

3-5 Proving Lines Parallel

Each of our original theorem/postulates start with "If two \parallel lines are cut by a transversal, then...."

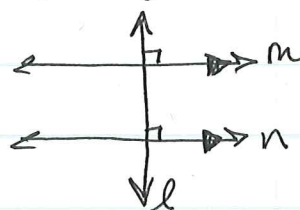
If two lines in a plane are cut by a transversal so that corresponding angles are congruent, then the lines are parallel.
(If corr. \angle s are \cong , then lines are \parallel)

Theorems

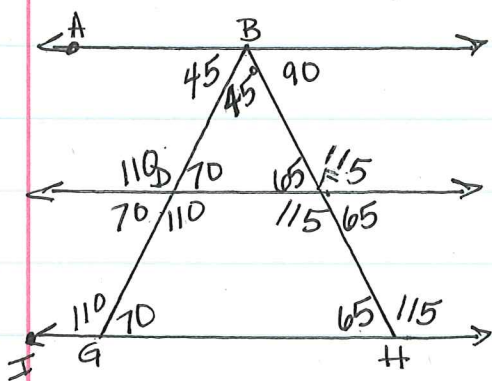
If two lines in a plane are cut by a transversal so that...

- alternate exterior angles are congruent, then the lines are parallel.
(If alt. ext. \angle s are \cong , then lines are \parallel)
- consecutive interior angles are supplementary, then the lines are parallel.
(If cons. int \angle s are suppl., then lines are \parallel)
- alternate interior angles are congruent, then the lines are parallel.
(If alt. int. \angle s are \cong , then lines are \parallel)

In a plane, if two lines are perpendicular to the same line, then they are parallel.



EX: \overline{BG} bisects $\angle ABH$. Determine which lines, if any, are parallel.



Because \overline{BG} bisects $\angle ABH$

$$\angle ABD \cong \angle DBF$$

$$m\angle ABD = 45$$

$$\angle \text{in a } \Delta \text{ have a sum of } 180 \rightarrow m\angle FHG + 70 + 45 = 180$$

$$m\angle BDF + 45 + 65 = 180$$

$$m\angle BDF = 70$$

$$m\angle FHG = 65$$

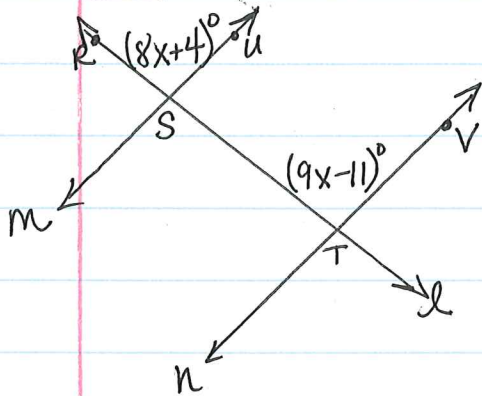
If alt. int. \angle s ($\angle IGD$ & $\angle GDF$) are \cong , then

$$\overleftrightarrow{DF} \parallel \overleftrightarrow{GH}$$

If corr. \angle s ($\angle BFD$ & $\angle FHG$) are \cong , then

$$\overleftrightarrow{DF} \parallel \overleftrightarrow{GH}$$

EX: Find x and $m\angle RSU$ so that $m \parallel n$.



$$\angle RSU \cong \angle STV$$

$$8x + 4 = 9x - 11$$

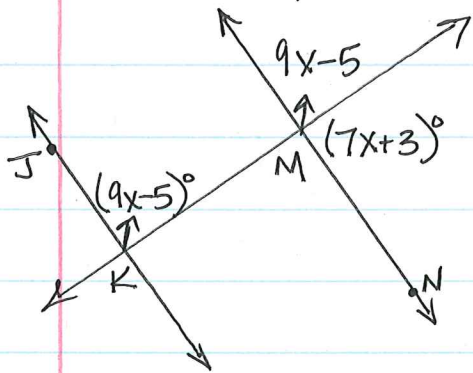
$$\boxed{x = 15}$$

$$m\angle RSU = 8(15) + 4$$

$$\boxed{m\angle RSU = 124}$$

For $m \parallel n$, the corr. \angle s must be congruent.

EX: Find x and $m\angle JKM$ so that $\overline{JK} \parallel \overline{MN}$.



$$9x - 5 + 7x + 3 = 180$$

$$16x - 2 = 180$$

$$+2 \quad +2$$

$$\frac{16x}{16} = \frac{182}{16}$$

$$\boxed{x = 11.375}$$

$$m\angle JKM = 9(11.375) - 5$$

$$\boxed{m\angle JKM = 97.375}$$