Your Name

Mrs. Theo

9/16/21

1.2 Segment Addition

Notes

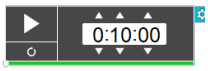
Lesson Objectives

- Draw and measure segments
- Use the segment addition postulate
- Apply concept of congruence to solve problems

Mental Floss: Tues, Sept 14th

Factor and solve the following equation.

$2x^2 - 13x - 24 = 0$



$(2x+3)(x-8)$

Undoing F O I L

Guess and Check

Box Method

AC Method

$2x^2 - 13x - 24 = 0$

a c b

$2x^2 + 3x - 16x - 24$

$(2x+3)(x-8) = 0$

$2x+3=0 \quad x-8=0$

$2x=-3$

$x=-3/2 \quad x=8$

rewrite splitting middle term

Factor by grouping

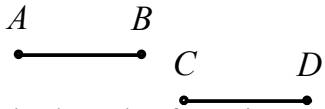
- factor out common factor from each pair
- factor out common expression from the pair, put left overs in parentheses behind

if $ab=0$ then $a=0$ or $b=0$

Set each factor $=0$ and solve for x

Congruent Segments

Line segments that have the same length are called ***congruent segments***.
You can express this in 3 different ways:



1. "The length of AB is equal to the length of CD"

actual number value 'distance'

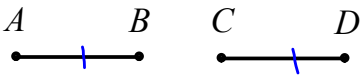
$AB = CD$ no bar on top

2. "Segment AB is congruent to segment CD."

needs bar

$\overline{AB} \cong \overline{CD}$

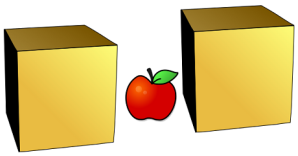
3. You can use "tick marks" to show congruence.



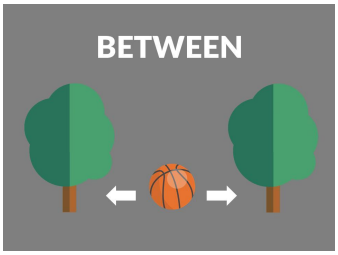
Between

1 2 3

2 is between 1 and 3.



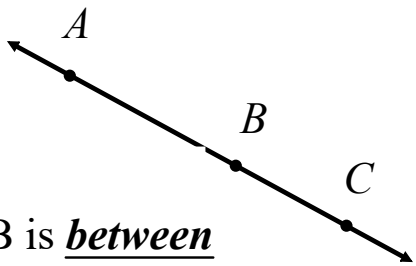
The apple is between the two boxes.



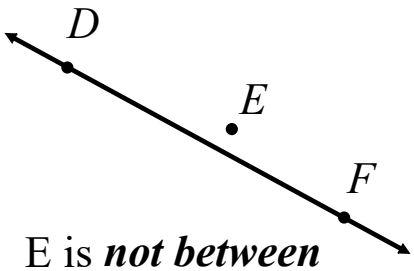
The ball is between the trees.

Betweenness of Points

When 3 points are collinear, you can say that one point is ***between*** the other 2.

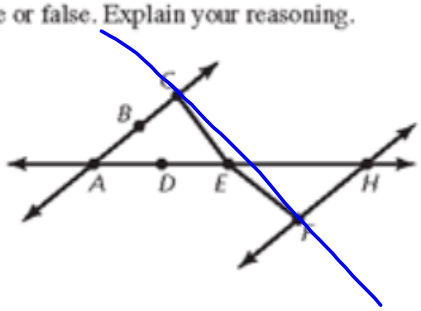


B is ***between*** points A and C.



E is ***not between*** points D and F.

27. USING STRUCTURE Determine whether the statements are true or false. Explain your reasoning.



a. B is between A and C. True

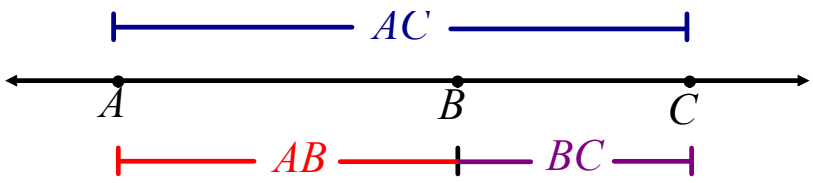
b. C is between B and E. False C is not collinear

c. D is between A and H. True

d. E is between C and F. False, if C and F were collinear, E would not be on it

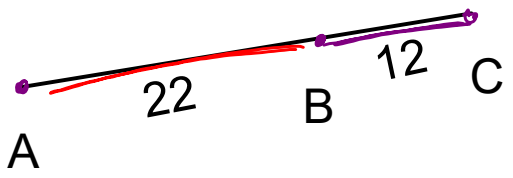
Segment Addition Postulate (2 parts)

- If B is between points A and C, then AB + BC = AC.
- If AB + BC = AC, then B is between points A and C.



In other words:

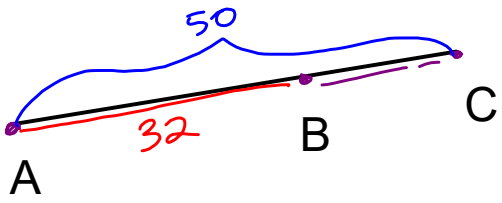
The smaller parts of the segment add up to equal the whole thing.



$AC = AB + BC$

$AC = 22 + 12$

$AC = 34$



AC = 50
AB = 32
BC = ?

$AC = AB + BC$

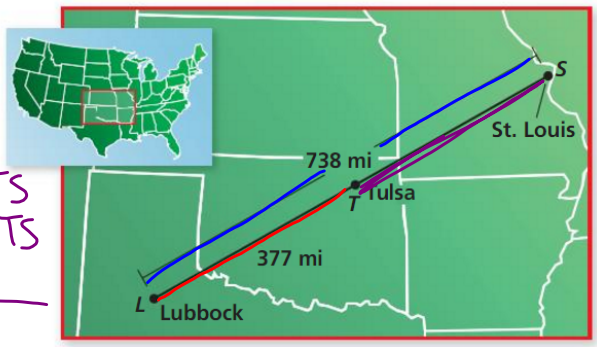
$50 = 32 + BC$

$-32 \quad -32$

$18 = BC$

EXAMPLE **Using the Segment Addition Postulate**

The cities shown on the map lie approximately in a straight line. Find the distance from Tulsa, Oklahoma, to St. Louis, Missouri.



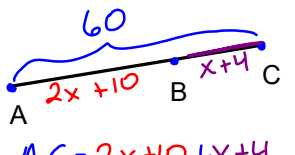
$LS = LT + TS$

$738 = 377 + TS$

$-377 \quad -377$

$361 = TS$

the distance from Tulsa to St Louis is 361 miles.



AC = 60

AB = 2x + 10

BC = x +4

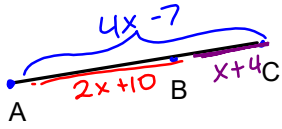
$AC = 2x + 10 + x + 4$

$60 = 3x + 14$

$-14 \quad -14$

$\frac{46}{3} = \frac{3x}{3}$

$x = 46/3$



$AC = 2x + 10 + x + 4$

$4x - 7 = 3x + 14$

$-3x \quad -3x$

$x - 7 = 14$

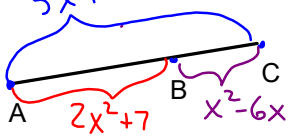
$+7 \quad +7$

$x = 21$

AC = 4x - 7

AB = 2x + 10

BC = x + 4



AC = 5x + 11

AB = $2x^2$ + 7

BC = x^2 - 6x

$AC = AB + BC$

$5x + 11 = (2x^2 + 7) + (x^2 - 6x)$

$5x + 11 = 3x^2 - 6x + 7$

$-5x \quad -11$

$0 = 3x^2 - 11x - 4$

a c b

$AC = 9.\overline{3}$ or $\frac{28}{3}$

$AB = 7.\overline{2}$ or $\frac{65}{9}$

$BC = 2.\overline{1}$ or $\frac{19}{9}$

a·c = -12

-12 : 1

+ -11

$0 = 3x^2 - 12x + 1x - 4$

$(3x)(x-4) + 1(x-4)$

$(x-4)(3x+1) = 0$

$x - 4 = 0$ $\quad$ $3x + 1 = 0$

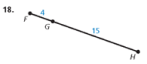
$x = 4$ $\quad$ $x = -\frac{1}{3}$

Can't have negative lengths

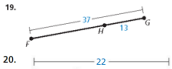
Homework

1.2 p.16 #18,19,22,26,28,29,36

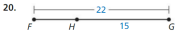
18.



19.

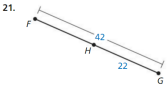


20.



FH = 7

21.



FH=20

26. **MODELING WITH MATHEMATICS** In 2003, a remote-controlled model airplane became the first ever to fly nonstop across the Atlantic Ocean. The map shows the airplane's position at three different points during its flight. Point *A* represents Cape Spear, Newfoundland, point *B* represents the approximate position after 1 day, and point *C* represents Mannin Bay, Ireland. The airplane left from Cape Spear and landed in Mannin Bay. *(See Example 4.)*

a. 1883 miles

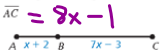
a. Find the total distance the model airplane flew.

b. The model airplane's flight lasted nearly 38 hours. Estimate the airplane's average speed in miles per hour.

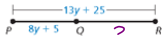
b. 1883/38 =49.553 mph

28. **MATHEMATICAL CONNECTIONS** Write an expression for the length of the segment.

a. $\overline{AC}$ $= 8x - 1$



b. $\overline{QR}$



PR = PQ + QR

13y + 25 = (8y + 5) + QR

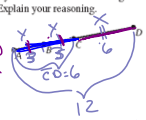
−8y −5 −8y −5

5y + 20 = QR

PR − PQ = QR

13y + 25 − (8y + 5) = QR

36. **MATHEMATICAL CONNECTIONS** In the diagram, $\overline{AB} \cong \overline{BC}$, $\overline{AC} \cong \overline{CD}$, and $AD = 12$. Find the lengths of all segments in the diagram. Suppose you choose one of the segments at random. What is the probability that the measure of the segment is greater than 3? Explain your reasoning.



12 = AB + BC + CD

12 = y + y + x

12 = x + x

12

Whole = part + part

AD = CD + AC

12 = x + x

$\frac{12}{2} = \frac{2x}{2}$

x = 6

AC = AB + BC

6 = y + y

$\frac{6}{2} = \frac{2y}{2}$

3 = y

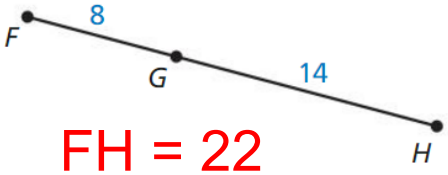
Probability = $\frac{\text{Desired options}}{\text{Total options}}$

$\frac{4}{6}$ 67%

$\frac{1}{3}$ 33%

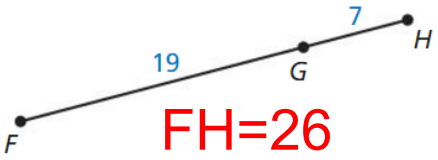
In Exercises 15–22, find *FH*. *(See Example 3.)*

15.



FH = 22

16.

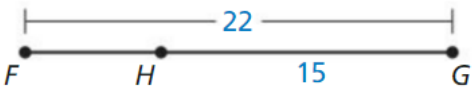


FH=26

17.

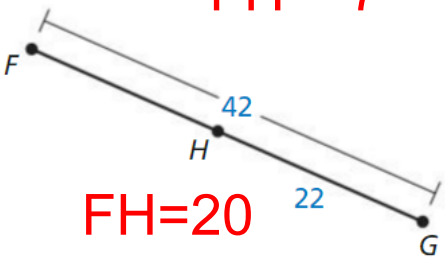
FH=23

20.



FH = 7

21.



FH=20

29. MATHEMATICAL CONNECTIONS Point S is between points R and T on $\overline{RT}$. Use the information to write an equation in terms of x. Then solve the equation and find RS, ST, and RT.

a. $RS = 2x + 10$
$ST = x - 4$
$RT = 21$

b. $RS = 3x - 16$
$ST = 4x - 8$
$RT = 60$

c. $RS = 2x - 8$
$ST = 11$
$RT = x + 10$

d. $RS = 4x - 9$
$ST = 19$
$RT = 8x - 14$

29. MATHEMATICAL CONNECTIONS Point S is between points R and T on $\overline{RT}$. Use the information to write an equation in terms of x. Then solve the equation and find RS, ST, and RT.

R S T
RT = RS + ST
21 = 2x+10 + x-4
21 = 3x + 6
15 = 3x
5 = x

X=5
RS = 20
ST=1
RT=21

a. $RS = 2x + 10$ → $2(5)+10$
$ST = x - 4$ → $(5)-4$
$RT = 21$

b. $RS = 3x - 16$
$ST = 4x - 8$
$RT = 60$

X=12
RS = 20
ST = 40
RT = 60

c. $RS = 2x - 8$ → $2(7)-8 = 6$
$ST = 11$
$RT = x + 10$ → $(7)+10 = 17$

X = 7
RS = 6
ST = 11
RT=17

R 2x-8 S 11 T
Whole = Part + Part
RT = RS + ST
x+10 = 2x-8 +11
x+10 = 2x+3
-3 -3
x+7 = 2x
-x -x
7 = x

d. $RS = 4x - 9$ → $4(6)-9 = 24-9$
$ST = 19$
$RT = 8x - 14$ → $8(6)-14$

X = 6
RS = 15
ST = 19
RT = 34

R 4x-9 S 19 T
8x-14
Whole = Parts + Part
8x-14 = 19 + 4x-9
8x-14 = 10 +4x
-4x -4x
4x-14 = 10
4x = 24
x = 6