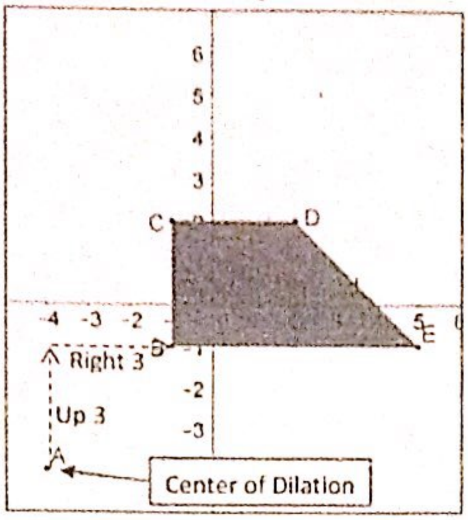
CCSS Geometry

G2a: Dilations not centered at origin

Name: Key

Date:

Dilating a full shape



Let's start with the Trapezoid $BCDE$ and dilate it from a center of dilation at A: $(-4,-4)$ by a scale factor of $c = \frac{2}{3}$ meaning it will shrink and be $\frac{2}{3}$ as far from the center of dilation. Remember that we start by counting from the center of dilation to each point. Counting from A to B we see that it is three up and three right. Verify for yourself that the following distances are correct.

C is six up and three right from A

D is six up and six right from A

E is three up and nine right from A

That means to get to the new points of the trapezoid in the image, we'll need to multiply all of those distances by the scale factor of $c = \frac{2}{3}$. That should give us the following distances from the center of dilation. Remember to count from the center of dilation, not from the points themselves!

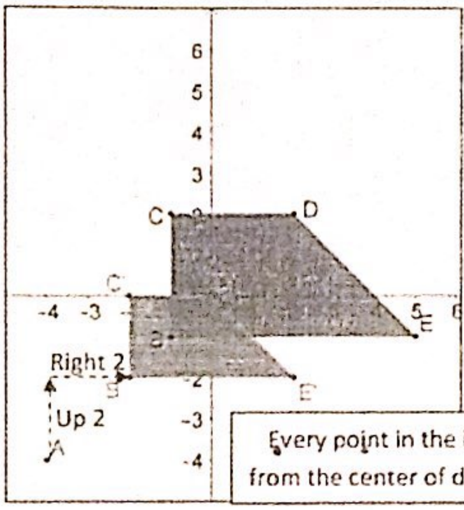
B' will be $\frac{2}{3} \cdot 3 = 2$ or two up and $\frac{2}{3} \cdot 3 = 2$ or two right from A

C' will be $\frac{2}{3} \cdot 6 = 4$ or four up and $\frac{2}{3} \cdot 3 = 2$ or two right from A

D' will be $\frac{2}{3} \cdot 6 = 4$ or four up and $\frac{2}{3} \cdot 6 = 4$ or four right from A

E' will be $\frac{2}{3} \cdot 3 = 2$ or two up and $\frac{2}{3} \cdot 9 = 6$ or six right from A

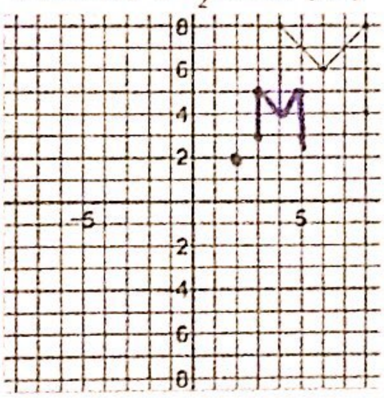
So we will move those distances from the center of dilation to plot all the new points in the image. Once we connect all of those points, we see the new trapezoid as shown in green to the left.



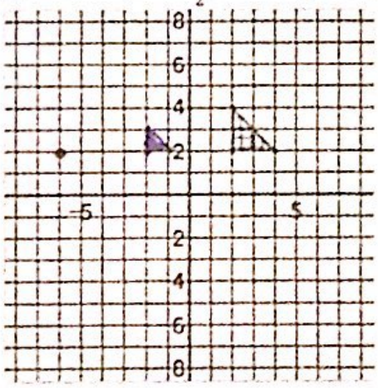
Every point in the image is two-thirds as far from the center of dilation as in the pre-image.

Now you try:

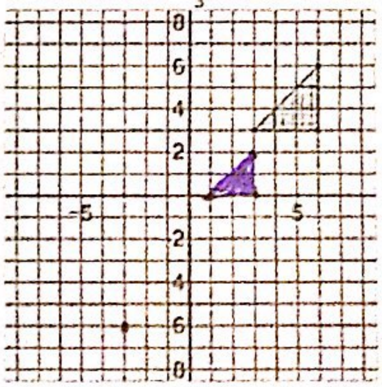
1. Dilate by $k = \frac{1}{2}$, center $(2,2)$



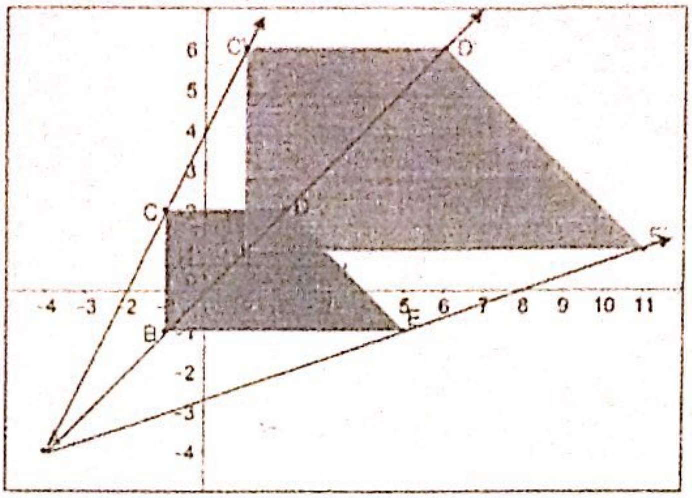
2. Dilate by $k = \frac{1}{2}$, center $(-6,2)$



3. Dilate by $k = \frac{2}{3}$, center $(-3,-6)$



Enlarging the trapezoid



If we take that same trapezoid and center of dilation and dilate it by a scale factor of $c = \frac{5}{3}$, we'll get the following distances.

B' will be $\frac{5}{3} \cdot 3 = 5$ or five up and $\frac{2}{3} \cdot 5 = 5$ or five right from A

C' will be $\frac{5}{3} \cdot 6 = 10$ or ten up and $\frac{5}{3} \cdot 3 = 5$ or five right from A

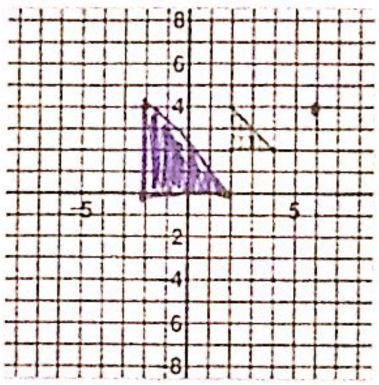
D' will be $\frac{5}{3} \cdot 6 = 10$ or ten up and $\frac{5}{3} \cdot 6 = 10$ or ten right from A

E' will be $\frac{5}{3} \cdot 3 = 5$ or five up and $\frac{5}{3} \cdot 9 = 15$ or fifteen right from A

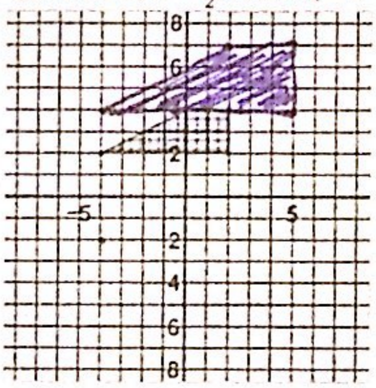
Here you can see the image trapezoid $B'C'D'E'$ is $\frac{5}{3}$ times as far away from the center of dilation as it was in the pre-image. You can even think of connecting the center of dilation to each of the points in the pre-image with a ray (arrow only in one direction) and see that they hit the corresponding points in the image. It's a like a funnel that the pre-image will either shrink or enlarge within.

Now you try:

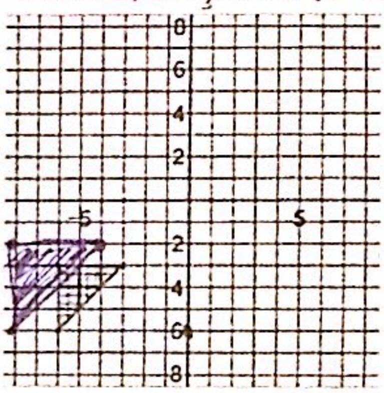
4. Dilate by k= 2, center (6,4)



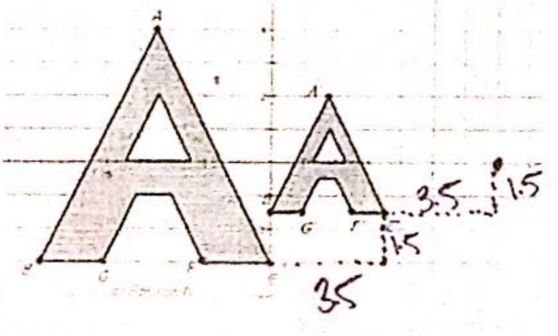
5. Dilate by $k = \frac{3}{2}$, center $(-4, -2)$



6. Dilate by $k = \frac{4}{3}$, center $(0, -6)$



7. Use the image below to describe the dilation that is occurring. Include both the center of dilation and scale factor (k).



Center of dilation: (7,0)

Scale factor: 2