y -axis. Label it B.
- 2 Rotate B **90° clockwise** about (0, 0). Label it C.
- 3 Describe fully the **single** transformation that maps A onto C.
- 4 Which points on the grid do not move under this single transformation?

Reflection in the line $y = x$

every point on the line $y = x$

16



- 1 Reflect A in the line $y = -1$. Label it B.
- 2 Reflect B in the line $x = 2$. Label it C.
- 3 Sami says one reflection maps A onto C. Explain why Sami is wrong.
- 4 Describe fully the **single** transformation that maps A onto C.

(3) Two reflections flip A twice, so C is not flipped over.

(4) Rotation 180° about (2, -1)