Unit 3, Lesson 1

Scale Drawings

Let's make a scale drawing.

1.1 Is That the Same Controller?

Original



A



B



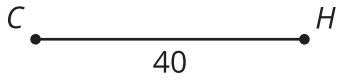
Diego took a picture of a video game controller and then edited it. Which is the scaled copy and which is the distorted image? Explain your reasoning.

Is there anything about the pictures you could measure to test whether there's been a distortion?

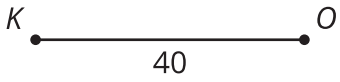
1.2 Sketching Stretching

A **dilation** with center O and a positive scale factor r takes a point P along the ray OP to another point whose distance is r times farther away from O than P is. If r is less than 1 then the new point is really closer to O, not farther away.

1. Dilate H using C as the center and a scale factor of 3. H is 40 units from C.

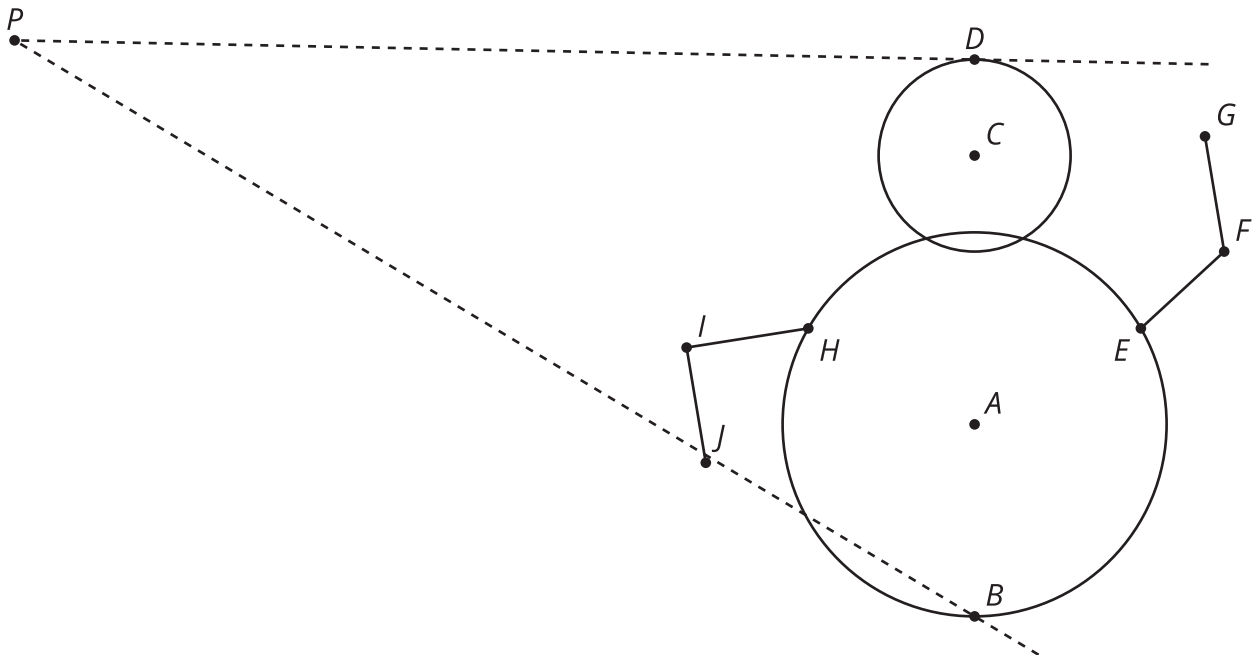


2. Dilate K using O as the center and a scale factor of $\frac{3}{4}$. K is 40 units from O.



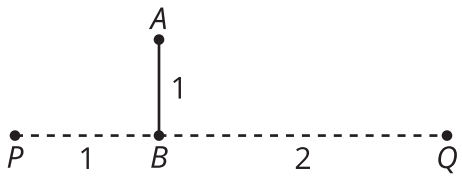
1.3 Bringing Some Perspective

1. Dilate the figure using center P as a vanishing point and a scale factor of $\frac{1}{2}$ so that there is a copy of the figure that appears farther back in the drawing.



2. What do you notice? What do you wonder?

Are you ready for more?



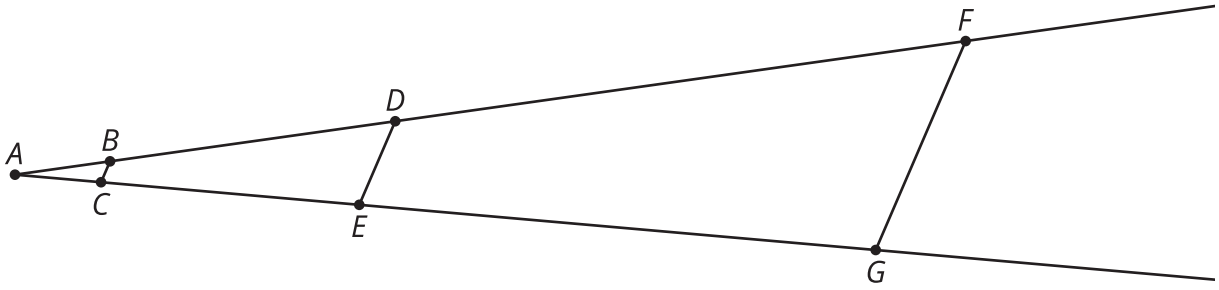
1. Dilate segment AB using center P and a scale factor of $\frac{1}{2}$. Label the result $A'B'$.
2. Dilate the segment AB using center Q and a scale factor of $\frac{1}{2}$. Label the result $A''B''$.
3. How does the length of $A''B''$ compare to $A'B'$? How would the length of $A''B''$ change if Q was even farther far away? Explain or show your answer.

Lesson 1 Summary

A scale drawing of an object is a drawing in which all lengths in the drawing correspond to lengths in the original object multiplied by the same value. When we scale a figure we need to be sure to scale all of the parts equally or else the image will become distorted.

Creating a scaled copy involves multiplying the lengths in the original figure by a scale factor. The scale factor is the factor by which every length in an original figure is multiplied when you make a scaled copy. A scale factor greater than 1 enlarges an object, and a scale factor less than 1 shrinks an object. What would a scale factor equal to 1 do?

For example, segment BC is a scaled copy of segment DE with a scale factor of $\frac{1}{4}$. So $BC = \frac{1}{4}DE$. If $DE = 6$, then $BC = \frac{6}{4}$ or 1.5.



To perform a dilation, we need a center of dilation, a scale factor, and something to dilate.
A **dilation** with center A and a positive scale factor of k takes a point D to another point along the ray AD that is k times farther away from A than D is.

In the image here, segment FG is a dilation of segment DE using center A and a scale factor of 3. So $FA = 3 \cdot DA$ and $GA = 3 \cdot EA$.

Segment BC is also a dilation of segment DE. This dilation uses center A and a scale factor of $\frac{1}{4}$.