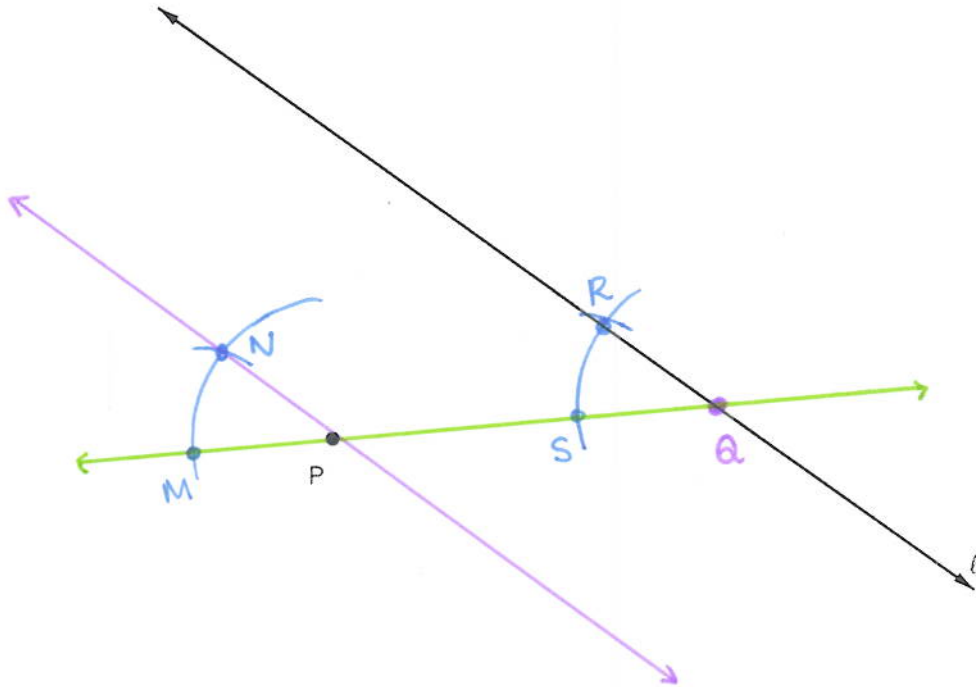
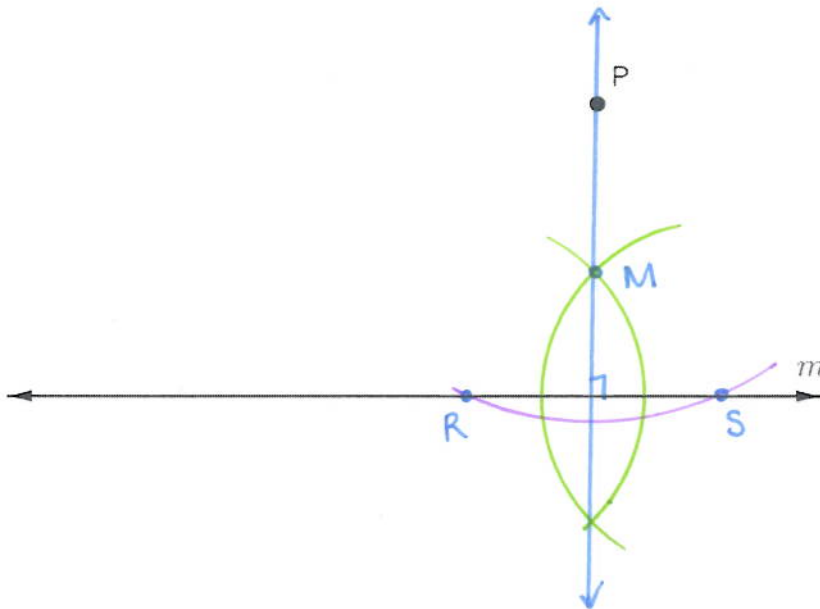


Activity 1: Constructions

Using only a compass and straight edge, construct the line parallel to ℓ through point P . Leave all of your arcs and markings, and label your points.



Using only a compass and straight edge, construct the line perpendicular to m through point P . Leave all of your arcs and markings, and label your points.



Activity 2: Proving lines are parallel

1. Given the following information, determine which lines, if any, are parallel.

Your answers will be "a || b" or "l || m."

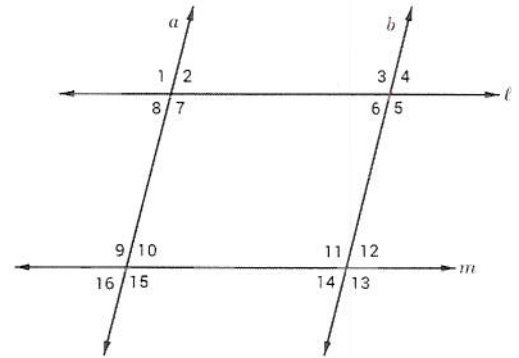
a. $\angle 3 \cong \angle 7$ *a || b*

b. $\angle 9 \cong \angle 11$ *a || b*

c. $\angle 4 \cong \angle 16$ *not enough info*

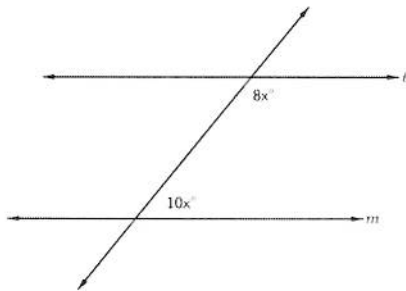
d. $m\angle 5 + m\angle 12 = 180^\circ$ *l || m*

e. $\angle 4 \cong \angle 13$ *not enough info (if $m\angle 4 + m\angle 13 = 180^\circ$, then l || m)*



2. Find x so that line l is parallel to line m.

a.

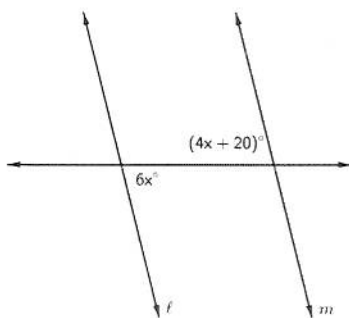


$$10x + 8x = 180$$

$$18x = 180$$

$$x = 10$$

b.



$$6x = 4x + 20$$

$$2x = 20$$

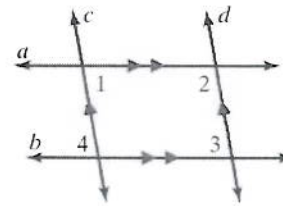
$$x = 10$$

Activity 3: Complete the Proofs

Complete the following proofs about parallel lines.

Given: $a \parallel b, c \parallel d$

Prove: $\angle 1 \cong \angle 3$

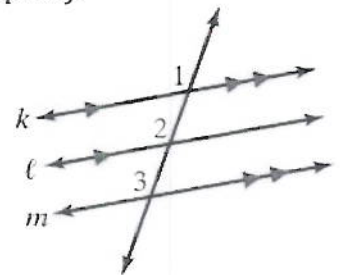


Statements	Reasons
1. $a \parallel b$	1. Given
2. $\angle 3$ and $\angle 2$ are supplementary.	2. same-side interior angles
3. $c \parallel d$	3. Given
4. $\angle 1$ and $\angle 2$ are supplementary.	4. same-side interior angles
5. $\angle 1 \cong \angle 3$	5. $\angle 1$ & $\angle 3$ are both supplementary to the same angle

Note: in the next example we are **proving** the statement "If two distinct lines are both parallel to a third line, then they are parallel to each other." This means we can't **use** that fact during the proof.

Given: $l \parallel k, m \parallel k$

Prove: $l \parallel m$



Statements	Reasons
1. $l \parallel k$	1. Given
2. $\angle 2 \cong \angle 1$	2. corresponding angles
3. $m \parallel k$	3. Given
4. $\angle 1 \cong \angle 3$	4. corresponding angles
5. $\angle 2 \cong \angle 3$	5. Transitive Property of Congruence
6. $l \parallel m$	6. corresponding angles

Activity 4: Parallel, Perpendicular, or Neither?

The following pairs of lines are parallel to each other, perpendicular to each other, or neither parallel nor perpendicular to each other (one of each). Determine which is which.

a. $3x + 2y = 5$ \rightarrow $2y = -3x + 5$ $\boxed{m = -\frac{3}{2}}$
 $3y + 2x = -3$ \rightarrow $y = -\frac{3}{2}x + \frac{5}{2}$
 $3y = -2x - 3$ $\boxed{m = -\frac{2}{3}}$
 $y = -\frac{2}{3}x - 1$

Neither

b. $y = 6$ \rightarrow Horizontal
 $x = 2$ \rightarrow Vertical

Perpendicular

c. $3x - y = 2$ \rightarrow $-y = -3x + 2$ $\boxed{m = 3}$
 $6x = 4 + 2y$ \rightarrow $y = 3x - 2$
 $2y = 6x - 4$ $\boxed{m = 3}$
 $y = 3x - 2$

Parallel