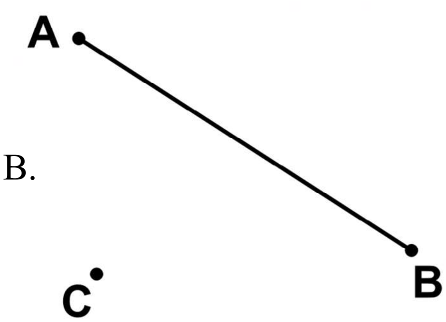
Name: ______________________________ Date: ____________________

MORE WORK WITH DILATIONS
N-GEN MATH® 8

In the last lesson we saw how to dilate points using a **center point** and a **scaling factor (aka dilation constant)**. This constant is a **constant of proportionality**. It is more difficult to dilate points that are not on a number line, but still possible.

***Exercise* #1:** In the diagram below, we want to dilate segment $\overline{AB}$ using a center at C and a scaling factor of 2.

(a) Draw ray $\overrightarrow{CA}$. Measure the length of $\overline{CA}$ and use this to locate A', the image of A after the dilation. (Use centimeter measurements.)



(b) Do the same to locate the image of point B. Draw in segment $\overline{A'B'}$.

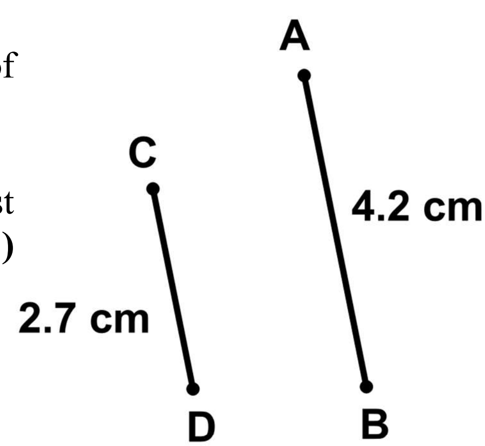
(c) Measure the lengths of $\overline{AB}$ and $\overline{A'B'}$ in centimeters. How do their lengths compare?

AB = __________ A'B' = _________

(d) What else seems to be true about segments $\overline{AB}$ and $\overline{A'B'}$?

When we dilate a line segment that does **not** contain the center, the image line segment has a length that has been **scaled** by the same scaling factor and is parallel to the original.

***Exercise* #2:** In the diagram shown, segment $\overline{CD}$ is the image of segment $\overline{AB}$ after a dilation.



(a) What is the value of the scaling factor to the nearest hundredth? **(Always do new length divided by old length!)**

(b) Locate the center of dilation. Label it E.

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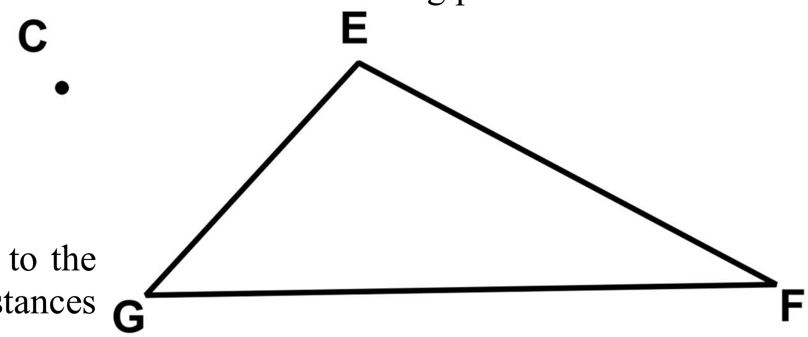
We can, of course, dilate all points in a geometric figure to get a new one as well. In the next exercise we will use rulers to help us dilate an entire triangle.

***Exercise* #3:** Triangle EFG is shown below. We want to dilate it using point C as the center and a scale factor of $\frac{1}{2}$.



(a) Draw rays $\overrightarrow{CE}$, $\overrightarrow{CF}$, and $\overrightarrow{CG}$.

(b) Using your ruler carefully measure, to the nearest tenth of a centimeter, the distances from C to E, C to F, and C to G.

$\overline{CE}$: __________ $\overline{CF}$: __________ $\overline{CG}$: __________

(c) Use your ruler now with the help of your calculator to find the locations of the image points so that they are half the distance away from C as the original points. Mark as E', F', and G'.

(d) Verify that each side length of the new triangle, $\Delta E'F'G'$, is one-half the length of the original.

GE = __________ EF = __________ FG = __________

G'E' = __________ E'F' = __________ F'G' = __________

An easier type of dilation of a triangle occurs when the **center** is one of the **vertices** of the triangle.

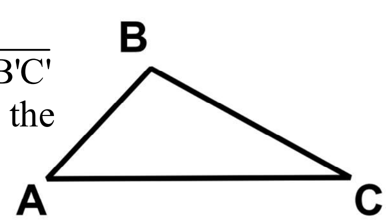
***Exercise* #4:** In the diagram below, we will dilate ΔABC by a factor of 3 using a center at A.

(a) Draw in rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$.

(b) Use your ruler to measure the lengths of $\overline{AB}$ and $\overline{AC}$ in centimeters.

(c) Locate points B' and C'.

(d) Verify that the length of $\overline{B'C'}$ is three times greater than the length of $\overline{BC}$.



(e) Why doesn't point A move under this mapping?

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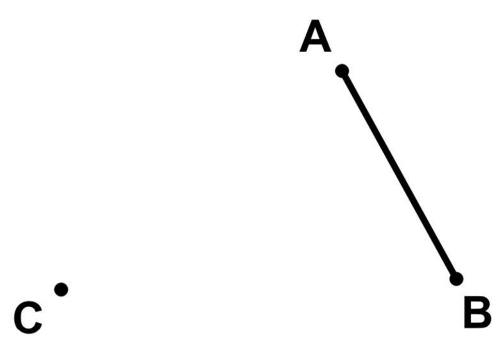
MORE WORK WITH DILATIONS
N-GEN MATH® 8 HOMEWORK

FLUENCY

1. Locate the image of A after a dilation by a factor of $\frac{1}{2}$ with a center at C. Label the image point A'. Explain how you located the point.

2. Find the image of segment $\overline{AB}$ after a dilation by a factor of 2 centered at C. Label the lengths of $\overline{AB}$ and its image $\overline{A'B'}$ to verify that the segment doubled in length.



3. Besides the fact that the length of $\overline{A'B'}$ is twice that of $\overline{AB}$, what other special relationship exists between the two segments in #2?

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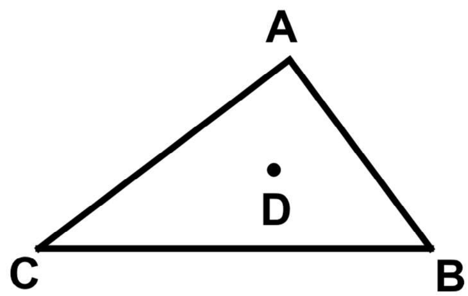
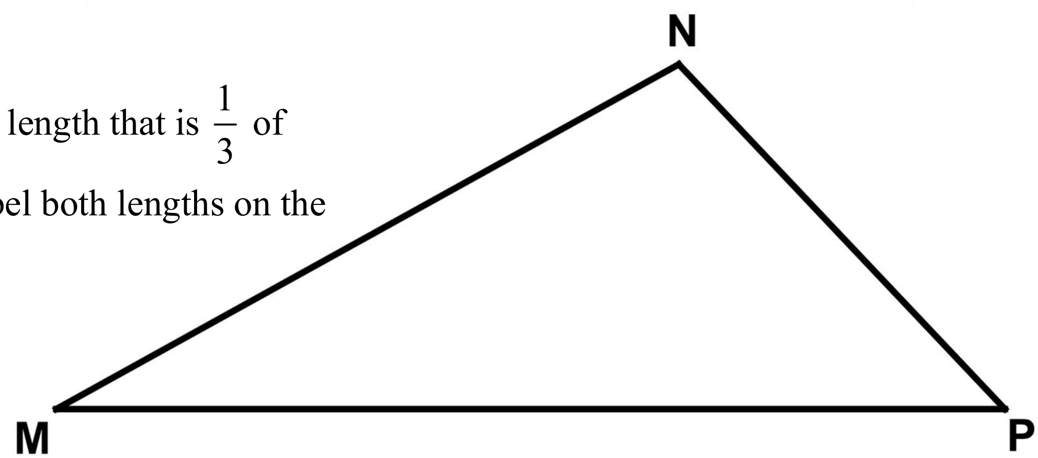
4. Using a ruler and your calculator, dilate triangle ABC below by a factor of 3 using point D as the center. Then, measure the lengths of the sides of ΔABC and its image $\Delta A'B'C'$. Label.



5. Using a ruler, dilate ΔMNP by a factor of $\frac{1}{3}$ with a center at point N. Label the image triangle at $\Delta M'N'P'$. (Note that one of the three vertices will not move under this dilation.)

Verify that $\overline{M'P'}$ has a length that is $\frac{1}{3}$ of the length of $\overline{MP}$. Label both lengths on the diagram.



REASONING

6. In the diagram above, line segment $\overline{MP}$ is horizontal. Must its image, $\overline{M'P'}$, also be horizontal? Explain why or why not.