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POINTS, LINES, RAYS, AND SEGMENTS N-GEN MATH[®] 7

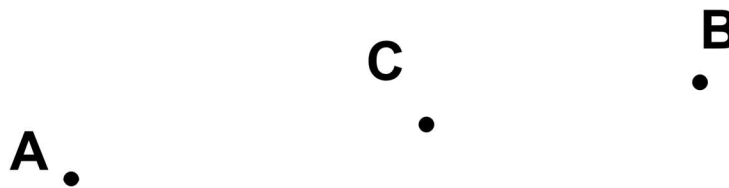


Geometry is the study of the mathematics that governs physical space. When we study geometry, we start with very basic concepts. In this lesson we will learn about **points**, **lines**, and **rays**.

POINTS

A **point** is a single location in space with no length, width, or height (zero dimensional). They are typically represented by a very small filled in circle and a **capital letter**.

Exercise #1: The points A, B, and C are shown below. Do they lie in a (straight) line? Test with a **straightedge**.



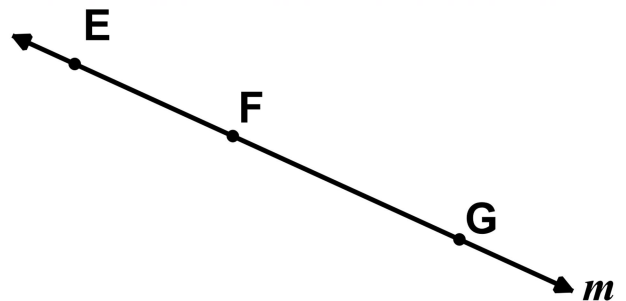
Three or more points that fall on the same line are known as **collinear**. Even though we all have a good idea of what a line is, they are surprisingly hard to define.

LINES

A **line** is a **collection of connected points** that has **no thickness** and extends **forever** in two opposite directions. Any **two points uniquely determine** a line.

Exercise #2: Lines can be named in multiple ways. Very often we use the letters of two points that lie along the line (in either order) or we use a single lowercase letter.

List at least four different ways you can name the line shown.



Exercise #3: Why can't we measure the length of a line?

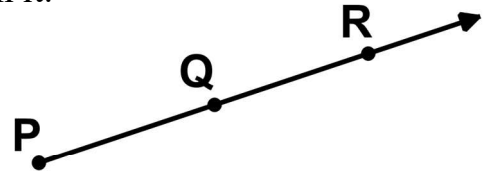


Sometimes we have only parts of a line. These can come in the form of **rays** or **line segments** depending on whether they have one or two endpoints. First, let's begin with a ray.

RAYS

A **ray** is a **collection of points along a line that has a starting point** and extends forever in only **one direction**. Like lines, they are named with two points, one being the starting point.

Exercise #4: A ray is shown below with three marked points on it. Give two names for this ray.



Our final concept of the lesson is that of a **line segment**.

LINE SEGMENTS

A **line segment** (or just **segment**) is a **collection of points along a line that has a starting point** and an **ending point**. It is named with these two points.

Exercise #5: A line segment is shown below.

(a) Give two ways to name the segment.



(b) How long is the segment in centimeters? Fill in the blank: $GH = \underline{\hspace{2cm}}$.

Because **line segments** lie on lines, they represent the **path of shortest distance between any two points**. So, we can talk about their **length** as being the **distance between two points**.

Exercise #6: Given points L and M below. Do the following.

(a) Draw \overline{LM} .



(b) Find the length of \overline{LM} in inches.
(Warning: fractional answer!)



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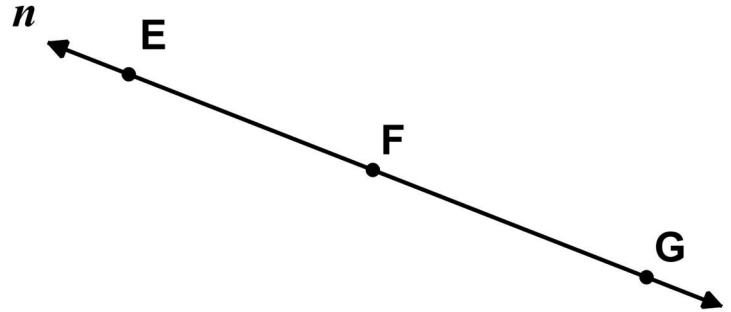
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POINTS, LINES, RAYS, AND SEGMENTS N-GEN MATH[®] 7 HOMEWORK

FLUENCY

1. Given the line shown below state four different ways it can be named.



2. In each of the following pictures, two points A and B are shown. Using a straightedge, draw each of the following:

(a) \overleftrightarrow{AB}

B •

A •

(b) \overline{AB}

B •

A •

(c) \overrightarrow{AB}

B •

A •

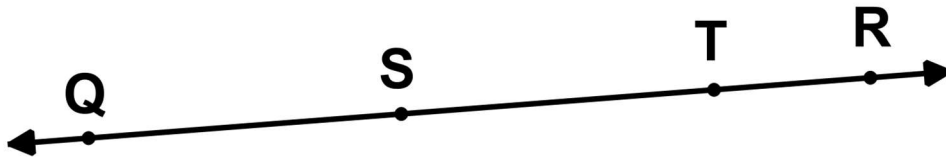
(d) \overrightarrow{BA}

B •

A •



3. The line \overleftrightarrow{QR} is shown below with various points, besides Q and R, marked on it.



(a) Give three additional ways this line could be named. (b) List three rays that lie on this line.

(c) List four line segments that lie on this line. (d) Using a ruler marked in centimeters, find the length of segment \overline{QT} .

4. In the diagram below points M, N, and P all lie on a common line. They are **collinear**.



(a) Find the lengths of each of the following segments in centimeters. (b) What can you say is true about the length of \overline{MP} compared to \overline{MN} and \overline{NP} ?

\overline{MN} : $MN =$ _____

\overline{NP} : $NP =$ _____

\overline{MP} : $MP =$ _____

