

Scale It Right

Use coordinate rules to track dilations from the origin.

GRADE 8 • TEKS 8.3

8.3 "Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to: generalize that the ratio of corresponding sides of similar shapes are proportional..."

NAME _____

DATE _____

DILATION RULES

For a dilation centered at the origin with positive scale factor k , multiply each coordinate by k : (x, y) becomes (kx, ky) . The ratio of an image side length to its matching original side length is k , so corresponding angles stay equal and corresponding sides are proportional. A factor greater than 1 enlarges a figure, while a factor between 0 and 1 shrinks it.

WORKED EXAMPLE

Vertex $M(34, -51)$ is dilated about the origin by a scale factor of $13/17$. Find M' .

1. Use the rule (x, y) becomes (kx, ky) .
2. $x' = (13/17)(34) = 26$.
3. $y' = (13/17)(-51) = -39$.

Answer: $M'(26, -39)$

PRACTICE 6 problems

- 1** Point $A(-3, 7)$ is dilated about the origin by a scale factor of 2. Find A' .

ANSWER _____

- 2** Point $B'(9, -6)$ is the image of point B after a dilation about the origin with scale factor $3/5$. Find B .

ANSWER _____

- 3** Triangle PQR has vertices $P(2, 4)$, $Q(6, 4)$, and $R(2, 10)$. Dilate the triangle about the origin by a scale factor of $1/2$. List P' , Q' , and R' .

ANSWER _____

- 4** A rectangle has a side length of 12 units. It is dilated by a scale factor of $3/4$. Find the length of the matching image side and the ratio image side/original side.

ANSWER _____

- 5** A dilation centered at the origin maps $C(-5, 3)$ to $C'(-20, 12)$. Find the scale factor.

ANSWER _____

- 6** A shape has a perimeter of 18 units and an area of 20 square units. It is dilated by a scale factor of $1/3$. Find the image perimeter and image area.

ANSWER _____

APPLY IT Show your work

- 1** A game design club creates a triangular flag for a game map. Its vertices are $(-2, 3)$, $(4, 3)$, and $(-2, 7)$. The club enlarges the flag from the origin using a scale factor of $\frac{5}{2}$. What are the coordinates of the enlarged flag?

WORK SPACE

ANSWER _____

- 2** In a design app, a logo side is 12 pixels long in the original image and 18 pixels long in the enlarged image. The enlargement is a dilation centered at the origin. If the original logo has a vertex $V(-10, 4)$, find the scale factor and V' .

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A dilation centered at the origin maps $D(-12, 18)$ to $D'(-8, 12)$. The same dilation maps $E(a, -15)$ to $E'(10, b)$. Find the positive scale factor, a , and b . Explain using a coordinate rule.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Point A(-3, 7) is dilated about the origin by a scale factor of 2. Find A'.	A'(-6, 14)
2	Point B' (9, -6) is the image of point B after a dilation about the origin with scale factor $\frac{3}{5}$. Find B.	B(15, -10)
3	Triangle PQR has vertices P(2, 4), Q(6, 4), and R(2, 10). Dilate the triangle about the origin by a scale factor of $\frac{1}{2}$. List P', Q', and R'.	P'(1, 2), Q'(3, 2), R'(1, 5)
4	A rectangle has a side length of 12 units. It is dilated by a scale factor of $\frac{3}{4}$. Find the length of the matching image side and the ratio image side/original side.	Image side length: 9 units; ratio: $\frac{3}{4}$
5	A dilation centered at the origin maps C(-5, 3) to C'(-20, 12). Find the scale factor.	4
6	A shape has a perimeter of 18 units and an area of 20 square units. It is dilated by a scale factor of $\frac{1}{3}$. Find the image perimeter and image area.	Perimeter: 6 units; area: $\frac{20}{9}$ square units

PART 2 • APPLY IT

- (-5, 15/2), (10, 15/2), and (-5, 35/2)** Multiply each x-coordinate and y-coordinate by $\frac{5}{2}$. The three image vertices are (-5, 15/2), (10, 15/2), and (-5, 35/2).
- Scale factor: $\frac{3}{2}$; V'(-15, 6)** The scale factor is image/original = $18/12 = \frac{3}{2}$. Multiply both coordinates of V by $\frac{3}{2}$ to get V'(-15, 6).

CHALLENGE

Scale factor: $\frac{2}{3}$; a = 15; b = -10. Since (x, y) becomes $(\frac{2x}{3}, \frac{2y}{3})$, $10 = \frac{2a}{3}$ gives a = 15, and $b = \frac{2(-15)}{3} = -10$.

Accept equivalent coordinate notation and equivalent fractional forms. For the area item, require that students square the scale factor when finding the image area.