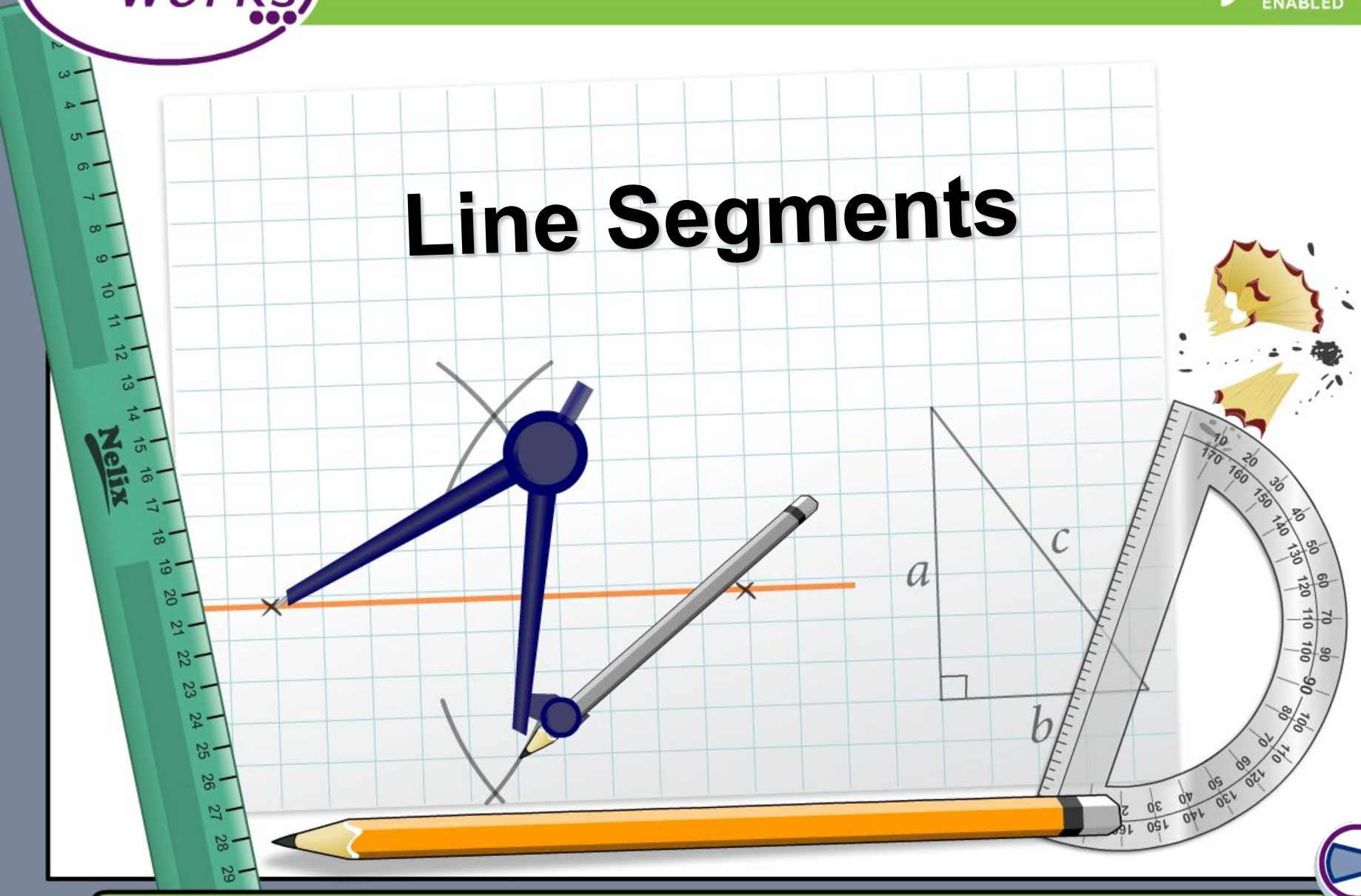
Line Segments



Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Line segments

A **line segment** is part of a line that contains all points between and including two **endpoints**.

The points A and B are the endpoints of the line segment.

The line segment is named $\overline{AB}$ or $\overline{BA}$.

How many points are there in a line segment?

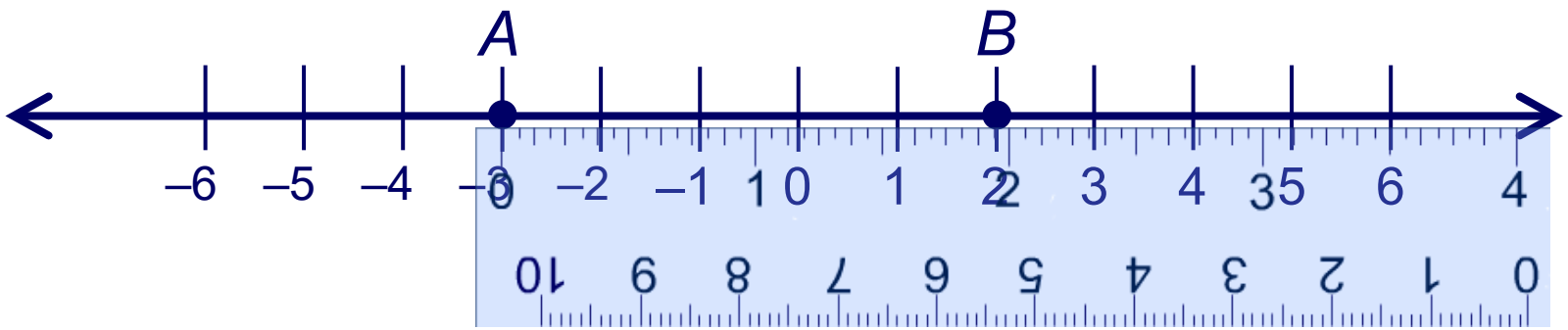
There are infinitely many points in a line segment. This means that no matter how close A and B are, there is always another point between them.

Distance and length of segments

Line segments have a **length**, which is the **distance** between the two endpoints. The length of $\overline{AB}$ is denoted AB.

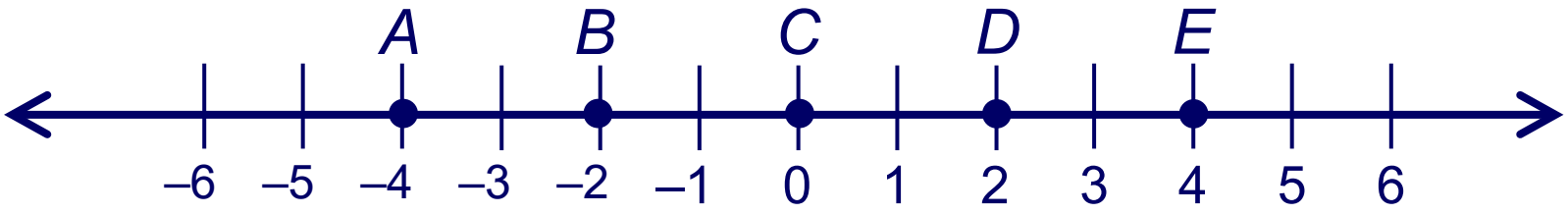
Distance can be measured using a ruler.

On a coordinate axis, the distance between two points is the difference between coordinates of the endpoints.



Congruence

Segments are called **congruent** if they have the same length, e.g. $AB = CD$. Congruent segments are denoted using the symbol ≅, e.g., $\overline{AB} \cong \overline{CD}$.



Properties of congruence

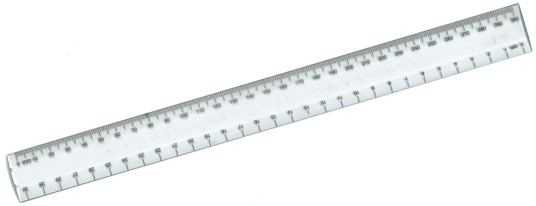
reflexive: $\overline{AB} \cong \overline{AB}$

symmetric: if $\overline{AB} \cong \overline{BC}$, then $\overline{BC} \cong \overline{AB}$

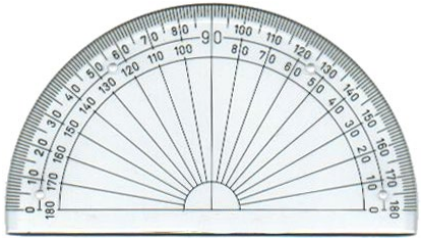
transitive: if $\overline{AB} \cong \overline{BC}$ and $\overline{BC} \cong \overline{CD}$, then $\overline{AB} \cong \overline{CD}$

Equipment needed for constructions

Which equipment do you need for constructing line segments?



ruler



protractor

compass

sharp pencil

Constructing congruent line segments

How can you make a copy of line segment $\overline{AB}$ using only a ruler and a compass?

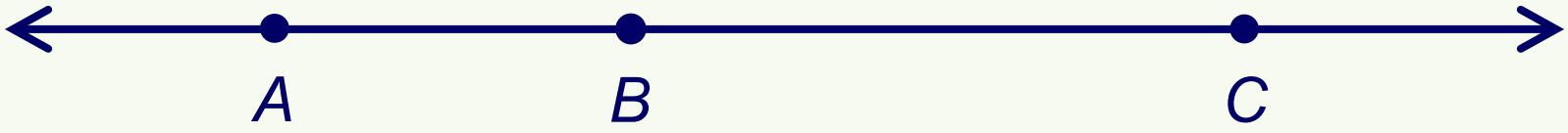
Press **play** to learn how.

Segment addition postulate and midpoint

The segment addition postulate:

if B is between A and C then:

$$AB + BC = AC$$

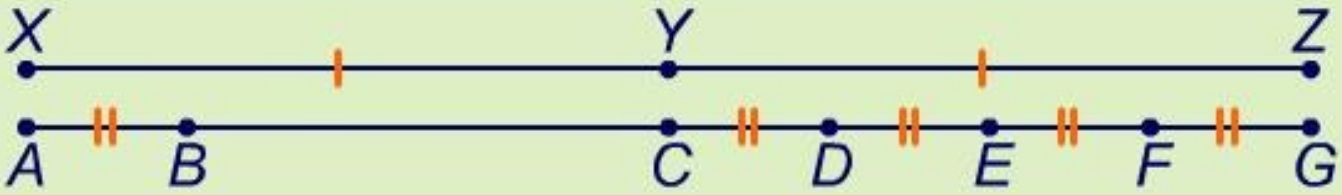


The **midpoint**, M, of a line segment is the point that **bisects**, or equally divides, a line segment into two congruent line segments: $\overline{AM} \cong \overline{MC}$, which means $AM = MC$.

In figures, congruent segments are denoted with tick marks.

Congruent segments

Are these statements about the figures true or false?



$\overline{YZ} \cong \overline{CG}$

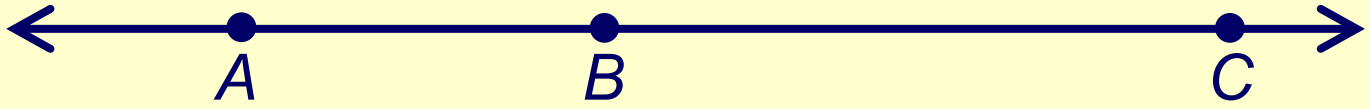
1.	C is the midpoint of $\overline{AG}$.	?
2.	$\overline{AB}$ is congruent to $\overline{EF}$ and $\overline{FG}$.	?
3.	The length of $\overline{BC}$ is twice the length of $\overline{AB}$.	?
4.	$\overline{CG}$ is not necessarily congruent to $\overline{XY}$.	?

true false

Segment addition postulate

Ashley and Corinne live 21 blocks apart on the same street. Brian lives between them and 7 blocks away from Ashley. How far apart do Brian and Corinne live?

1. Represent the street as a line, with points representing where the children live:



2. Translate the information given into line segment lengths:

$$AC = 21 \qquad AB = 7$$

3. Substitute the values into the segment addition postulate to find the answer:

segment addition postulate: $AB + BC = AC$

substitute: $7 + BC = 21$

rearrange and solve: $BC = 21 - 7 = \mathbf{14}$

Line segments summary

Question: 1/4

Construct a line segment with length $AB + CD$.

Press here to see how.