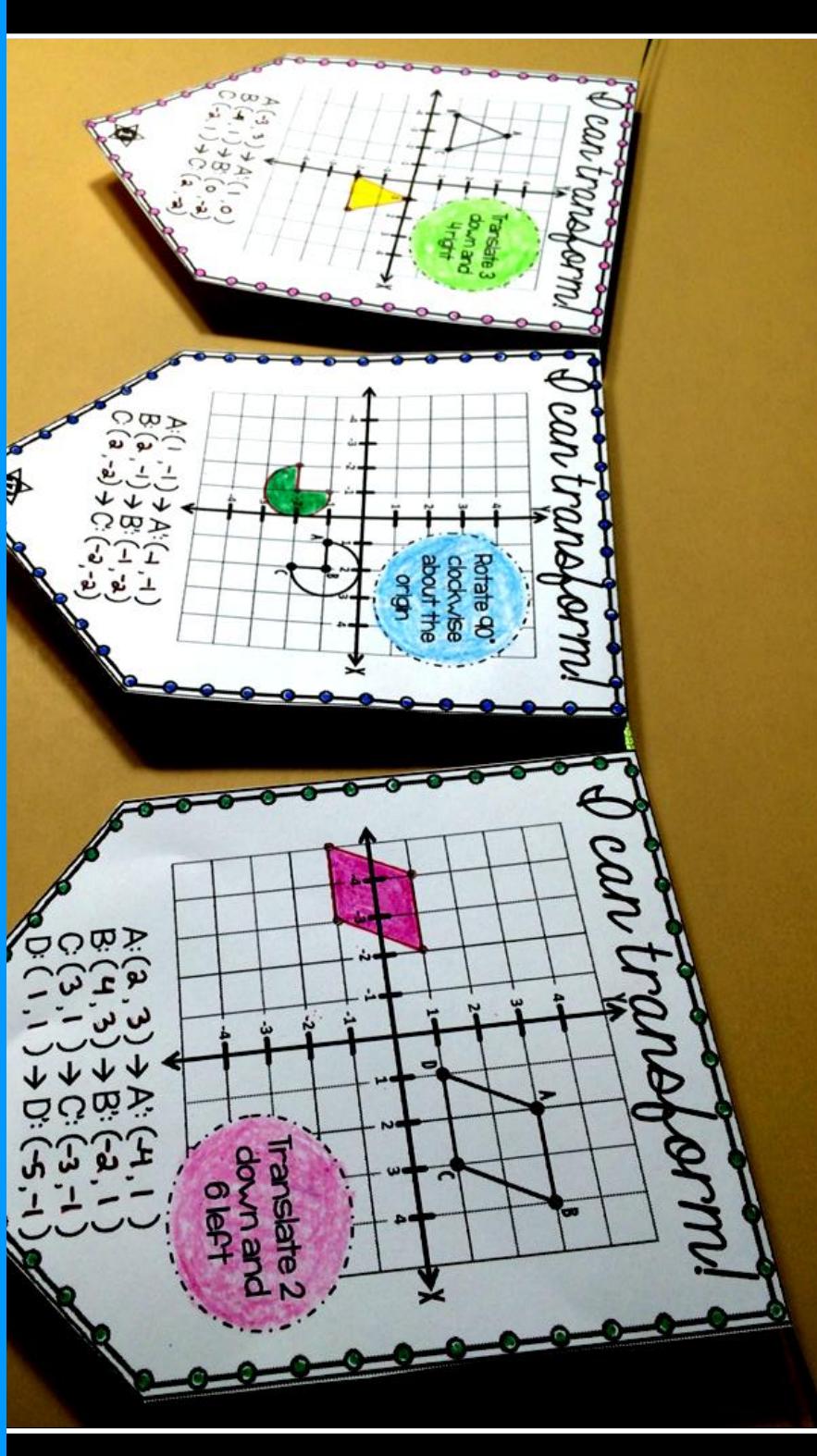


a collaborative activity



TRANSFORMATIONS



DIRECTIONS

Pages 3 - 14: Pennants

Pages 16 - 27: Answer key

Nuts and Bolts:

- ↳ Print pages 3 - 14.
 - ↳ Give a set of pages to each of your student groups.
 - ↳ Also give them scissors and a stapler, tape or a glue stick.
- OPTIONAL: colored pencils or markers.

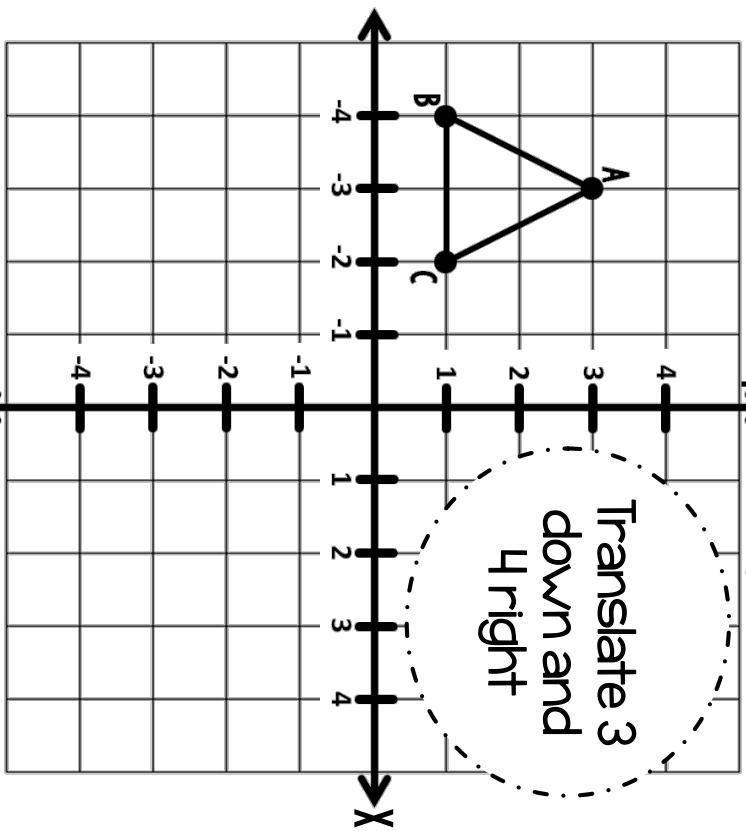
The Activity:

- Students complete the problems on each pennant.
- When a pennant is complete and correct, the student can add it to your string of completed pennants.
- Students can also color their pennants first ☺

\diamond can transform!

(2: fold along this edge and staple or tape)

Translate 3
down and
4 right



1

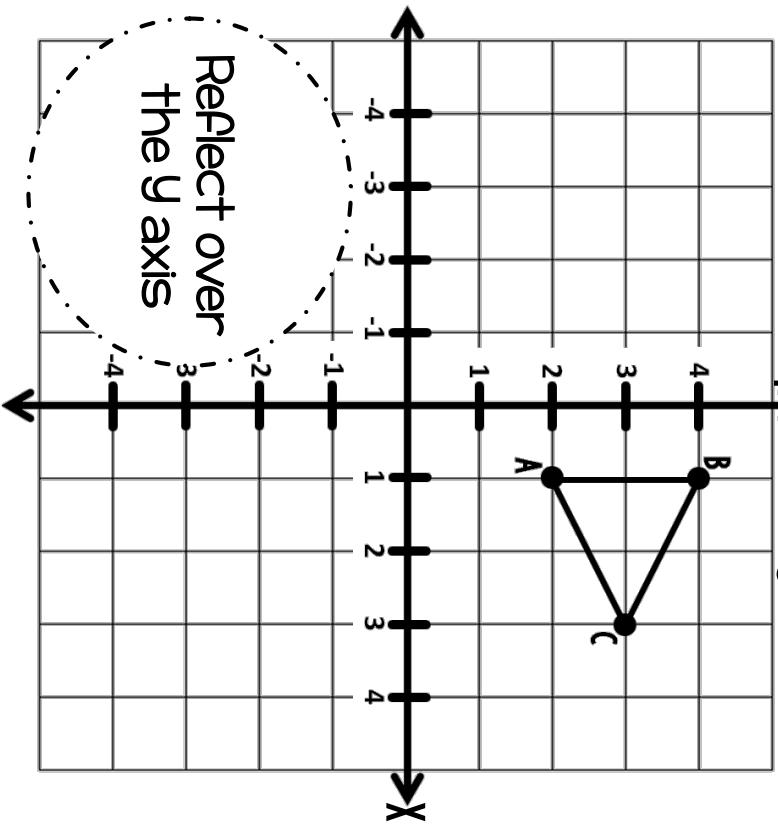
1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A': (,) \\ B: (,) &\rightarrow B': (,) \\ C: (,) &\rightarrow C': (,) \end{aligned}$$

\diamond can transform!

(2: fold along this edge and staple or tape)

Reflect over
the Y axis



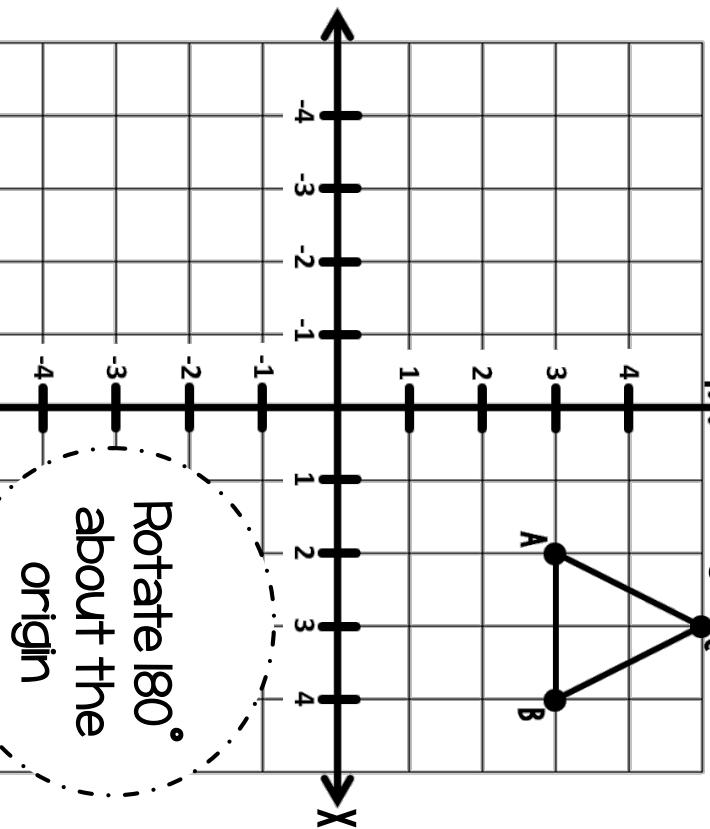
2

1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A'': (,) \\ B: (,) &\rightarrow B'': (,) \\ C: (,) &\rightarrow C'': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)



3

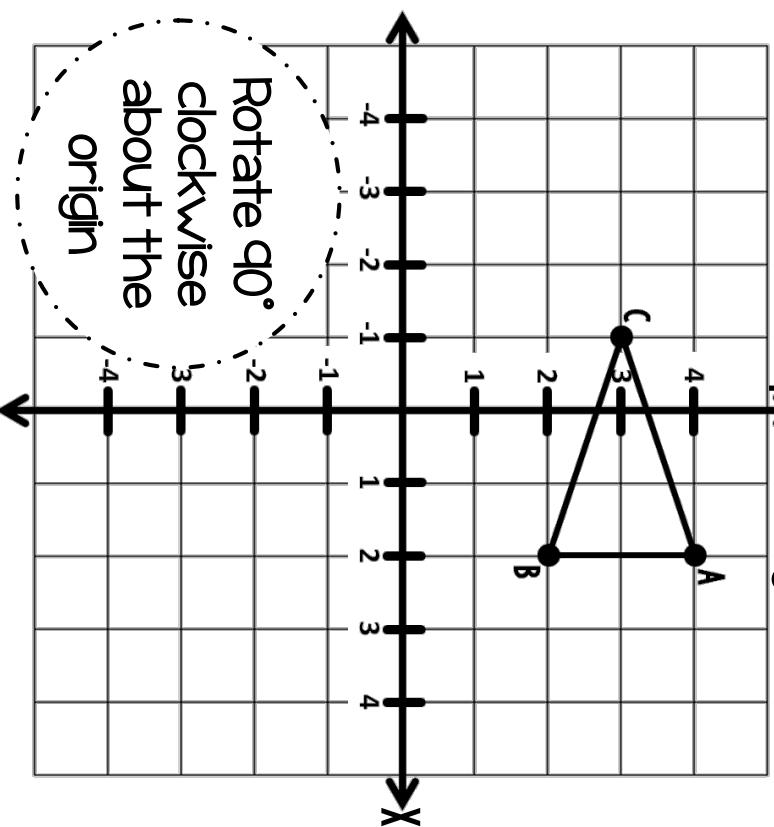
1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A': (,) \\ B: (,) &\rightarrow B': (,) \\ C: (,) &\rightarrow C': (,) \end{aligned}$$

Rotate 180°
about the
origin

Q can transform!

(2: fold along this edge and staple or tape)



4

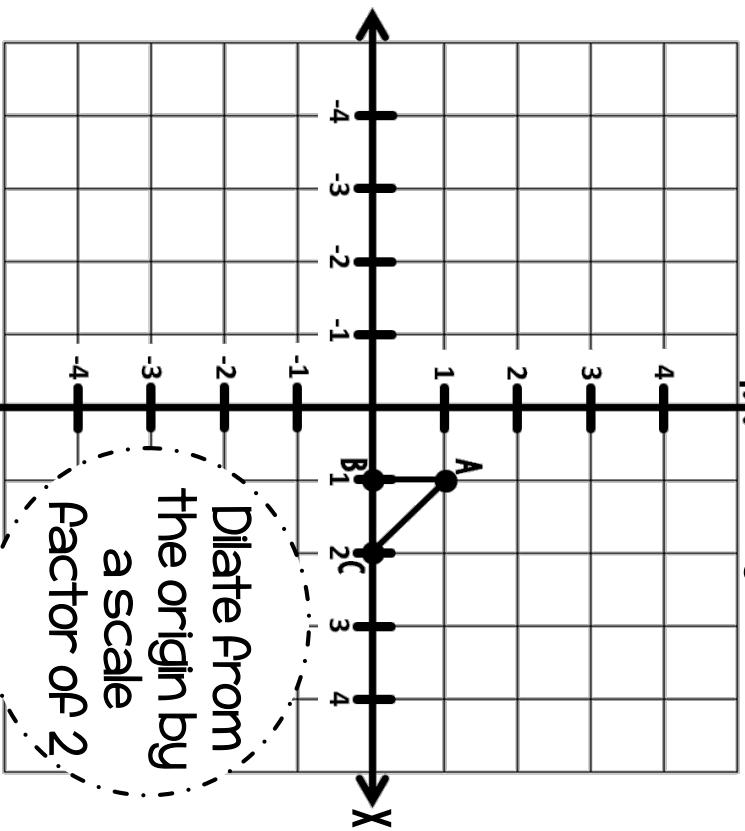
1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A'': (,) \\ B: (,) &\rightarrow B'': (,) \\ C: (,) &\rightarrow C'': (,) \end{aligned}$$

Rotate 90°
clockwise
about the
origin

Q can transform!

(2: fold along this edge and staple or tape)



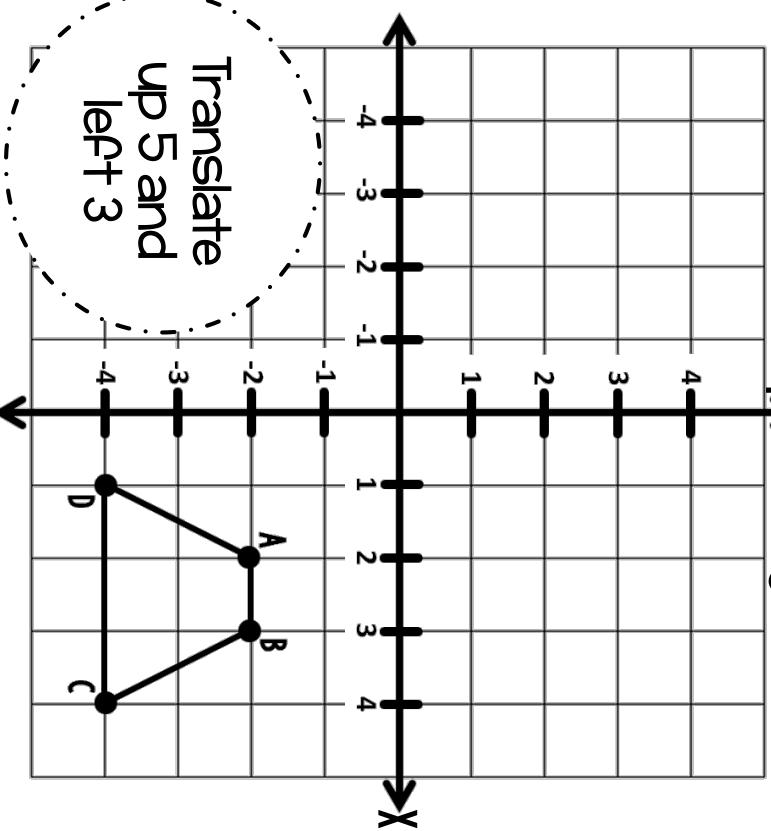
5

1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A': (,) \\ B: (,) &\rightarrow B': (,) \\ C: (,) &\rightarrow C': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)



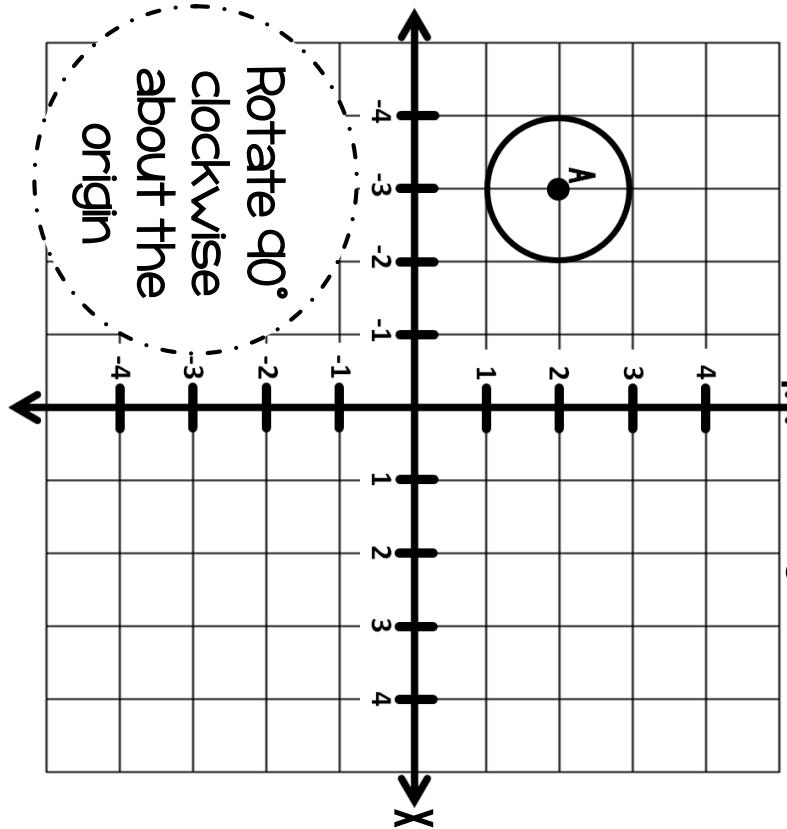
6

1: Cut along outermost edge

$$\begin{aligned} A: (,) &\rightarrow A': (,) \\ B: (,) &\rightarrow B': (,) \\ C: (,) &\rightarrow C': (,) \\ D: (,) &\rightarrow D': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)



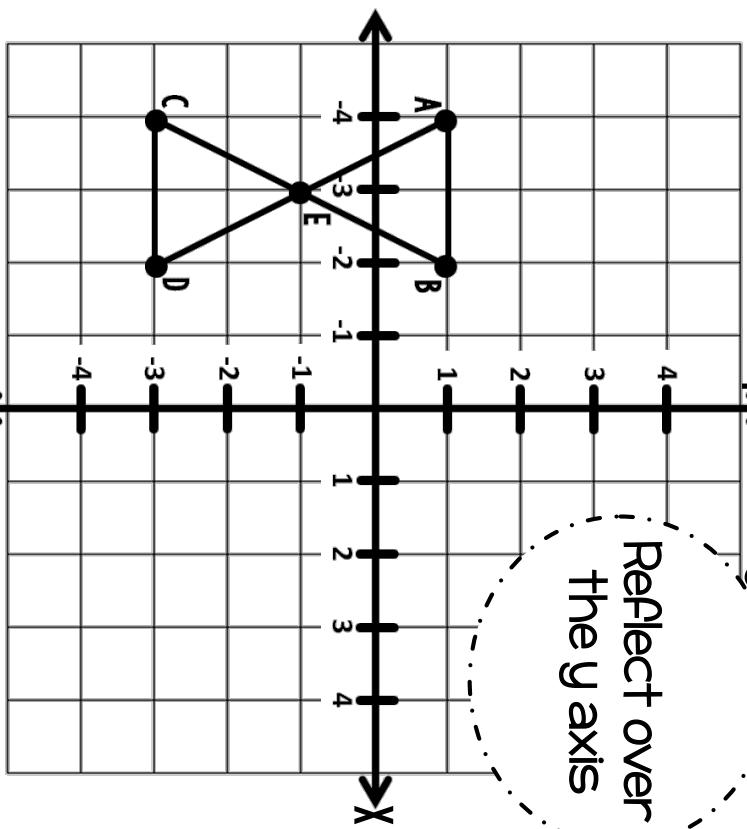
1: Cut along outermost edge

$$A:(\ , \) \rightarrow A':(\ , \)$$

Rotate 90°
clockwise
about the
origin

Q can transform!

(2: fold along this edge and staple or tape)



1: Cut along outermost edge

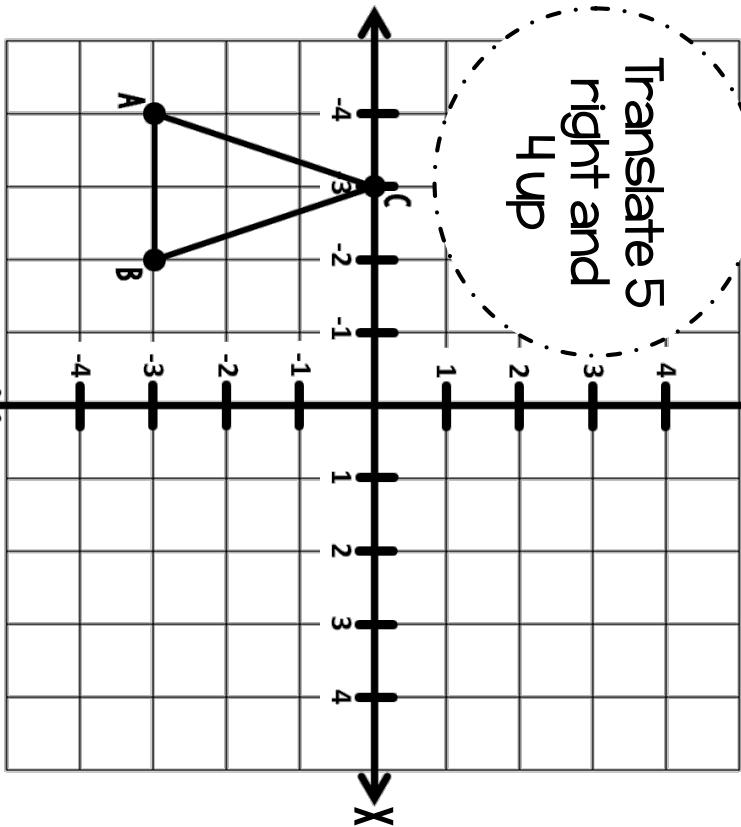
$$\begin{aligned} A:(\ , \) &\rightarrow A':(\ , \) \\ B:(\ , \) &\rightarrow B':(\ , \) \\ C:(\ , \) &\rightarrow C':(\ , \) \\ D:(\ , \) &\rightarrow D':(\ , \) \\ E:(\ , \) &\rightarrow E':(\ , \) \end{aligned}$$

Reflect over
the y axis

(2: fold along this edge and staple or tape)

Q can transform!

Translate 5
right and
4 up



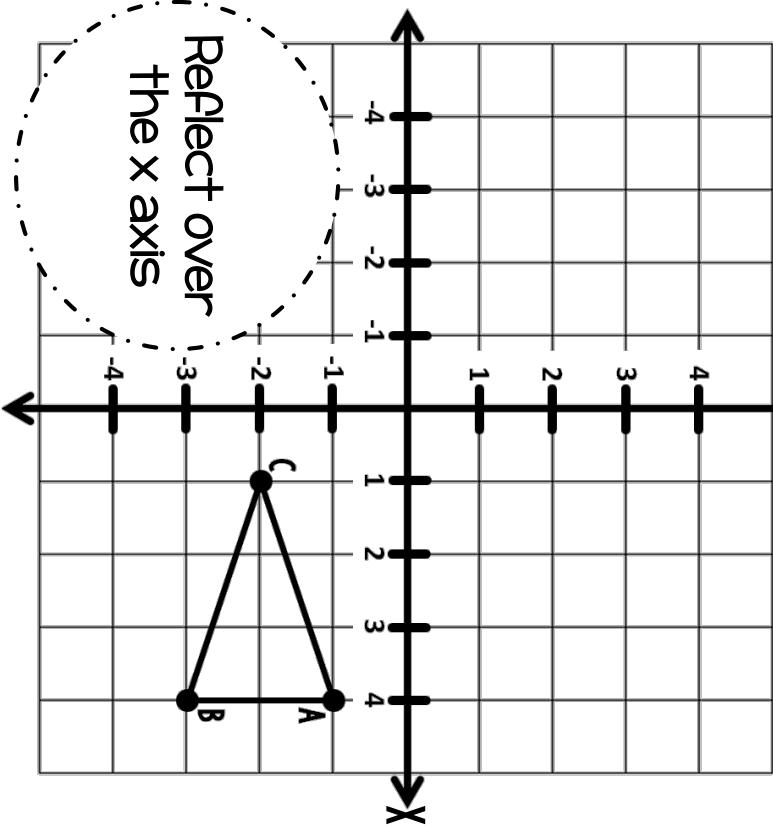
1: Cut along outermost edge

$$\begin{aligned} A:(& ,) \rightarrow A':(& ,) \\ B:(& ,) \rightarrow B':(& ,) \\ C:(& ,) \rightarrow C':(& ,) \end{aligned}$$

(2: fold along this edge and staple or tape)

Q can transform!

Reflect over
the x axis



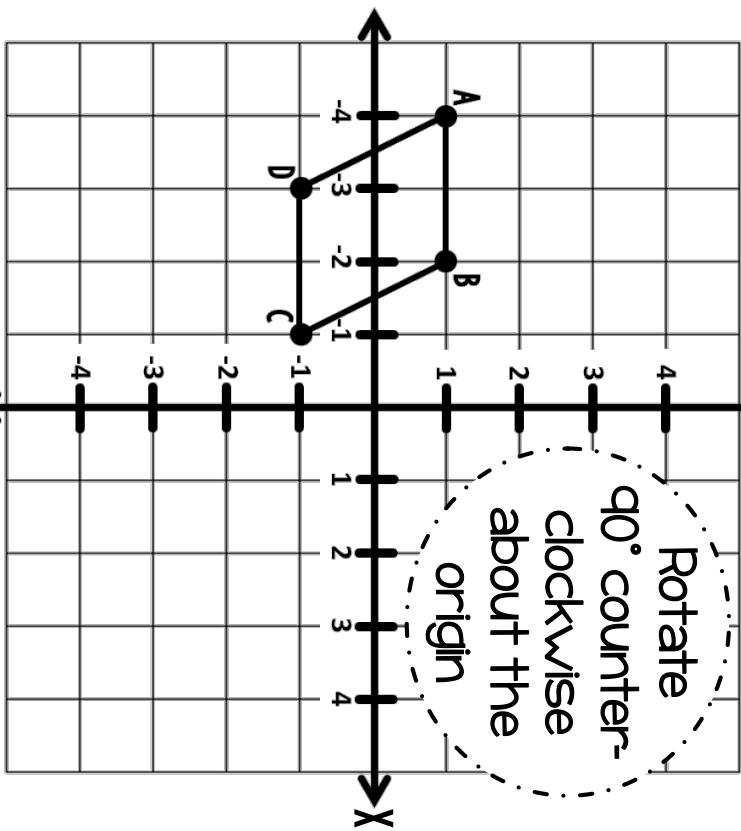
1: Cut along outermost edge

$$\begin{aligned} A:(& ,) \rightarrow A':(& ,) \\ B:(& ,) \rightarrow B':(& ,) \\ C:(& ,) \rightarrow C':(& ,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

90° counter-clockwise about the origin



1: Cut along outermost edge

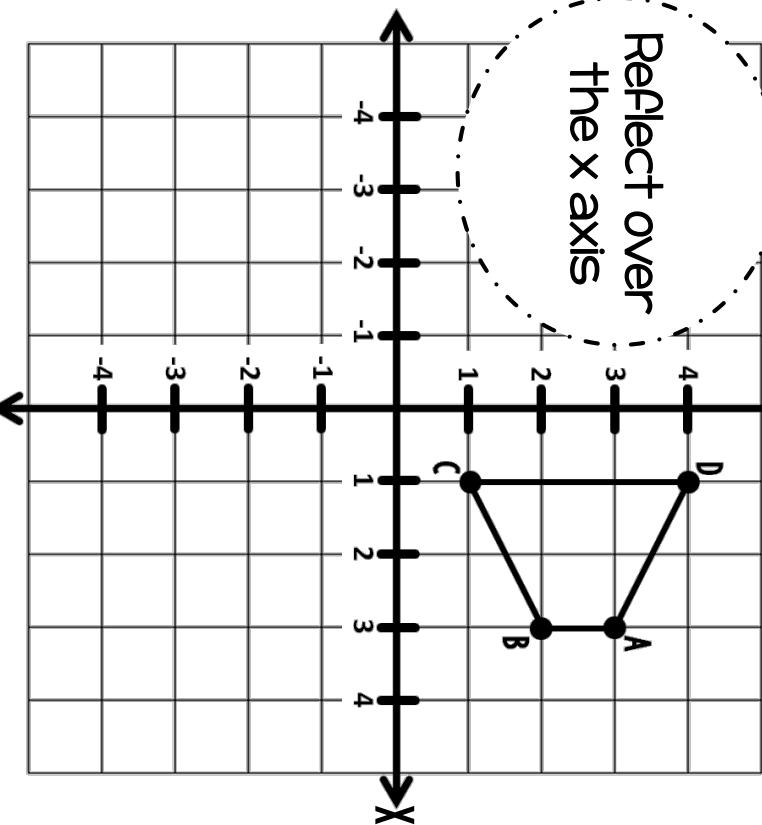
$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \\ C:(\ ,\) \rightarrow C':(\ ,\) \\ D:(\ ,\) \rightarrow D':(\ ,\) \end{array}$$

$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \\ C:(\ ,\) \rightarrow C':(\ ,\) \\ D:(\ ,\) \rightarrow D':(\ ,\) \end{array}$$

Q can transform!

(2: fold along this edge and staple or tape)

Reflect over the x axis



1: Cut along outermost edge

$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \\ C:(\ ,\) \rightarrow C':(\ ,\) \\ D:(\ ,\) \rightarrow D':(\ ,\) \end{array}$$

$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \\ C:(\ ,\) \rightarrow C':(\ ,\) \\ D:(\ ,\) \rightarrow D':(\ ,\) \end{array}$$

Q can transform!

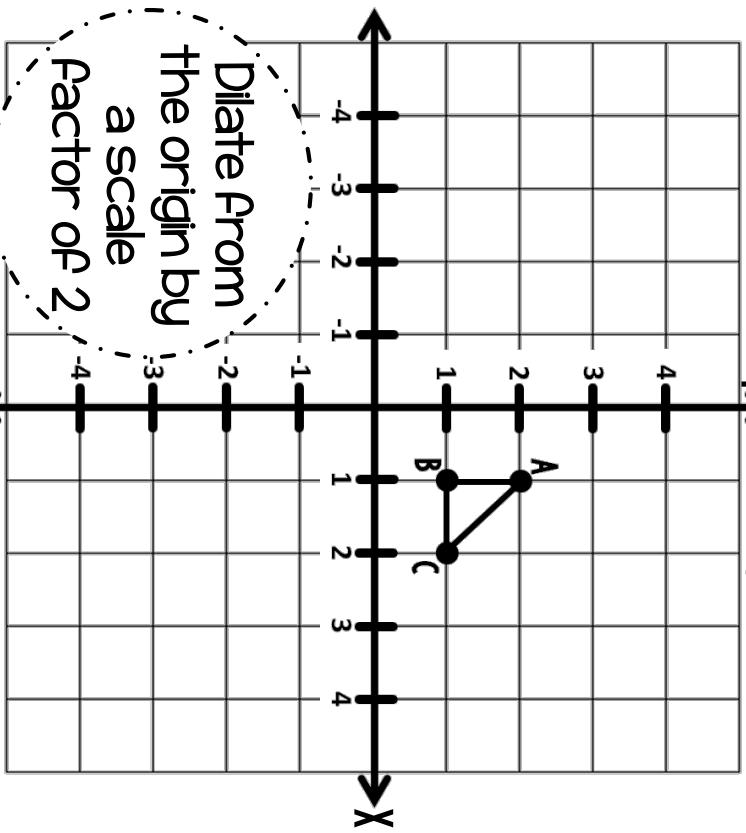
(2: fold along this edge and staple or tape)

13

1: Cut along outermost edge

$$\begin{array}{l} A:(\ , \) \rightarrow A:(\ , \) \\ B:(\ , \) \rightarrow B:(\ , \) \\ C:(\ , \) \rightarrow C:(\ , \) \end{array}$$

Dilate from
the origin by
a scale
factor of 2.

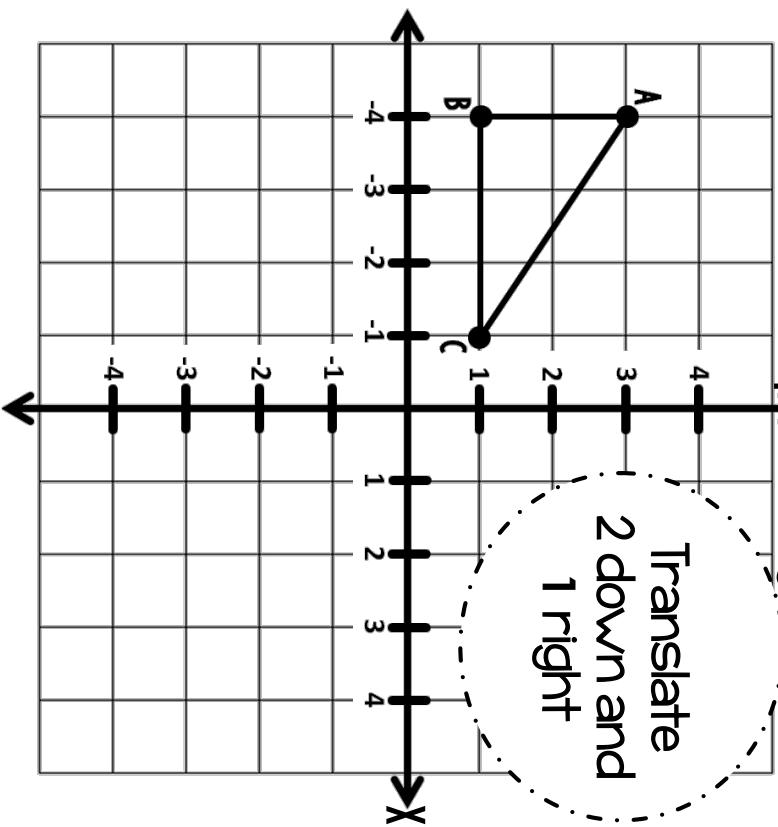


14

1: Cut along outermost edge

$$\begin{array}{l} A:(\ , \) \rightarrow A:(\ , \) \\ B:(\ , \) \rightarrow B:(\ , \) \\ C:(\ , \) \rightarrow C:(\ , \) \end{array}$$

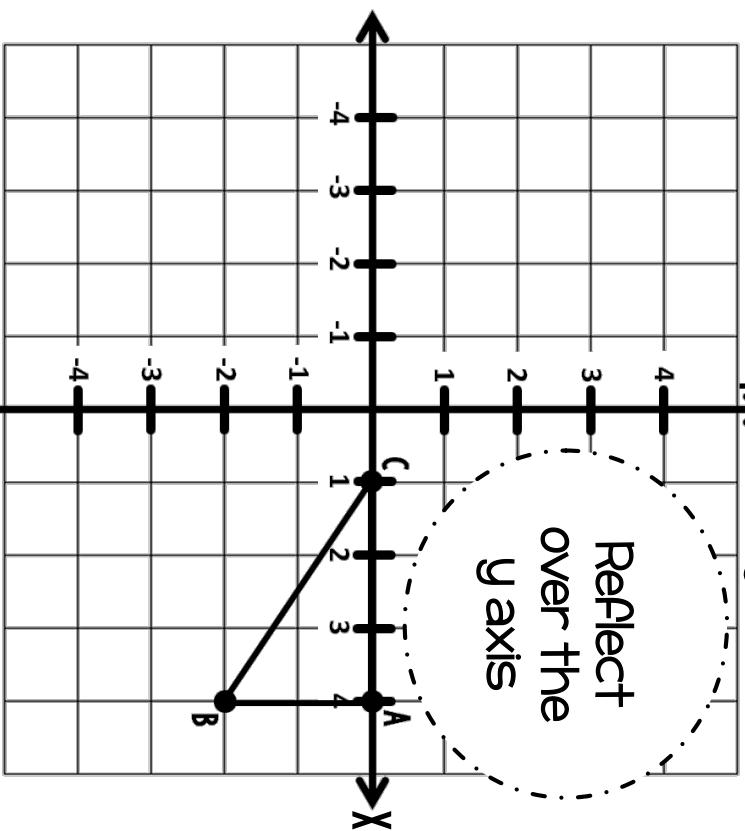
Translate
2 down and
1 right



Q can transform!

(2: fold along this edge and staple or tape)

Reflect
over the
y axis



15

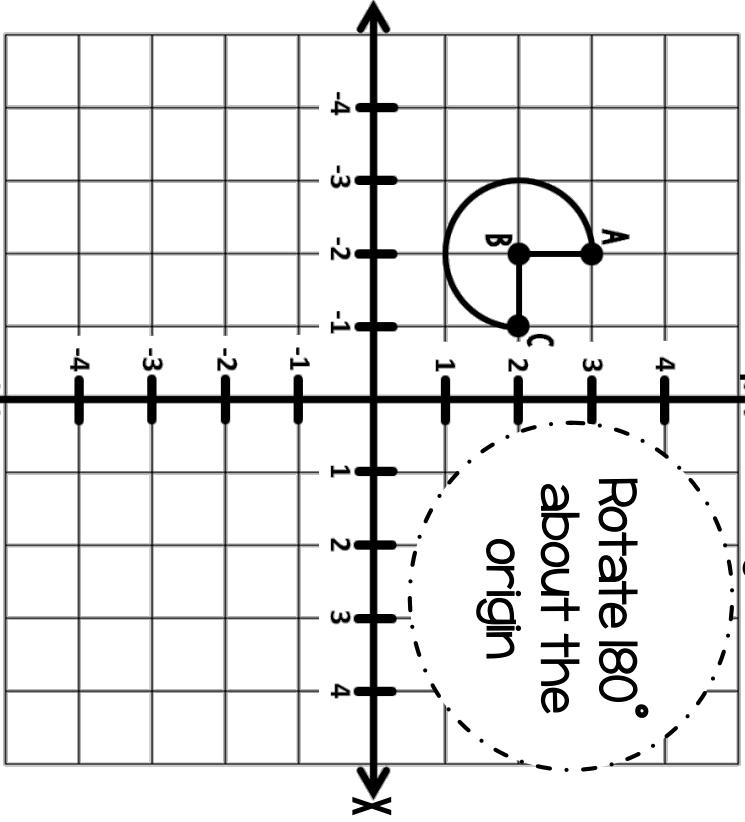
1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (& ,) \\ B: (& ,) \rightarrow B': (& ,) \\ C: (& ,) \rightarrow C': (& ,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

Rotate 180°
about the
origin



16

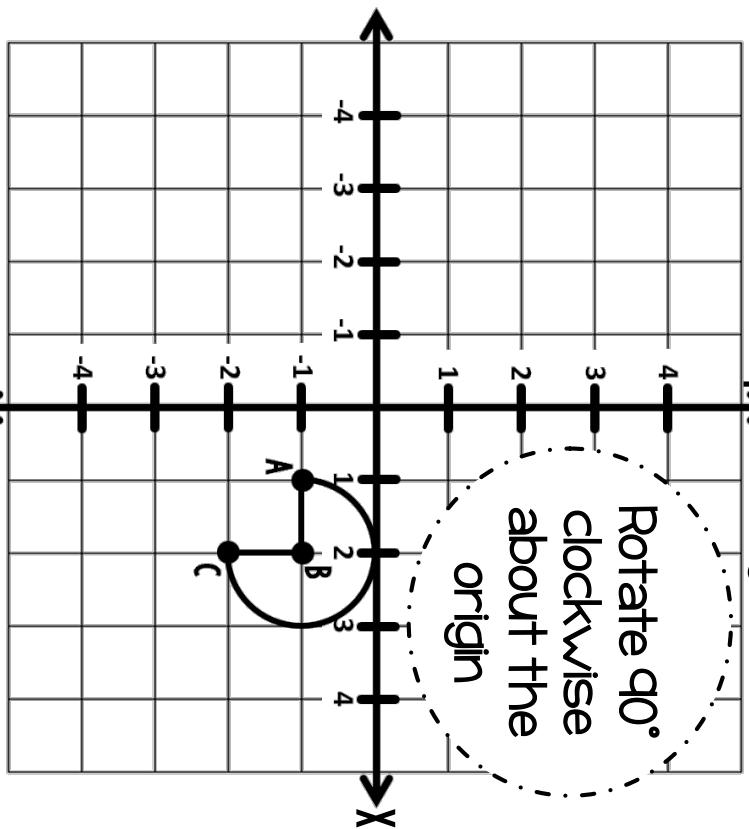
1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (& ,) \\ B: (& ,) \rightarrow B': (& ,) \\ C: (& ,) \rightarrow C': (& ,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

Rotate 90°
clockwise
about the
origin



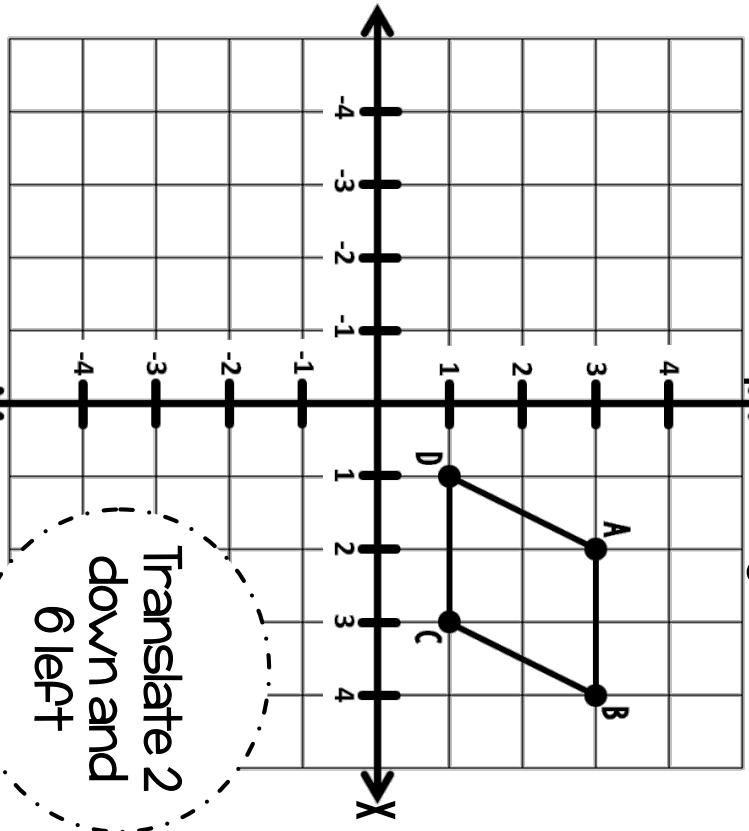
1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (,) \\ B: (& ,) \rightarrow B': (,) \\ C: (& ,) \rightarrow C': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

Translate 2
down and
6 left



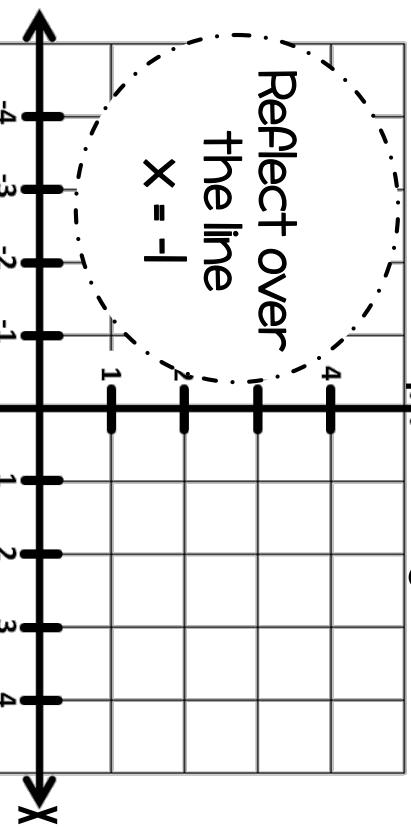
1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (,) \\ B: (& ,) \rightarrow B': (,) \\ C: (& ,) \rightarrow C': (,) \\ D: (& ,) \rightarrow D': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

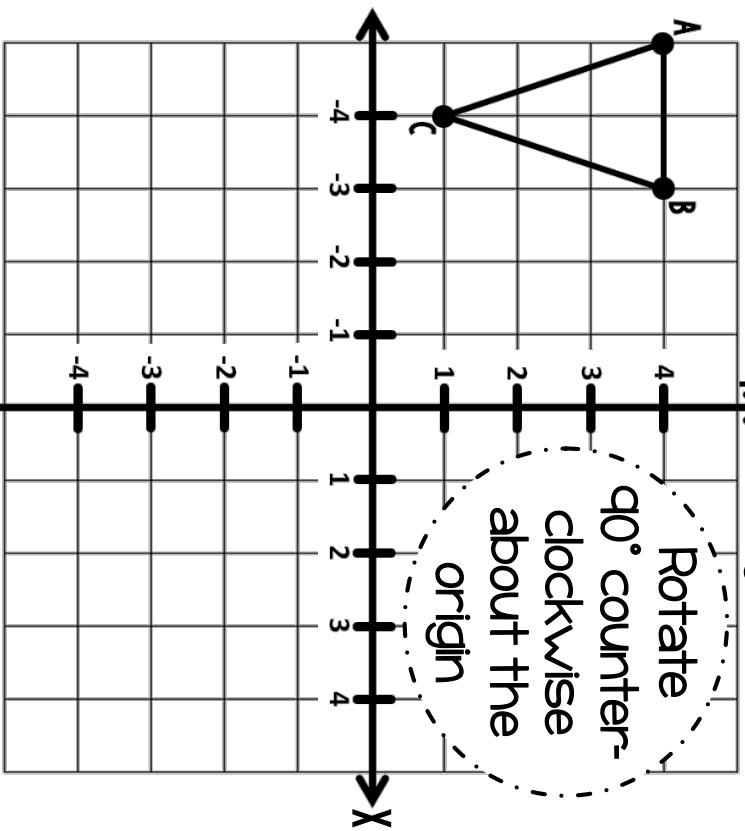
Reflect over
the line
 $x = -1$



19

1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (& ,) \\ B: (& ,) \rightarrow B': (& ,) \\ C: (& ,) \rightarrow C': (& ,) \end{aligned}$$



Rotate
90° counter-
clockwise
about the
origin

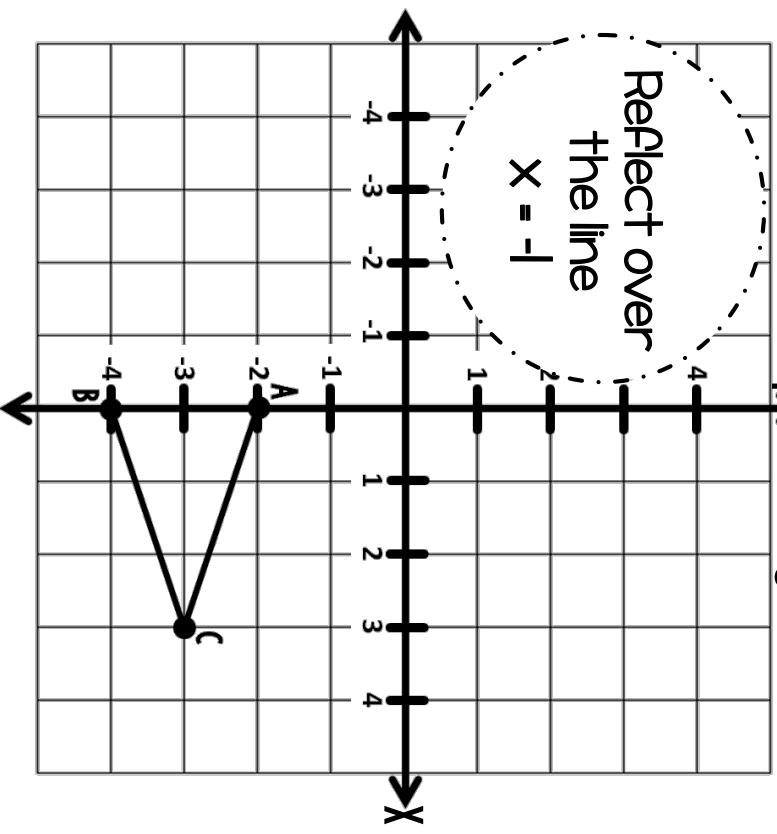
Q can transform!

(2: fold along this edge and staple or tape)

20

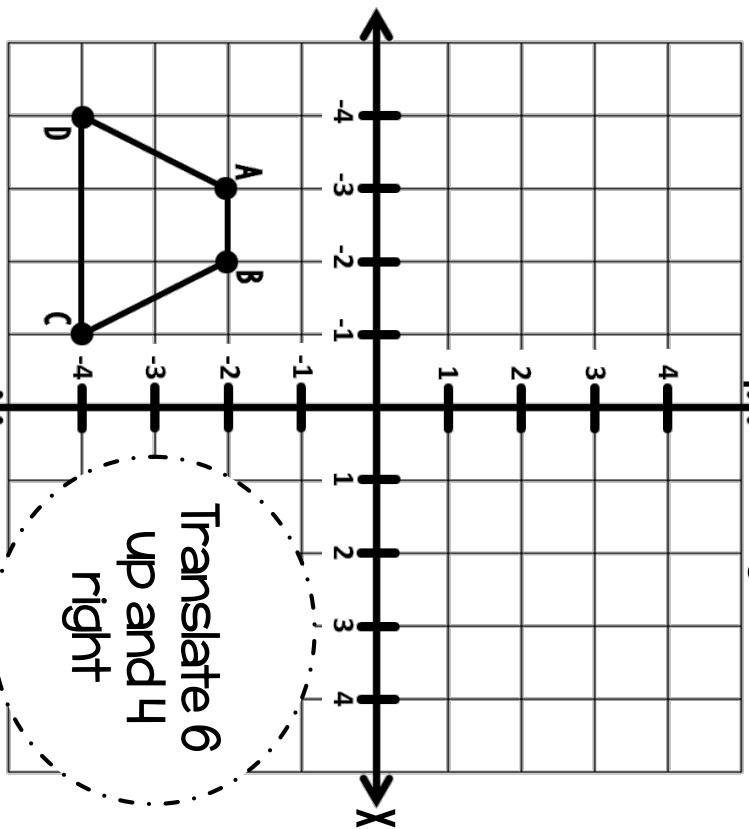
1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (& ,) \\ B: (& ,) \rightarrow B': (& ,) \\ C: (& ,) \rightarrow C': (& ,) \end{aligned}$$



Q can transform!

(2: fold along this edge and staple or tape)

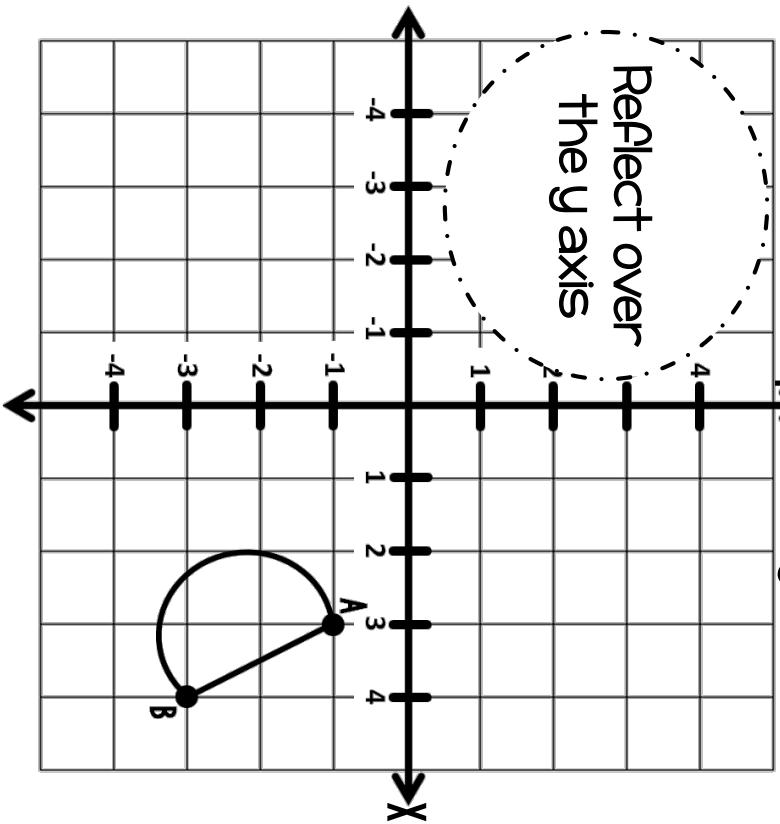


1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (,) \\ B: (& ,) \rightarrow B': (,) \\ C: (& ,) \rightarrow C': (,) \\ D: (& ,) \rightarrow D': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

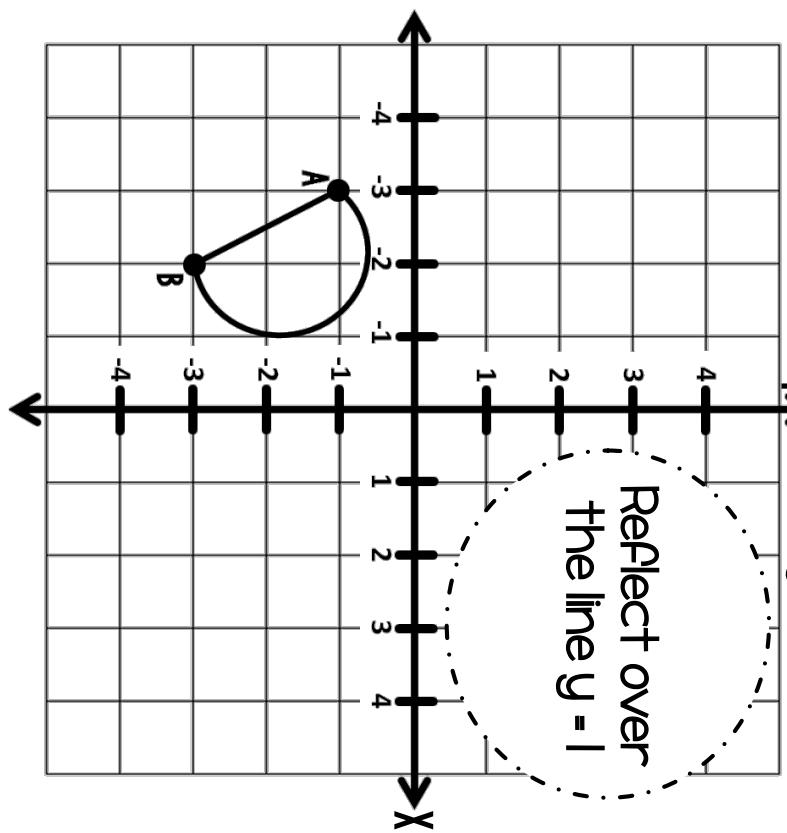


1: Cut along outermost edge

$$\begin{aligned} A: (& ,) \rightarrow A': (,) \\ B: (& ,) \rightarrow B': (,) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)



23

1: Cut along outermost edge

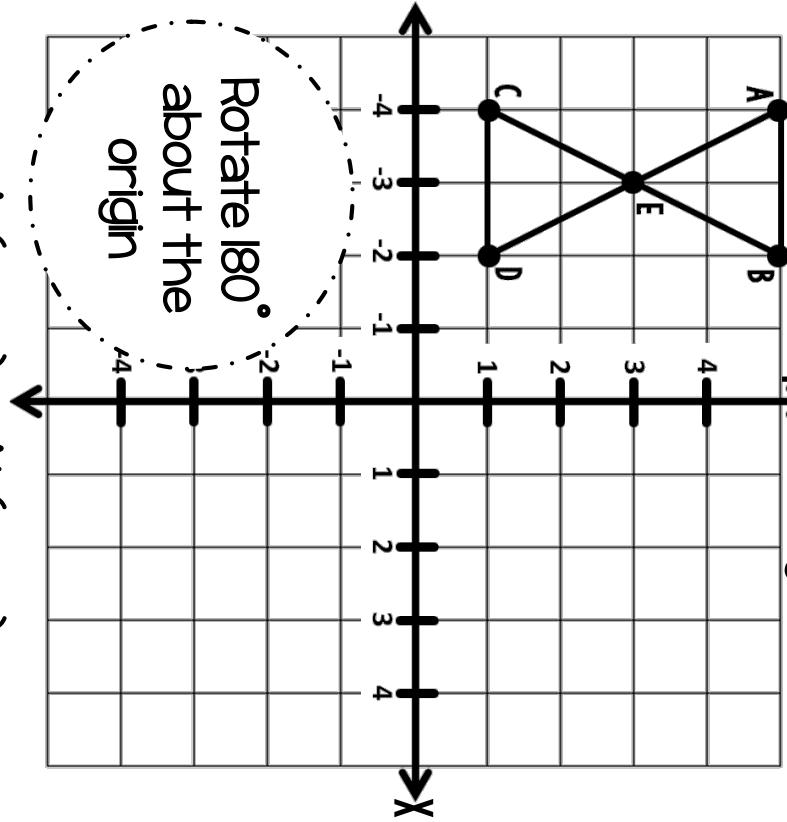
$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \end{array}$$

24

1: Cut along outermost edge

$$\begin{array}{l} A:(\ ,\) \rightarrow A':(\ ,\) \\ B:(\ ,\) \rightarrow B':(\ ,\) \\ C:(\ ,\) \rightarrow C':(\ ,\) \\ D:(\ ,\) \rightarrow D':(\ ,\) \\ E:(\ ,\) \rightarrow E':(\ ,\) \end{array}$$

Rotate 180° about the origin



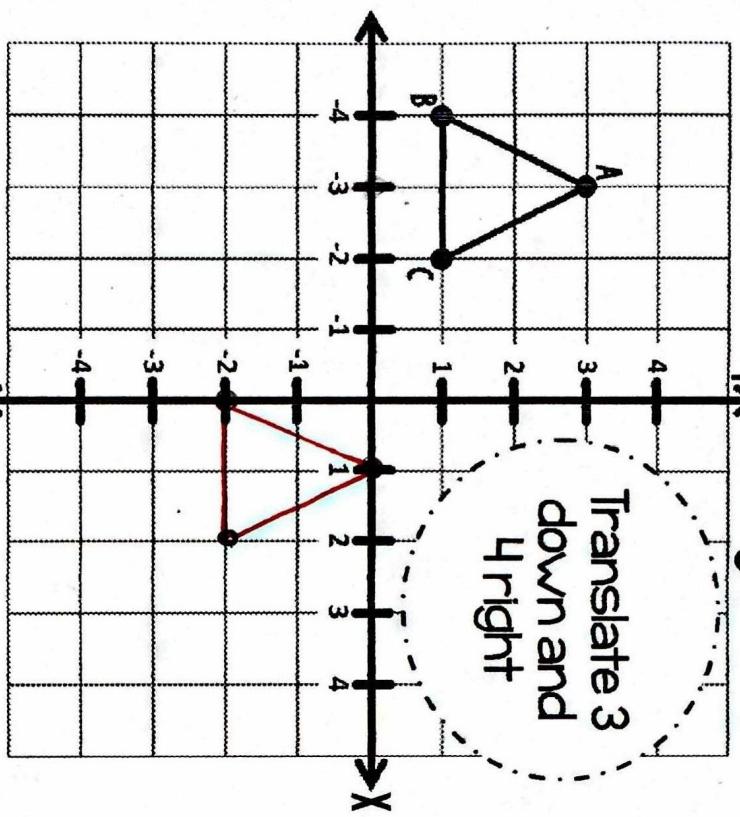
Q can transform!

(2: fold along this edge and staple or tape)

hey sommo
body

Q can transform!

(2: fold along this edge and staple or tape)

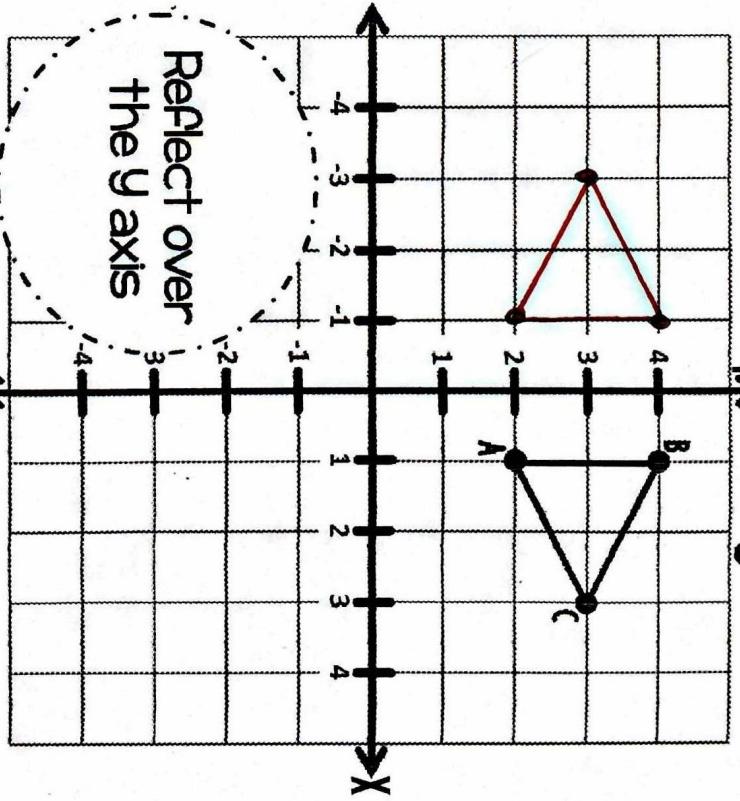


1: Cut along outermost edge

$$\begin{aligned} A: (-3, 3) &\rightarrow A': (1, 0) \\ B: (-4, -1) &\rightarrow B': (0, -2) \\ C: (-2, 1) &\rightarrow C': (2, -2) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)

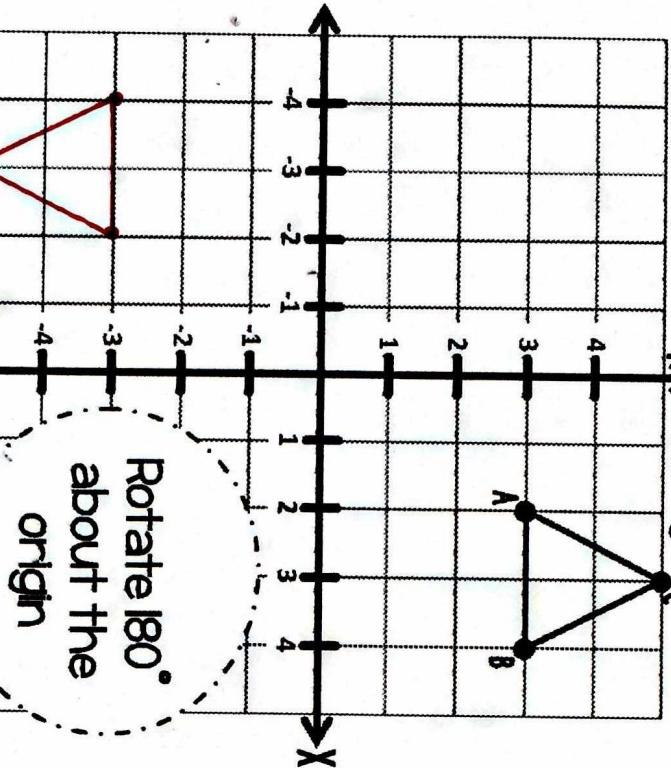


1: Cut along outermost edge

$$\begin{aligned} A: (1, 2) &\rightarrow A': (-1, 2) \\ B: (1, 4) &\rightarrow B': (-1, 4) \\ C: (3, 3) &\rightarrow C': (-3, 3) \end{aligned}$$

Q can transform!

(2: fold along this edge and staple or tape)



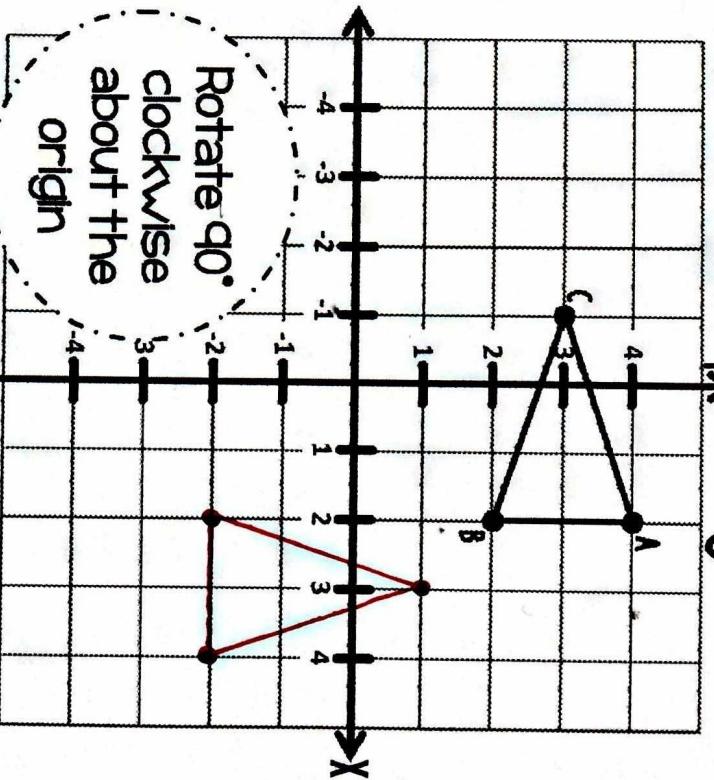
Rotate 180°
about the
origin

$$\begin{aligned} A: (2, 3) &\rightarrow A': (-2, -3) \\ B: (4, -3) &\rightarrow B': (-4, 3) \\ C: (3, 5) &\rightarrow C': (-3, -5) \end{aligned}$$

1: Cut along outermost edge

Q can transform!

(2: fold along this edge and staple or tape)



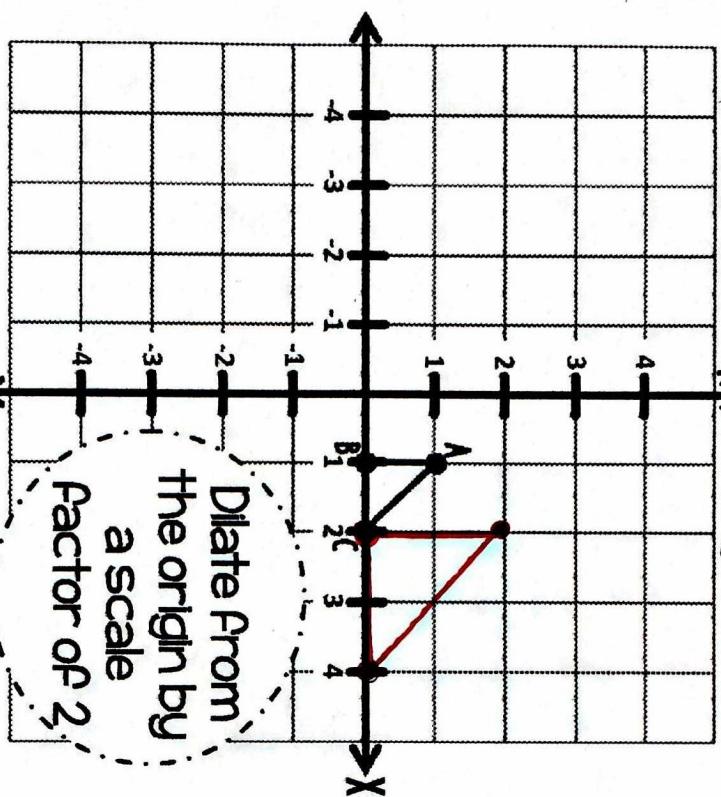
Rotate 90°
clockwise
about the
origin

$$\begin{aligned} A: (2, 4) &\rightarrow A': (4, -2) \\ B: (2, 2) &\rightarrow B': (2, -2) \\ C: (-1, 3) &\rightarrow C': (3, 1) \end{aligned}$$

1: Cut along outermost edge

I can transform!

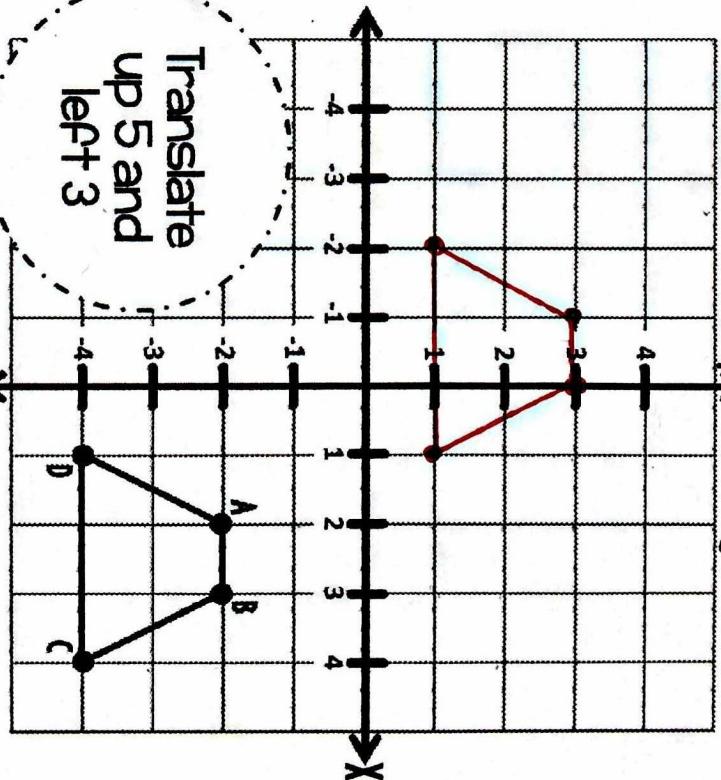
{2: fold along this edge and staple or tape}



1: Cut along outermost edge

$$\begin{aligned} A: (1, 1) &\rightarrow A': (2, 2) \\ B: (-1, 0) &\rightarrow B': (-2, 0) \\ C: (2, 0) &\rightarrow C': (4, 0) \end{aligned}$$

{2: fold along this edge and staple or tape}

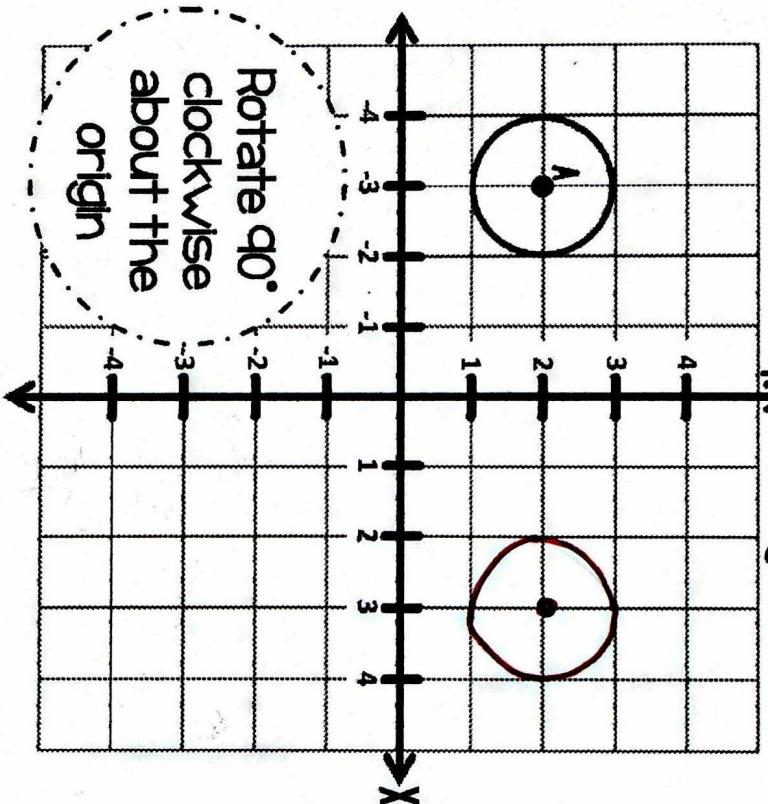


1: Cut along outermost edge

$$\begin{aligned} A: (2, -2) &\rightarrow A: (-1, 3) \\ B: (3, -1) &\rightarrow B: (0, 3) \\ C: (1, -1) &\rightarrow C: (-2, 1) \\ D: (1, -2) &\rightarrow D: (-2, -1) \end{aligned}$$

{2: fold along this edge and staple or tape}

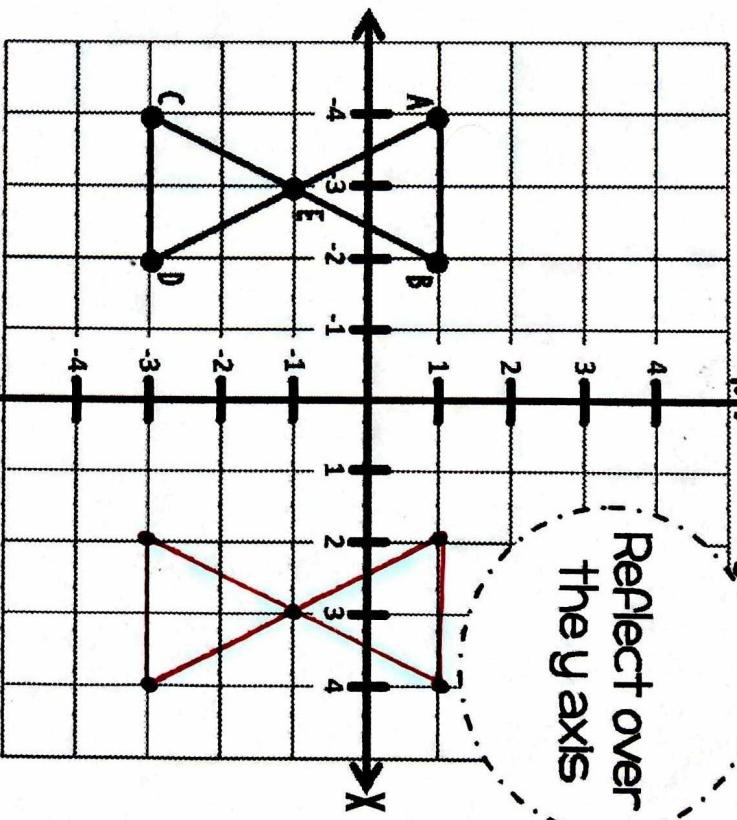
Q can transform!



1: cut along outermost edge

{2: fold along this edge and staple or tape}

Q can transform!

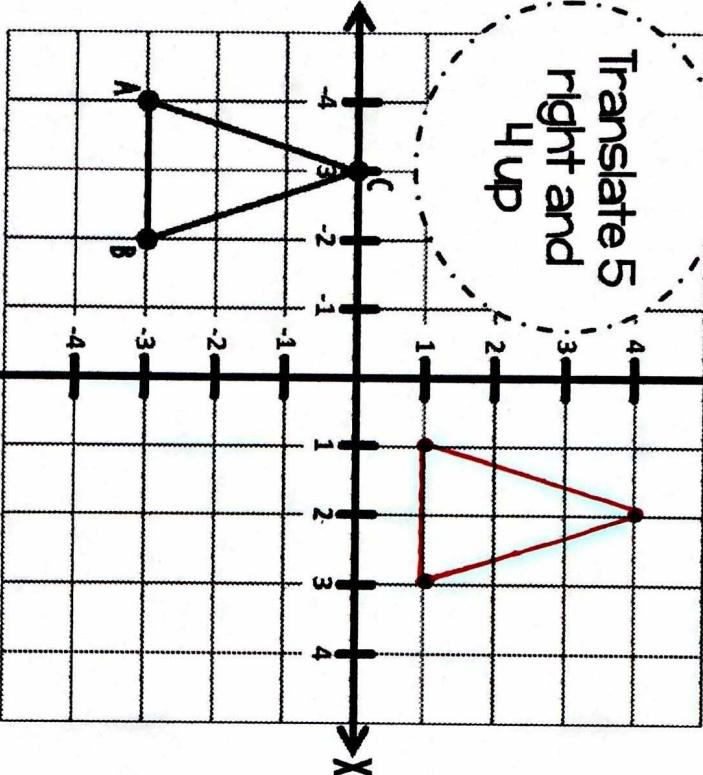


1: cut along outermost edge

(2: fold along this edge and staple or tape)

Q can transform!

Translate 5
right and
4 up



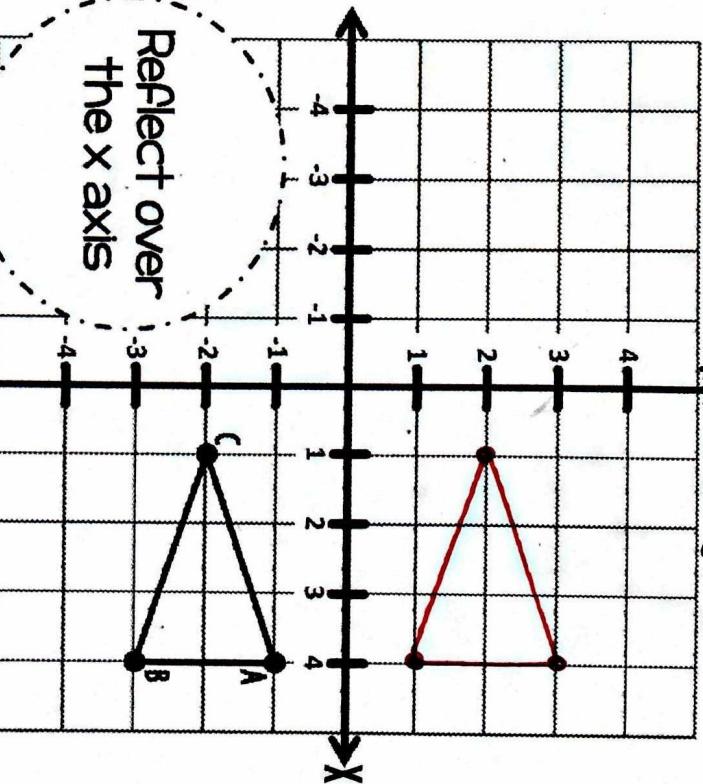
1: Cut along outermost edge

$$\begin{aligned} A: (-4, -3) &\rightarrow A': (1, 1) \\ B: (-2, -3) &\rightarrow B': (3, 1) \\ C: (-3, 0) &\rightarrow C': (2, 4) \end{aligned}$$

(2: fold along this edge and staple or tape)

Q can transform!

Reflect over
the x axis



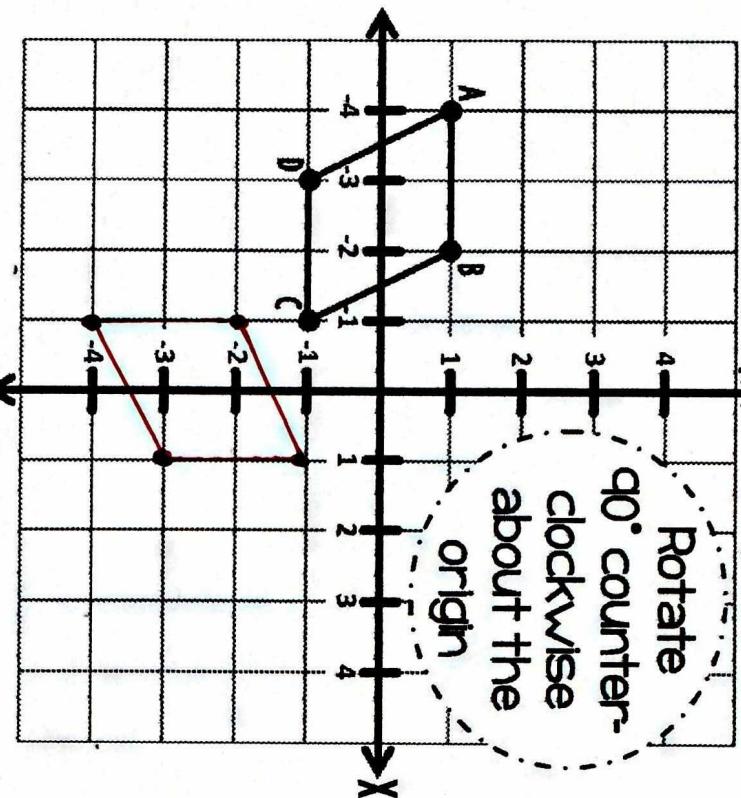
1: Cut along outermost edge

$$\begin{aligned} A: (4, -1) &\rightarrow A': (4, 1) \\ B: (4, -3) &\rightarrow B': (4, 3) \\ C: (1, -2) &\rightarrow C': (1, 2) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

90° counter-clockwise about the origin



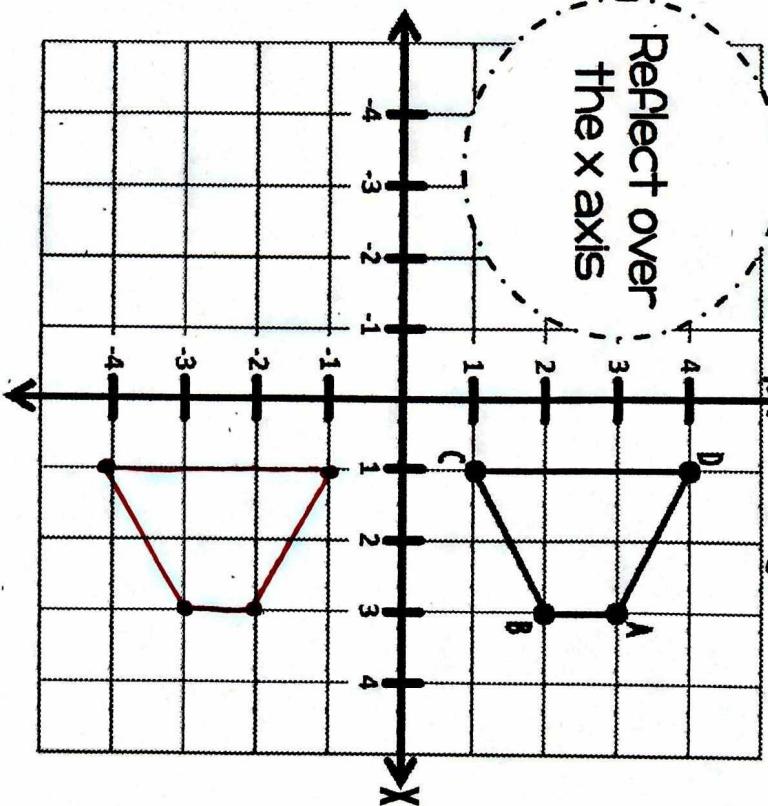
1: Cut along outermost edge

$$\begin{aligned} A: (-4, 1) &\rightarrow A': (-1, -4) \\ B: (-2, 1) &\rightarrow B': (-1, 2) \\ C: (-1, -1) &\rightarrow C': (-1, 1) \\ D: (-3, -1) &\rightarrow D': (1, 3) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

Reflect over the x axis

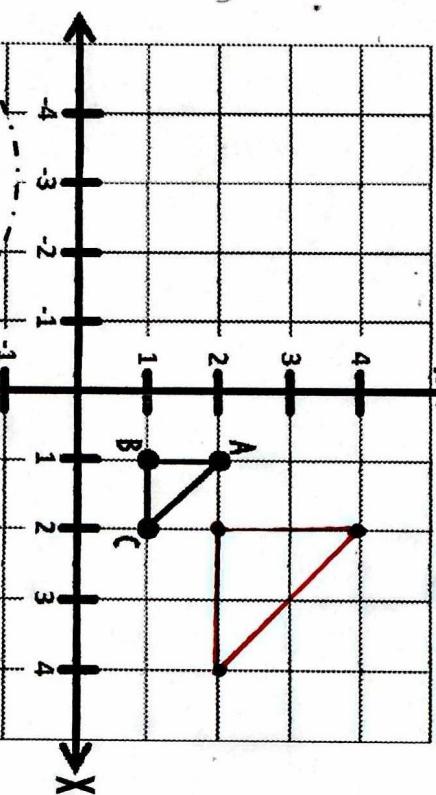


1: Cut along outermost edge

$$\begin{aligned} A: (3, 3) &\rightarrow A': (3, -3) \\ B: (3, 2) &\rightarrow B': (3, -2) \\ C: (1, 1) &\rightarrow C': (1, -1) \\ D: (1, 4) &\rightarrow D': (1, -4) \end{aligned}$$

{2: fold along this edge and staple or tape}

Q can transform!



Dilate from
the origin by
a scale
factor of 2

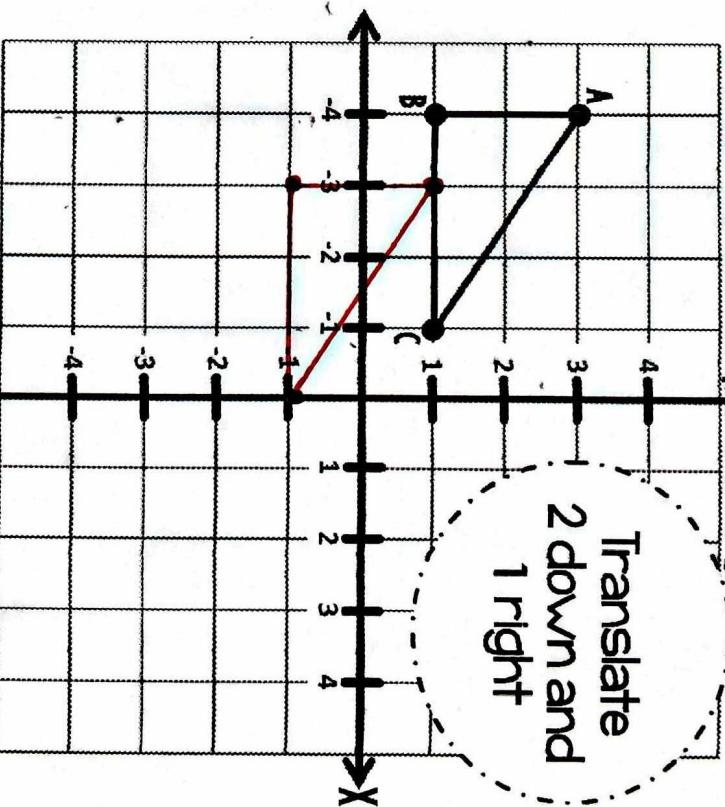
$$\begin{aligned} A: (1, 2) &\rightarrow A': (2, 4) \\ B: (1, 1) &\rightarrow B': (2, 2) \\ C: (1, 0) &\rightarrow C': (4, 0) \end{aligned}$$

1: Cut along outermost edge

1: Cut along outermost edge

{2: fold along this edge and staple or tape}

Q can transform!



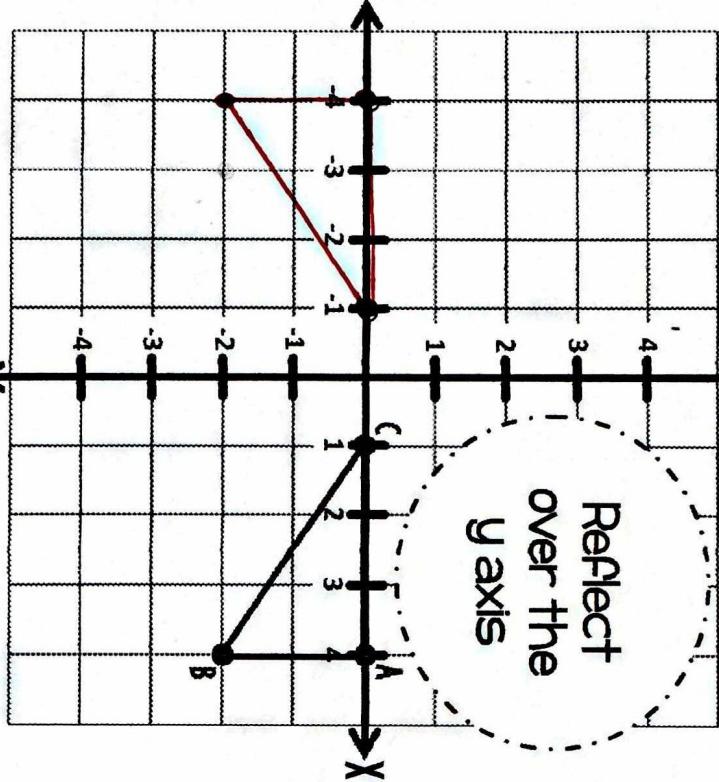
Translate
2 down and
1 right

$$\begin{aligned} A: (-4, 3) &\rightarrow A': (-3, 1) \\ B: (-4, 1) &\rightarrow B': (-3, -1) \\ C: (-1, 1) &\rightarrow C': (0, -1) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

Reflect
over the
y axis



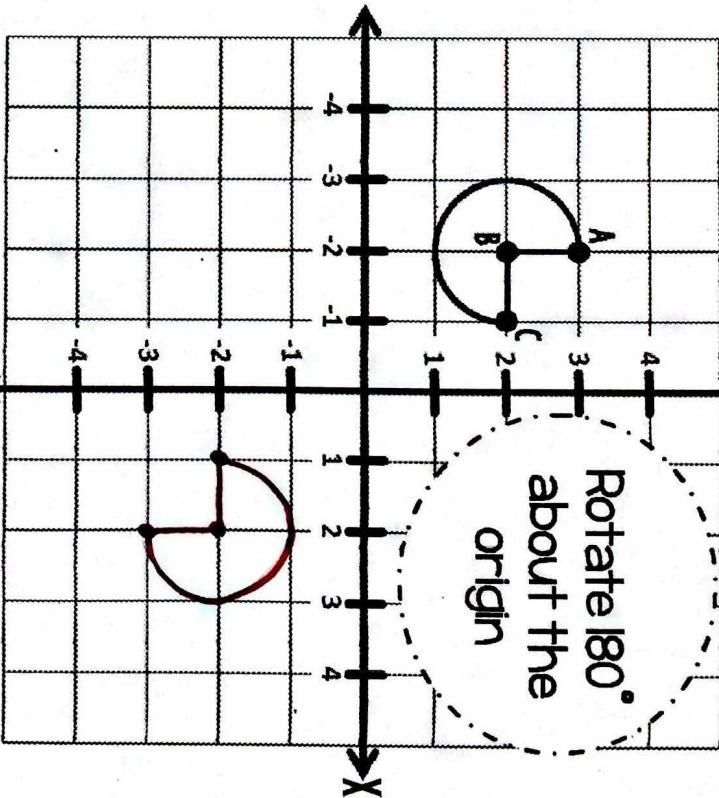
1: Cut along outermost edge

$$\begin{aligned} A: (-4, 0) &\rightarrow A': (4, 0) \\ B: (-2, -2) &\rightarrow B': (2, -2) \\ C: (-1, 0) &\rightarrow C': (1, 0) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

Rotate 180°
about the
origin



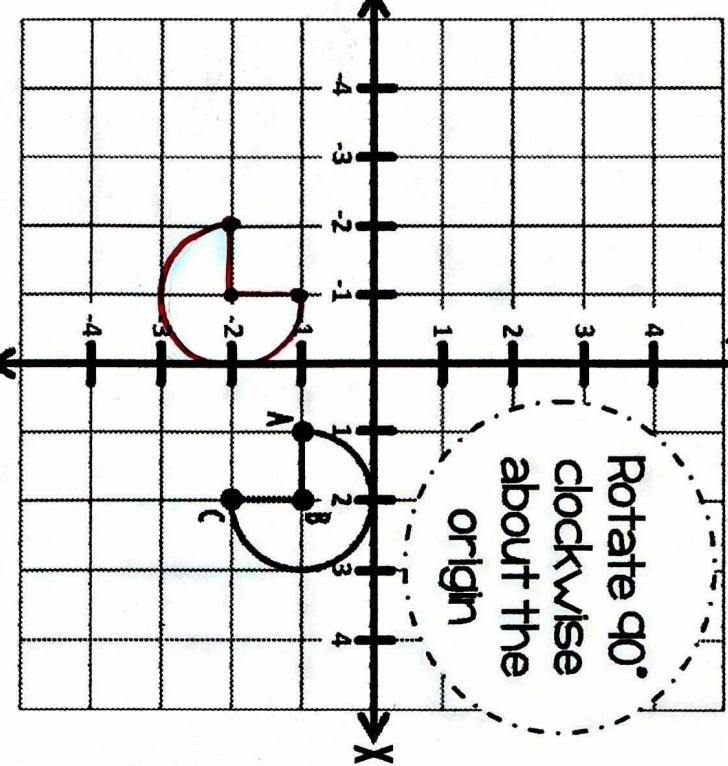
1: Cut along outermost edge

$$\begin{aligned} A: (2, 3) &\rightarrow A': (-2, -3) \\ B: (2, -2) &\rightarrow B': (-2, 2) \\ C: (1, 2) &\rightarrow C': (-1, -2) \end{aligned}$$

(2: fold along this edge and staple or tape)

Φ can transform!

Rotate 90°
clockwise
about the
origin



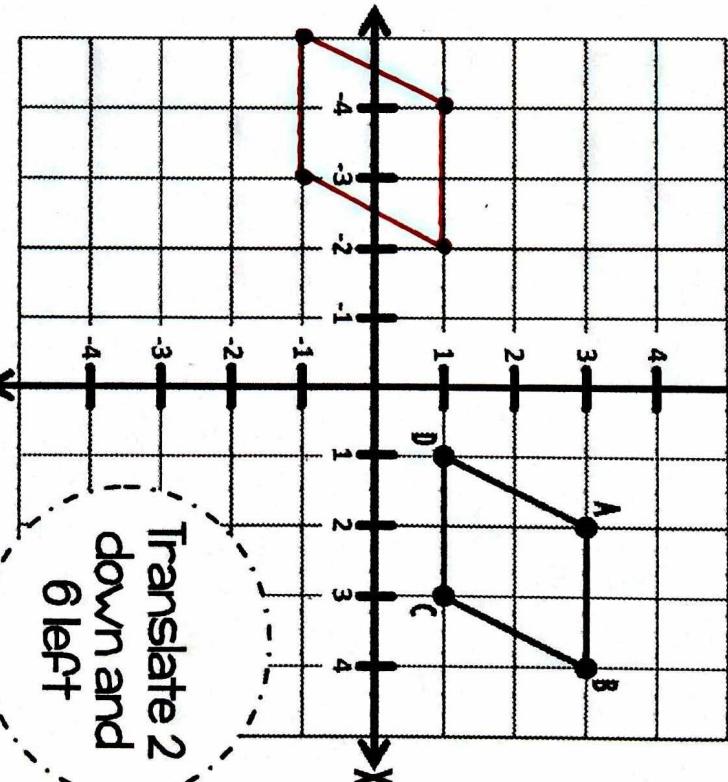
1: Cut along outermost edge

$$\begin{aligned} A: (-1, -1) &\rightarrow A': (-1, -1) \\ B: (-1, -2) &\rightarrow B': (-1, -2) \\ C: (-2, -2) &\rightarrow C': (-2, -2) \end{aligned}$$

(2: fold along this edge and staple or tape)

Φ can transform!

Translate 2
down and
6 left



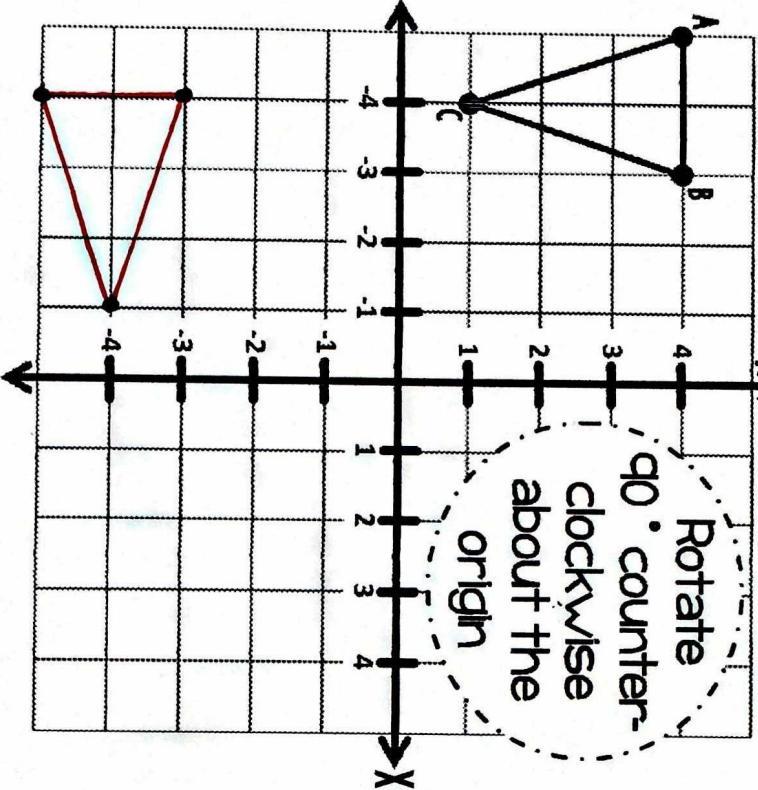
1: Cut along outermost edge

$$\begin{aligned} A: (2, 3) &\rightarrow A': (-4, 1) \\ B: (4, 3) &\rightarrow B': (-2, 1) \\ C: (3, 1) &\rightarrow C': (-3, -1) \\ D: (1, 1) &\rightarrow D': (-5, -1) \end{aligned}$$

I can transform!

(2: fold along this edge and staple or tape)

Rotate
90° counter-clockwise
about the
origin



19

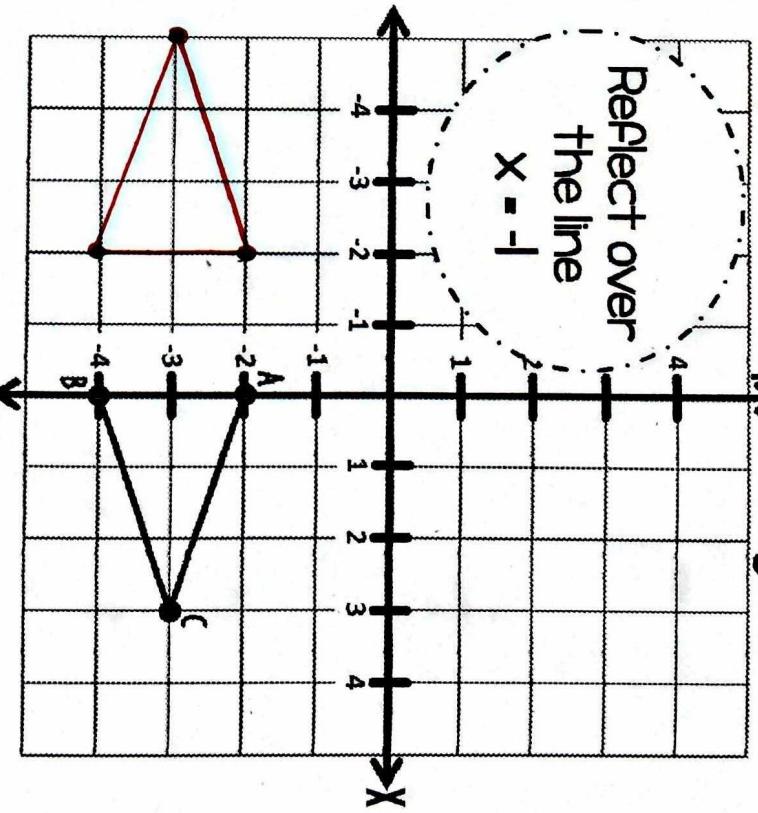
1: Cut along outermost edge

$$\begin{aligned} A: (-5, 4) &\rightarrow A': (-4, -5) \\ B: (-3, 4) &\rightarrow B': (-4, -3) \\ C: (-4, 1) &\rightarrow C': (-1, -4) \end{aligned}$$

I can transform!

(2: fold along this edge and staple or tape)

Reflect over
the line
 $x = -1$



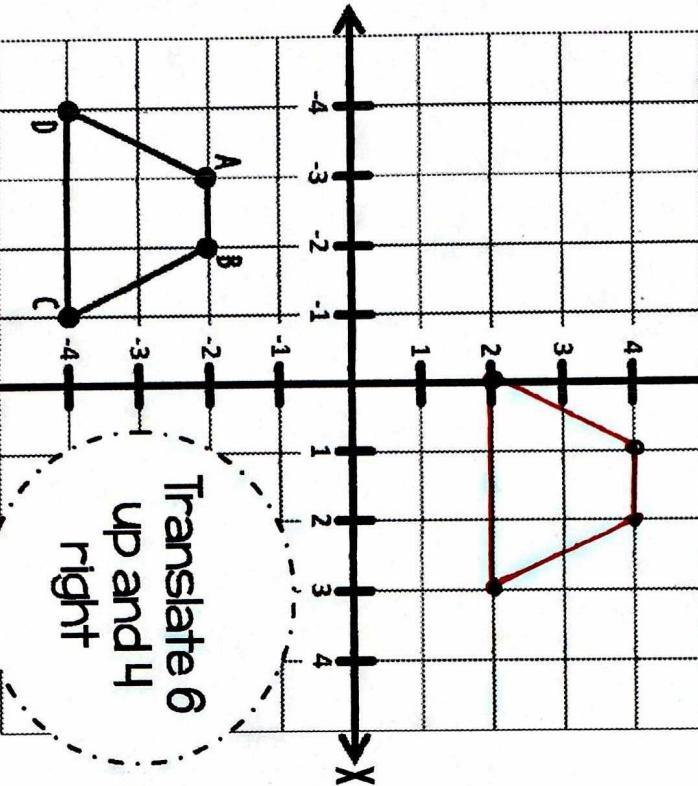
20

1: Cut along outermost edge

$$\begin{aligned} A: (0, -2) &\rightarrow A': (-2, -2) \\ B: (0, -4) &\rightarrow B': (-2, -4) \\ C: (3, -3) &\rightarrow C': (5, -3) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

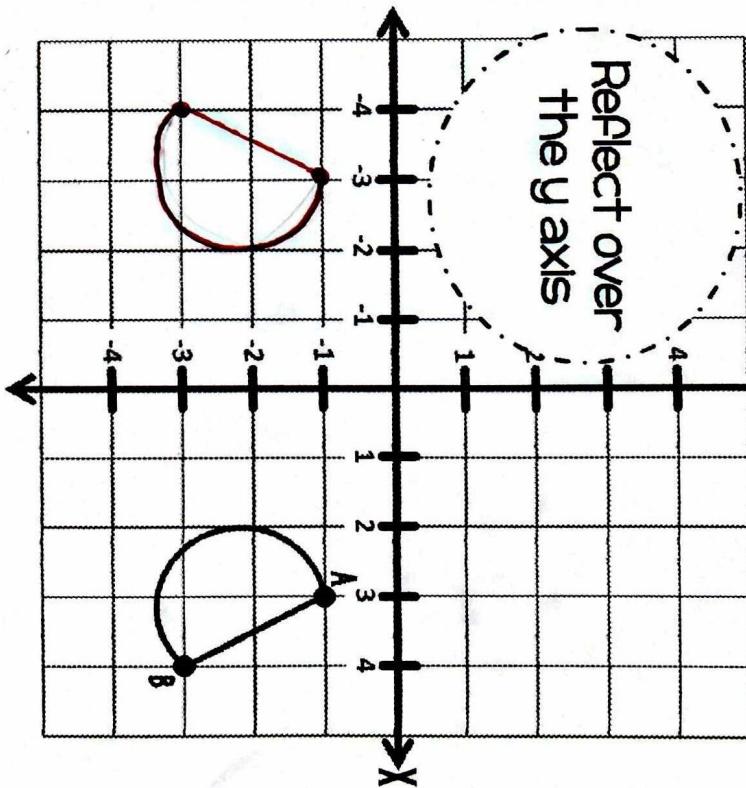


1: Cut along outermost edge

$$\begin{aligned} A: (-3, -2) &\rightarrow A': (1, 4) \\ B: (-2, -2) &\rightarrow B': (2, 4) \\ C: (-1, -3) &\rightarrow C': (3, 2) \\ D: (-4, -4) &\rightarrow D: (0, 2) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!



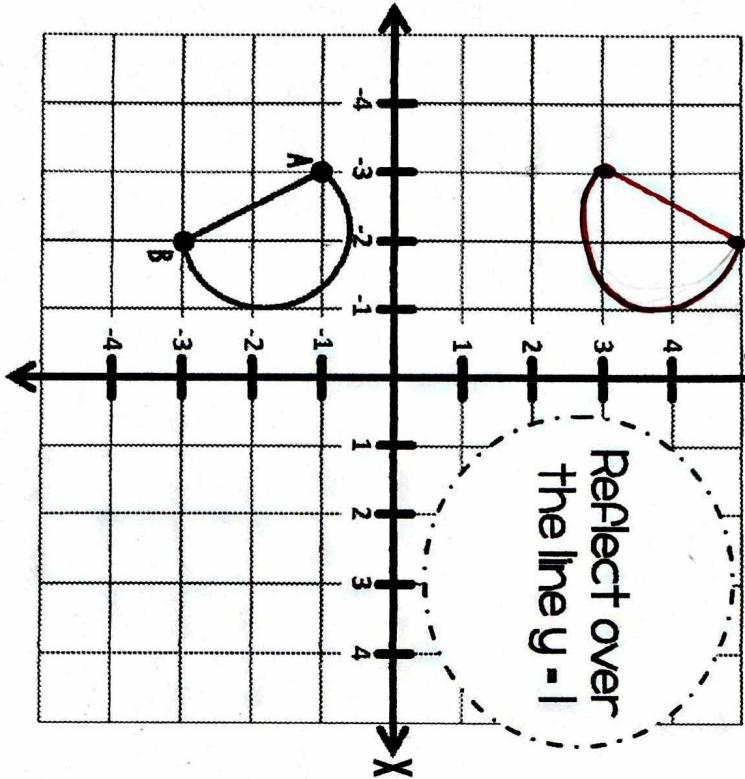
1: Cut along outermost edge

$$\begin{aligned} A: (3, -1) &\rightarrow A': (-3, -1) \\ B: (4, -3) &\rightarrow B': (-4, -3) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

Reflect over
the line $y = 1$



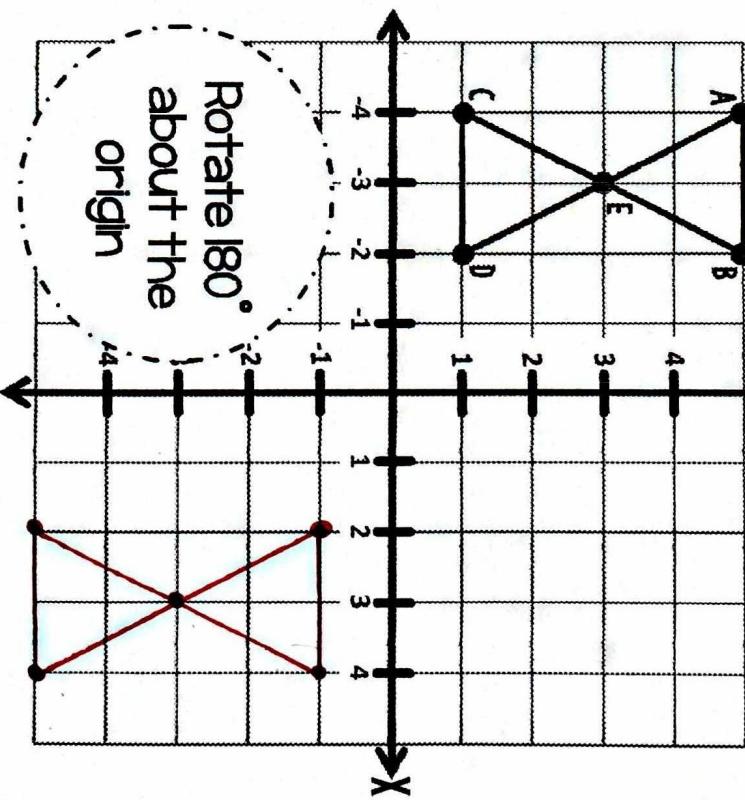
1: Cut along outermost edge

$$\begin{aligned} A: (-3, -1) &\rightarrow A': (-3, 3) \\ B: (-2, -3) &\rightarrow B': (-2, 5) \end{aligned}$$

(2: fold along this edge and staple or tape)

I can transform!

Rotate 180°
about the
origin



1: Cut along outermost edge

$$\begin{aligned} A: (-4, 5) &\rightarrow A': (4, -5) \\ B: (-2, 5) &\rightarrow B': (2, -5) \\ C: (-1, 1) &\rightarrow C': (1, -1) \\ D: (-2, 1) &\rightarrow D': (2, -1) \end{aligned}$$

Thank you!

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