HW #4 - Due Fri, Dec 4
Ch 4 Review Problems pp.176-180 #7-36, 48,51,52

Khan Academy exercises: "Congruence"

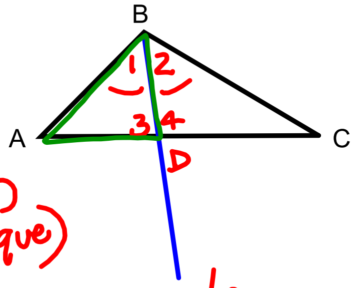
HW #5 - Due Fri, Dec 11
Ch 5 Review Problems pp. 206-209 #15-50

HW #6
Ch 6

Test #2 - Mon 12/14 or Wed. 12/16?

**Heron's Proof of the Triangle Inequality**

*Given:* ABC is a triangle.
*Prove:* AB+BC>AC




*Proof:*

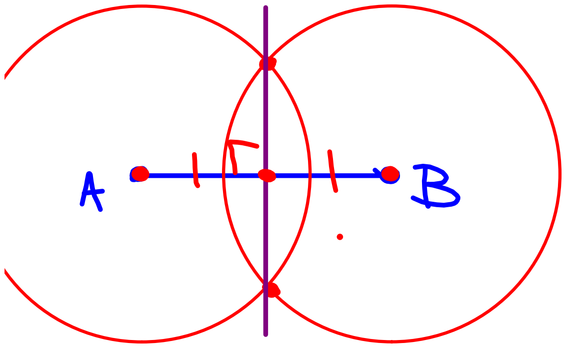
| **Statements** | **Reasons** |
|---|---|
| 24. Let BD bisect ∠ABC | compass construction of ∠ bisector (unique) |
| 25. ∠1=∠2 | angle bisector divides an angle into two equal angles |
| 26. ∠3>∠2 and ∠4>∠1 | an exterior angle is larger than either remote interior angle |
| 27. ∠3>∠1 and ∠4>∠2 | substitution (#25 into #26) |
| 28. AB>AD and BC>DC | If 2 angles of a triangle are unequal then the sides opposite them are unequal in same order |
| 29. AB+BC>AD+DC | Addition Theorem of Inequality |
| 30. AD+DC=AC | Betweenness of Points |
| 31. AB+BC>AC | Substitution (#30 into #29) |

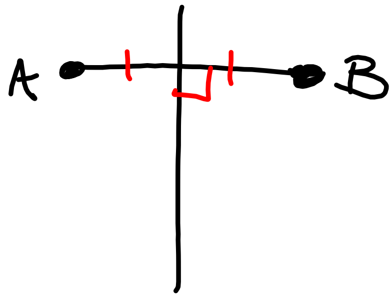
## 6.1 – Line Symmetry

Def: Two points are symmetric with respect to a line iff the line is the perpendicular bisector of the line segment connecting the two points.

Theorem 16: In a plane, two points each equidistant from the endpoints of a line segment determine the perpendicular bisector of the line segment.

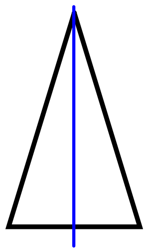
Construction 6: To construct a line perpendicular to a given line through a given point.



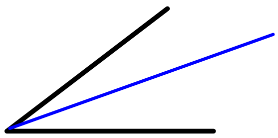




Sketch the lines of symmetry.

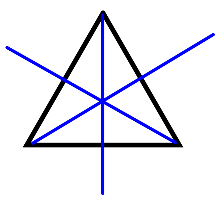
5. Isosceles triangle



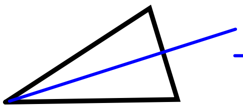
6. Angle



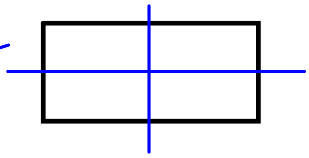
7. Equilateral triangle



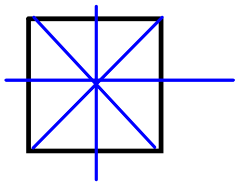
8. Isosceles triangle



9. Rectangle

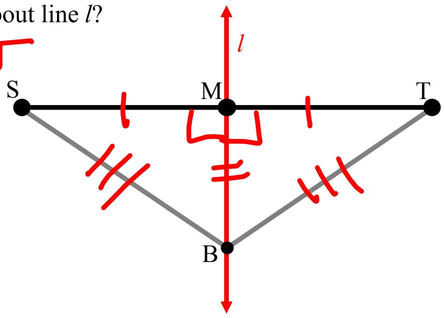


10. Square



Points S and T are symmetric with respect to line $l$. What can you conclude about line $l$?

$l$ is the perpendicular bisector of ST




Give a reason for each of the following statements.

22. SM=MT

bisector divides a line segment into 2 equal parts

23. ∠BMS and ∠BMT are right angles

perpendicular lines meet at right angles

24. ∠BMS=∠BMT

all right angles are equal

25. MB=MB

reflexive property

26. ΔBMS≅ΔBMT

SAS congruence

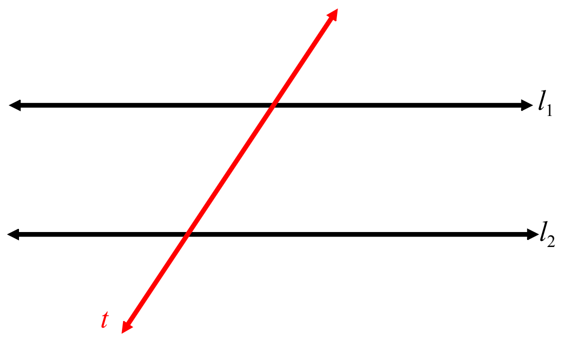
27. BS=BT

corresponding parts of congruent Δ's are equal

**6.2 – Proving Lines Parallel**

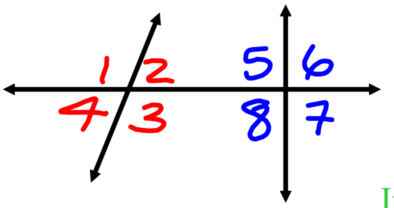
Def: Two lines are parallel iff they lie in the same plane and do not intersect.

A transversal is a line that intersects two or more lines in different points.



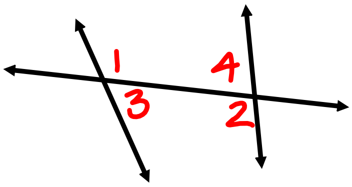
When a transversal intersects two lines that lie in the same plane, it forms pairs of angles that are given special names:

Corresponding angles



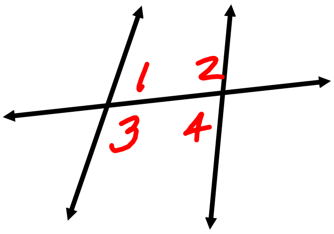

1 & 5
2 & 6
3 & 7
4 & 8

Alternate interior angles




1 & 2
3 & 4

Interior angles on the same side of the transversal

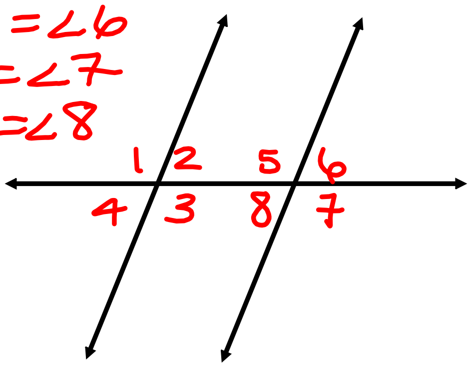



1 & 2
3 & 4

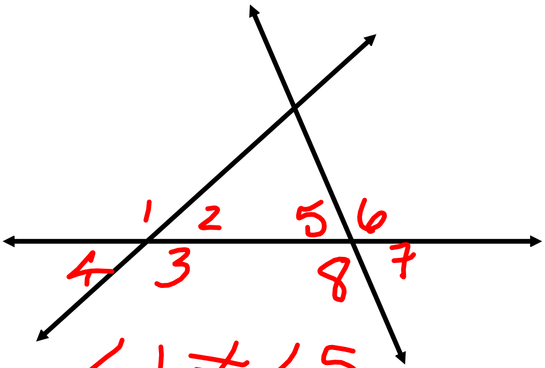
Theorem 17: Equal corresponding angles mean that lines are parallel.

$\angle 1 = \angle 5$
$\angle 2 = \angle 6$
$\angle 3 = \angle 7$
$\angle 4 = \angle 8$

$a \rightarrow b$




$\sim b \rightarrow \sim a$



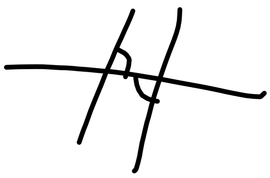

$\angle 1 \neq \angle 5$
etc.

Corollary 1: Equal alternate interior angles mean that lines are parallel.

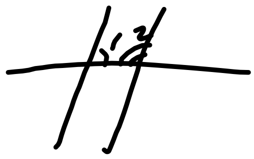
Corollary 2: Supplementary interior angles on the same side of a transversal mean that lines are parallel.

Corollary 3: In a plane, two lines perpendicular to a third line are parallel.

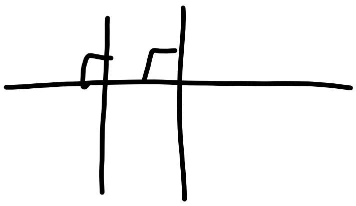
C1



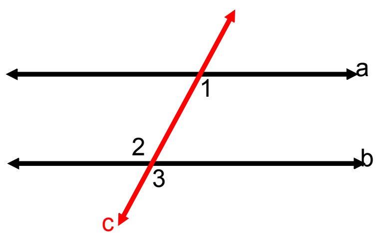
C2 $\angle 1 + \angle 2 = 180°$




C3



**Corollary 1: Equal alternate interior angles mean that lines are parallel.**




*Given*: $\angle 1 = \angle 2$
*Prove*: a||b

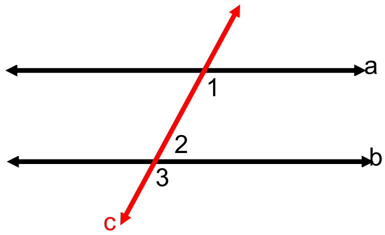
*Proof*:

| **Statements** | **Reasons** |
| --- | --- |
| 1. $\angle 1 = \angle 2$ | Given |
| 2. $\angle 2 = \angle 3$ | Vertical angles are equal |
| 3. $\angle 1 = \angle 3$ | Substitution |
| 4. a \|\| b | Equal corresponding angles mean that lines are parallel. |

**<u>Corollary 2</u>: Supplementary interior angles on the same side of a transversal mean that lines are parallel.**

*Given:* ∠1 and ∠2 are supplementary

*Prove:* a||b



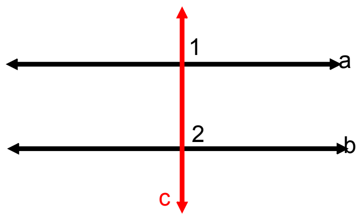

*Proof:*

| **Statements** | **Reasons** |
| --- | --- |
| 1. ∠1 & ∠2 are supplementary | Given |
| 2. ∠2 & ∠3 are supplementary | The angles in a linear pair are supplementary |
| 3. ∠1 = ∠3 | Supplements of the same angle are equal |
| 4. a\|\|b | Equal corresponding angles mean that lines are parallel. |

**<u>Corollary 3</u>: In a plane, two lines perpendicular to a third line are parallel.**

*Given:* a ⊥ c and b ⊥ c

*Prove:* a||b




*Proof:*

| **Statements** | **Reasons** |
| --- | --- |
| 1. a ⊥ c and b ⊥ c | Given |
| 2. ∠1 and ∠2 are right angles | Perpendicular lines form right angles |
| 3. ∠1 = ∠2 | All right angles are equal |
| 4. a\|\|b | Equal corresponding angles mean that lines are parallel. |