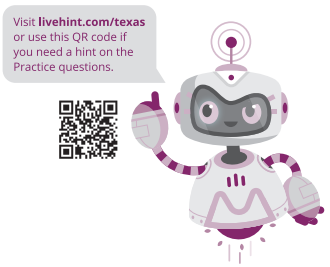
Write

In your own words, explain how to dilate a figure on the coordinate plane using repeated translations. Use examples with scale factors less than and greater than 1 to illustrate your explanation.

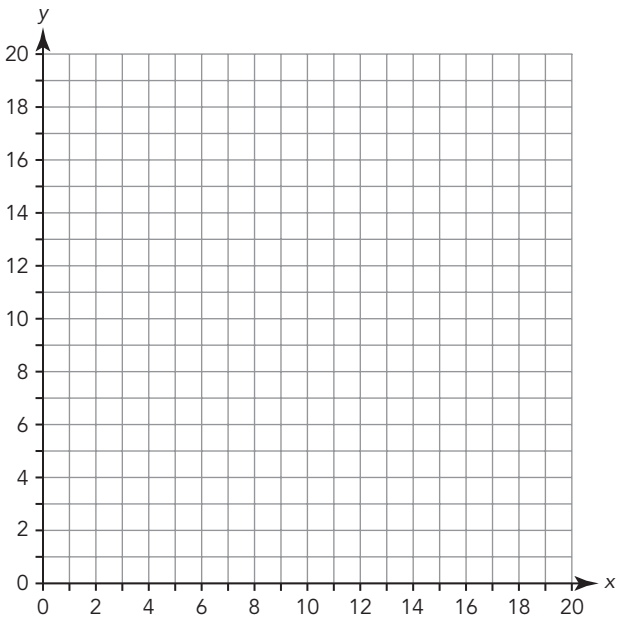
Remember

If the dilation of a figure is centered at the origin, you can multiply the coordinates of the points of the original figure by the scale factor to determine the coordinates of the new figure.

Practice



1. Graph Triangle *XYZ* with the coordinates *X* (3, 18), *Y* (18, 18), and *Z* (18, 9).



a. Reduce Triangle *XYZ* on the coordinate plane using the origin as the center of dilation and a scale factor of $\frac{1}{3}$ to form Triangle $X'Y'Z'$.

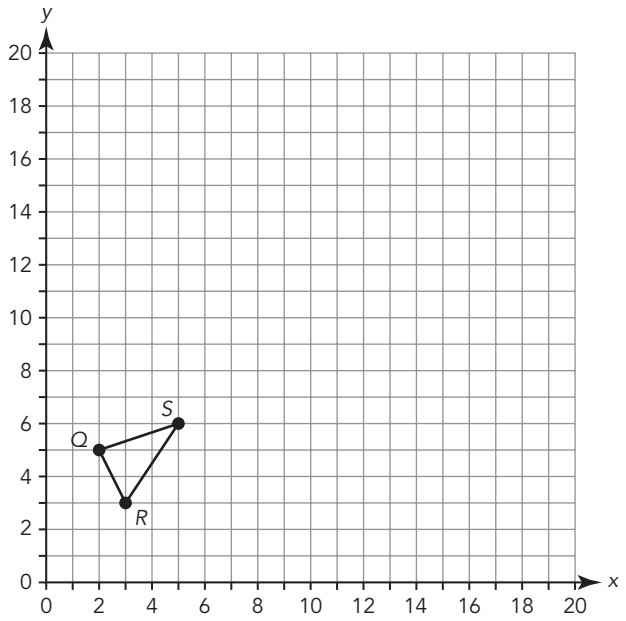
b. What are the coordinates of points X', Y', and Z'?

c. What is the area of the pre-image and the image?

d. What is the relationship between the two areas?

e. If the perimeter of the pre-image is 41.49 units, what is the perimeter of the image? Explain your reasoning.

2. Dilate Triangle *QRS* on the coordinate plane using the origin (0, 0) as the center of dilation and a scale factor of 3 to form Triangle *Q′R′S′*. Label the coordinates of points *Q′*, *R′*, and *S′*.

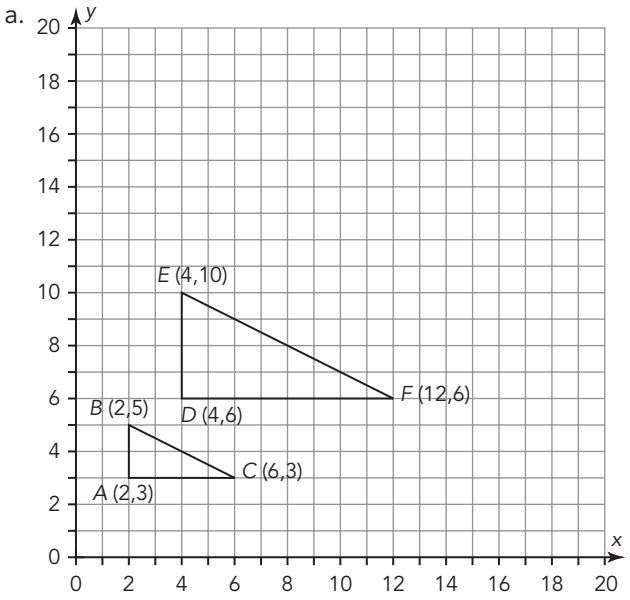


3. Triangle *ABC* is graphed on a coordinate plane with vertices at *A* (−7, 5), *B* (4, 6), and *C* (5, 8). Triangle *ABC* is dilated by a scale factor of *w* with the origin as the center of dilation to create triangle *A′B′C′*. What are the coordinates of the vertices of triangle *A′B′C′*?

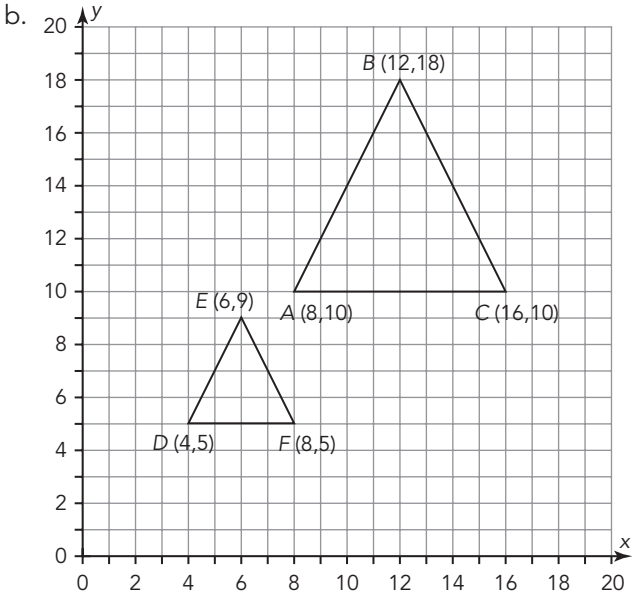
4. Quadrilateral *QRST* is graphed on a coordinate plane with vertices as *Q* (2, 14), *R* (10, 18), *S* (12, −5), and *T* (4, −1). Quadrilateral *QRST* is dilated by a scale factor of $\frac{1}{u}$ with the origin as the center of dilation to create quadrilateral *Q′R′S′T′*. What are the coordinates of the vertices of quadrilateral *Q′R′S′T′*?

5. Verify that each pair of triangles is similar.

a.



b.

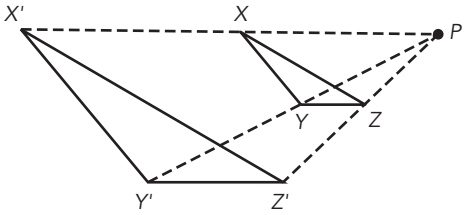


Stretch

Square *ABCD* has coordinates *A* (4, 4), *B* (8, 4), *C* (8, 0), and *D* (4, 0). A dilation of Square *ABCD* has coordinates *A*′ (0, 0), *B*′ (2, 0), *C*′ (2, −2), and *D*′ (0, −2). What is the center of dilation?

Review

1. Triangle *XYZ* has been enlarged with *P* as the center of dilation to form Triangle *X*′*Y*′*Z*′. Identify the equivalent ratios that are equal to the scale factor.



2. A triangle is dilated with center of dilation at point *U*. Point *E* is a vertex of the triangle, and point *E*′ is the corresponding vertex of the image. If $UE = 2$ centimeters and $UE' = 10$ centimeters, what is the scale factor?
3. The coordinates of Quadrilateral *ABCD* are *A* (−6, 2), *B* (−5, 3), *C* (7, 3), and *D* (0, −4). What are the coordinates of the image if the quadrilateral is translated 4 units right and 3 units down?
4. The coordinates of △*JKL* are *J* (0, 1), *K* (6, 0), and *L* (−6, 0). What are the coordinates of the image if the triangle is translated 8 units left?
5. Write two unit rates for each situation.
   a. Julie can deliver $\frac{1}{4}$ of the newspapers in $\frac{1}{2}$ hour.
   b. It took the author $\frac{3}{4}$ of the year to write $\frac{1}{4}$ of the book.