

Grade 8 · Translations, Reflections and Rotations · Worksheet Answer Key

Common Core 8.G.A.1, 8.G.A.3 · mathovore.fr

Every problem from the transformations worksheet is solved here. Compare each image point with the rule used, and use the figures to check where the pre-image and image sit. Rotations are always counterclockwise about the origin.

Grade 8 Common Core: 8.G.A.1 · 8.G.A.3

Problem 1: Translate a point

Add 4 to x and 5 to y : $(3+4, -2+5) = (7,3)$.

The image is $(7,3)$.

Problem 2: Reflect a point in the x-axis

The rule is $(x,y) \rightarrow (x,-y)$. So $(5,-3) \rightarrow (5,3)$.

The image is $(5,3)$.

Problem 3: Reflect a point in the y-axis

The rule is $(x,y) \rightarrow (-x,y)$. So $(-4,6) \rightarrow (4,6)$.

The image is $(4,6)$.

Problem 4: Rotate a point 180 degrees

The rule is $(x,y) \rightarrow (-x,-y)$. So $(2,-7) \rightarrow (-2,7)$.

The image is $(-2,7)$.

Problem 5: Rotate a point 90 degrees

The rule is $(x,y) \rightarrow (-y,x)$. So $(3,5) \rightarrow (-5,3)$.

The image is $(-5,3)$.

Problem 6: Rotate a point 270 degrees

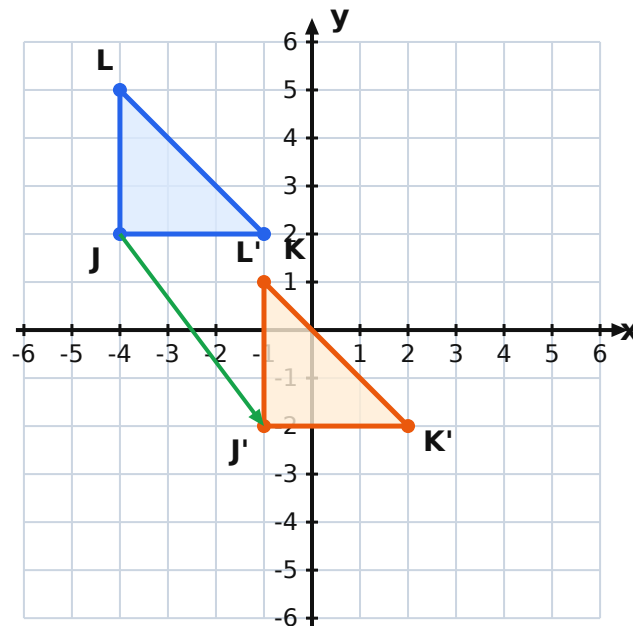
The rule is $(x,y) \rightarrow (y,-x)$. So $(4,-1) \rightarrow (-1,-4)$.

The image is $(-1,-4)$.

Problem 7: Translate a triangle

Add 3 to each x and subtract 4 from each y .

$J'(-1,-2)$, $K'(2,-2)$, $L'(-1,1)$.



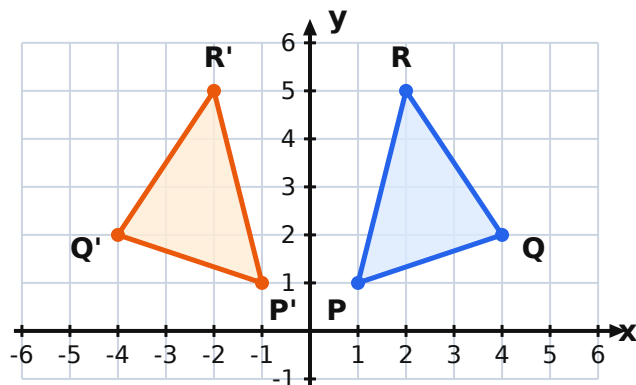
Triangle JKL and its image.

The image is triangle $J'K'L'$ as listed.

Problem 8: Reflect a triangle

Change the sign of each x -coordinate: $(x,y) \rightarrow (-x,y)$.

$P'(-1,1)$, $Q'(-4,2)$, $R'(-2,5)$.



Triangle PQR and its mirror image.

Problem 9: Reflect a trapezoid

Change the sign of each y -coordinate: $(x,y) \rightarrow (x,-y)$.

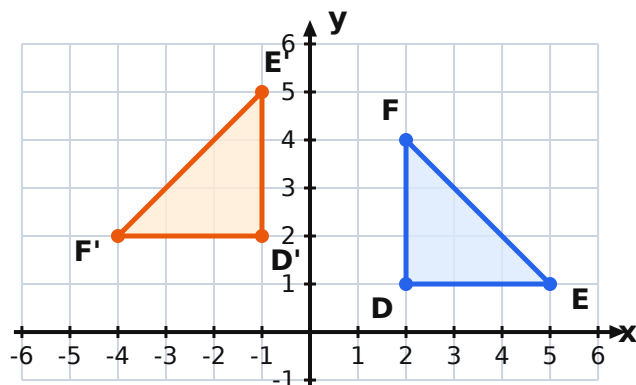
$A'(-5,-2)$, $B'(-1,-2)$, $C'(-2,-5)$, $D'(-4,-5)$.

The top side of length 3 and the bottom side of length 4 keep their lengths, so the image is congruent.

Problem 10: Rotate a triangle 90 degrees

Use $(x,y) \rightarrow (-y,x)$ on each vertex.

$D'(-1,2)$, $E'(-1,5)$, $F'(-4,2)$.



Triangle DEF and its rotation.

Problem 11: Rotate a parallelogram

Use $(x,y) \rightarrow (-x,-y)$.

$W'(-1,-1)$, $X'(-5,-1)$, $Y'(-6,-3)$, $Z'(-2,-3)$.

Opposite sides of the image are still parallel.

Problem 12: Rotate a triangle 270 degrees

Use $(x,y) \rightarrow (y,-x)$.

$G'(1,3)$, $H'(4,3)$, $I'(1,1)$.

Problem 13: Describe a translation

For A : x changes from -2 to 3 , which is $+5$. y changes from 1 to -3 , which is -4 .

Check B : $(0+5, 4-4) = (5,0)$.

The translation is **5 units right and 4 units down**, $(x,y) \rightarrow (x+5, y-4)$.

Problem 14: Identify the reflection

$A(2,1)$ goes to $A'(2,-1)$: the x -coordinate stays and the y -coordinate changes sign. $C(2,3)$ goes to $(2,-3)$, which agrees.

It is a **reflection across the x -axis**, $(x,y) \rightarrow (x,-y)$.

Problem 15: Identify the rotation

Test $A(1,2)$ with the three rules. 90° gives $(-2,1)$. 180° gives $(-1,-2)$. 270° gives $(2,-1)$, which matches A' .

Check $B(4,2)$: $(y,-x) = (2,-4)$.

The rotation is 270° **counterclockwise**.

Problem 16: Write the rule

In both pairs the y -coordinate is unchanged and the x -coordinate changes sign.

It is a **reflection across the y -axis**, $(x,y) \rightarrow (-x,y)$.

Problem 17: What stays the same

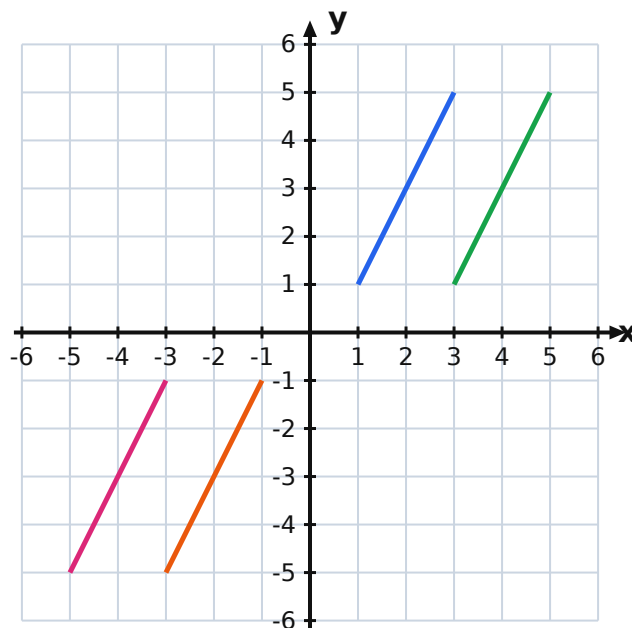
A reflection is a rigid motion, so it keeps segment lengths and angle measures.

$D'E' = 6 \text{ cm}$, $E'F' = 8 \text{ cm}$, and $\angle E' = 90^\circ$.

Problem 18: Parallel lines

Images: p' joins $(-1,-1)$ and $(-3,-5)$; q' joins $(-3,-1)$ and $(-5,-5)$.

Slope of p' : $\frac{-5-(-1)}{-3-(-1)} = \frac{-4}{-2} = 2$. Slope of q' : $\frac{-5-(-1)}{-5-(-3)} = \frac{-4}{-2} = 2$.



The two segments and their images.

The slopes are equal, so the images are **parallel**.

Problem 19: Translate, then reflect

Step 1, $(x-2, y-3)$: $A'(-1,-1)$, $B'(1,-1)$, $C'(-1,2)$.

Step 2, $(x,y) \rightarrow (-x,y)$: $A''=(1,-1)$, $B''=(-1,-1)$, $C''=(1,2)$.

The final image has vertices $(1,-1)$, $(-1,-1)$, $(1,2)$.

Problem 20: Rotate, then reflect

Step 1, $(-y,x)$: $(-1,1)$, $(-1,4)$, $(-3,4)$.

Step 2, $(x,-y)$: $(-1,-1)$, $(-1,-4)$, $(-3,-4)$.

The final image has vertices $(-1,-1)$, $(-1,-4)$, $(-3,-4)$.

Problem 21: Park map

Reflect across the y -axis: $(-6,2) \rightarrow (6,2)$.

The benches have the same y -coordinate, so the distance is $6 - (-6) = 12$ units.

The second bench is at $(6,2)$, and the benches are **12 yards** apart.

Problem 22: Game piece

First card: $(3,2) \rightarrow (-2,3)$. Second card: $(-2,3) \rightarrow (-3,-2)$.

Directly, 180° gives $(-3,-2)$.

The piece is at $(-3,-2)$, the same as one 180° rotation.

Problem 23: Wallpaper stamp

The 4th stamp is 3 translations from the first, so it has moved $3 \times 4 = 12$ units right.

$(1+12, 1) = (13,1)$.

The vertex is at $(13,1)$.

Problem 24: Find the original point

The rule is $(x,y) \rightarrow (y,-x)$. So $y = -3$ and $-x = 8$, which gives $x = -8$.

Check: $(-8,-3) \rightarrow (-3,8)$.

The original point is $Q(-8,-3)$.

Problem 25: Two reflections

First: $(3,2) \rightarrow (3,-2)$. Second: $(3,-2) \rightarrow (-3,-2)$.

A 180° rotation sends $(3,2)$ to $(-3,-2)$ too.

The result is $(-3,-2)$, equal to a 180° rotation.

Problem 26: Legs and the right angle

Image: $A'(-1,1)$, $B'(-1,5)$, $C'(-4,5)$.

Original legs: $AB = 5 - 1 = 4$ and $BC = 4 - 1 = 3$.

Image legs: $A'B' = 5 - 1 = 4$ (vertical) and $B'C' = -1 - (-4) = 3$ (horizontal).

A vertical and a horizontal segment meet at 90° , so the right angle and both lengths are preserved.