NAME ______________________ DATE __________

Reteaching with Practice

For use with pages 17–25

GOAL **Use segment postulates and use the distance formula to measure distances**

VOCABULARY

A **postulate** or **axiom** is a rule that is accepted without proof.

Postulate 1 Ruler Postulate:
The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the **coordinate** of the point.

The **distance** between points A and B, written as AB, is the absolute value of the difference between the coordinates of A and B.

AB is also called the **length** of $\overline{AB}$.

When three points lie on a line, you can say that one of them is **between** the other two.

Postulate 2 Segment Addition Postulate:
If B is between A and C, then $AB + BC = AC$. If $AB + BC = AC$, then B is between A and C.

The **Distance Formula** is a formula for computing the difference between two points in a coordinate plane.

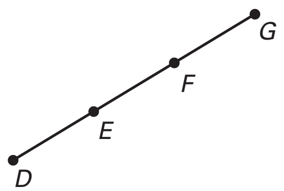
The Distance Formula:
If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Segments that have the same length are called **congruent segments.**

EXAMPLE 1 ***Using the Segment Addition Postulate***

In the diagram of the collinear points, $DE = 2$, $EF = 3$, and $DE = FG$. Find each length.

FG
DF
DG
EG



SOLUTION

Since $DE = FG$ and $DE = 2$, $FG = 2$.

Since $DF = DE + EF$, $DF = 2 + 3 = 5$.

Since $DG = DF + FG$, $DG = 5 + 2 = 7$.

Since $EG = EF + FG$, $EG = 3 + 2 = 5$.

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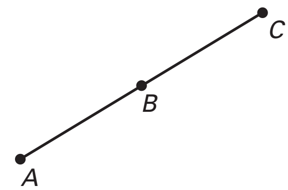
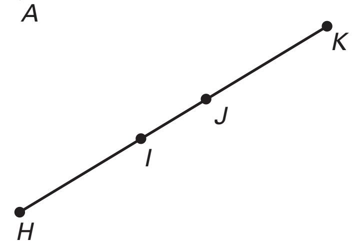
Exercises for Example 1

1. In the diagram of the collinear points, $BC = 5$ and $BC = AB$. Find the following lengths.



a. AC
b. AB
c. Are any segments congruent?

2. In the diagram of the collinear points, $HK = 9$, $HI = JK$, and $IJ = 1$. Find the following lengths.

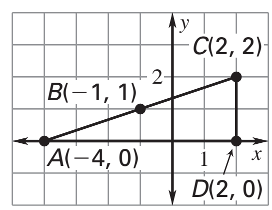


a. HI
b. JK
c. HJ
d. IK

EXAMPLE 2

Using the Distance Formula

Find the following distances. State whether any of the segments are congruent.



a. AB
b. BC
c. CD
d. AC

SOLUTION

Use the Distance Formula.

a. $AB = \sqrt{[(-1) - (-4)]^2 + (1 - 0)^2} = \sqrt{3^2 + 1^2} = \sqrt{9 + 1} = \sqrt{10}$

b. $BC = \sqrt{[2 - (-1)]^2 + (2 - 1)^2} = \sqrt{3^2 + 1^2} = \sqrt{9 + 1} = \sqrt{10}$

c. $CD = \sqrt{(2 - 2)^2 + (0 - 2)^2} = \sqrt{0^2 + (-2)^2} = \sqrt{0 + 4} = \sqrt{4} = 2$

d. $AC = \sqrt{[2 - (-4)]^2 + (2 - 0)^2} = \sqrt{6^2 + 2^2} = \sqrt{36 + 4} = \sqrt{40} = 2\sqrt{10}$

$\overline{AB}$ and $\overline{BC}$ are congruent because they have the same length.

Exercises for Example 2

Find the distance between the points whose coordinates are given.

3. $(6, 4), (-8, 11)$
4. $(-5, 8), (-10, 14)$
5. $(-4, -20), (-10, 15)$
6. $(40, 32), (36, 20)$
7. $(5, -8), (0, 0)$
8. $(a, b), (-a, -b)$