

HW #1 - due Fri 11/6

- Read Ch 1
- Ch 1 Review Problems pp. 36-38 #1-30

Quiz #1 - Thur, 11/12

- Vocab
- Fill in the blank proofs

HW #2 - due Fri, 11/13

- Read Ch 2
- Ch 2 Review Problems pp. 71-74 #1-19, 31-49

HW #3 - due Wed, 11/18

- Read Ch 3
- Ch 3 Review Problems pp. 124-128 #17-31, 34-49

Test #1 - Thur, 11/19

3.2 – The Ruler and Distance

Postulate 3: The Ruler Postulate – The points on a line can be numbered so that positive number differences measure distance.

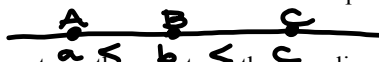
Def: **Betweenness of Points** – A point is between two other points on the same line iff its coordinate is between their coordinates. (More briefly, A-B-C iff $a < b < c$ or $a > b > c$.)

Theorem 1: The Betweenness of Points Theorem: If A-B-C, then $AB+BC=AC$

Proof for $a < b < c$ case:

Statements:	Reasons:
1. A-B-C	The hypothesis.
2. $a < b < c$	Definition of betweenness.
3. $AB=b-a$ and $BC=c-b$	Ruler Postulate.
4. $AB+BC=(b-a)+(c-b)=c-a$	Addition (and simplification).
5. $AC=c-a$	Ruler Postulate.
6. $AB+BC=AC$	Substitution (steps 4 and 5).

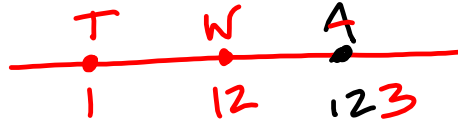
$$AB = |b - a| = b - a$$



point B is between A & C



Three points on a line have the following coordinates:
 point A, 123; point T, 1; and point W, 12.



Which idea is the reason for each statement below (Ruler Postulate, definition of betweenness of points, or Betweenness of Points Theorem)?

4. T-W-A because $1 < 12 < 123$.

betw. of pts definition

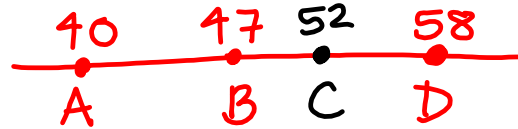
5. $TW + WA = TA$ because T-W-A.

betw. of pts. theorem

Suppose point A is at coordinate 40, point B is at coordinate 47, distance BC is 5, and point D is at coordinate 58. Determine:

1. The total distance AD.

18 (ruler postulate)



2. The coordinate of C.

52

3. The distance CD.

6

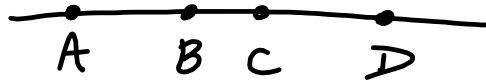
Because A-B-C, $AB + BC = AC$, or $7 + 5 = 12$, according to the Betweenness of Points Theorem. Use this theorem to complete the statements:

1. 9. Because B-C-D, $BC + CD = BD$, or $5 + 6 = 11$.

2. 10. Because A-B-D, $AB + BD = AD$, or $7 + 11 = 18$.

3. 11. Because A-C-D, $AC + CD = AD$, or $12 + 6 = 18$.

Suppose $AC=BD$. Complete the statements:



38. Because A-B-C, $AC=$ **$AB+BC$**

39. Because B-C-D, $BD=$ **$BC+CD$**

40. Why is $AB+BC=BC+CD$?
substitution ($AC=BD$)

41. Why is $AB=CD$?
subtraction (by BC)

3.3 – The Protractor and Angle Measure

Postulate 4: The Protractor Postulate – The rays in a half-rotation can be numbered from 0 to 180 so that positive number differences measure angles.

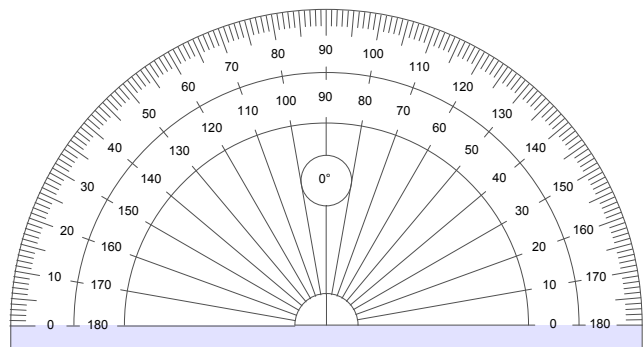
Definitions: An angle is

Acute iff it is less than 90° .

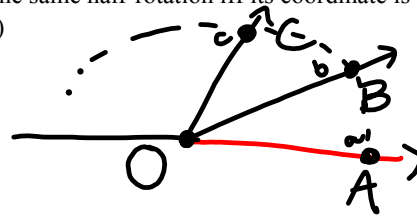
Right iff it is 90° .

Obtuse iff it is more than 90° but less than 180° .

Straight iff it is 180° .



Def: Betweenness of Rays – A ray is between two others in the same half-rotation iff its coordinate is between their coordinates. (More briefly, OA-OB-OC iff $a < b < c$ or $a > b > c$.)



Theorem 2: The Betweenness of Rays Theorem –

If OA-OB-OC, then $\angle AOB + \angle BOC = \angle AOC$.

Proof for $a > b > c$ case:

Statements:

1. OA-OB-OC
2. $a > b > c$
3. $\angle AOB = a - b$ and $\angle BOC = b - c$
4. $\angle AOB + \angle BOC = (a - b) + (b - c) = a - c$
5. $\angle AOC = a - c$
6. $\angle AOB + \angle BOC = \angle AOC$

Reasons:

- The hypothesis.
- Definition of betweenness.
- Protractor Postulate.
- Addition (and simplification).
- Protractor Postulate.
- Substitution (steps 4 and 5).

Three rays in a half-rotation have the following coordinates:
ray HE, 81; ray HI, 18; and ray HO, 180.

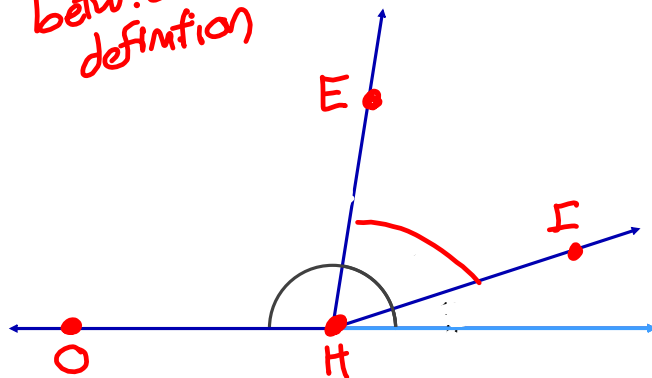
4. Which ray is between the other two (and why)?

HE

$18 < 81 < 180$
 $HI - HE - HO$

betw. of rays definition

Use your protractor to draw a figure.



5. Name and find the measures of the three angles formed by the rays.

$\angle EHI = \angle IHE = 81 - 18 = 63^\circ$

$\angle OHE = \angle EHO = 180 - 81 = 99^\circ$

$\angle OHI = \angle IHO = 180 - 18 = 162^\circ$

betw of pts Thm:

$\angle OHI = \angle OHE + \angle EHI$

3.4 – Bisection

Def: A point is on the midpoint of a line segment iff it divides the line segment into two equal segments.

Def: A line bisects an angle iff it divides the angle into two equal angles.

Def: Two objects are congruent if and only if they coincide exactly when superimposed.

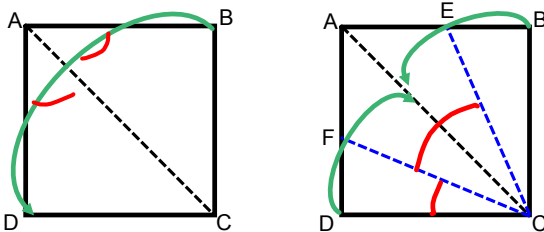


Def: A corollary is a theorem that can be easily proved as a consequence of a postulate or another theorem.

Corollary to the Ruler Postulate: A line segment has exactly one midpoint.

Corollary to the Protractor Postulate: An angle has exactly one ray that bisects it.

Bisecting angles with origami: Starting with a square sheet of paper, corner B is folded onto D. Then sides BC and DC are folded onto the fold AC.



Because $\angle BAC$ fits onto $\angle DAC$, $\angle BAC$ and $\angle DAC$ are congruent.

17. Which angle is bisected if $\angle BAC = \angle DAC$?

$\angle BAD$

18. Name three more angles that are bisected in the folding process.

$\angle BCD, \angle DCA, \angle BCA$

Angle BCD is a right angle because the process starts with a square. Find the number of degrees in each of the following angles.

20. $\angle FCD$ 22.5°

21. $\angle FCE$ 45°

23. $\angle DFC$ 67.5°