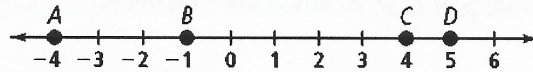# Handout 1.3: Points, Lines, and Planes

Name: *Key* **Date:** _____ **Per:** _____

In Exercises 1–6, use the figure below. Find the length of each segment.

A ● at −4, B ● at −1, C ● at 4, D ● at 5 on a number line from −4 to 6.

1. $\overline{AB} = |-4--1| = |-3| = \boxed{3}$ **2.** $\overline{BC} = |4--1| = \boxed{5}$ **3.** $\overline{AC} = |4--4| = |8| = \boxed{8}$

4. $\overline{AD} = |-4-5| = |-9| = \boxed{9}$ **5.** $\overline{BD} = |-1-5| = |-6| = \boxed{6}$ **6.** $\overline{CD} = |4-5| = |-1| = \boxed{1}$

For Exercises 7–11, use the figure at the right.

P 7 Q 10 R

7. If $PQ = 7$ and $QR = 10$, then $PR = \boxed{17}$.

P 20 Q 22 R

8. If $PQ = 20$ and $QR = 22$, then $PR = \boxed{42}$.

9. If $PR = 25$ and $PQ = 12$, then $QR = \boxed{13}$. P 12 Q R   25−12=13
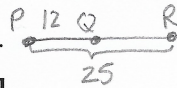
10. If $PR = 19$ and $QR = 12$, then $PQ = \boxed{7}$. P Q 12 R

19−12=7 19

11. If $PR = 10$ and $PQ = 4$, then $QR = \boxed{6}$. P 4 Q R 10−4=6

10
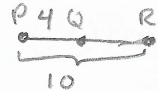
Use the number line below for Exercises 12–16. Give the length of each segment, then tell whether the segments are congruent.

G ● at −10, H ● at −6, I ● at −2, J ● at 0, K ● at 2 on a number line from −10 to 2.
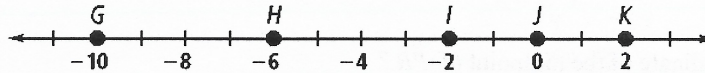
12. $\overline{GH}$ and $\overline{HI}$ ~~and $\overline{JK}$~~

$GH = |-10--6| = |-4| = 4$
$HI = |-2--6| = 4$
$\overline{GH} \cong \overline{HI}$

13. $\overline{GH}$ and $\overline{IK}$

$GH = 4$
$IK = |-2-2| = |-4| = 4$
$\overline{GH} \cong \overline{IK}$

14. $\overline{HJ}$ and $\overline{IK}$

$HJ = |-6-0| = |-6| = 6$
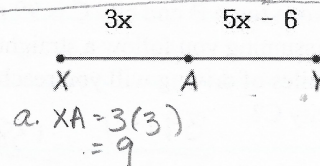$IK = 4$
$\overline{HJ} \not\cong \overline{IK}$

15. $\overline{IJ}$ and $\overline{JK}$

$IJ = |-2-0| = |-2| = 2$
$JK = |0-2| = |-2| = 2$
$\overline{IJ} \cong \overline{JK}$

16. Algebra A is the midpoint of $\overline{XY}$.

X ─ 3x ─ A ─ 5x−6 ─ Y

a. XA = 3(3)
 = 9

$3x = 5x-6$
$-5x \quad -5x$
$\dfrac{-2x}{-2} = \dfrac{-6}{-2}$
$x = 3$

 a. Find XA $\boxed{9}$
 b. ~~Find AY and XY.~~
 $\boxed{AY = 9}$ and $\boxed{XY = 9+9 = 18}$

Algebra For Exercises 20–22, use the figure below. Find the value of PT.

17. $PT = 5x + 3$ and $TQ = 7x - 9$

18. $PT = 4x - 6$ and $TQ = 3x + 4$

P ─ T ─ Q (number line)

19. $PT = 7x - 24$ and $TQ = 6x - 2$

See attached (left margin)

Handout 1.3

⑰ PT = 5x + 3 and TQ = 7x - 9

$$5x + 3 = 7x - 9$$
$$\underline{-5x \qquad -5x}$$
$$3 = 2x - 9$$
$$\underline{+9 \qquad +9}$$
$$\frac{12}{2} = \frac{2x}{2}$$
$$x = 6$$

PT = 5(6) + 3

= 30 + 3

| PT = 33 |

⑱ PT = 4x - 6 and TQ = 3x + 4

$$4x - 6 = 3x + 4$$
$$\underline{-3x \qquad -3x}$$
$$x - 6 = 4$$
$$\underline{+6 \quad +6}$$
$$x = 10$$

PT = 4(10) - 6

= 40 - 6

| PT = 34 |

⑲ PT = 7x - 24 and TQ = 6x - 2

$$7x - 24 = 6x - 2$$
$$\underline{-6x \qquad -6x}$$
$$x - 24 = -2$$
$$\underline{+24 \quad +24}$$
$$x = 22$$

PT = 7(22) - 24

= 154 - 24

| PT = 130 |

On a number line, the coordinates of *P, Q, R,* and *S* are –12, –5, 0, and 7, respectively.

22. Draw a sketch of this number line. Use this sketch to answer Exercises 23–26.
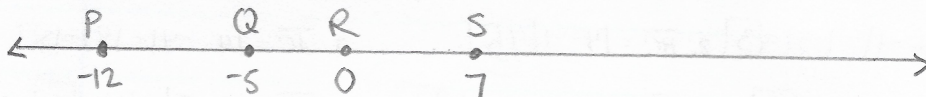
P   Q   R   S
-12   -5   0   7

23. Which line segment is the shortest?

QR

$$PS = |-12-7| = |-19| = 19$$

$$PR = |-12-0| = |-12| = 12$$

24. Which line segment is the longest?

PS

$$PQ = |-12--5| = |-7| = 7$$

$$QR = |-5-0| = |-5| = 5$$

25. Which line segments are congruent?

$\overline{PR} \cong \overline{QS}$ and $\overline{PQ} \cong \overline{RS}$
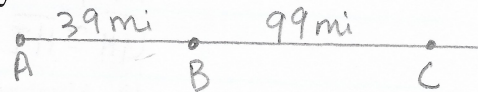
$$QS = |-5-7| = |-12| = 12$$

$$RS = |0-7| = |-7| = 7$$

26. What is the coordinate of the midpoint of $\overline{PR}$?

$$\frac{-12+0}{2} = \boxed{-6}$$

27. You plan to drive north from city A to town B and then continue north to city C. The distance between city A and town B is 39 mi, and the distance between town B and city C is 99 mi.

39 mi   99 mi
A   B   C

a. Assuming you follow a straight driving path, after how many miles of driving will you reach the midpoint between city A and city C?

$$\frac{39+99}{2} = \frac{138}{2} = \boxed{69 \text{ miles}}$$

b. If you drive an average of 46 mi/h, how long will it take you to drive from city A to city C?

$$138 \text{ miles} \times \frac{1 \text{ hour}}{46 \text{ miles}} = \frac{138}{46} \text{ hours} = \boxed{3 \text{ hours}}$$