

Transformations and Congruence: math practice, Grade 8 – download the PDF

20 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Translate a point

★ ★ ★

Point P has coordinates $(3, -4)$. Find the image of P under the translation $\langle -5, 6 \rangle$.

2 Reflect across the axes

★ ★ ★

Reflect the point $K(5, 2)$ (a) across the x-axis and (b) across the y-axis.

3 Half turn about the origin

★ ★ ★

Rotate the point $S(6, -1)$ by 180° about the origin. What are the coordinates of S' ?

4 True or false?



Say whether each statement is true or false.

- a. A translation changes the size of a figure.
- b. A reflection keeps all side lengths the same.
- c. Two congruent figures must be in the same place.
- d. A rotation changes the measure of the angles of a figure.

5 Find the translation



A translation sends $A(2, 5)$ to $A'(-1, 1)$. (a) Find the vector. (b) Where does $B(4, -2)$ go?

6 A reflected rectangle



A rectangular garden is 8 meters long and 5 meters wide. Its plan is reflected across a line. Give the dimensions, the perimeter, and the area of the image.

7 Angles after a rotation



In triangle ABC , $\angle A = 52^\circ$ and $\angle B = 67^\circ$. The triangle is rotated to give $\triangle A'B'C'$. Find $\angle C'$.

8 Translate a triangle



Triangle ABC has vertices $A(-3, 1)$, $B(-1, 1)$, $C(-3, 4)$. Translate it by $\langle 6, -3 \rangle$ and give the new vertices. Then verify that $AC = A'C'$.

9 A reflected parallelogram



The quadrilateral $PQRS$ has $P(1, 1)$, $Q(4, 1)$, $R(5, 3)$, $S(2, 3)$. It is reflected across the y -axis. (a) Find the image vertices. (b) Is $P'Q'R'S'$ still a parallelogram? Explain.

10 Rotate a triangle



Triangle ABC has $A(1, 1)$, $B(5, 1)$, $C(1, 4)$. Rotate it 90° counterclockwise about the origin. Give A' , B' , C' , and check that $B'C' = BC$.

11 Match the triangles



Triangle ABC has vertices $A(1, 1)$, $B(5, 1)$, $C(1, 4)$. Triangle DEF has vertices $D(7, 2)$, $E(7, 6)$, $F(4, 2)$. Show that the triangles are congruent by describing two transformations that map ABC onto DEF .

12 Reflect across a vertical line



The line of reflection is the vertical line $x = 2$. Reflect the points $U(5, 3)$ and $V(-3, -2)$. (Hint: the image is the same distance from the line on the other side.)

13 Moves in a video game



A game character starts at $(3, 7)$ on a map. It moves by $\langle -4, -2 \rangle$, then by $\langle 6, 5 \rangle$. (a) Where does it end? (b) What single translation does the same job?

14 Turning a wheel



A wheel has 6 identical spokes evenly spaced around its center. (a) What is the smallest positive angle of rotation about the center that maps the wheel onto itself? (b) How many such turns bring a spoke back to its starting spot for the first time?

15 Reflect, then rotate



Triangle PQR has $P(2, 1)$, $Q(6, 1)$, $R(2, 4)$. Reflect it across the x-axis, then rotate the result 90° counterclockwise about the origin. (a) Find the final vertices. (b) Compare each final point with the original one. What simple rule do you notice?

16 Does the order matter?



Let $M(3, 2)$. Compute the image of M when you (a) rotate 90° counterclockwise about the origin, then reflect across the x-axis; (b) reflect across the x-axis first, then rotate 90° counterclockwise. What do you conclude?

17 A half turn about another center



Rotate by 180° about the origin, then translate by $\langle 4, 3 \rangle$. (a) Find the image of $A(1, 0)$. (b) Find the single point that is the center of an equivalent 180° rotation, and write the rule $(x, y) \rightarrow (?, ?)$.

18 Drone delivery



A delivery drone is translated by $\langle 6, 8 \rangle$ on a map where one unit is 5 meters. (a) How many units does each point of the drone travel? (b) How many meters is that? (c) Is the distance the same for every point?

19 Which triangle is congruent?



Triangle ABC has $AB = 7$ in., $BC = 9$ in., and $\angle B = 40^\circ$. Triangle DEF is the image of ABC under a rigid motion, with $D \leftrightarrow A$, $E \leftrightarrow B$, $F \leftrightarrow C$. (a) Give DE , EF , and $\angle E$. (b) Triangle XYZ has $XY = 7$ in., $YZ = 9$ in., and $\angle Y = 45^\circ$. Can it be congruent to ABC ? Explain.

20 Not a rigid motion



Consider the rule $(x, y) \rightarrow (2x, 2y)$. (a) Find the images of $O(0, 0)$ and $N(3, 4)$. (b) Compare the distances ON and $O'N'$. Is the rule a rigid transformation? (c) Is $(x, y) \rightarrow (x, y + 3)$ rigid?



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