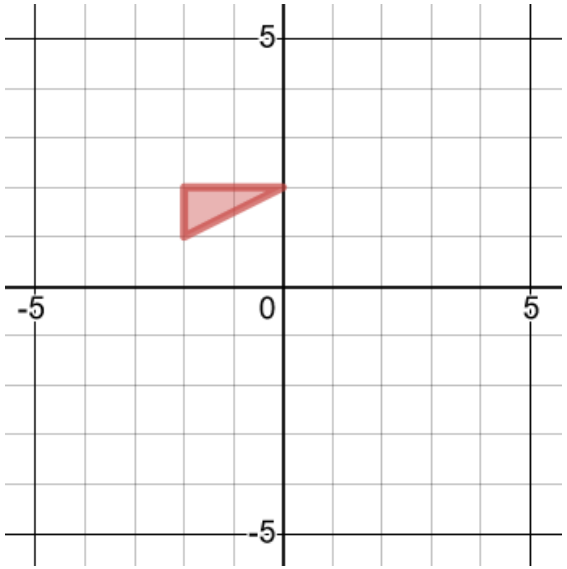
Transformations

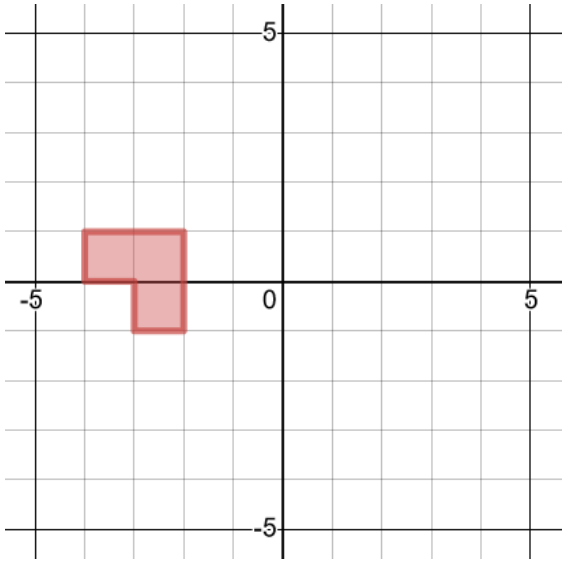
Images from mrcartermaths (using school subscription)

CONTENTS

Worked example

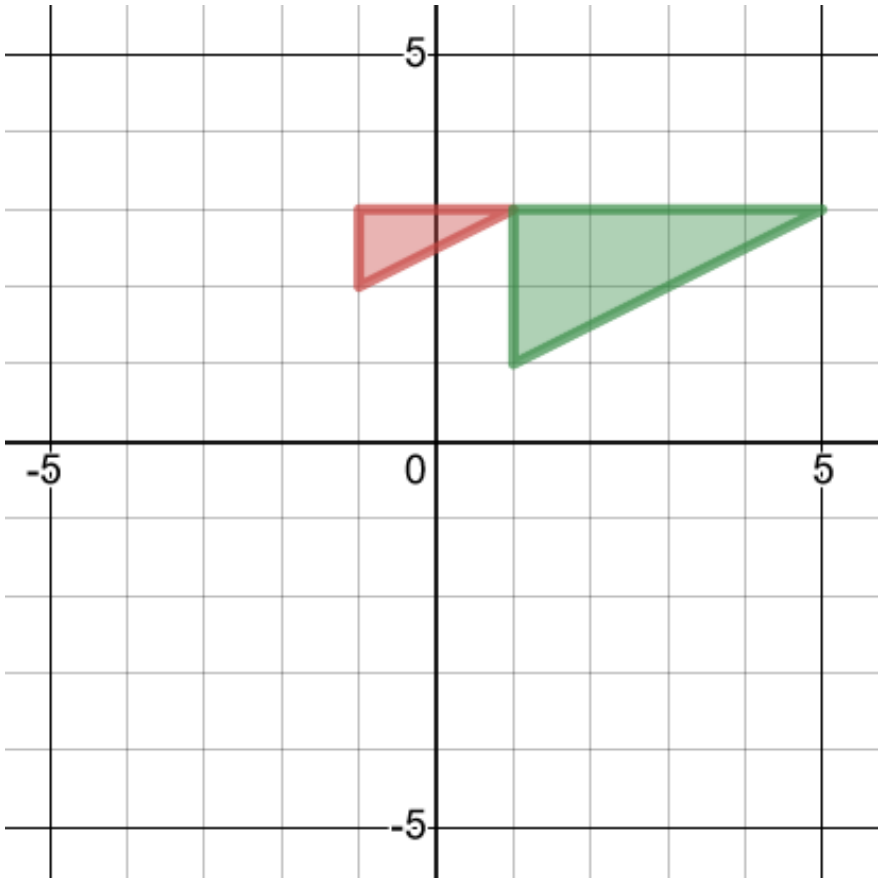
Enlarge about $(-4, 3)$, scale factor 2





Your turn

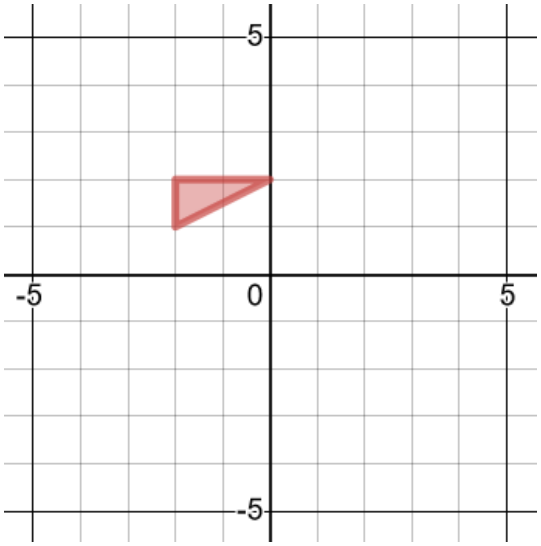
Enlarge about $(-3, 3)$, scale factor 2



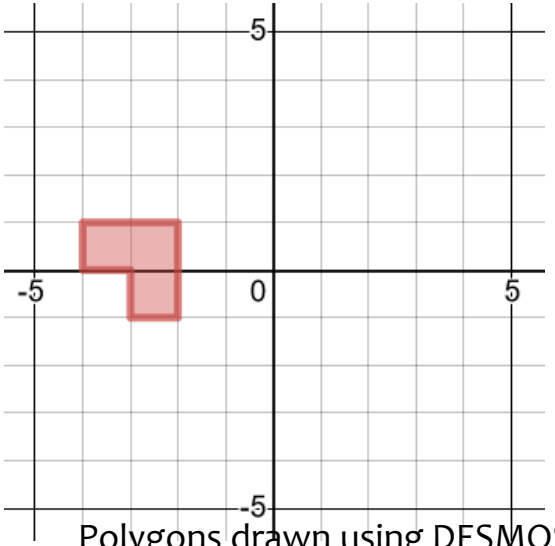
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Enlarge about $(-2, 4)$, scale factor 3

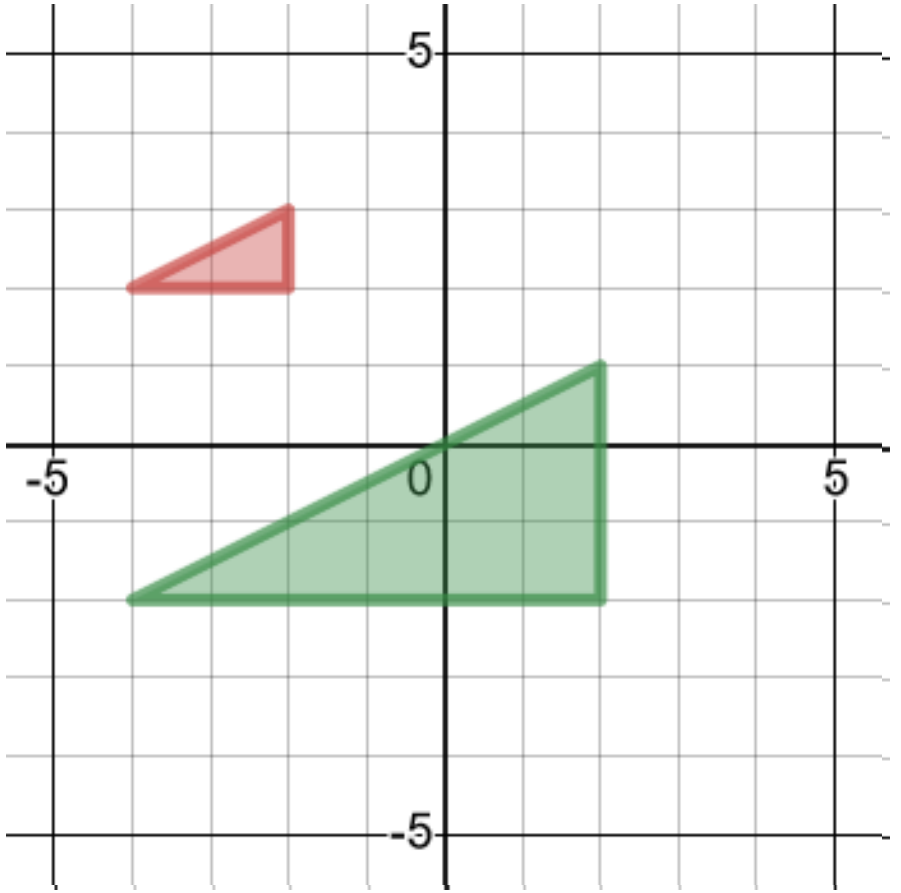


Enlarge about $(-5, 0)$, scale factor 3



Your turn

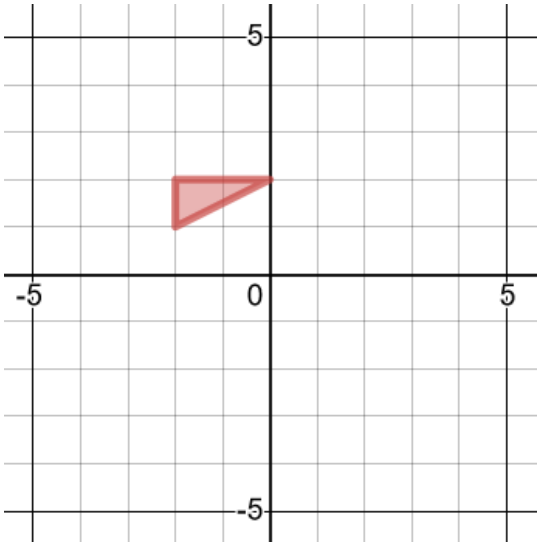
Enlarge about $(-4\ ,4\ )$, scale factor 3



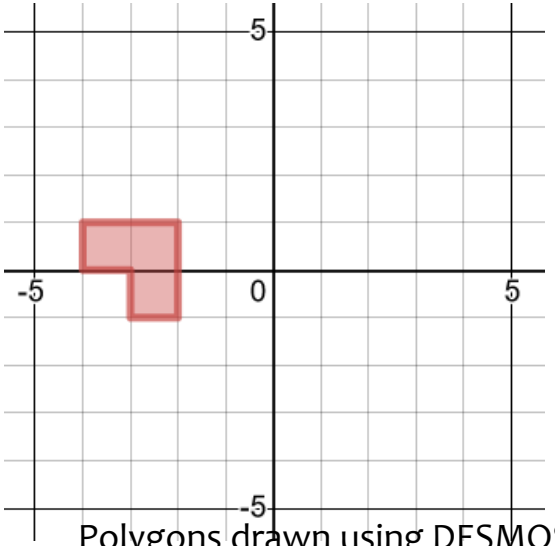
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Worked example

Enlarge about $(1, 0)$, scale factor -2

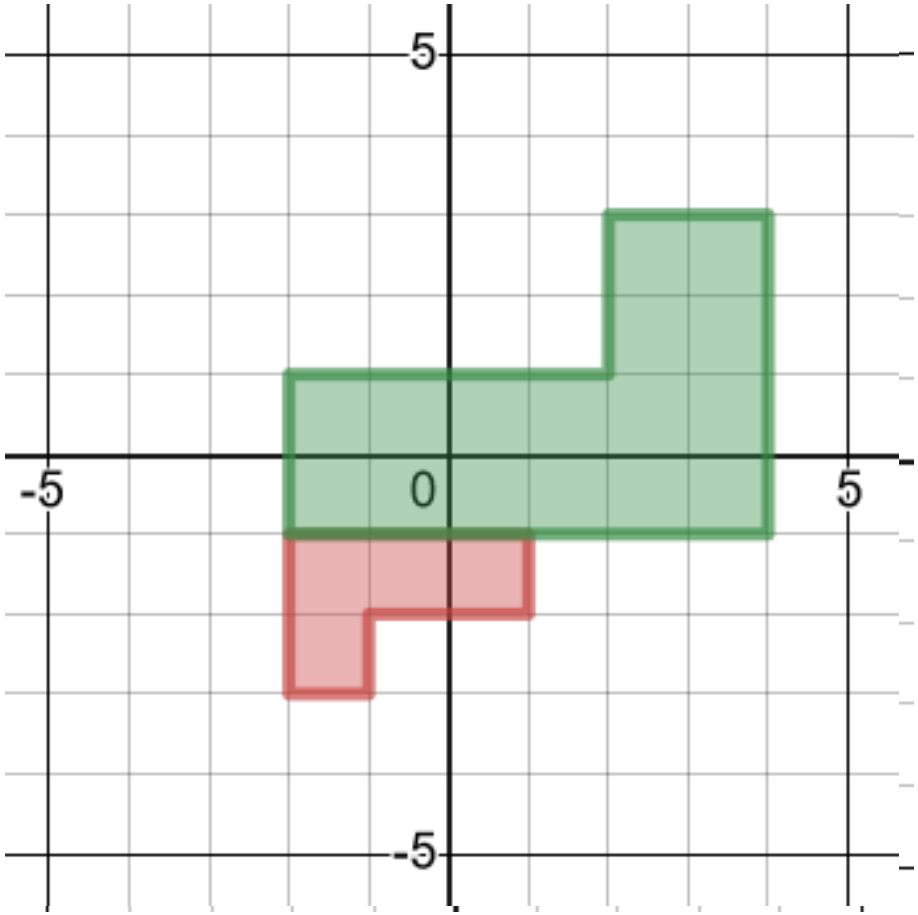


Enlarge about $(-2, 1)$, scale factor -2



Your turn

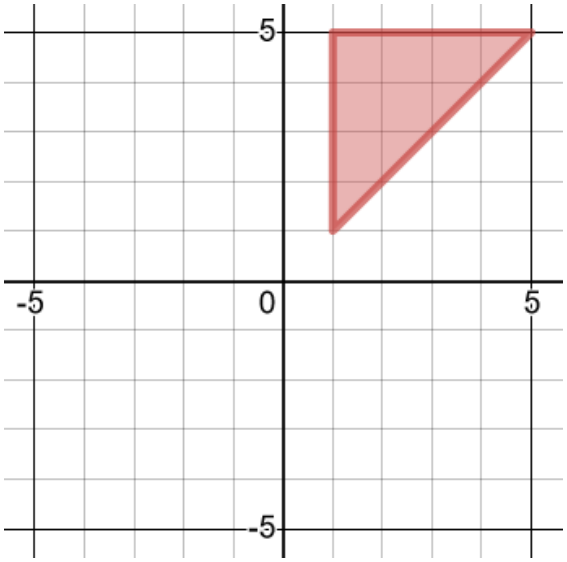
Enlarge about $(0, -1)$, scale factor -2



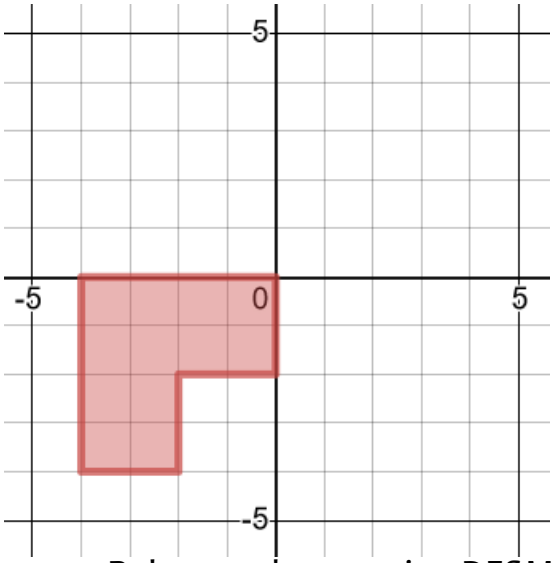
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Enlarge about $(-3, -3)$, scale factor $\frac{1}{2}$

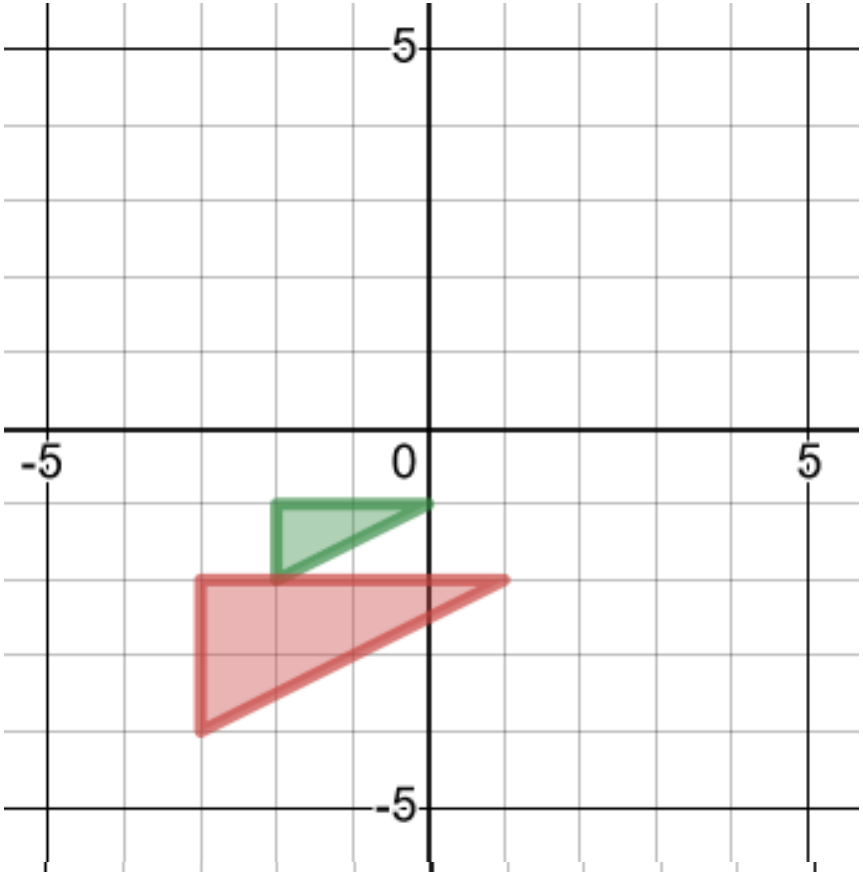


Enlarge about $(0, 2)$, scale factor $\frac{1}{2}$



Your turn

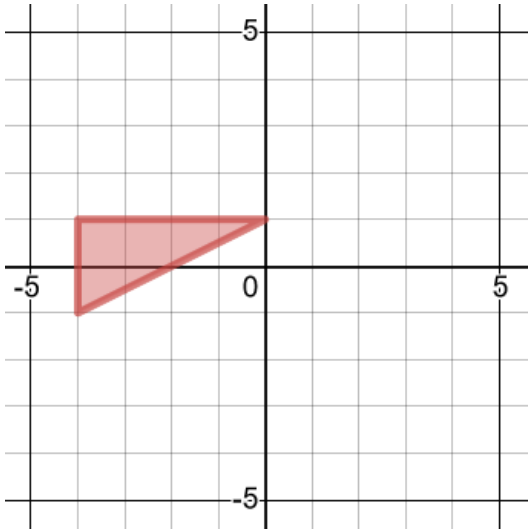
Enlarge about $(-1, 0)$, scale factor $\frac{1}{2}$



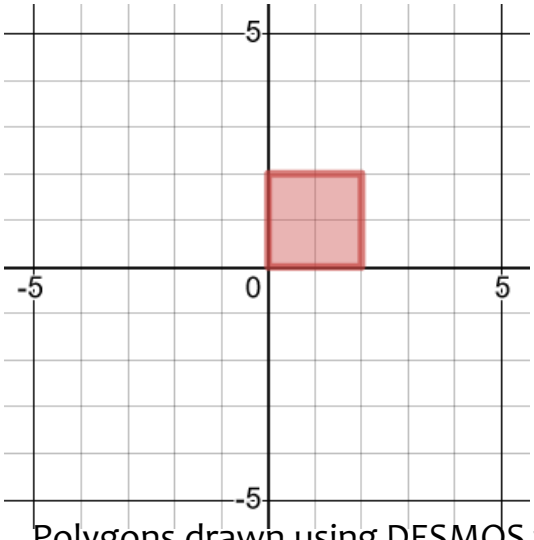
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Enlarge about $(-2, -3)$, scale factor $-\frac{1}{2}$

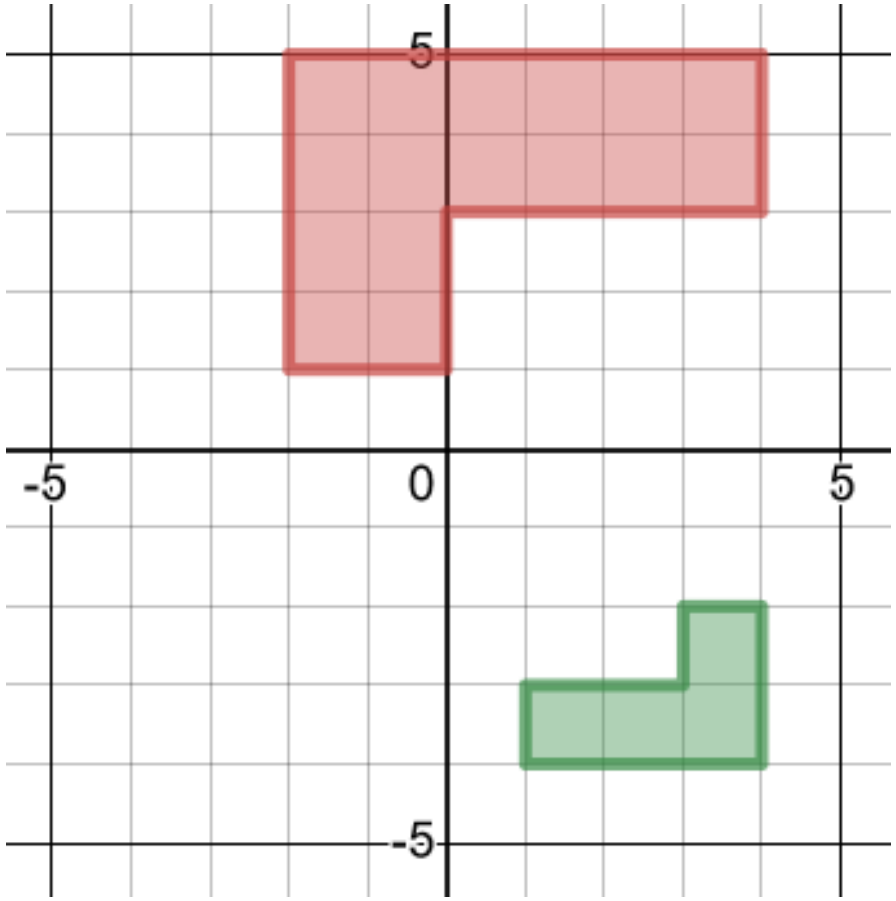


Enlarge about the origin, scale factor $-\frac{1}{2}$



Your turn

Enlarge about $(2, -1)$, scale factor $-\frac{1}{2}$

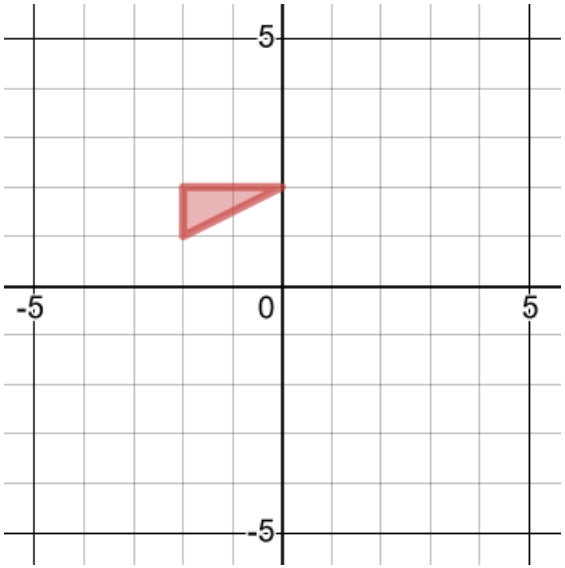


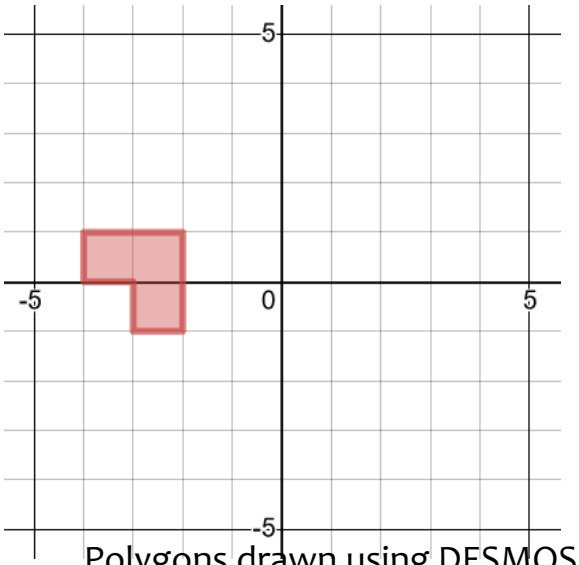
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Are there any invariant points?

Enlarge about $(-2,\ 2)$, scale factor 2

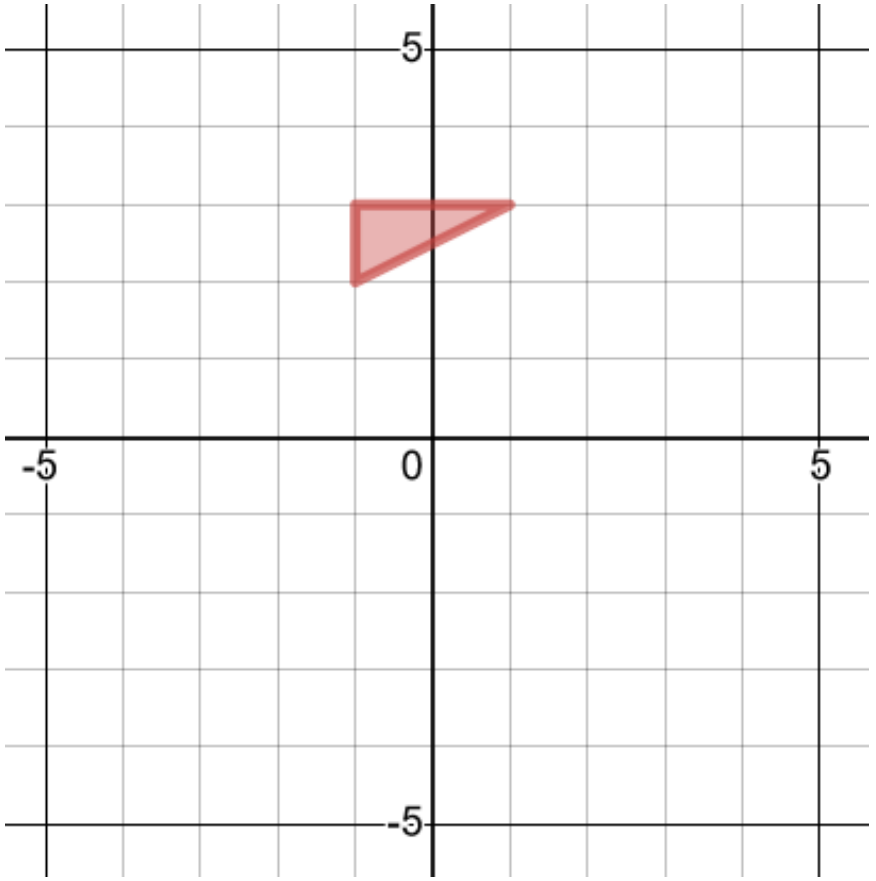




Your turn

Are there any invariant points?

Enlarge about $(-1,\ 2)$, scale factor 3

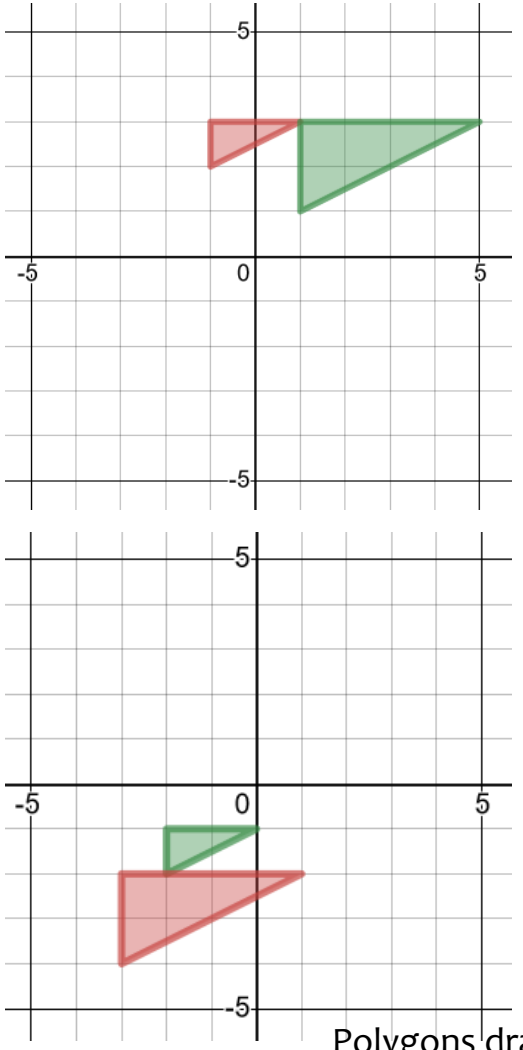


Yes – The point $(-1,2)$

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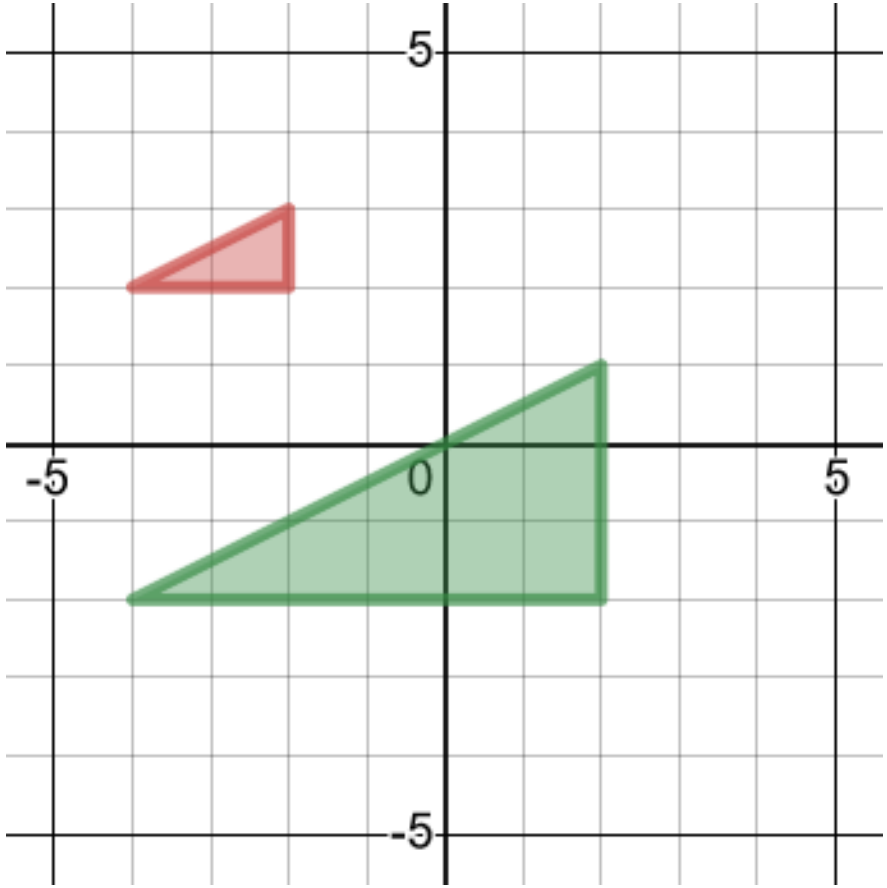
Worked example

Describe the single transformation of the red object onto the green image



Your turn

Describe the single transformation of the red object onto the green image

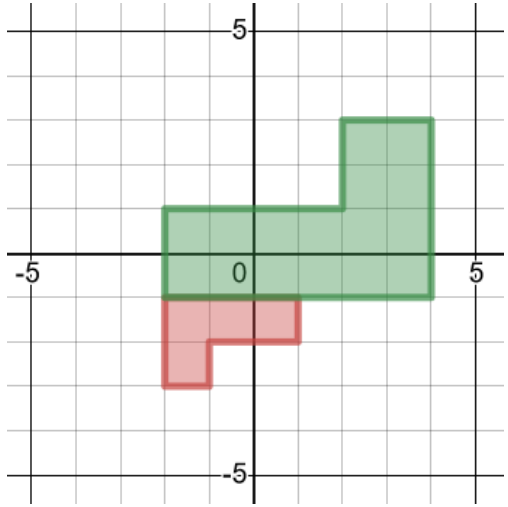


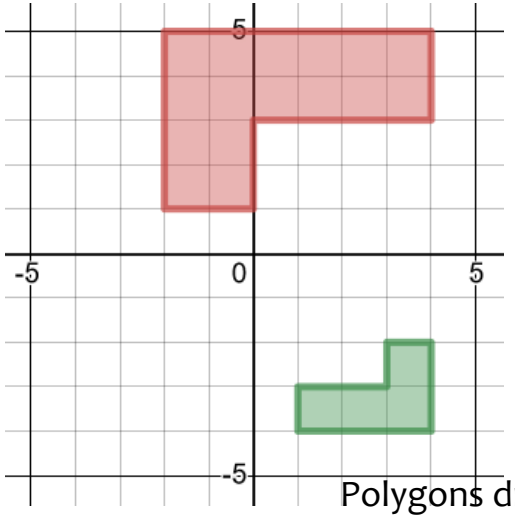
Enlargement about $(-4,4)$, scale factor 3

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

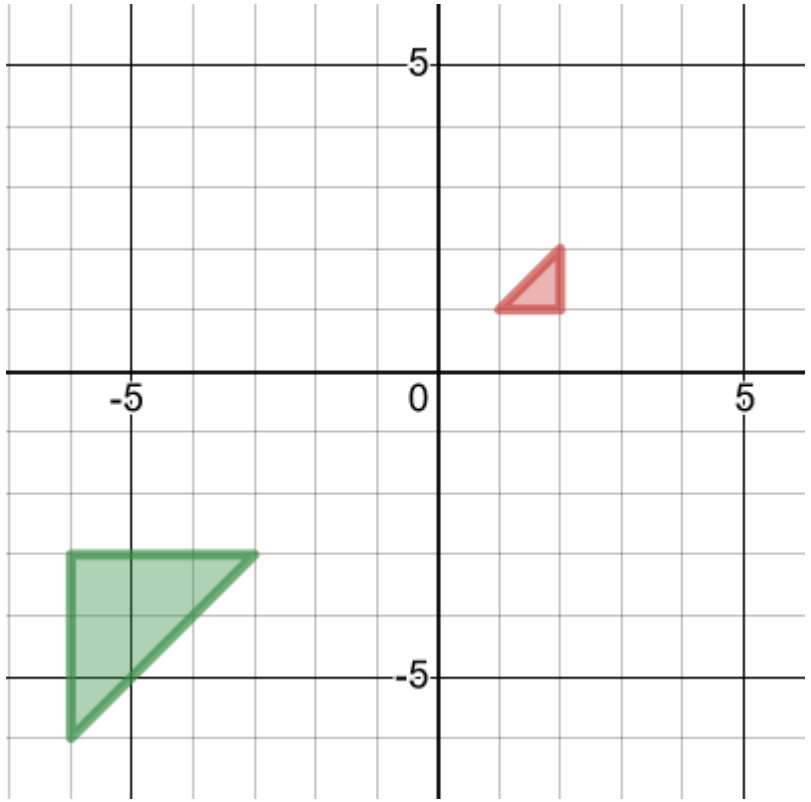
Describe the single transformation of the red object onto the green image





Your turn

Describe the single transformation of the red object onto the green image

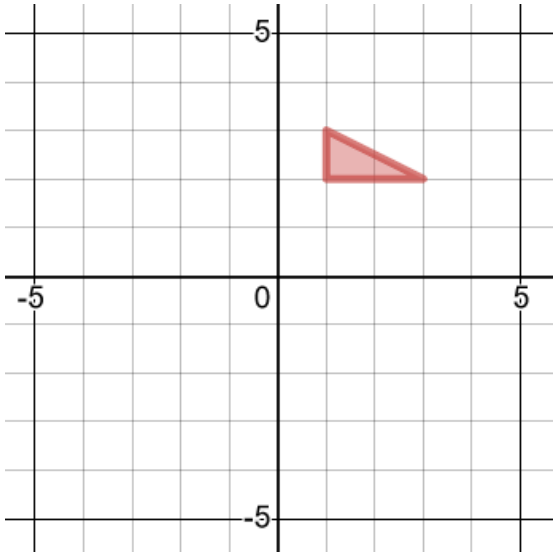


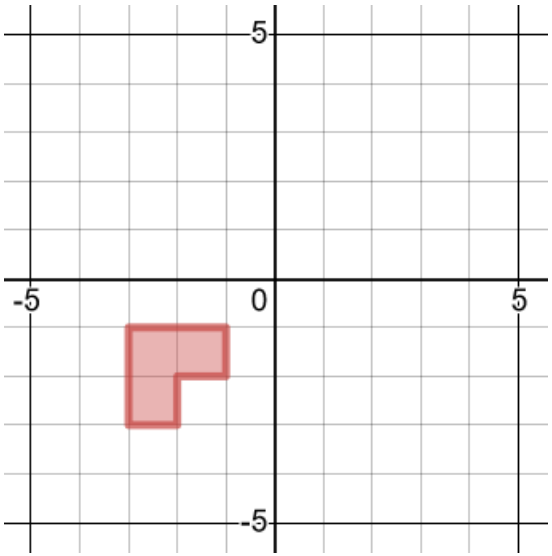
Enlargement about the origin (0,0), scale factor −3

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

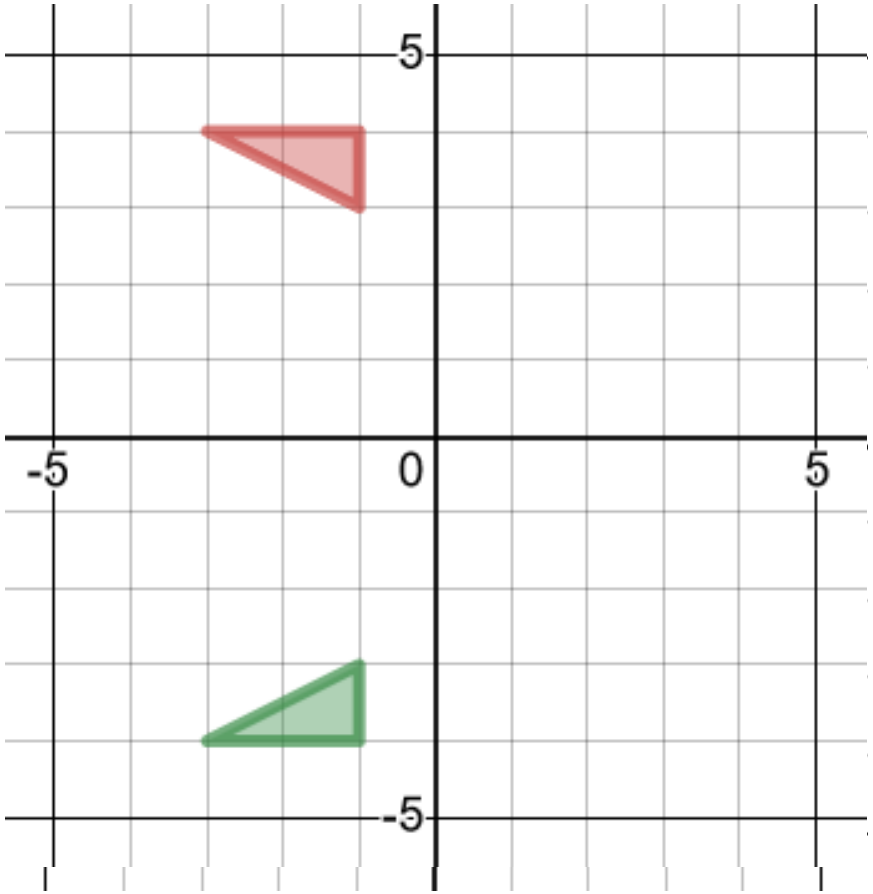
Reflect in the x-axis





Your turn

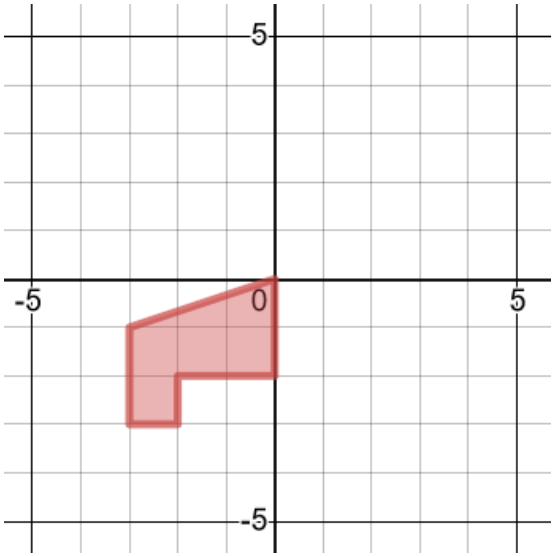
Reflect in the x-axis

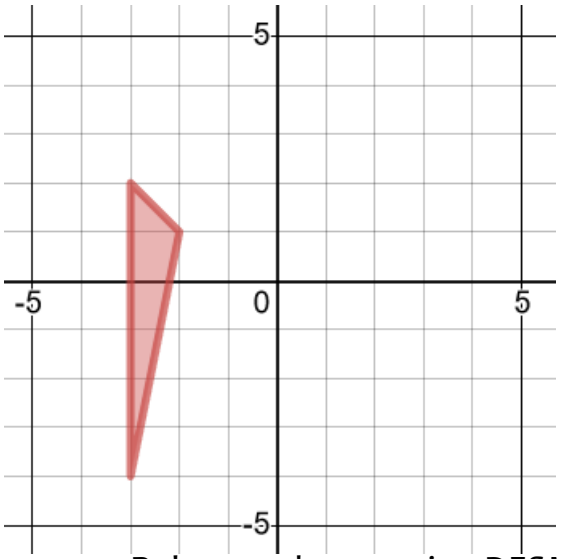


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

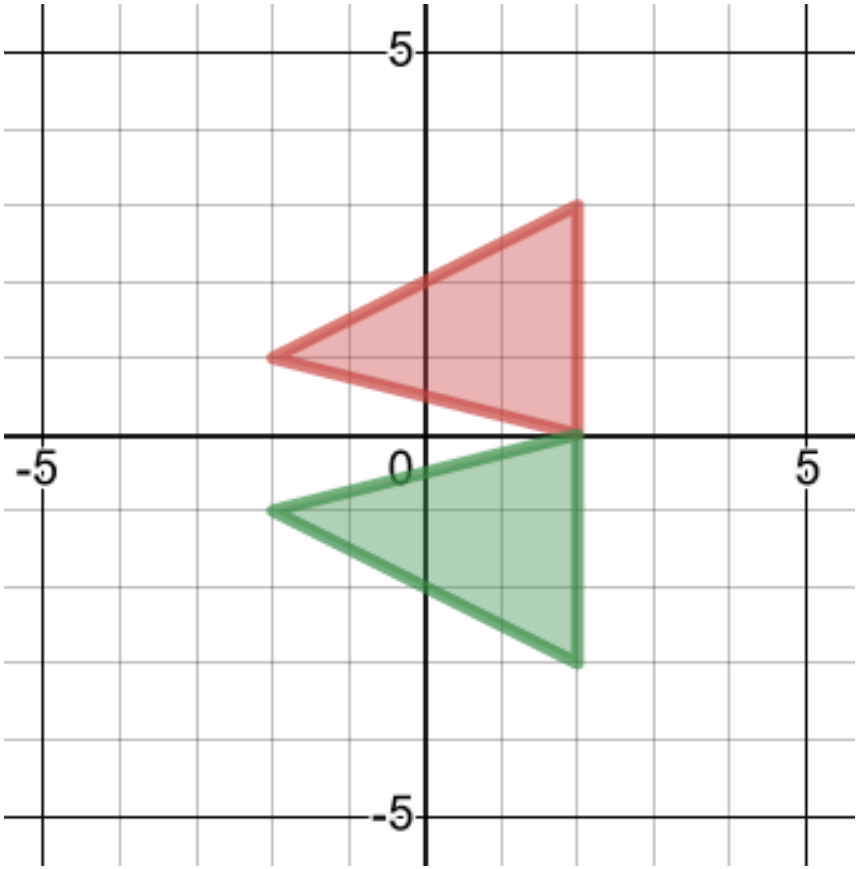
Reflect in the x-axis





Your turn

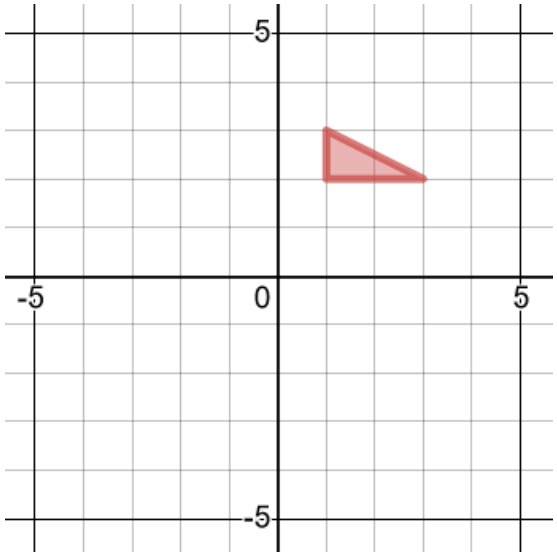
Reflect in the x-axis

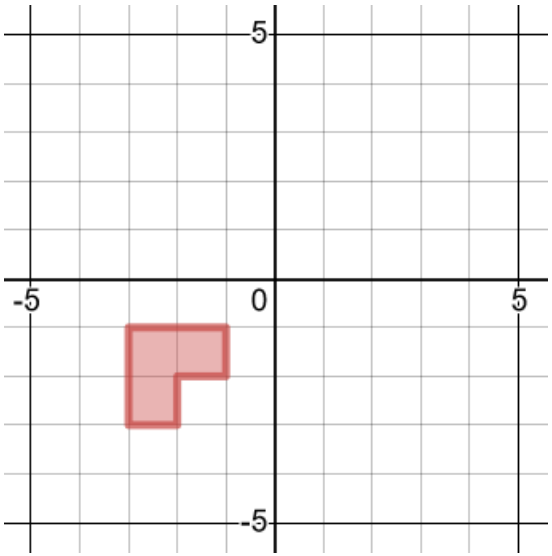


Polygons drawn using DESMOS with permission: https://www.desmos.com/

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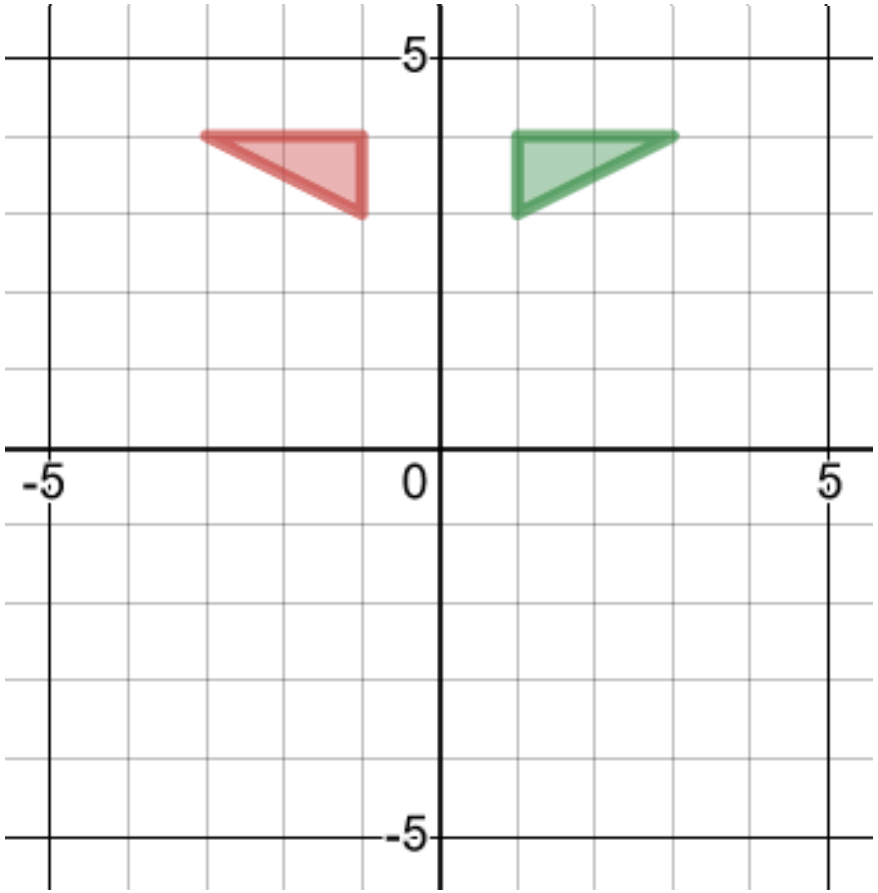
Reflect in the y-axis





Your turn

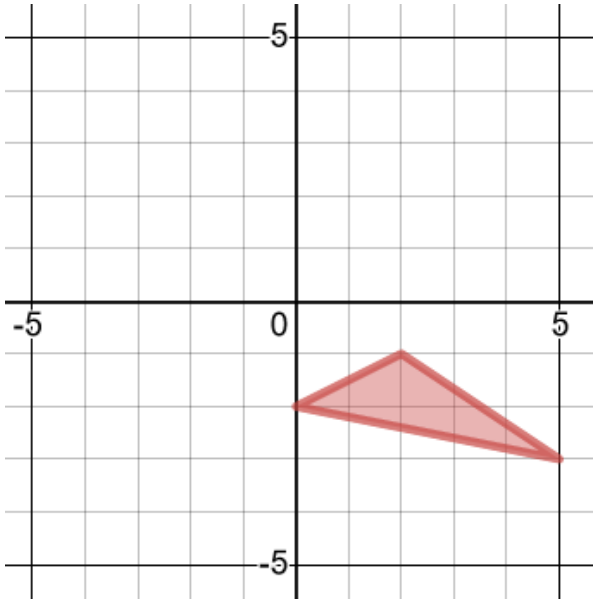
Reflect in the y-axis

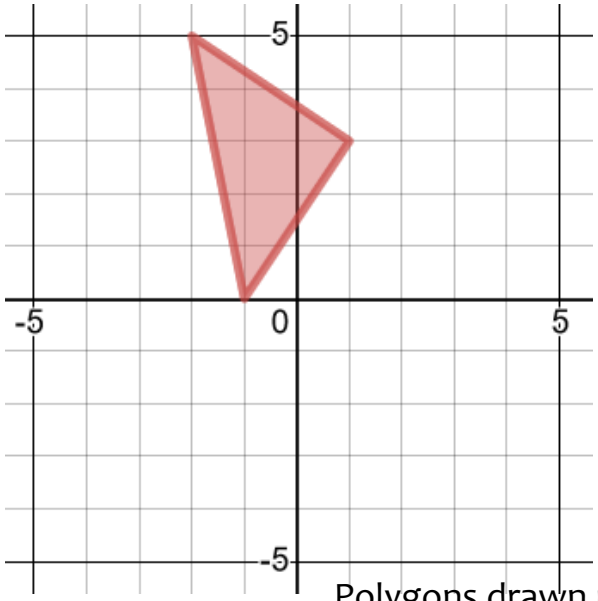


Polygons drawn using DESMOS with permission: https://www.desmos.com/

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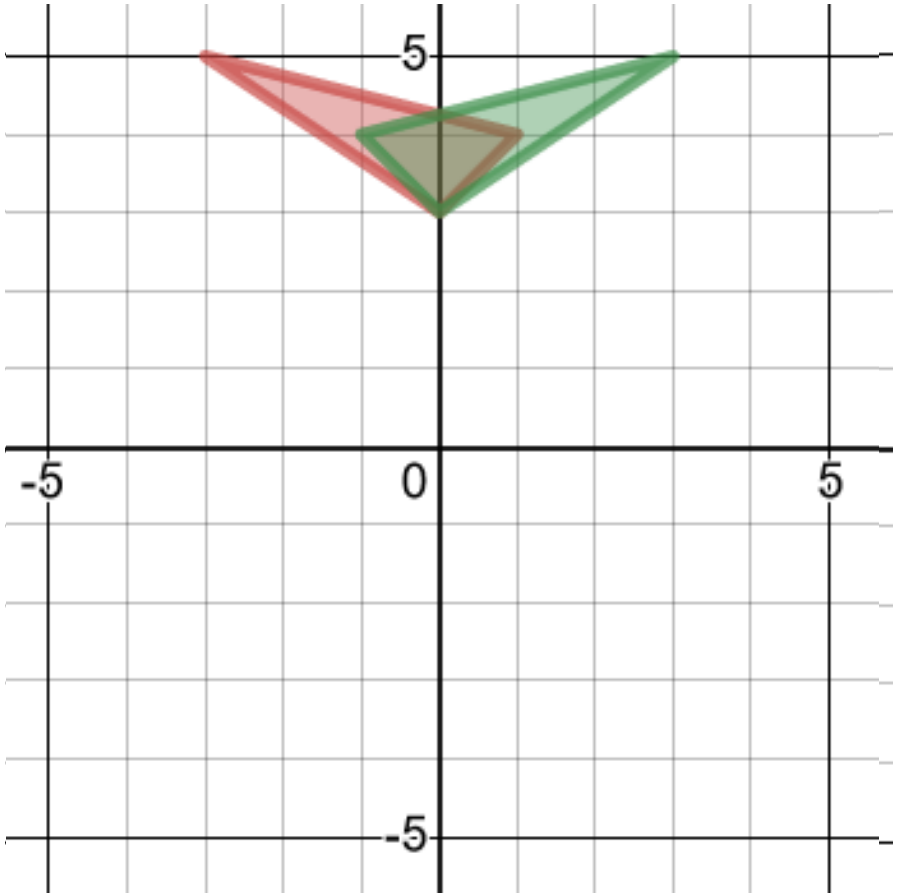
Reflect in the y-axis





Your turn

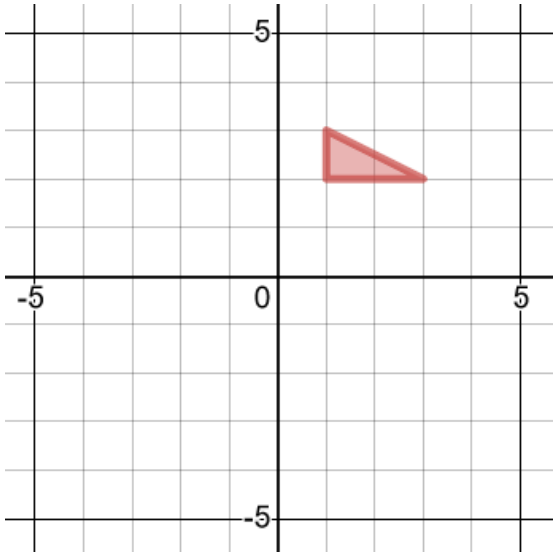
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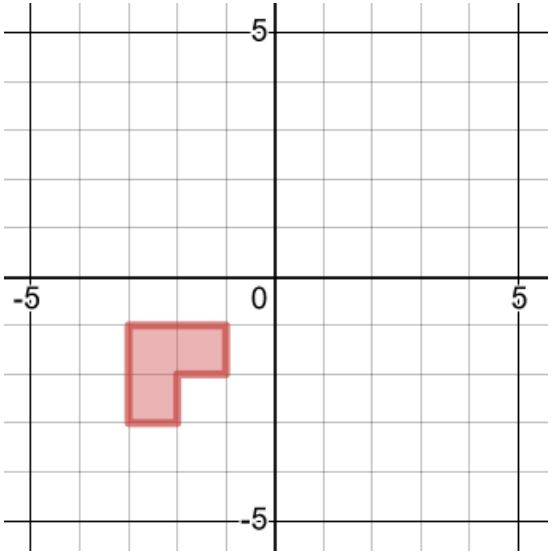
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Reflect in the line $y = 1$

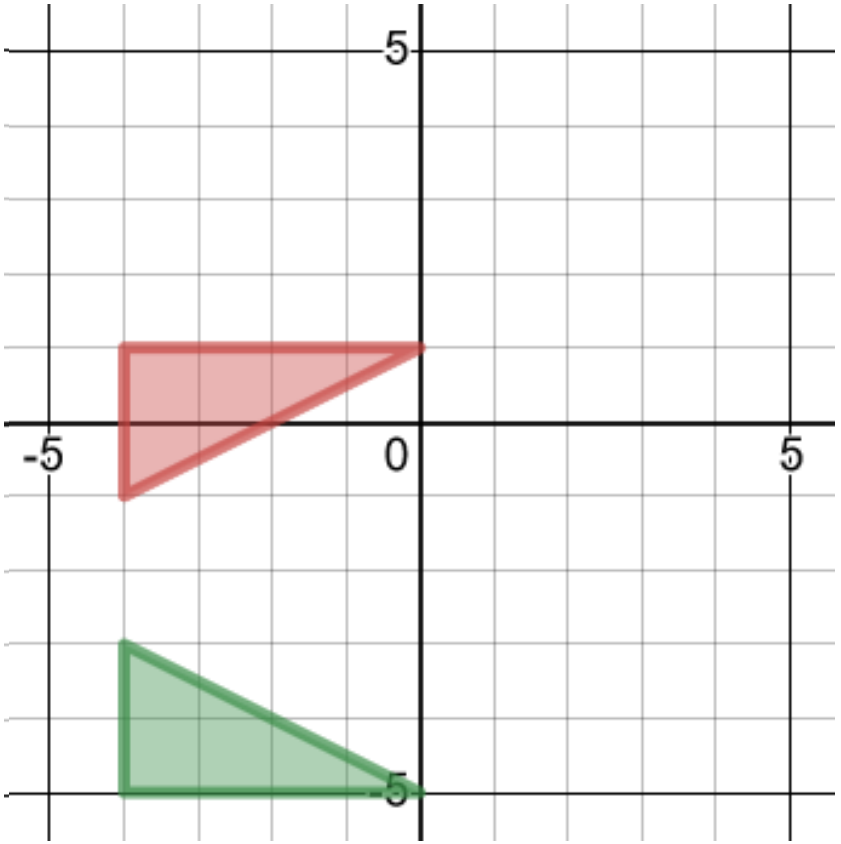


Reflect in the line $y = -1$



Your turn

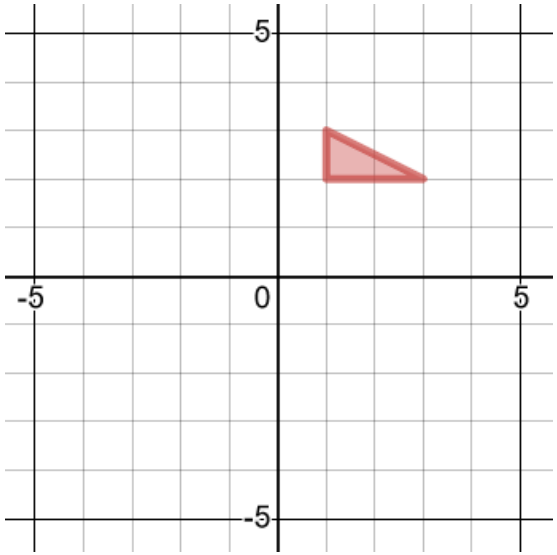
Reflect in the line $y = -2$



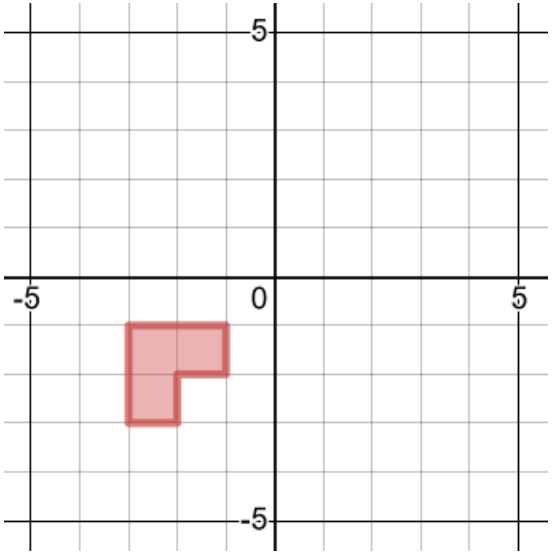
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Reflect in the line $x = 3$

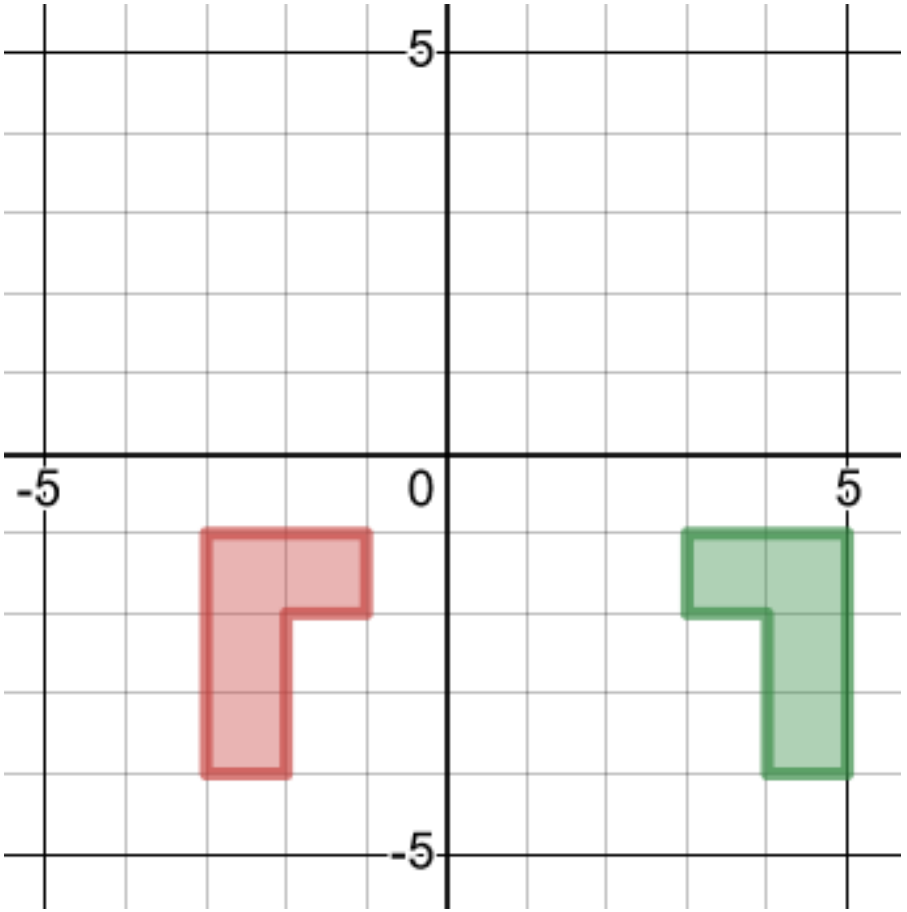


Reflect in the line $x = -1$



Your turn

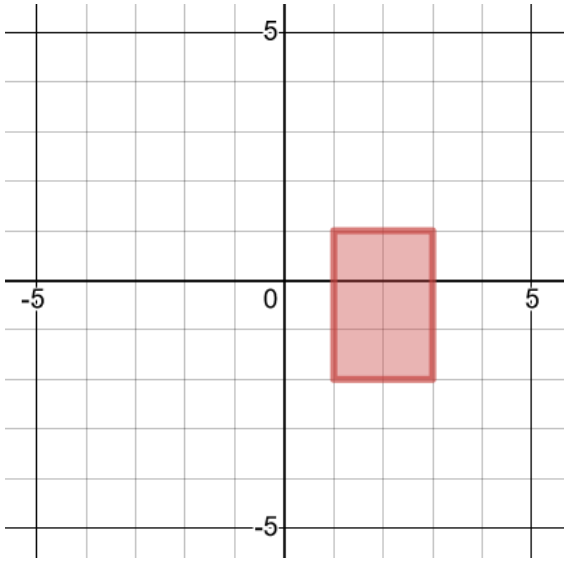
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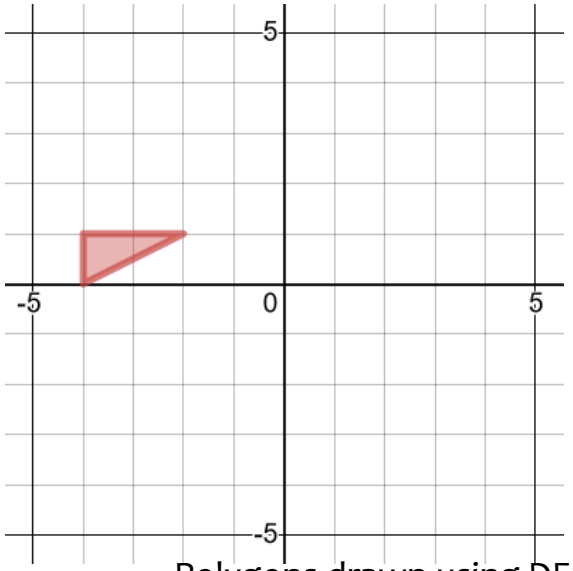


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Worked example

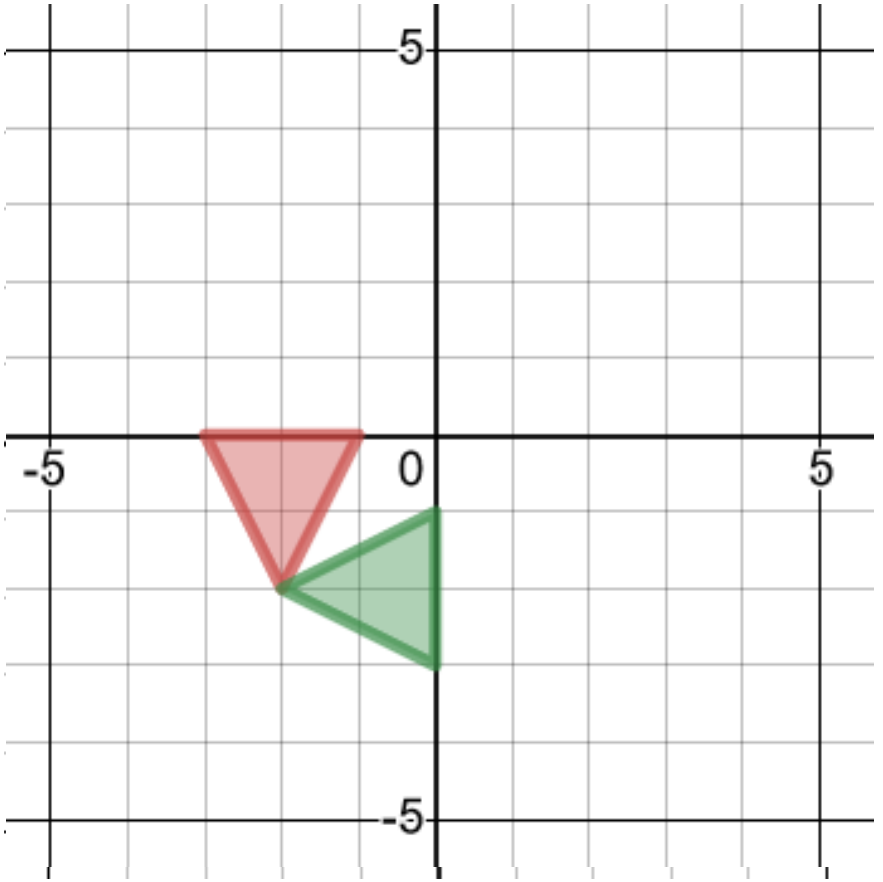
Reflect in the line $y = x$





Your turn

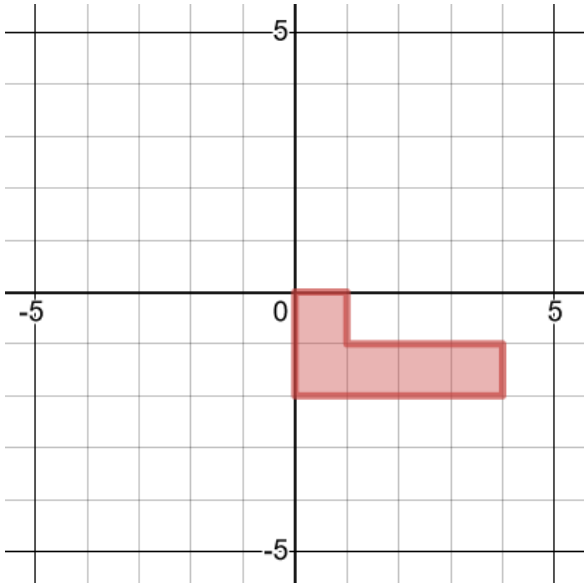
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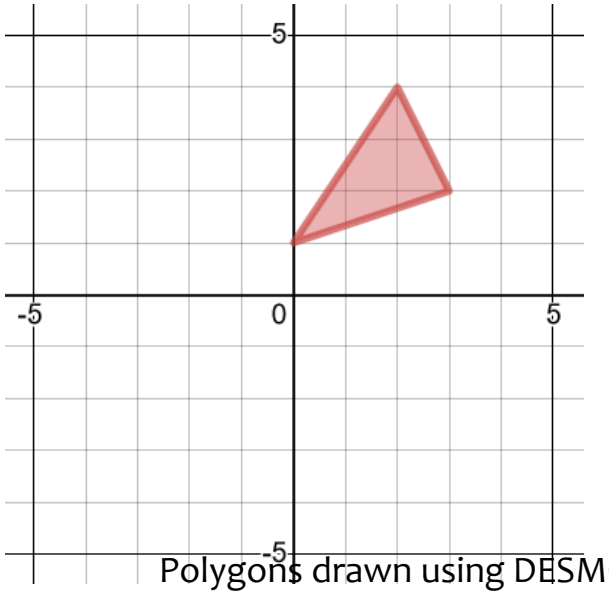


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

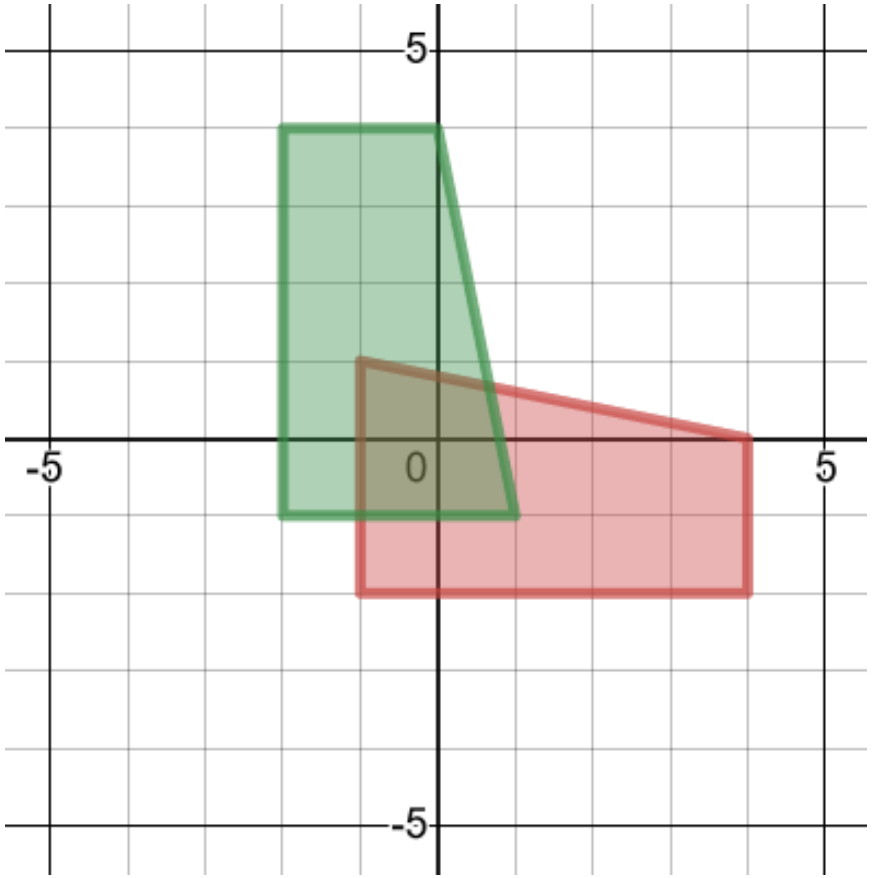
Reflect in the line $y = x$





Your turn

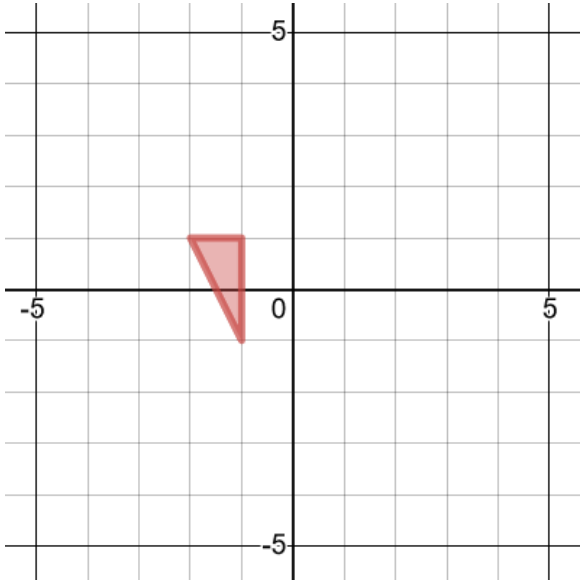
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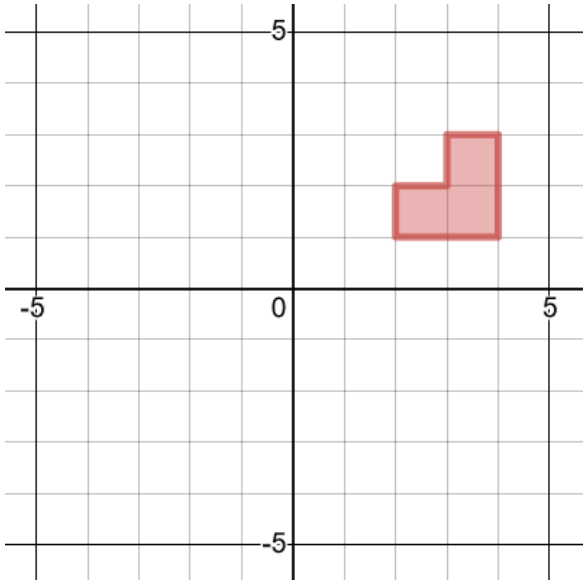


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Worked example

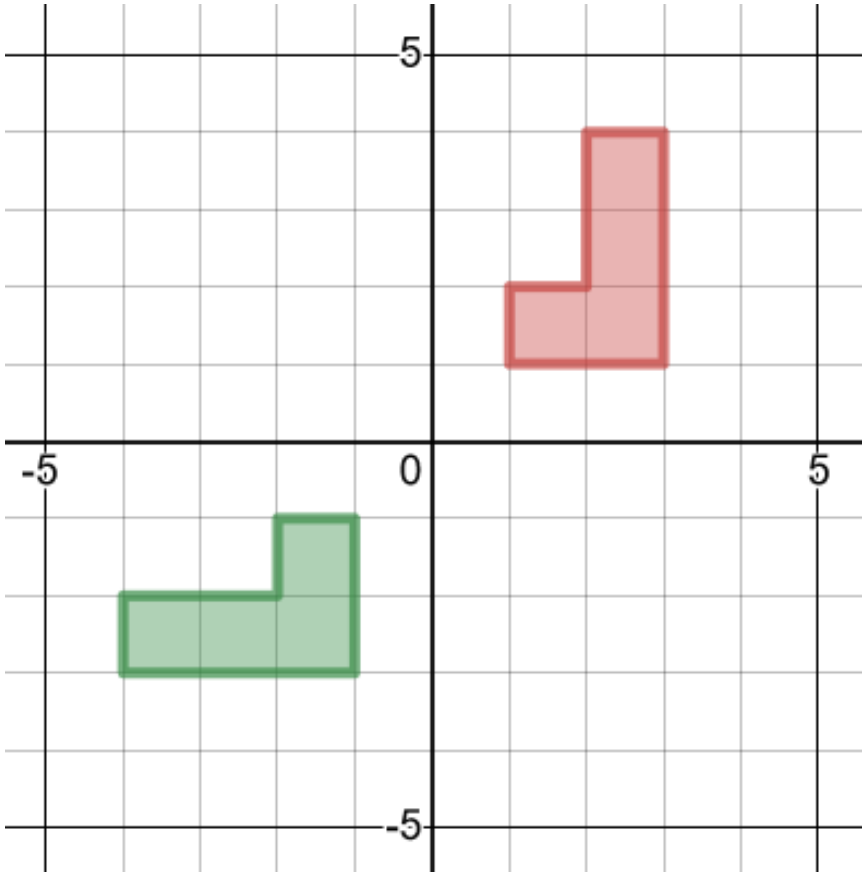
Reflect in the line $y = -x$





Your turn

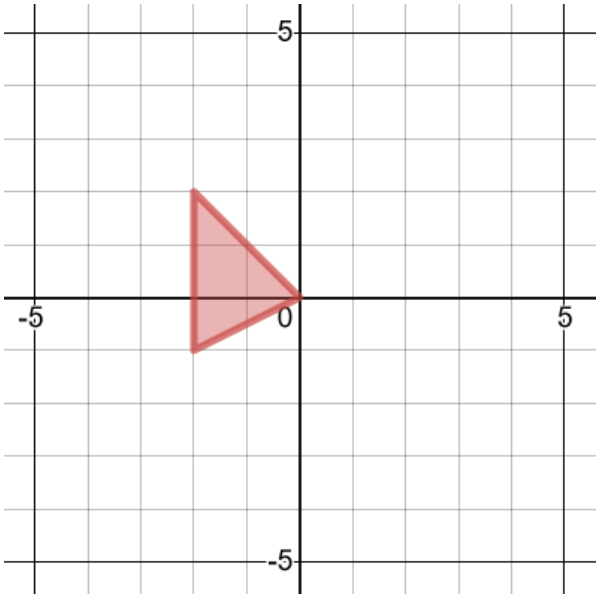
Reflect in the line $y = -x$

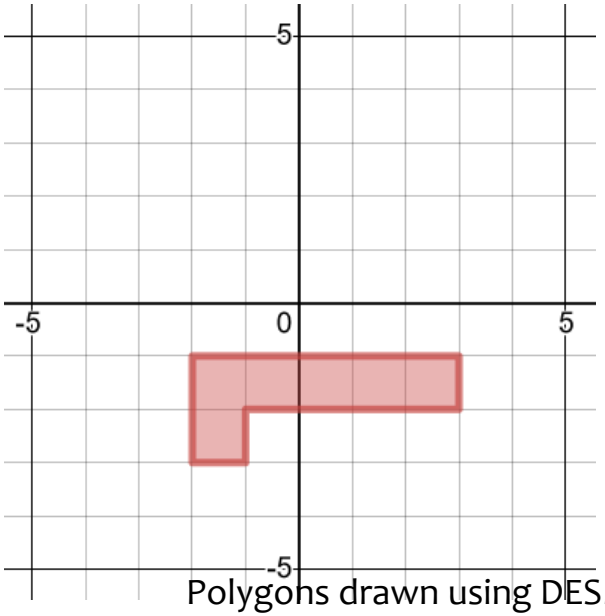


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

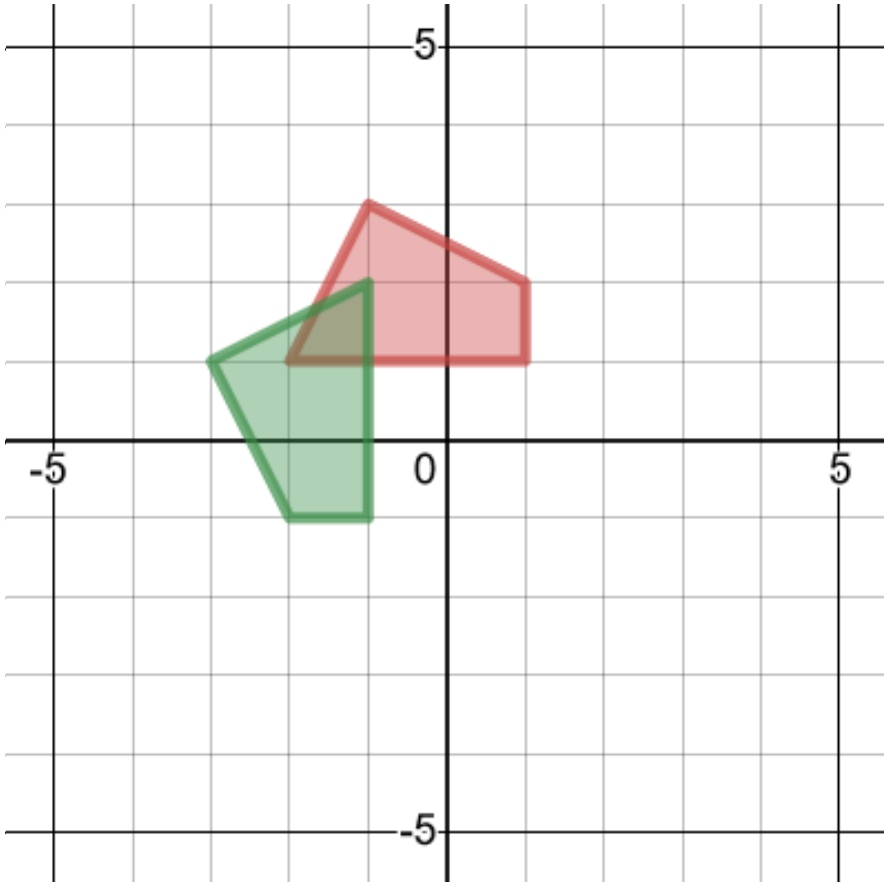
Reflect in the line $y = -x$





Your turn

Reflect in the line $y = -x$

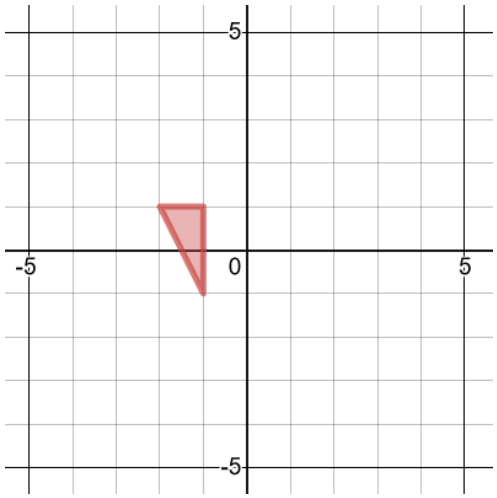


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

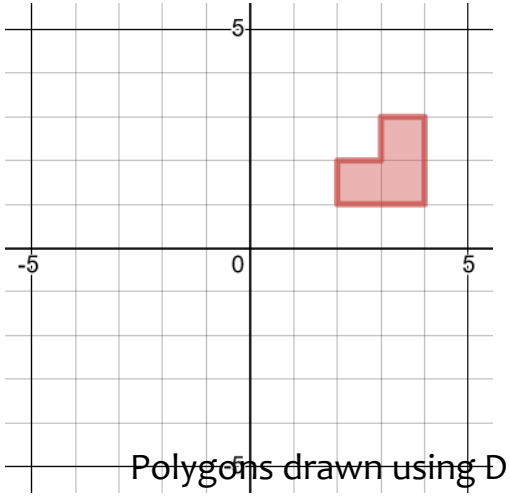
Reflect in the line $y = -x$

Are there any invariant points?



Reflect in the line $y = x$

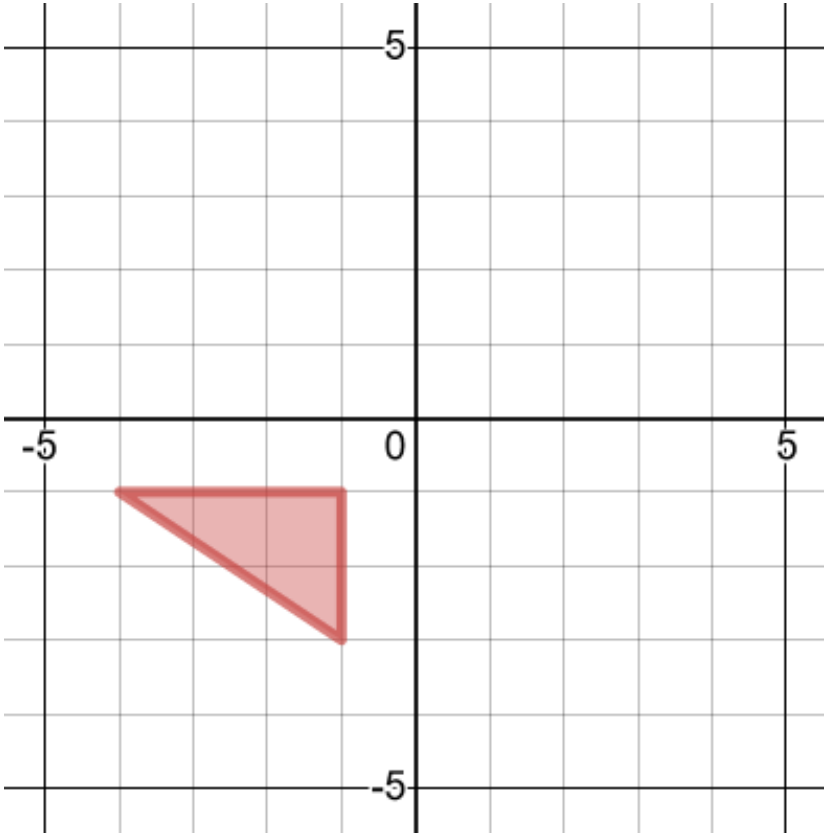
Are there any invariant points?



Your turn

Reflect in the line $y = -1$

Are there any invariant points?

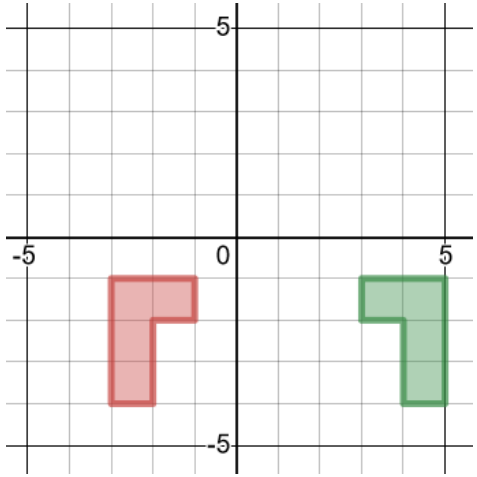


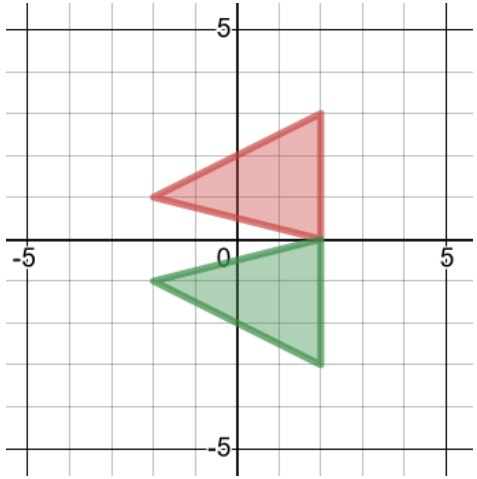
Yes – the points $(-4, -1)$ and $(-1, -1)$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

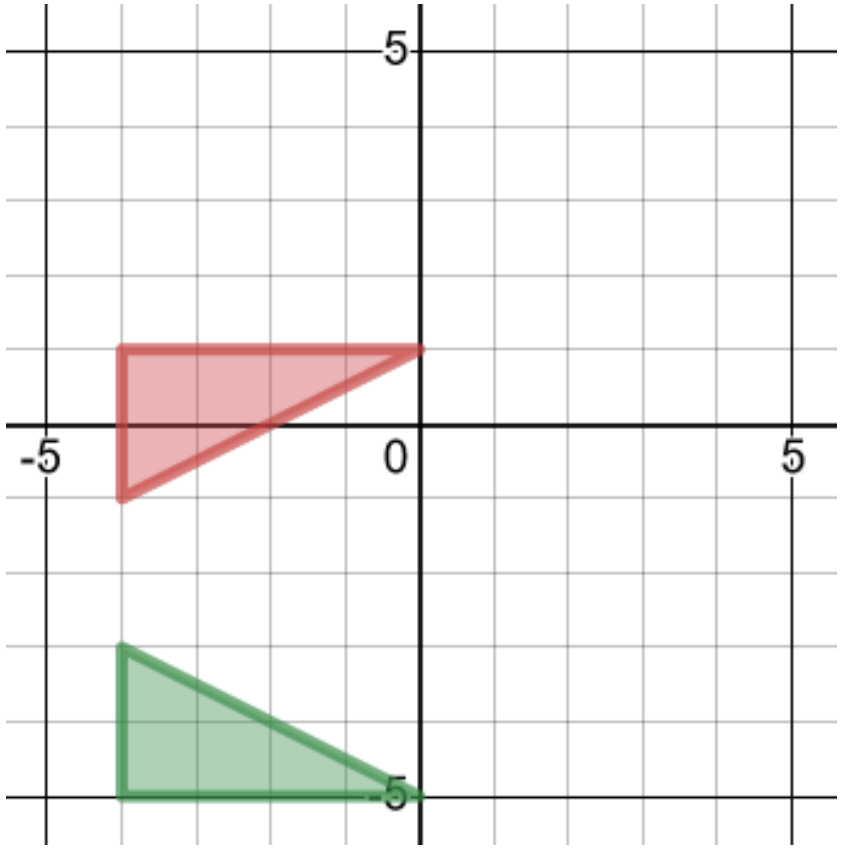
Describe the single transformation of the red object onto the green image





Your turn

Describe the single transformation of the red object onto the green image

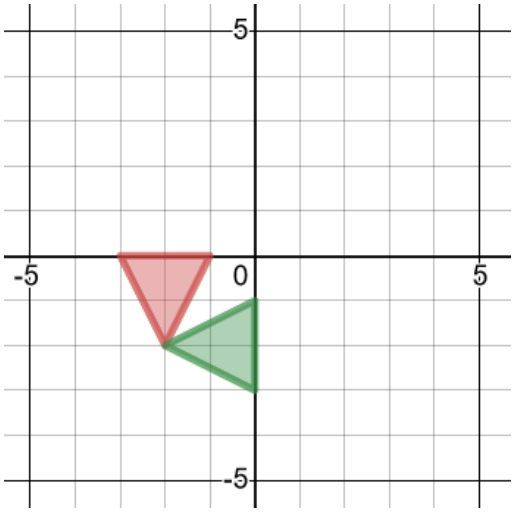


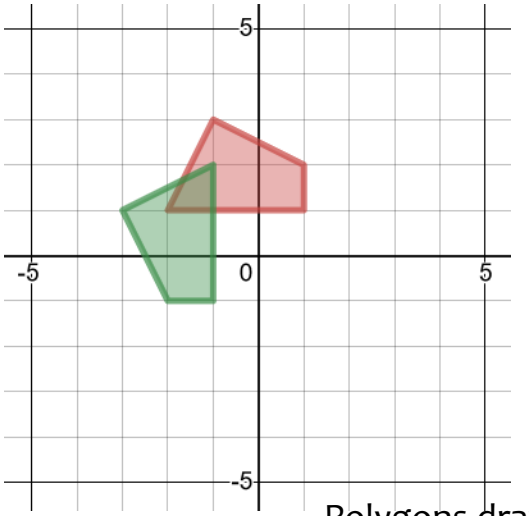
Reflection in the line $y = -2$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

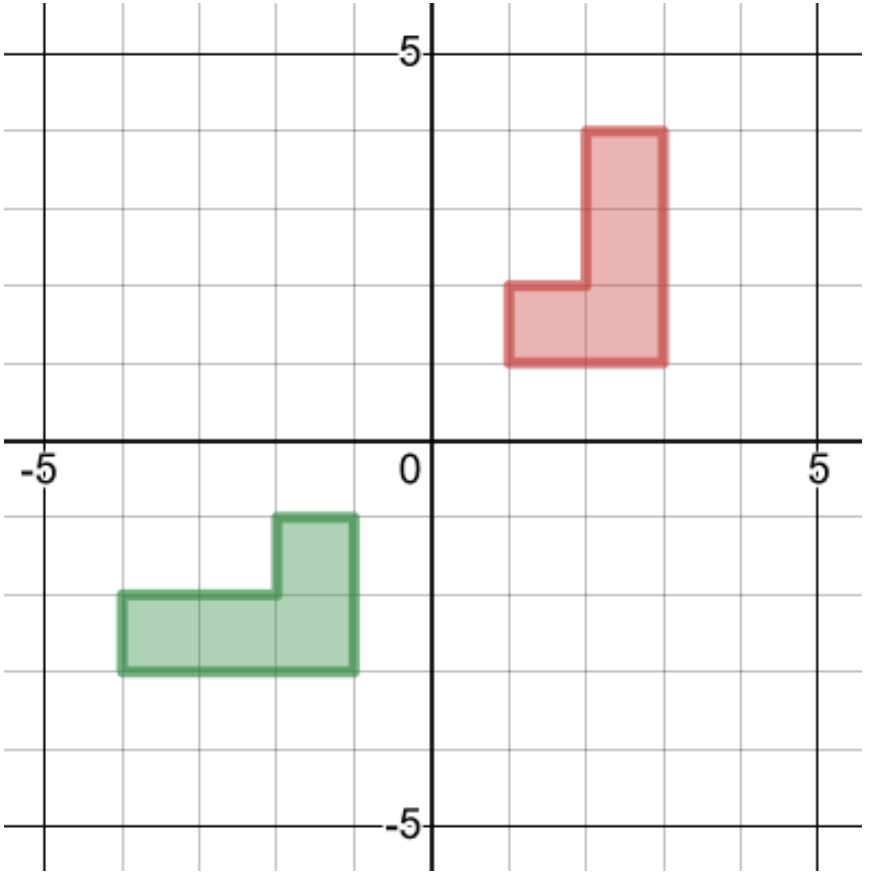
Describe the single transformation of the red object onto the green image





Your turn

Describe the single transformation of the red object onto the green image



Reflection in the line $y = -x$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example	Your turn
A point $(2, -5)$ is reflected in the y-axis. What is the image of the point after the transformation?	A point $(-5, 4)$ is reflected in the y-axis. What is the image of the point after the transformation? $(5, 4)$
A point $(-3, 7)$ is reflected in the y-axis. What is the image of the point after the transformation?	

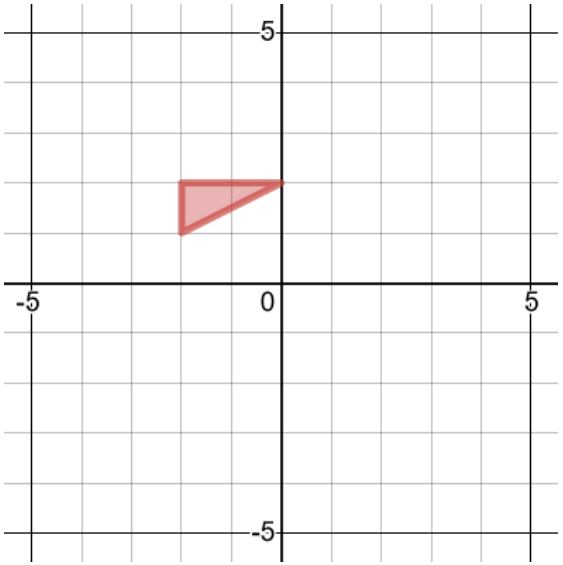
Worked example	Your turn
A point $(2, -5)$ is reflected in the x-axis. What is the image of the point after the transformation?	A point $(-5, 4)$ is reflected in the x-axis. What is the image of the point after the transformation? $(-5, -4)$
A point $(-3, 7)$ is reflected in the x-axis. What is the image of the point after the transformation?	

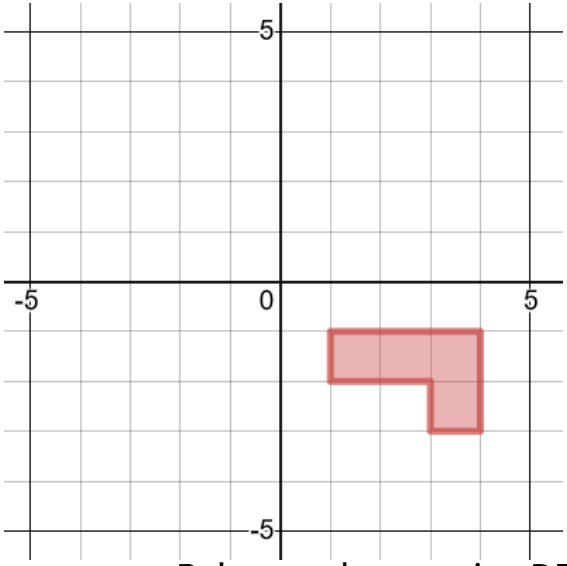
Worked example	Your turn
A point $(2, -5)$ is reflected in the line $y = x$. What is the image of the point after the transformation?	A point $(-5, 4)$ is reflected in the line $y = x$. What is the image of the point after the transformation? $(4, -5)$
A point $(-3, 7)$ is reflected in the line $y = x$. What is the image of the point after the transformation?	

Worked example	Your turn
A point $(2, -5)$ is reflected in the line $y = -x$. What is the image of the point after the transformation?	A point $(-5, 4)$ is reflected in the line $y = -x$. What is the image of the point after the transformation? $(-4, 5)$
A point $(-3, 7)$ is reflected in the line $y = -x$. What is the image of the point after the transformation?	

Worked example

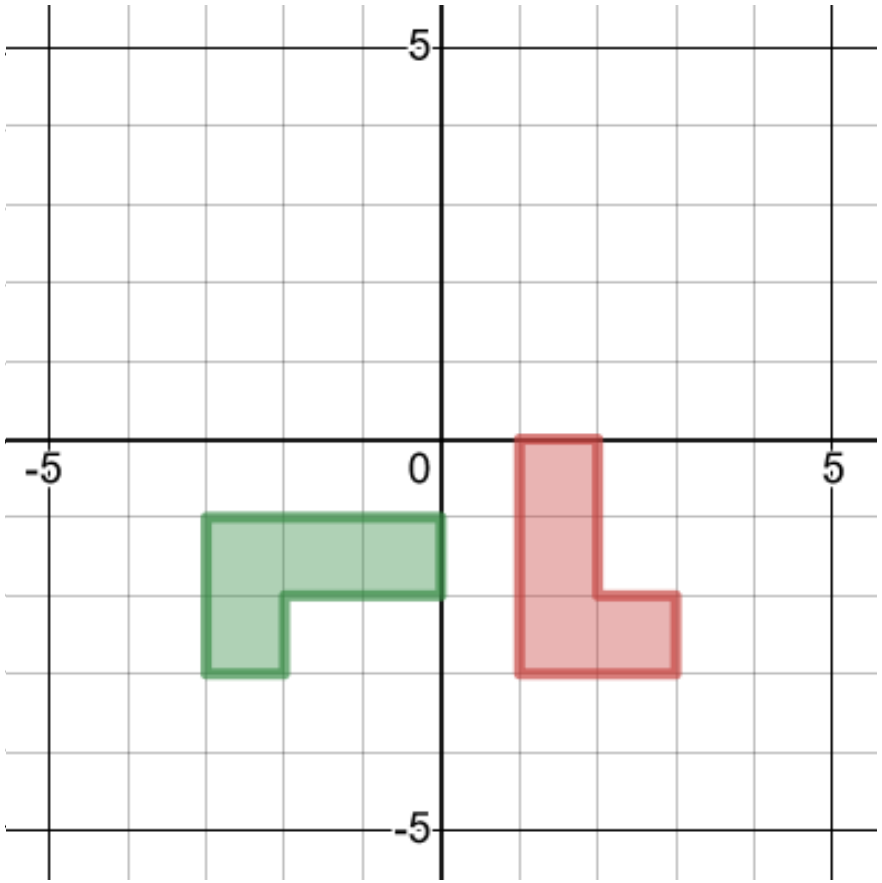
Rotate 90° clockwise about the origin





Your turn

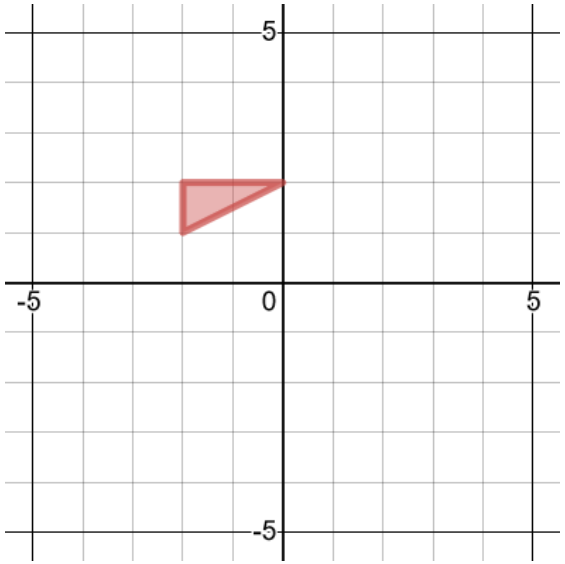
Rotate 90° clockwise about the origin

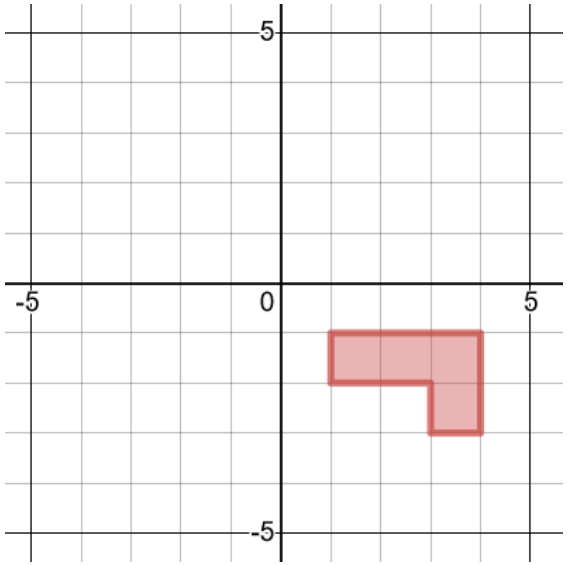


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

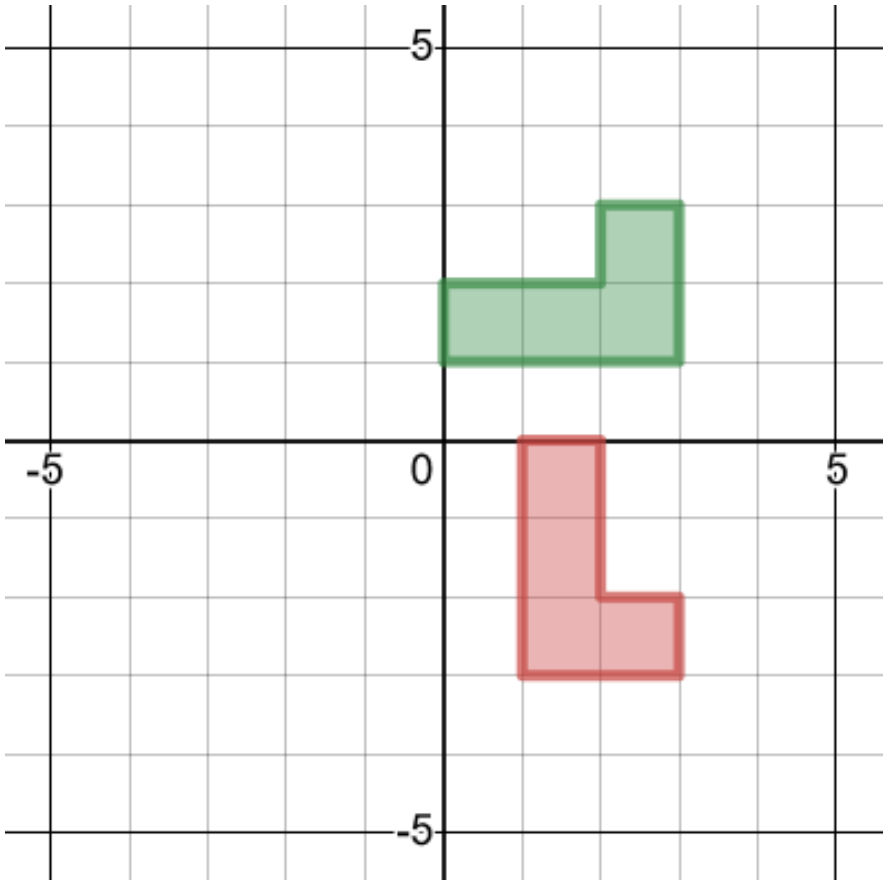
Rotate 90° anti-clockwise about the origin





Your turn

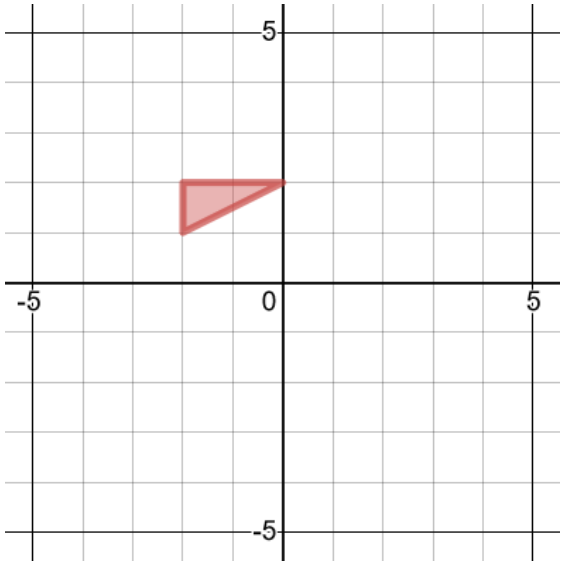
Rotate 90° anti-clockwise about the origin

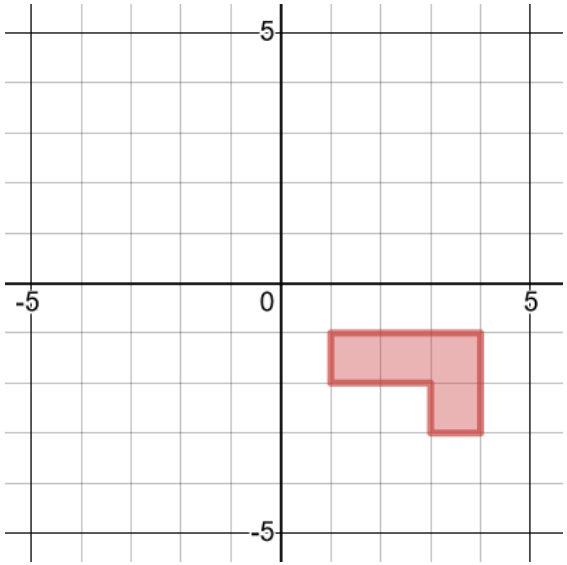


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

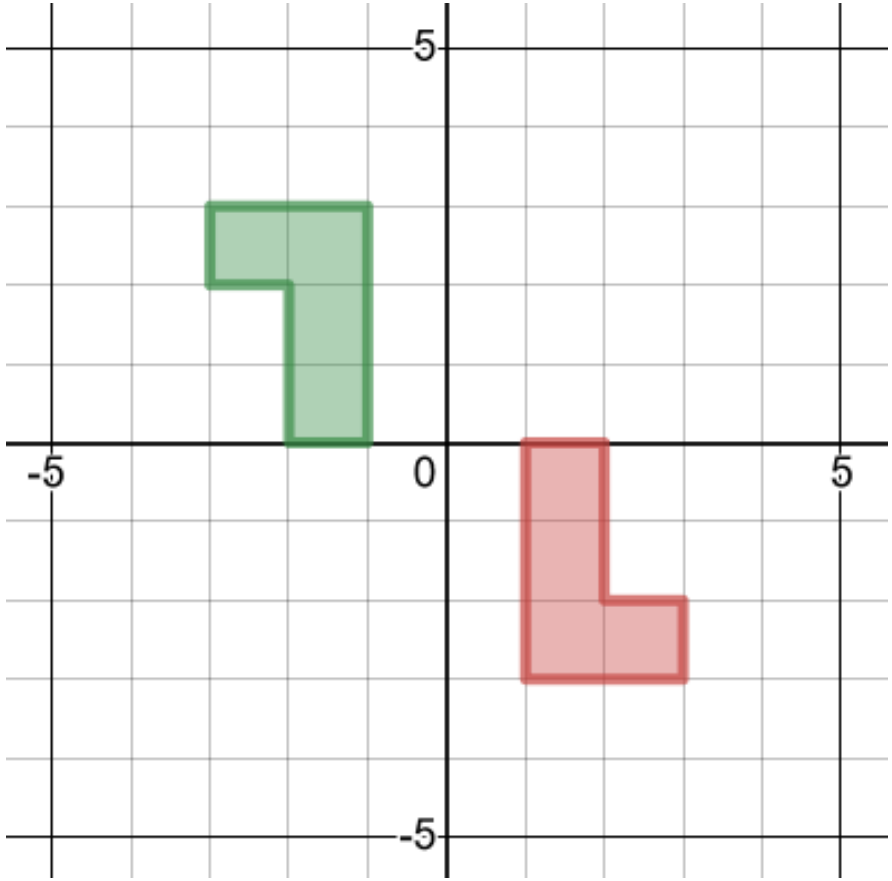
Rotate 180° about the origin





Your turn

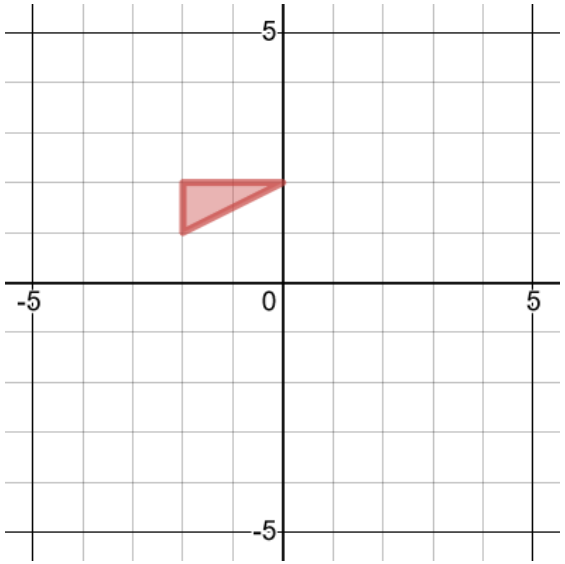
Rotate 180° about the origin

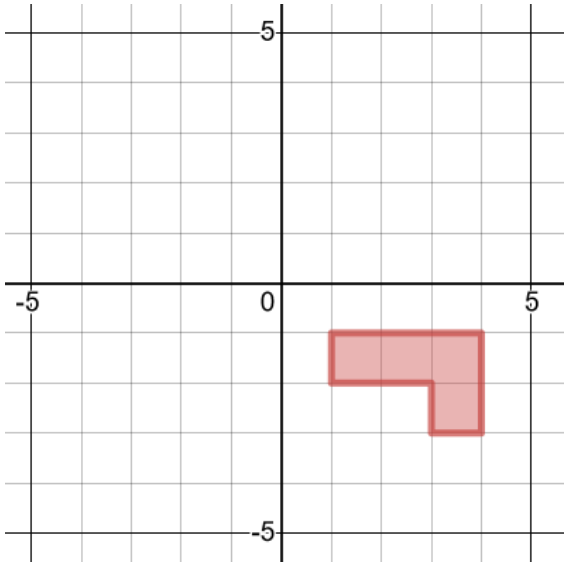


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

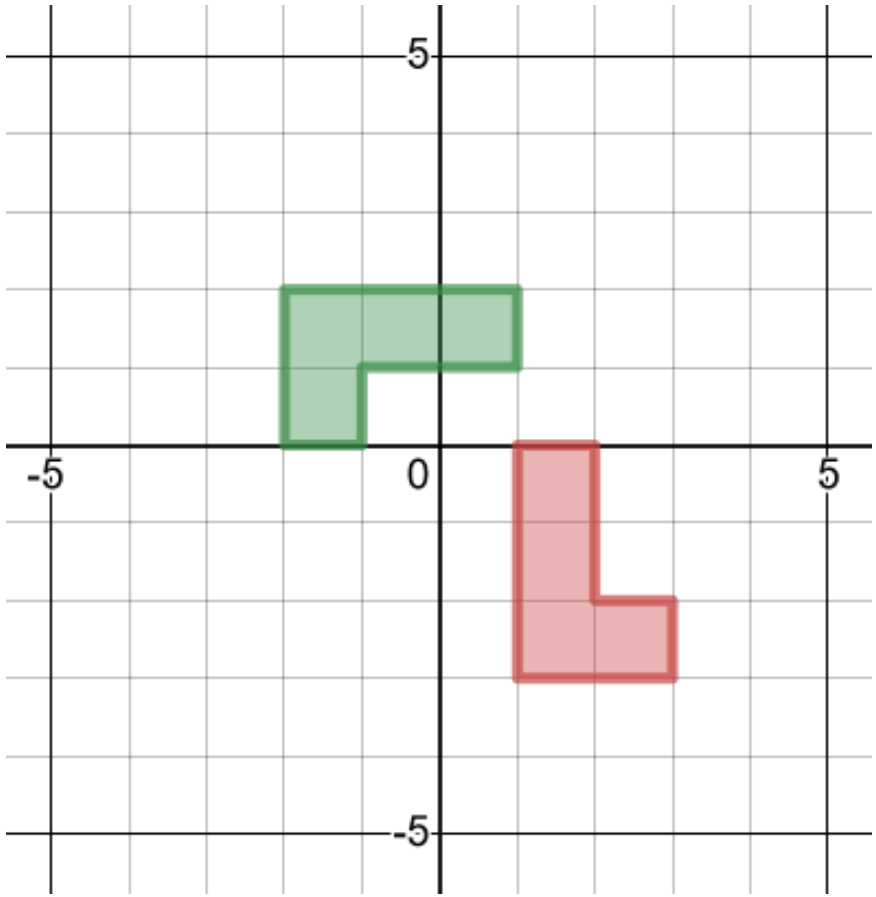
Rotate 90° clockwise about $(1, -1)$





Your turn

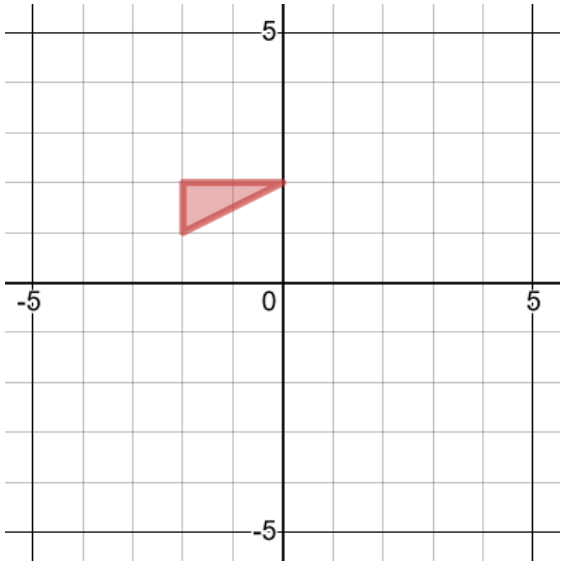
Rotate 90° clockwise about $(2, 1)$

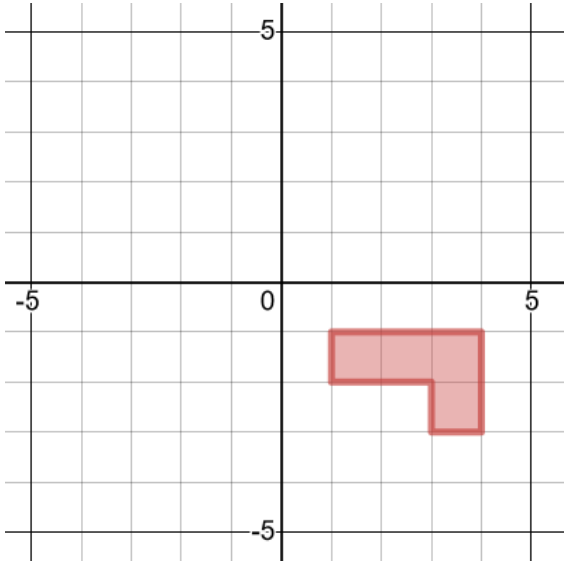


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

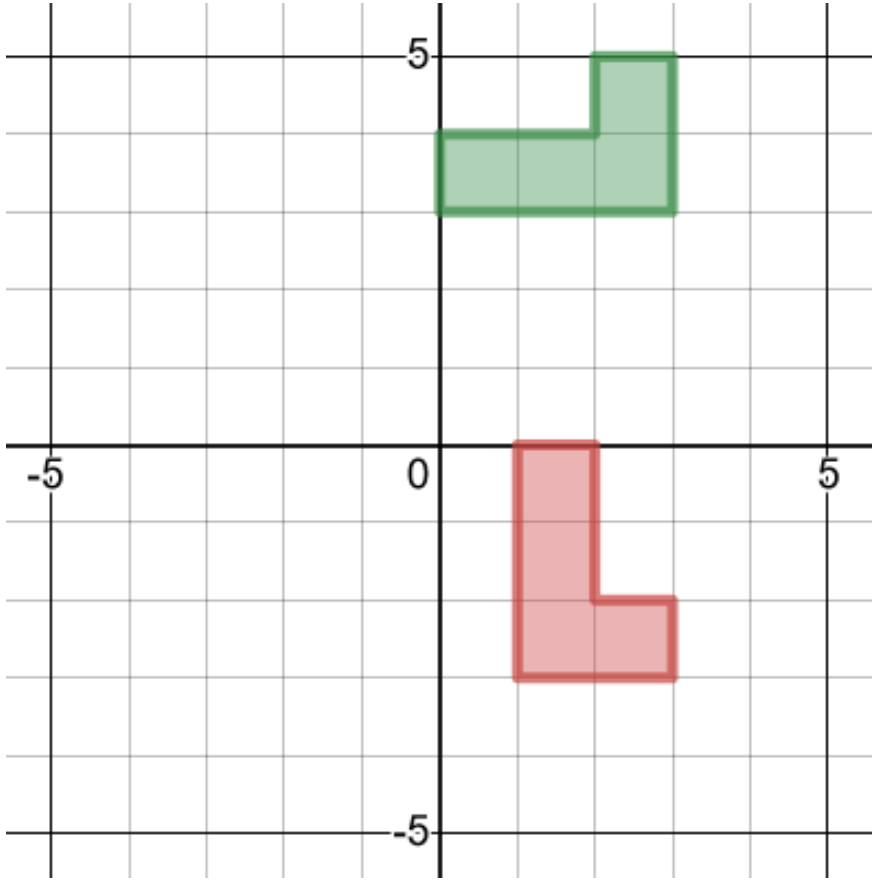
Rotate 90° anti-clockwise about $(1, -1)$





Your turn

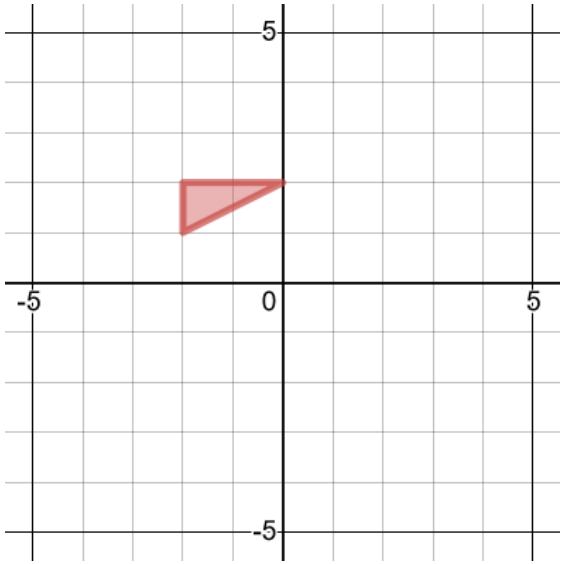
Rotate 90° anti-clockwise about $(-1,1)$

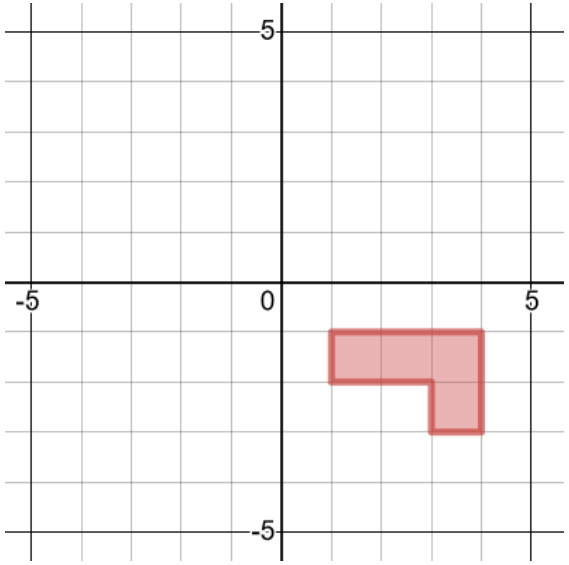


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

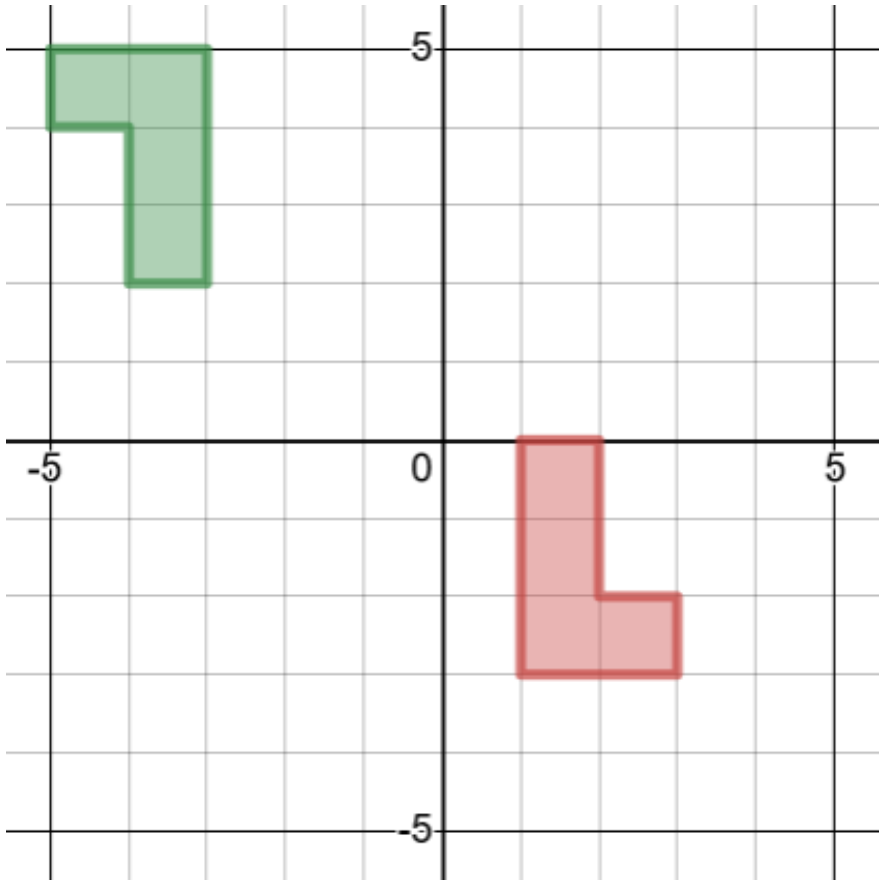
Rotate $180°$ about $(1, -1)$





Your turn

Rotate $180°$ about $(-1,1)$

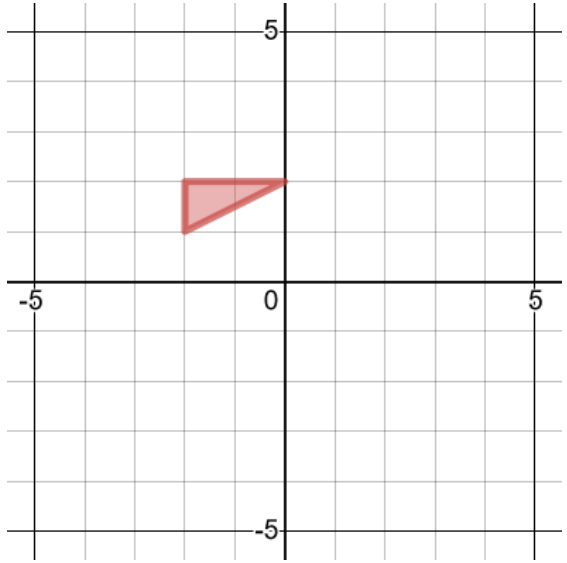


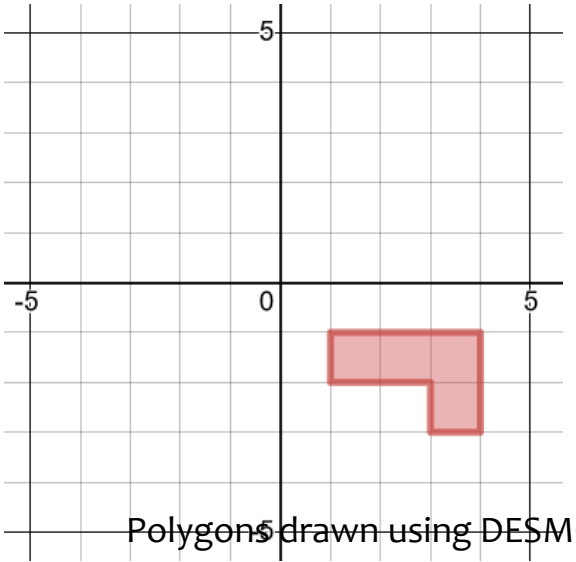
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Rotate $180°$ about $(1, -1)$

Are there any invariant points?

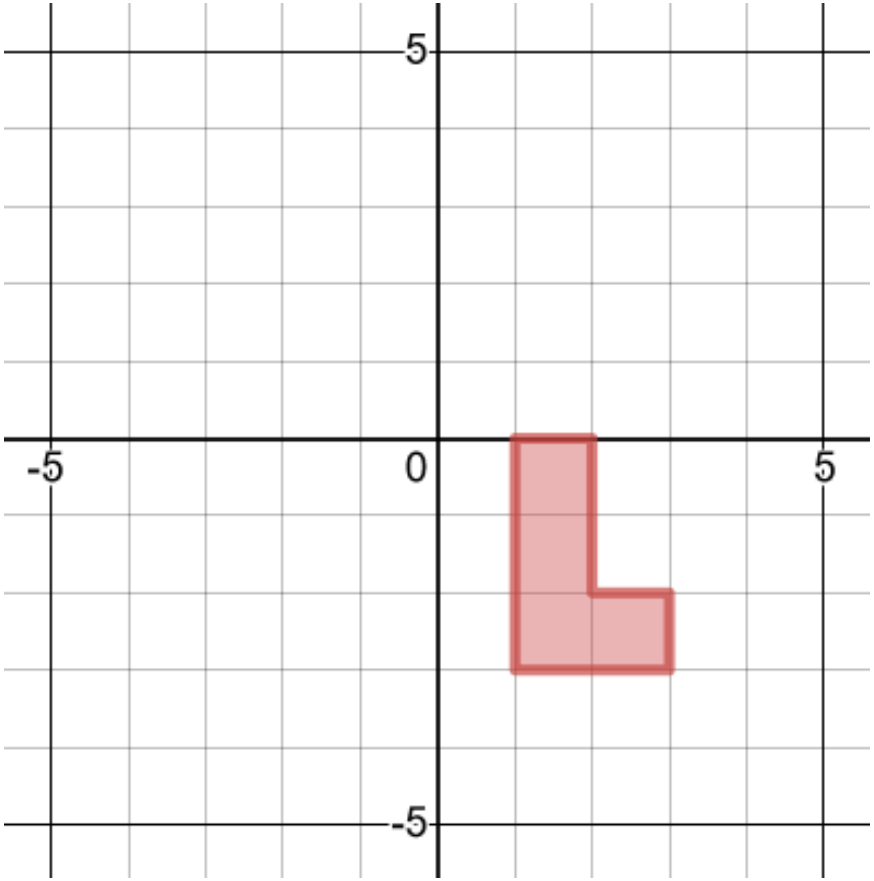




Your turn

Rotate $180°$ about $(1, 0)$

Are there any invariant points?

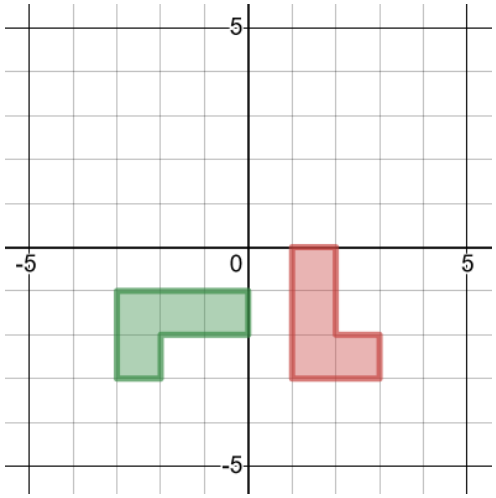


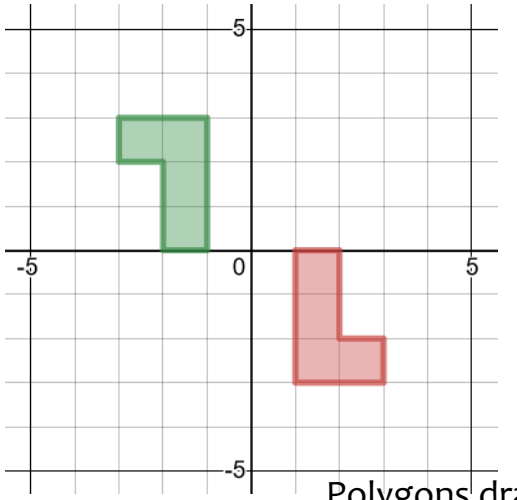
Yes – the point $(1, 0)$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

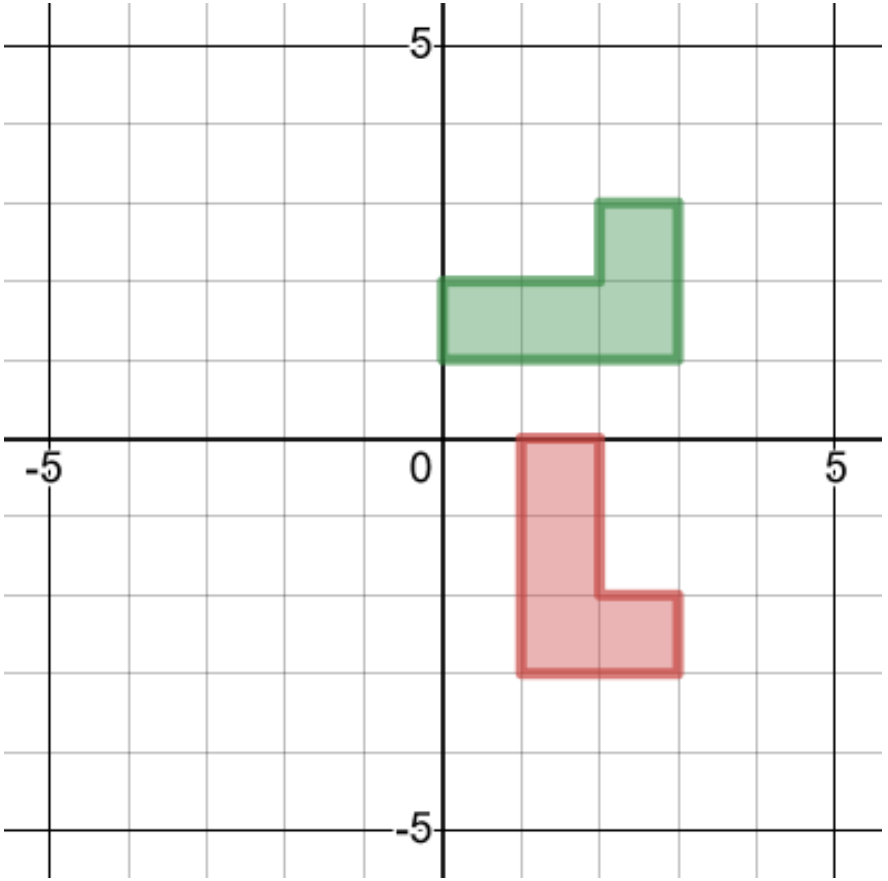
Describe the single transformation of the red object onto the green image





Your turn

Describe the single transformation of the red object onto the green image

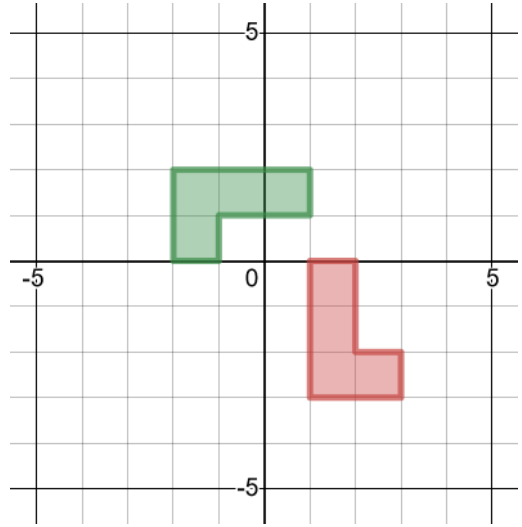


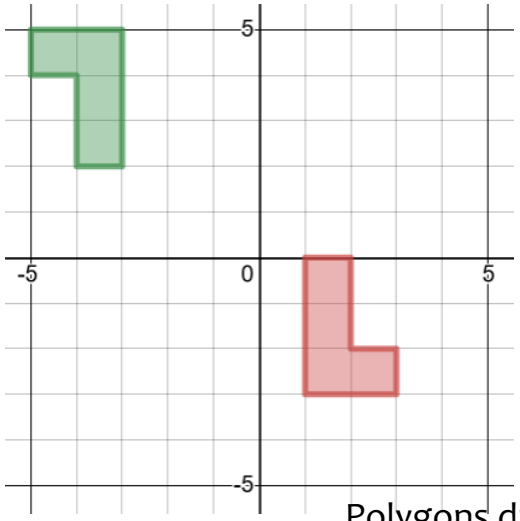
Rotation 90° anti-clockwise about the origin $(0, 0)$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

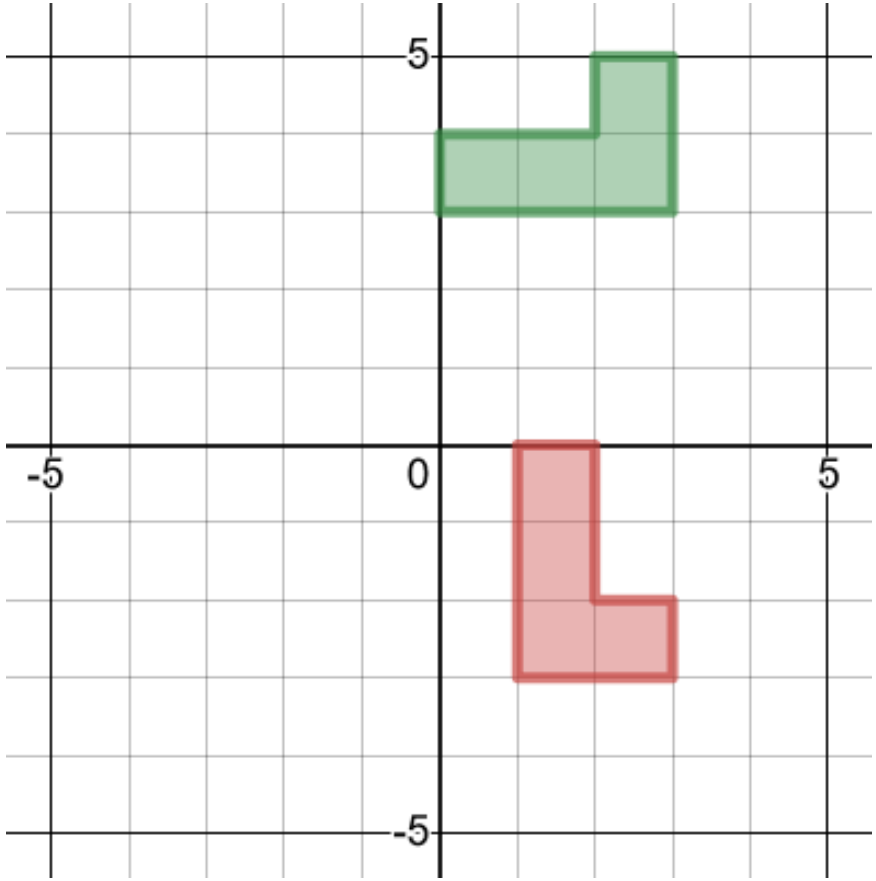
Describe the single transformation of the red object onto the green image





Your turn

Describe the single transformation of the red object onto the green image

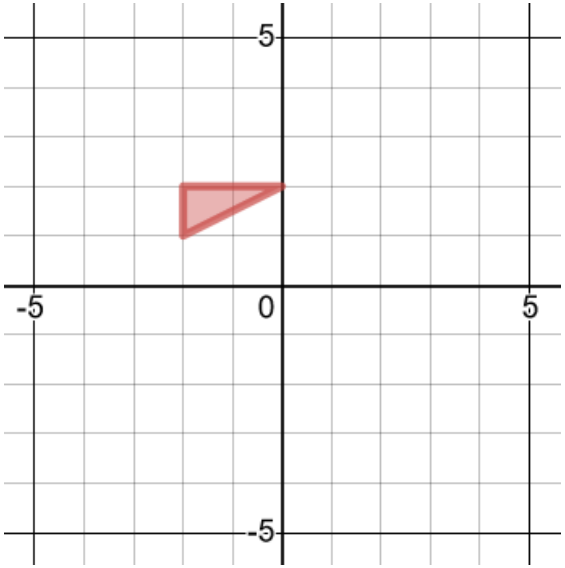


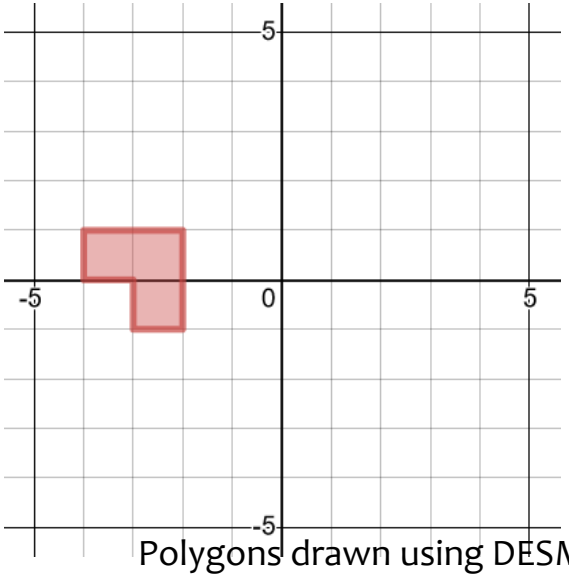
Rotation 90° anti-clockwise about $(-1, 1)$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

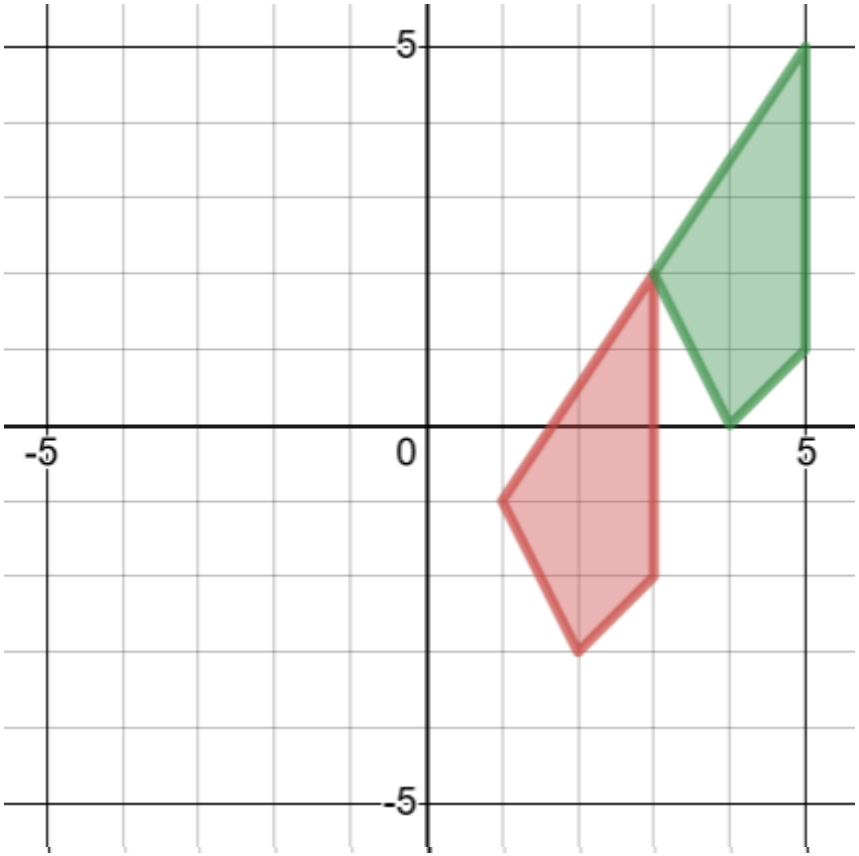
Translate by vector $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$





Your turn

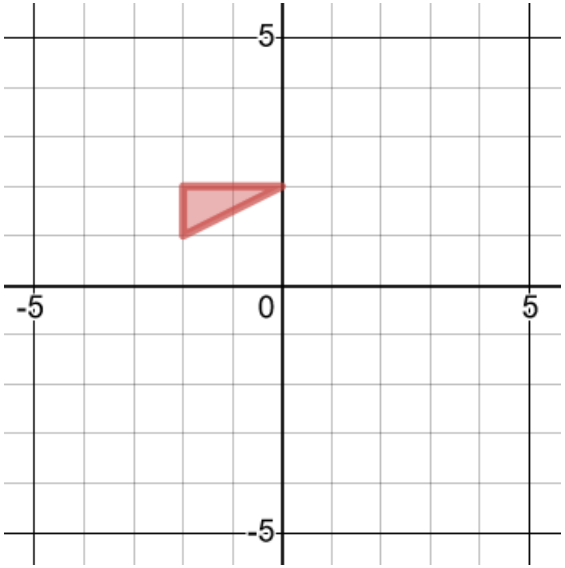
Translate by vector $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

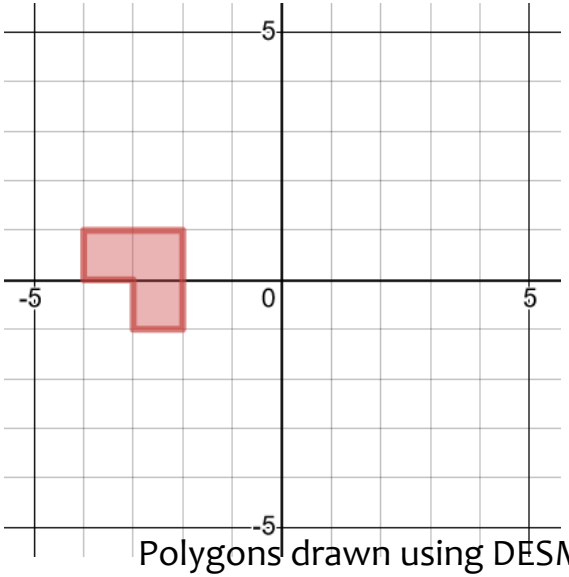


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

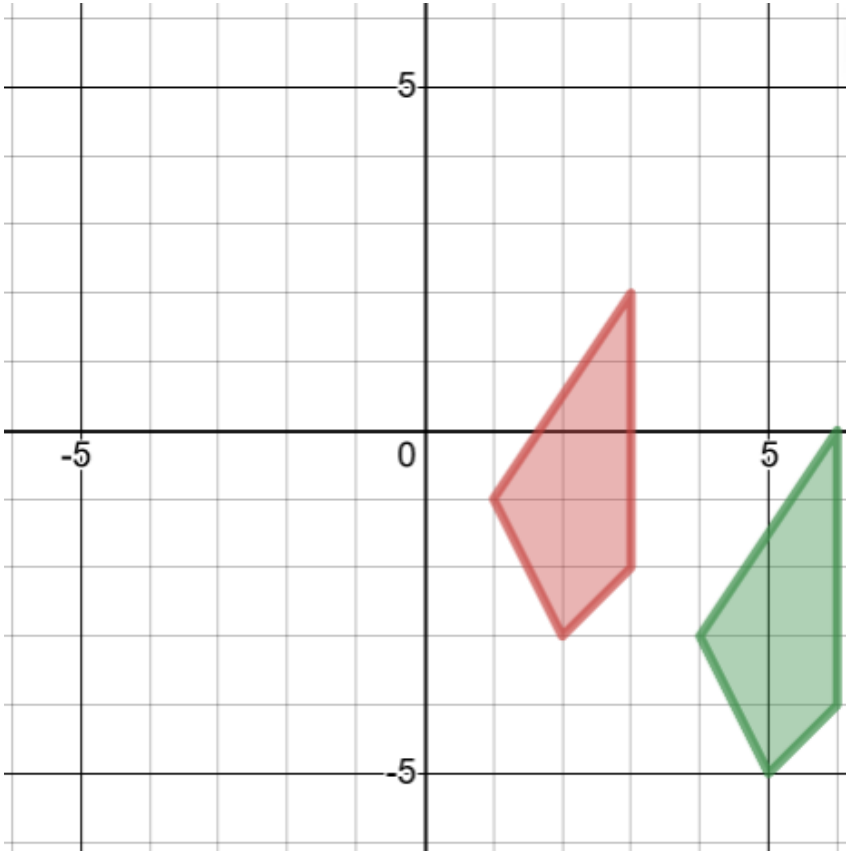
Translate by vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$





Your turn

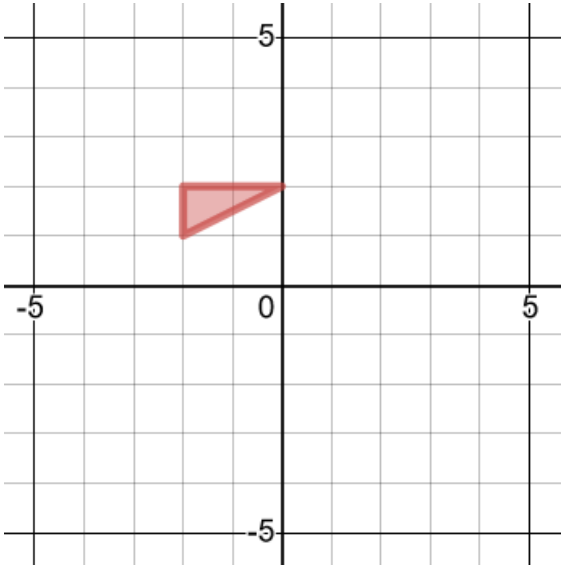
Translate by vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$

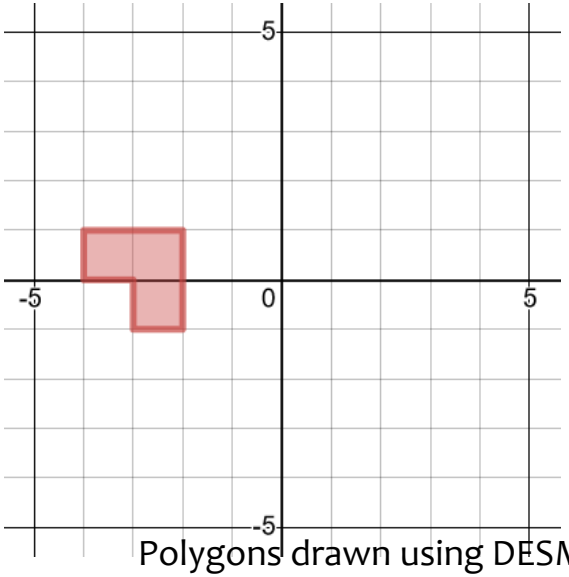


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

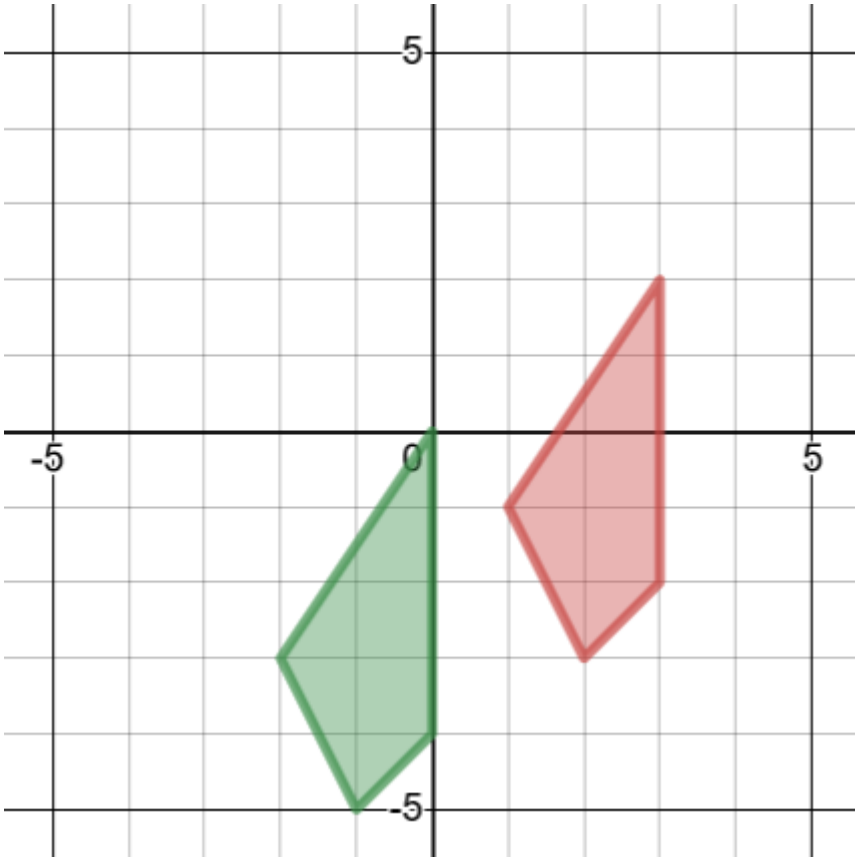
Translate by vector $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$





Your turn

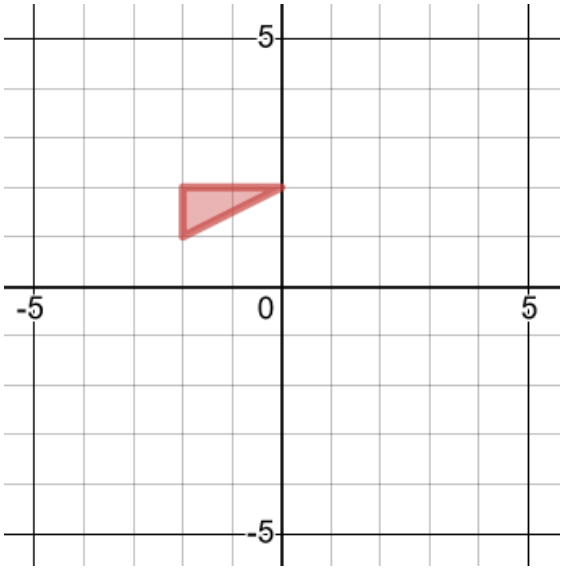
Translate by vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

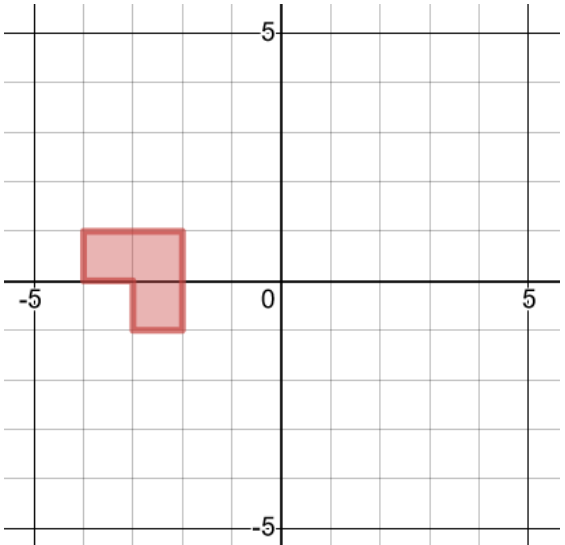


Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

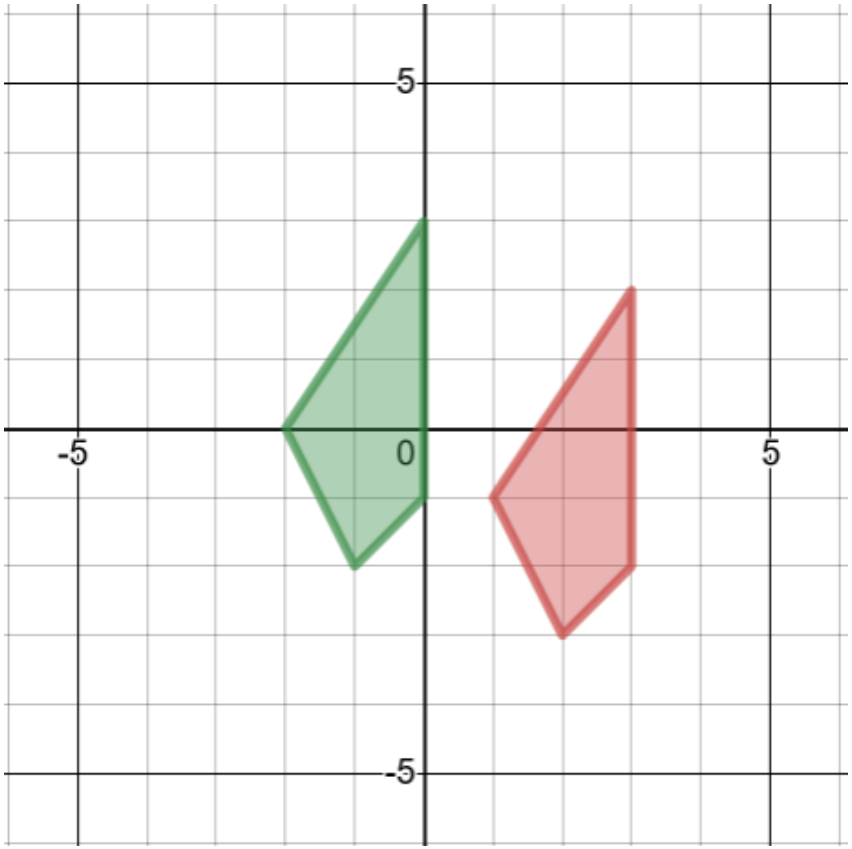
Translate by vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and then by vector $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$





Your turn

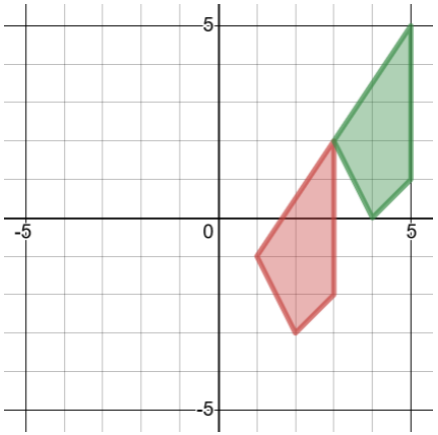
Translate by vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and then by vector $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$

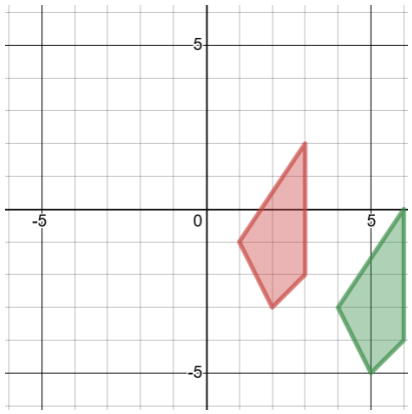


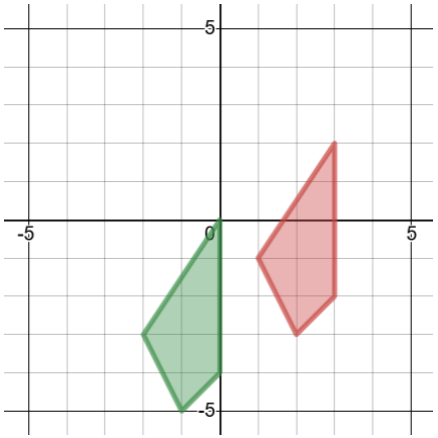
Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example

Describe the single transformation of the red object onto the green image

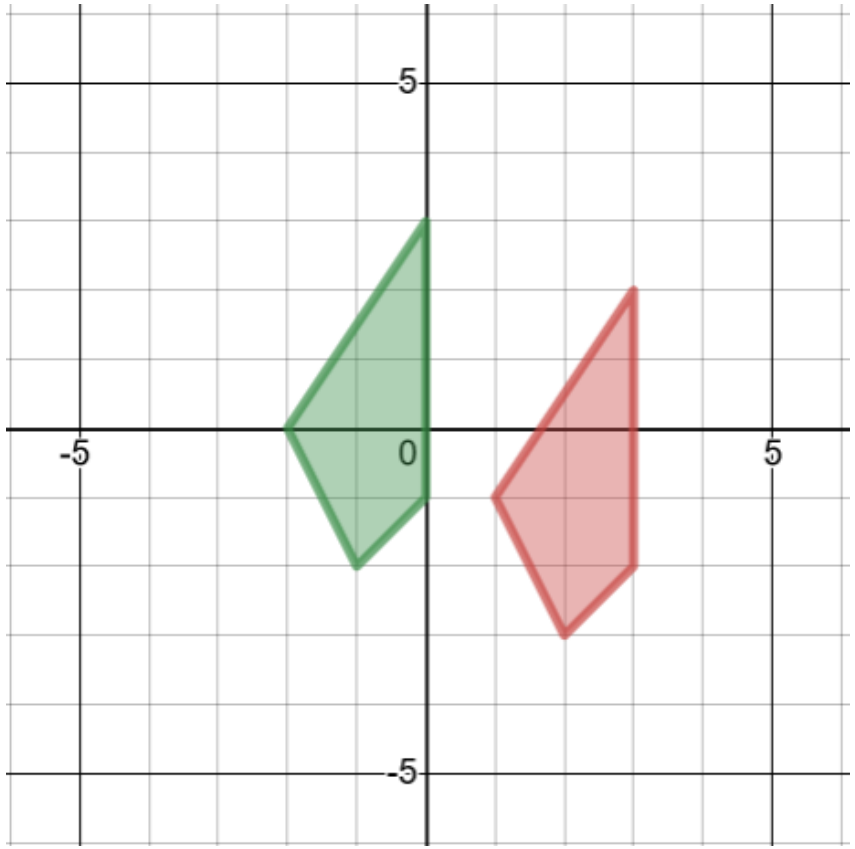






Your turn

Describe the single transformation of the red object onto the green image



Translation by vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$

Polygons drawn using DESMOS with permission: https://www.desmos.com/

Worked example	Your turn
A point $(2, -5)$ is translated by the vector $(-3, 7)$. What is the image of the point after the transformation?	A point $(-2, 5)$ is translated by the vector $(7, -3)$. What is the image of the point after the transformation? $(5, 2)$
A point $(11, -13)$ is translated by the vector $(0, -5)$. What is the image of the point after the transformation?	