

Congruent and Similar Figures Through Dilations

Grade 8 math · Worksheet · Standards: 8.G.A.2, 8.G.A.3, 8.G.A.4

Name: _____ Date: _____ Class: _____

These problems cover congruence through rigid motions and similarity through dilations, standards 8.G.A.2, 8.G.A.3, and 8.G.A.4. Early problems apply the rule (kx, ky) to points; later ones ask for sequences of moves and real scale models.

Sketch the figure for each coordinate problem and test every answer with a ratio of corresponding sides.

Standards: 8.G.A.2, 8.G.A.3, 8.G.A.4 · **Level:** Grade 8

Problem 1 Enlarge a point (easy)

Dilate the point $(5, -2)$ about the origin with scale factor 4.

Problem 2 Shrink a point (easy)

Dilate the point $(28, -20)$ about the origin with scale factor $1/4$.

Problem 3 Fractional factor (easy)

Dilate the point $(-6, 9)$ about the origin with scale factor $2/3$.

Problem 4 Find the scale factor (easy)

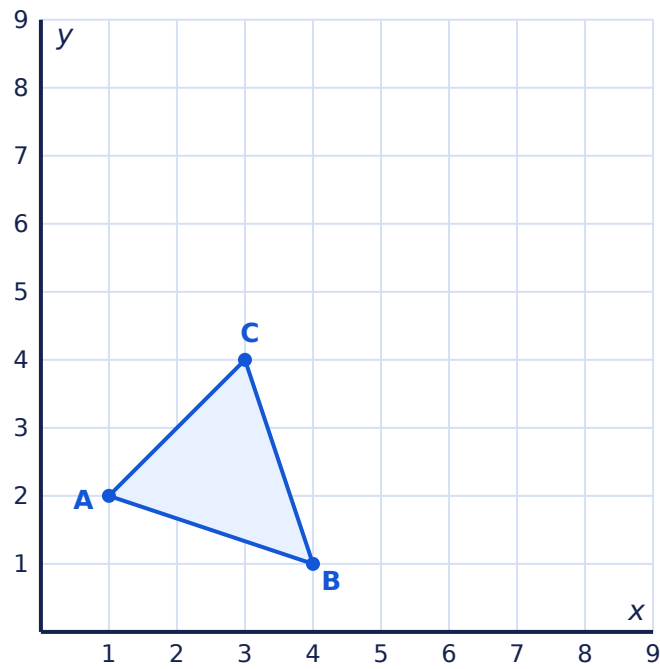
A dilation about the origin sends $(6, -4)$ to $(15, -10)$. Find the scale factor.

Problem 5 Rectangle sizes (easy)

A rectangle measures 8 cm by 5 cm. It is enlarged by a scale factor of 2.5. Find the dimensions of the image.

Problem 6 Double a triangle (medium)

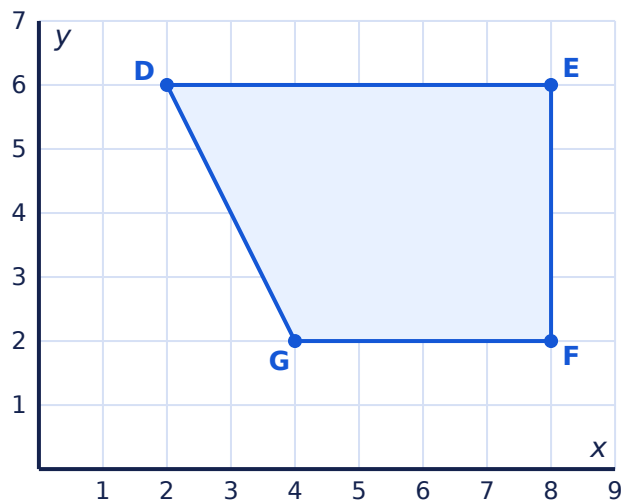
Dilate $\triangle ABC$ about the origin with scale factor 2. List the vertices of the image.



Triangle ABC.

Problem 7 Shrink a trapezoid (medium)

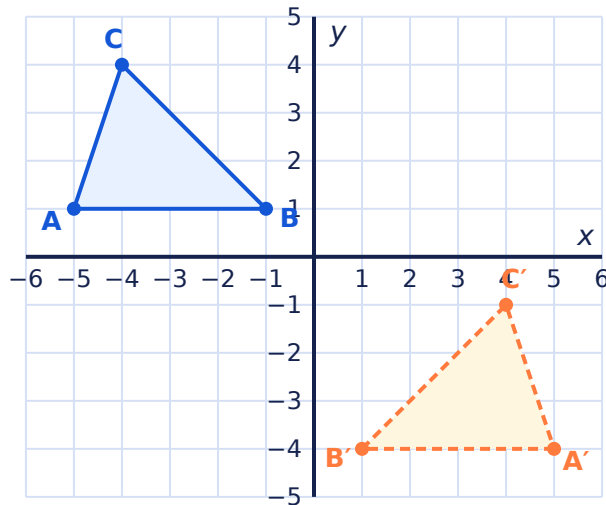
Dilate trapezoid DEFG about the origin with scale factor $\frac{1}{2}$. Write the image vertices.



Trapezoid DEFG.

Problem 8 Show congruence (medium)

Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle A'B'C'$.



$\triangle ABC$ and $\triangle A'B'C'$.

Problem 9 Check a dilation of sides (medium)

A triangle has sides 9 in., 15 in., and 21 in. A second triangle has sides 12 in., 20 in., and 28 in. Find the scale factor from the first to the second and decide whether the triangles are similar.

Problem 10 Similar rectangles? (medium)

Rectangle R is 10 cm by 14 cm. Rectangle S is 15 cm by 21 cm. Is S similar to R? If so, find the scale factor from R to S.

Problem 11 Missing side (medium)

Triangle ABC has sides 9, 12, and 15. A similar triangle has a shortest side of 6. Find its other two sides.

Problem 12 Shrink to a third (medium)

Dilate the triangle with vertices $(-3, 6)$, $(9, -3)$, and $(0, -6)$ about the origin by a scale factor of $1/3$.

Problem 13 Reduce or enlarge? (medium)

Triangle ABC has sides 9, 12, and 15. Triangle DEF has sides 4.5, 6, and 7.5. Find the scale factor from $\triangle ABC$ to $\triangle DEF$ and say whether the dilation enlarges or reduces.

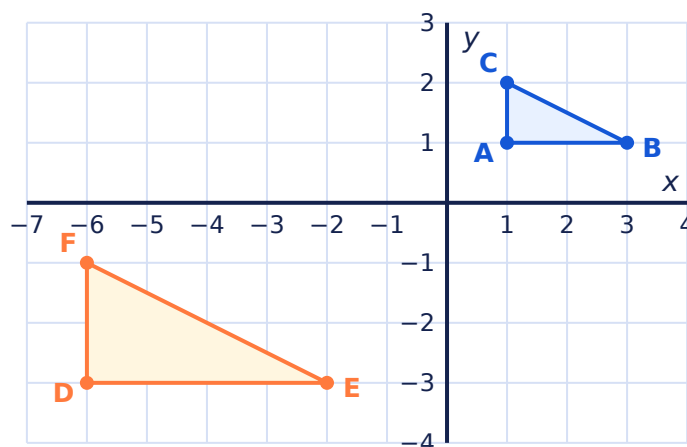
Problem 14 Lengths scale too (hard)

Points A(2, 3) and B(6, 3) are dilated about the origin with scale factor 2.5. Find A' and B', then compare the length of A'B' with the length of AB.

Problem 15 Similar by two moves (hard)

Show that $\triangle DEF$ is similar to $\triangle ABC$ by describing a dilation about the origin followed by a

translation.



$\triangle ABC$ and $\triangle DEF$.

Problem 16 Poster enlargement (medium)

A school fundraiser photo measures 4 in. by 6 in. It is enlarged by a scale factor of 3.5 for a poster. Find the poster dimensions and explain why the photo and poster are similar.

Problem 17 Model airplane (hard)

A model airplane has a wingspan of 24 cm. The real plane has a wingspan of 36 m. Find the scale factor from the real plane to the model, and then find the length of the model fuselage if the real fuselage is 31.5 m.

Problem 18 Shadow measurement (hard)

A student who is 5.5 ft tall casts a shadow of 8.25 ft. At the same time, a tree casts a shadow of 33 ft. Use similar triangles to find the height of the tree.

Problem 19 Garden map (hard)

A triangular garden on a map has vertices (4, 2), (10, 2), and (10, 10) in meters. A new plan dilates the garden about the origin by a scale factor of 1.5. Find the new vertices and compare the perimeters.

Problem 20 Three moves (hard)

Triangle PQR has vertices (2, 2), (6, 2), and (2, 5). Dilate it about the origin by 2, reflect the result across the y-axis, and translate it 3 units right and 1 unit down. Find the final vertices and say whether the final triangle is similar or congruent to $\triangle PQR$.