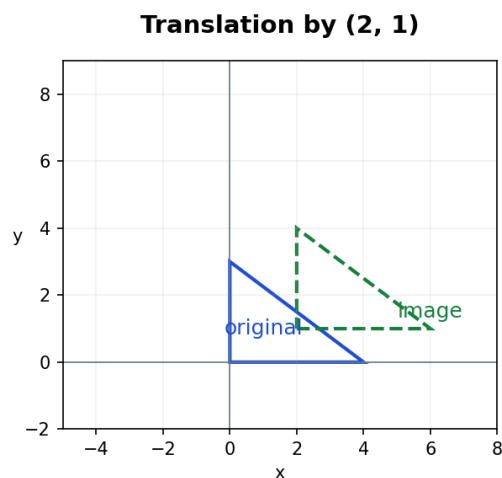


Solutions

6.1 Rigid Motions

6.1.1. Translate $A = (0, 0)$, $B = (4, 0)$, $C = (0, 3)$ by $(2, 1)$.

Solution. The image vertices are $A' = (2, 1)$, $B' = (6, 1)$, and $C' = (2, 4)$. All side lengths are preserved.



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The image vertices are $(2, 1)$, $(6, 1)$, and $(2, 4)$.

6.1.2. Rotate $(2, -4)$ by 180° about the origin.

Solution. Negate both coordinates: $(-2, 4)$.

6.1.3. Reflect $(4, 1)$ across $y = x$.

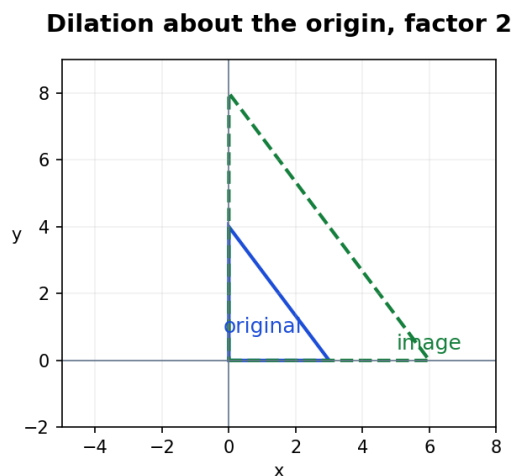
Solution. Interchange coordinates to obtain $(1, 4)$.

Solutions

6.2 Dilations

6.2.1. Dilate the triangle $(0, 0), (3, 0), (0, 4)$ about the origin by factor 2. Give its image and area.

Solution. The image is $(0, 0), (6, 0), (0, 8)$. Its area is 24, four times the original area 6.



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The image is $(0,0), (6,0), (0,8)$, with area 24.

6.2.2. A dilation changes a length from 8 to 12. Find the scale factor and area factor.

Solution. $k = 12/8 = 3/2$. The area factor is $(3/2)^2 = 9/4$.

6.2.3. Can a dilation by factor 3 be a rigid motion for a nondegenerate triangle?

Solution. No. Its nonzero side lengths triple, so distances are not preserved.

Solutions

6.3 Compositions

6.3.1. Apply a 90° counterclockwise rotation about the origin twice to $(3, 1)$.

Solution. First $(-1, 3)$, then $(-3, -1)$. The composition is a 180° rotation.

6.3.2. Reflect $(2, 5)$ across the x -axis and then the y -axis.

Solution. The intermediate point is $(2, -5)$ and the final point is $(-2, -5)$.

6.3.3. Translate a point by $(4, -2)$ and then by $(-1, 5)$. Give the single equivalent translation.

Solution. Add displacement vectors: $(3, 3)$.