

Lesson 10: Dividing the King's Foot into 12 Equal Pieces

Classwork

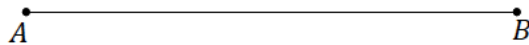
Opening Exercise

Use a compass to mark off equally spaced points C , D , E , and F so that \overline{AB} , \overline{BC} , \overline{CD} , \overline{DE} , and \overline{EF} are equal in length. Describe the steps you took.



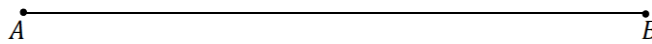
Exploratory Challenge 1

Divide segment AB into three segments of equal lengths.

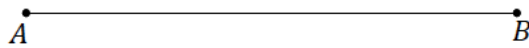


Exercise 1

Divide segment AB into five segments of equal lengths.

**Exploratory Challenge 2**

Divide segment AB into four segments of equal length.

**Exercise 2**

On a piece of poster paper, draw a segment AB with a measurement of 1 foot. Use the dilation method to divide \overline{AB} into twelve equal-length segments, or into 12 inches.

Lesson Summary

SIDE SPLITTER METHOD: If \overline{AB} is a line segment, construct a ray AA_1 , and mark off n equally spaced points using a compass of fixed radius to get points $A = A_0, A_1, A_2, \dots, A_n$. Construct $\overline{A_nB}$ that is a side of $\triangle AA_nB$. Through each point A_1, A_2, \dots, A_{n-1} , construct $\overline{A_iB_i}$ parallel to $\overline{A_nB}$ that connect two sides of $\triangle AA_nB$.

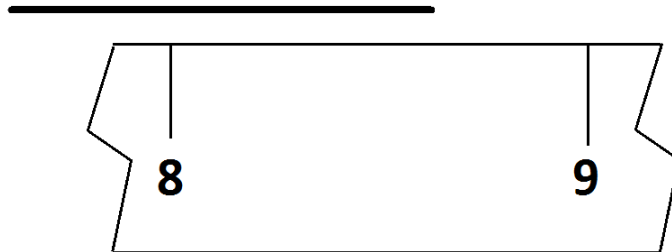
DILATION METHOD: Construct a ray XY parallel to \overline{AB} . On the parallel ray, use a compass to mark off n equally spaced points X_1, X_2, \dots, X_n so that $XX_n \neq AB$. \overrightarrow{AX} and $\overrightarrow{BX_n}$ intersect at a point O . Construct the rays OX_i that meet \overline{AB} in points A_i .

Problem Set

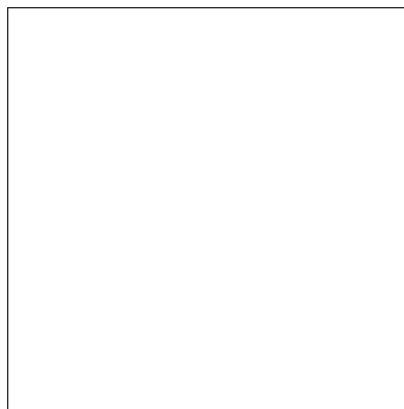
1. Pretend you are the king or queen and that the length of your foot is the official measurement for one foot. Draw a line segment on a piece of paper that is the length of your foot. (You may have to remove your shoe.) Use the method above to find the length of 1 inch in your kingdom.
2. Using a ruler, draw a segment that is 10 cm. This length is referred to as a *decimeter*. Use the side splitter method to divide your segment into ten equal-sized pieces. What should be the length of each of those pieces based on your construction? Check the length of the pieces using a ruler. Are the lengths of the pieces accurate?
3. Repeat Problem 2 using the dilation method. What should be the length of each of those pieces based on your construction? Check the lengths of the pieces using a ruler. Are the lengths of the pieces accurate?
4. A portion of a ruler that measured whole centimeters is shown below. Determine the location of $5\frac{2}{3}$ cm on the portion of the ruler shown.



5. Merrick has a ruler that measures in inches only. He is measuring the length of a line segment that is between 8 in. and 9 in. Divide the one-inch section of Merrick’s ruler below into eighths to help him measure the length of the segment.



6. Use the dilation method to create an equally spaced 3×3 grid in the following square.



7. Use the side splitter method to create an equally spaced 3×3 grid in the following square.

