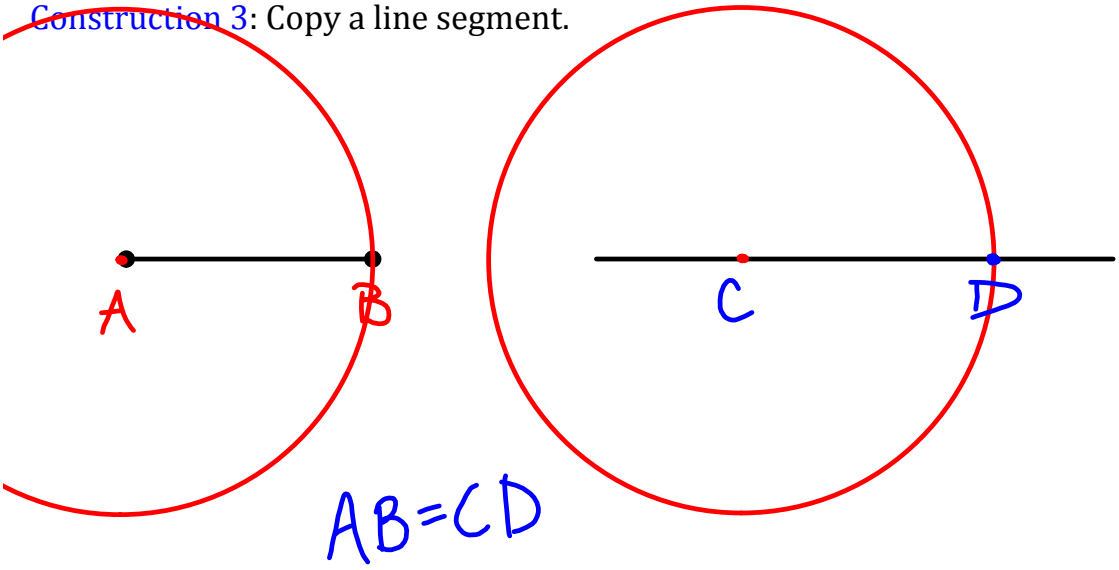
4.7 – Constructions

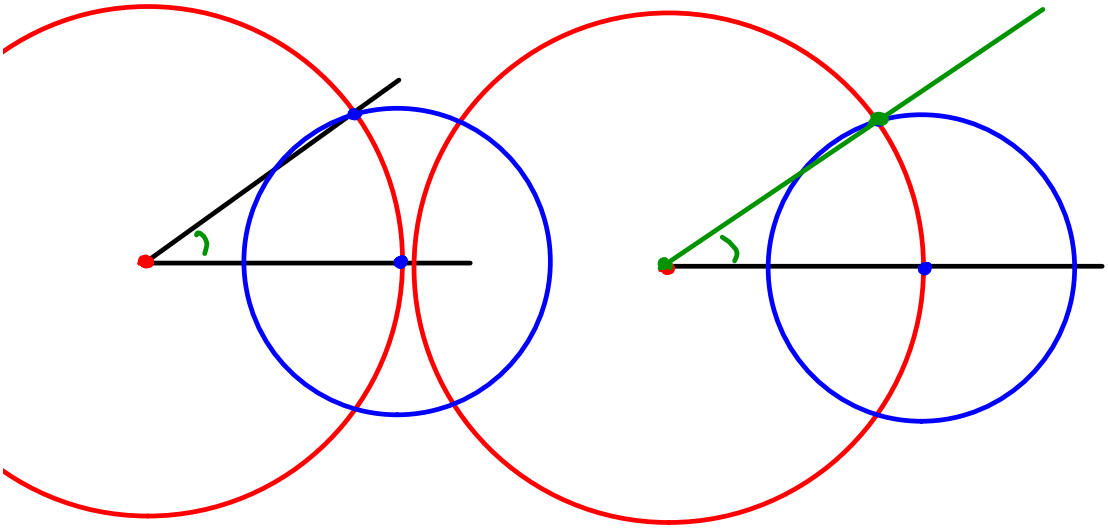
Construction 1: Bisect a line segment.

Construction 2: Bisect an angle.

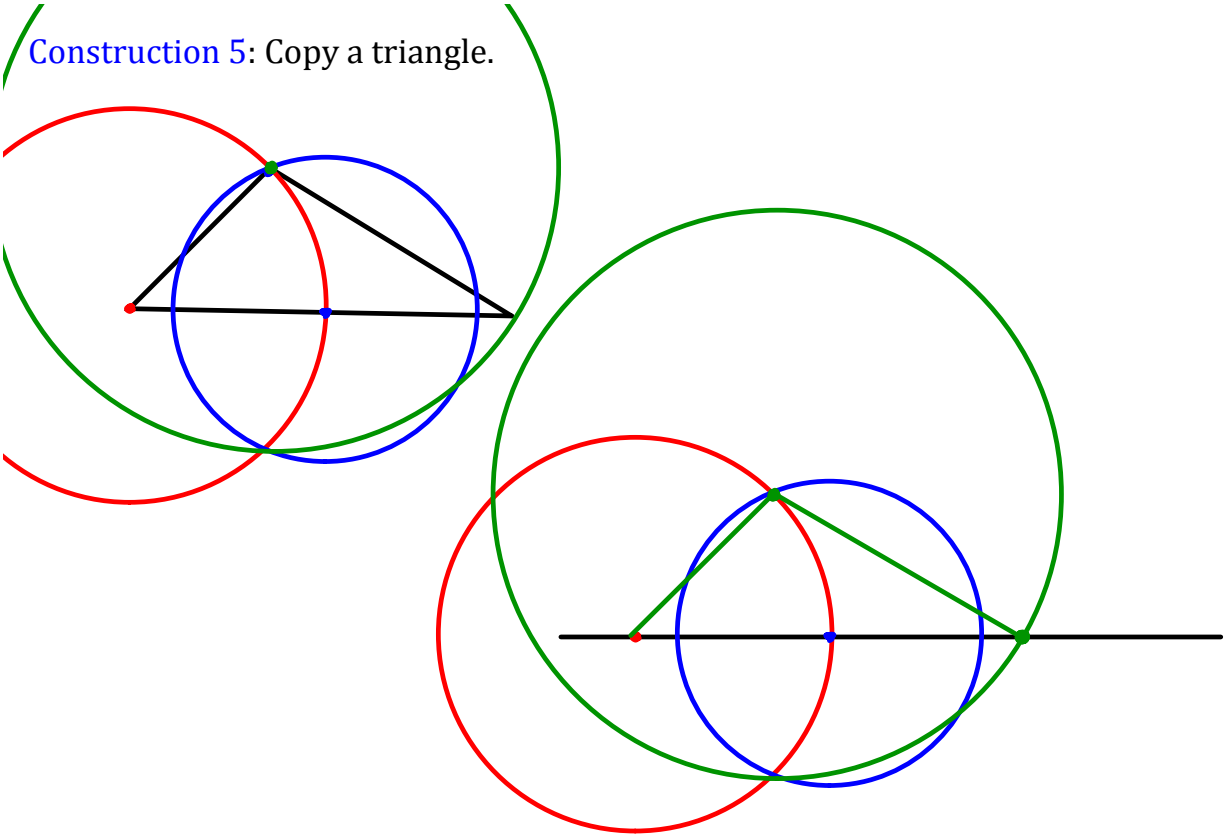
Construction 3: Copy a line segment.



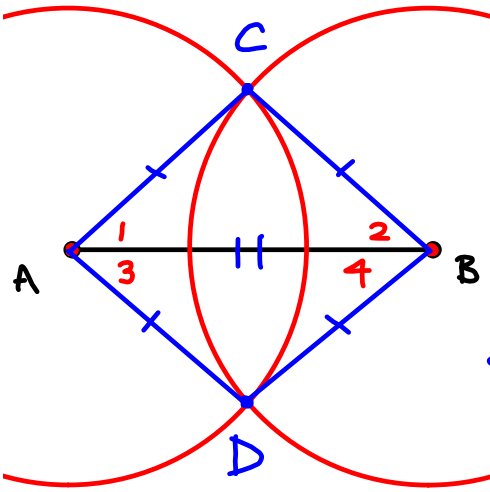
Construction 4: Copy an angle.



Construction 5: Copy a triangle.



22. Draw line segment AB and construct two triangles ACB and ADB so that AC=CB=AD=DB. Identify the equal lengths with tick marks.



23. What kind of triangles are ΔACB and ΔADB?

isosceles

24. Why is ∠1=∠2 and ∠3=∠4?

if two sides in a triangle are equal the angles opposite them are equal

25. Why is ∠1+∠3=∠2+∠4?

$\angle 1 + \angle 3 = \angle 2 + \angle 3$ addition & $\angle 1 + \angle 3 = \angle 2 + \angle 4$ substitution

26. Why is ∠CAD=∠CBD?

$\angle CAD = \angle 1 + \angle 3$ & $\angle CBD = \angle 2 + \angle 4$ (Betweenness of Rays Theorem)

$\angle CAD = \angle CBD$ (substitution)

27. Why must ΔACB and ΔADB be congruent?

AB=AB (reflexive)

SSS congruence

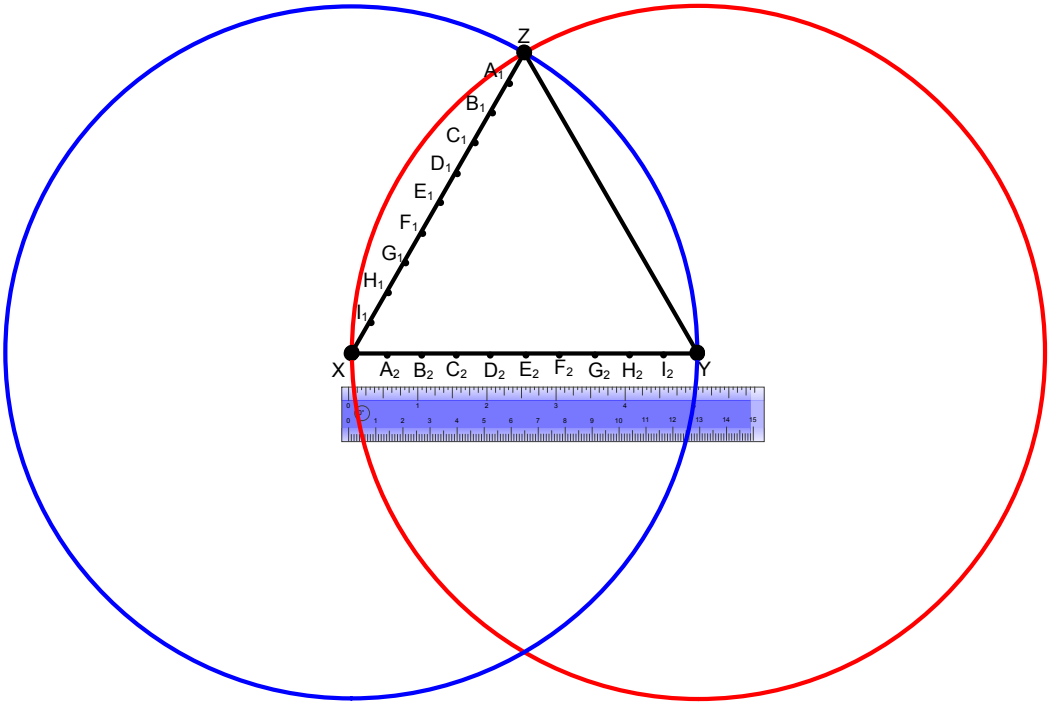
28. Why is ∠1=∠3 and ∠2=∠4?

corresponding parts of congruent triangles are equal

29. How is AB related to ∠CAD and ∠CBD?

angle bisector

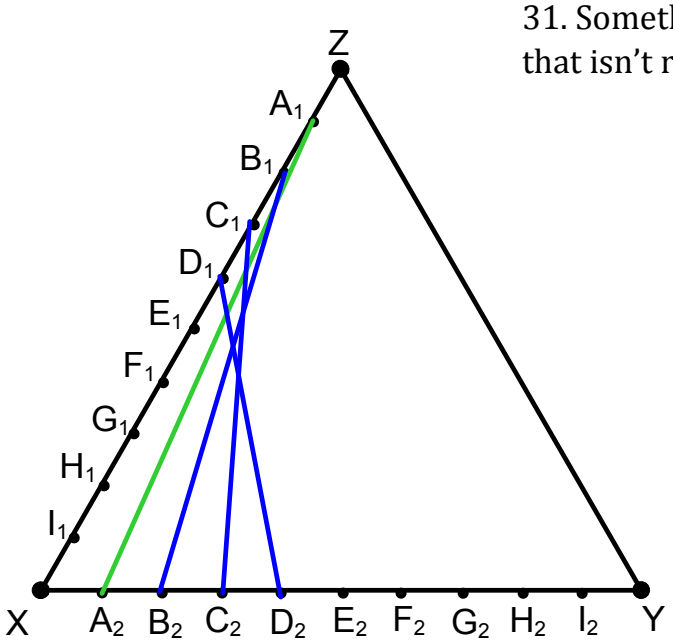
30. Use your ruler to draw a horizontal line segment 5 inches long in the center of a sheet of paper. Label it XY. Construct equilateral triangle XYZ having XY as its base. Use your ruler to mark points on XY 0.5 inch apart; do the same on XZ. Label the points as shown.



Use your straightedge to draw line segments between the points labeled with the same letter (A_1A_2, B_1B_2, etc.)

31. Something appears to be in the figure that isn't really there. What is it?

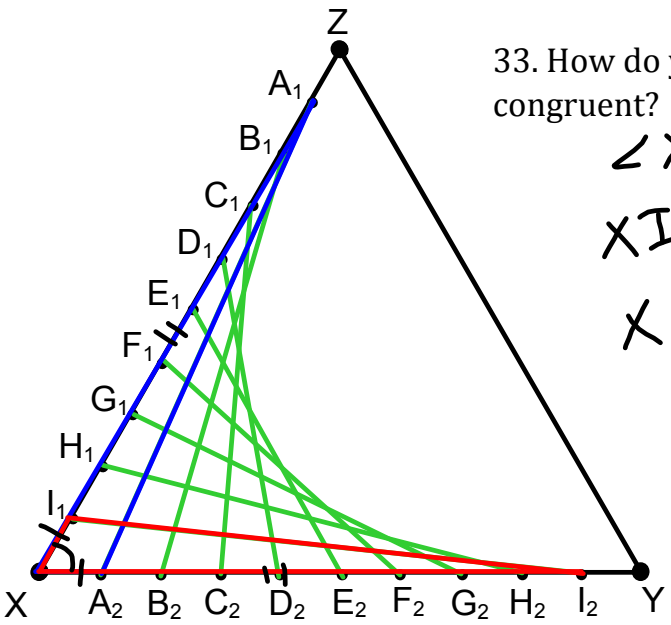
parabola



The finished figure contains many pairs of congruent triangles.

32. To which triangle is ΔXA_1A_2 congruent?

ΔXI_2I_1



33. How do you know that these triangles are congruent?

$\angle X = \angle X$

$XI_1 = XA_2$

$XI_2 = XA_1$

SAS congruence

5.1 – Properties of Inequality

Algebraic Axioms:

The "Three Possibilities" Property: either a>b, a=b, or a<b

The Transitive Property: If a>b and b>c, then a>c $a > b > c$

The Addition Property: If a>b, then a+c>b+c

The Subtraction Property: If a>b, then a-c>b-c

The Multiplication Property: If a>b and c>0, then ac>bc

The Division Property: If a>b and c>0, then a/c>b/c

The Addition Theorem of Inequality: If a>b and c>d, then a+c>b+d

Given Prove

Proof:

Statements	Reasons
1. a>b	Given
2. a+c>b+c	Addition
3. c>d	Given
4. b+c>b+d	Addition
5. a+c>b+d	Transitive

The "Whole Greater than Part" Theorem: If a>0, b>0, and a+b=c, then c>a and c>b

Proof:

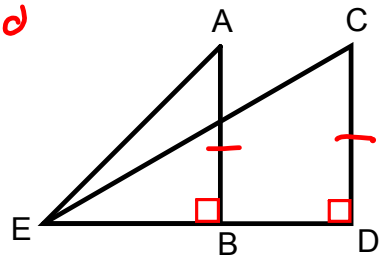
Statements	Reasons
1. a>0 and b>0	Given
2. a+b>b and a+b>a	Addition
3. a+b=c	Given
4. c>b and c>a	Substitution

47.

iff $a<c<d$ or $a>c>d$

Given: AB=CD; EA-EC-ED

Prove: ∠AED>∠CED



Proof:

Statements	**Reasons**
1. EA-EC-ED	Given
2. ∠AED=∠AEC+∠CED	Betweenness of Rays Theorem → guarantees a<c or a>c (i.e. a≠c)
3. ∠AEC>0	∠AEC≠0
3.5 ∠AEC+∠CED>∠CED	Addition
4. ∠AED>∠CED	Substitution

HW #1 (submitted Friday, 11/7)
- Read Ch 1 & Ch 2
- Ch 1 Review Problems pp. 36-38
- Start working on Geometry badge on Khan Academy

HW #2 (submitted Friday, 11/14)
- Read Ch 3 & Ch 4
- Ch 2 Review Problems pp. 71-74
- Ch 3 Review Problems pp. 124-128
- Khan Academy exercises:
  "Introduction to Euclidean geometry"
  "Angles and intersecting lines"

HW #3 (due Friday, 11/21)
- Read Ch 4 & Ch 5
- **Ch 4 Review Problems pp.176-180**
- Khan Academy exercises: "Congruence"