Alternate Interior Angles

Lesson 14

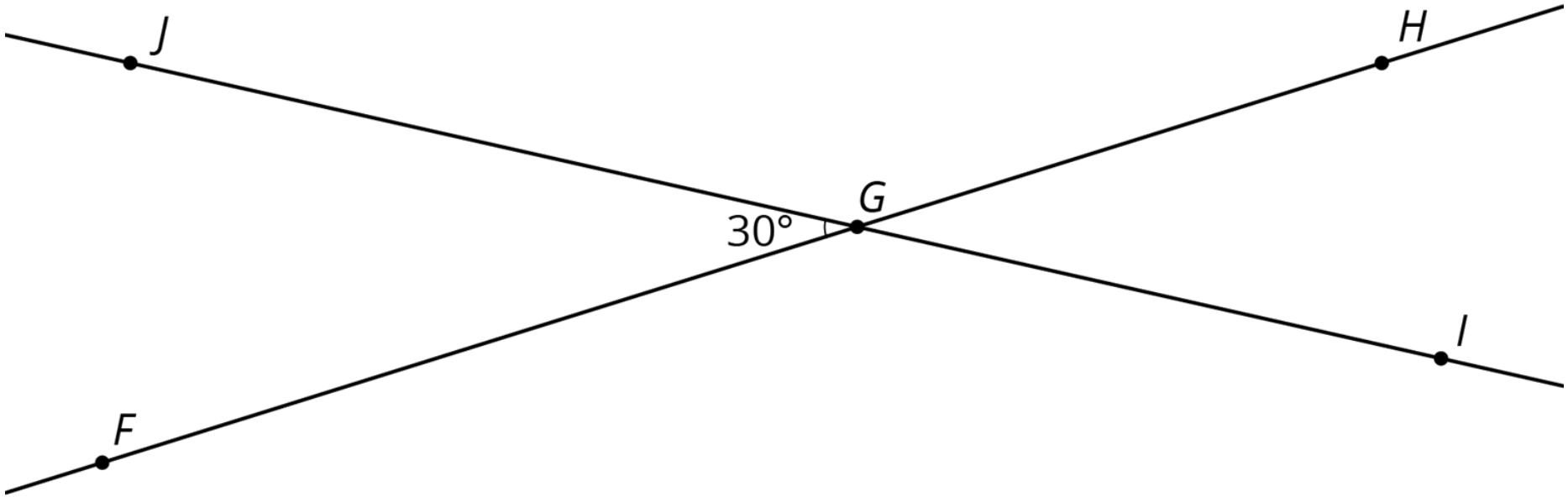
CCSS Standards: Building on	• 7.G.B.5
CCSS Standards: Addressing	• 8.G.A.1 • 8.G.A.5

Let’s explore why some angles are always equal!

Angle Pairs

Warm Up 14.1

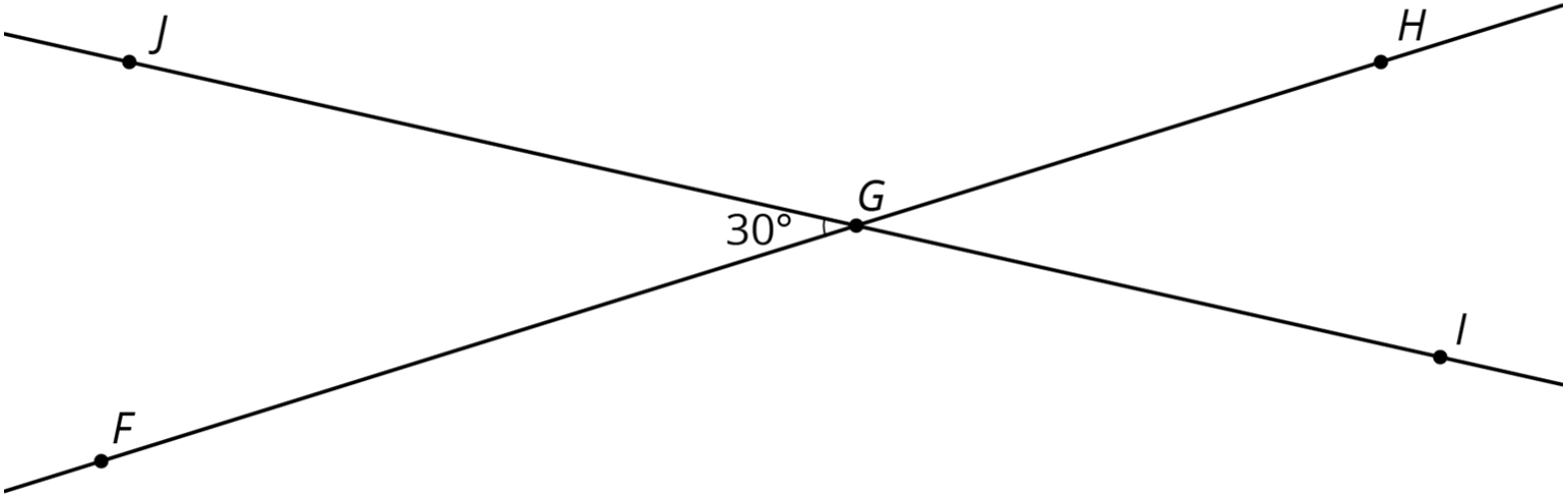
Name the angle that is noted with a 30° angle measure in the figure.



Begin with Quiet Work Time.

(3 min)

1. Find the measure of angle *JGH*. Explain or show your reasoning.
2. Find and label a second 30° angle in the diagram. Find and label an angle congruent to angle *JGH*.

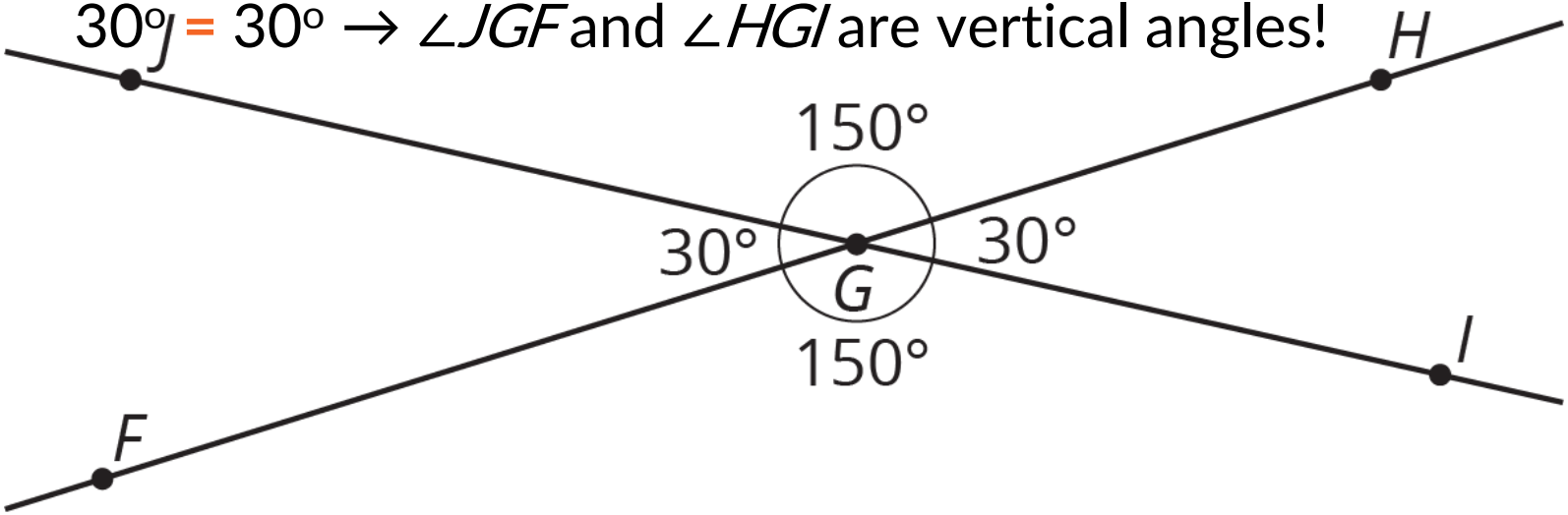


supplementary angles: two angles that sum to 180°

30° + 150° = **180°** → ∠*FGJ* and ∠*JGH* are supplementary angles!

vertical angles: opposite, angles made by 2 intersecting lines

30° = 30° → ∠*JGF* and ∠*HGI* are vertical angles!

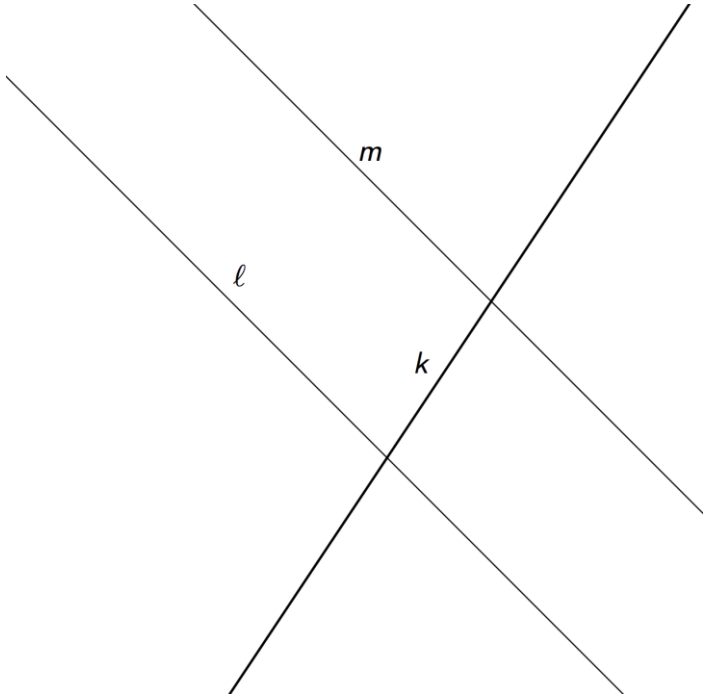


Cutting Parallel Lines with a Transversal

Activity 14.2 (Questions 4-5 are optional)

- Think Pair Share

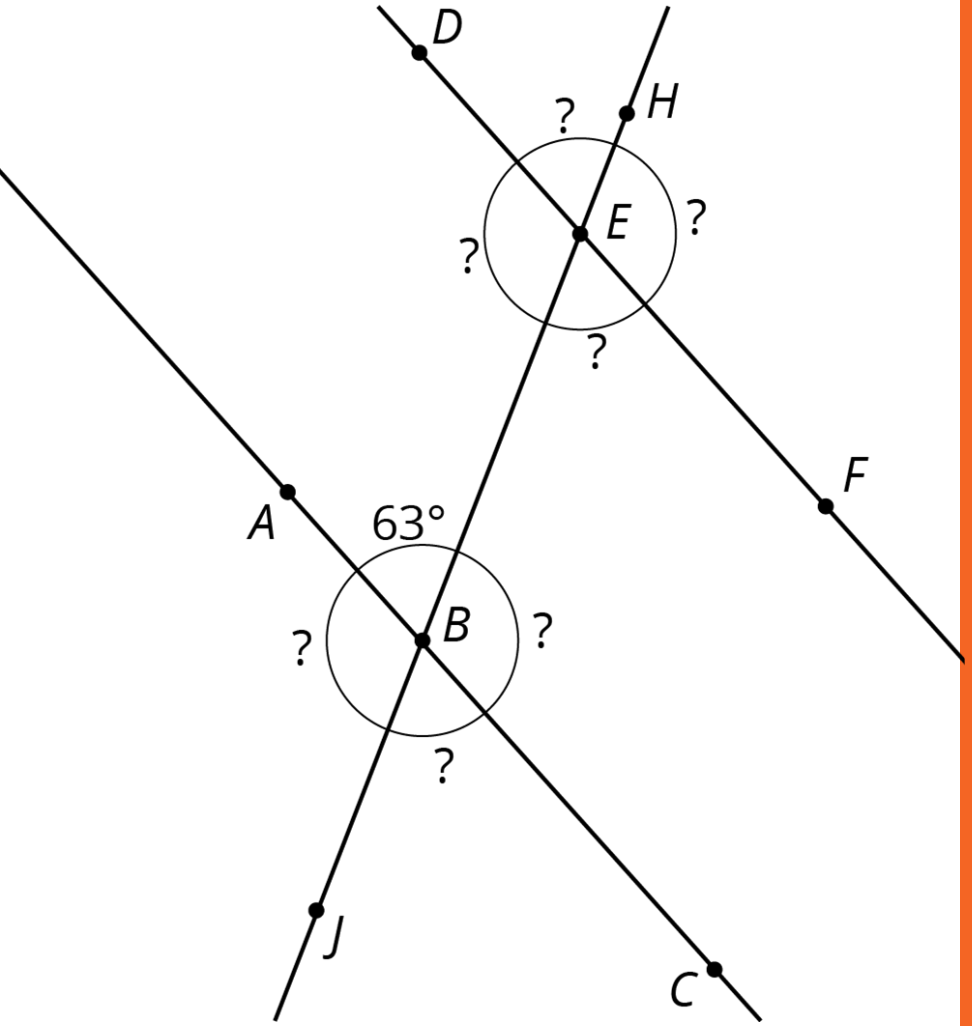
transversal
(or transversal line)



A transversal for a pair of parallel lines is…

a line that meets each of the parallel lines at exactly one point

Line *k* is a transversal for parallel lines *l* and *m*.

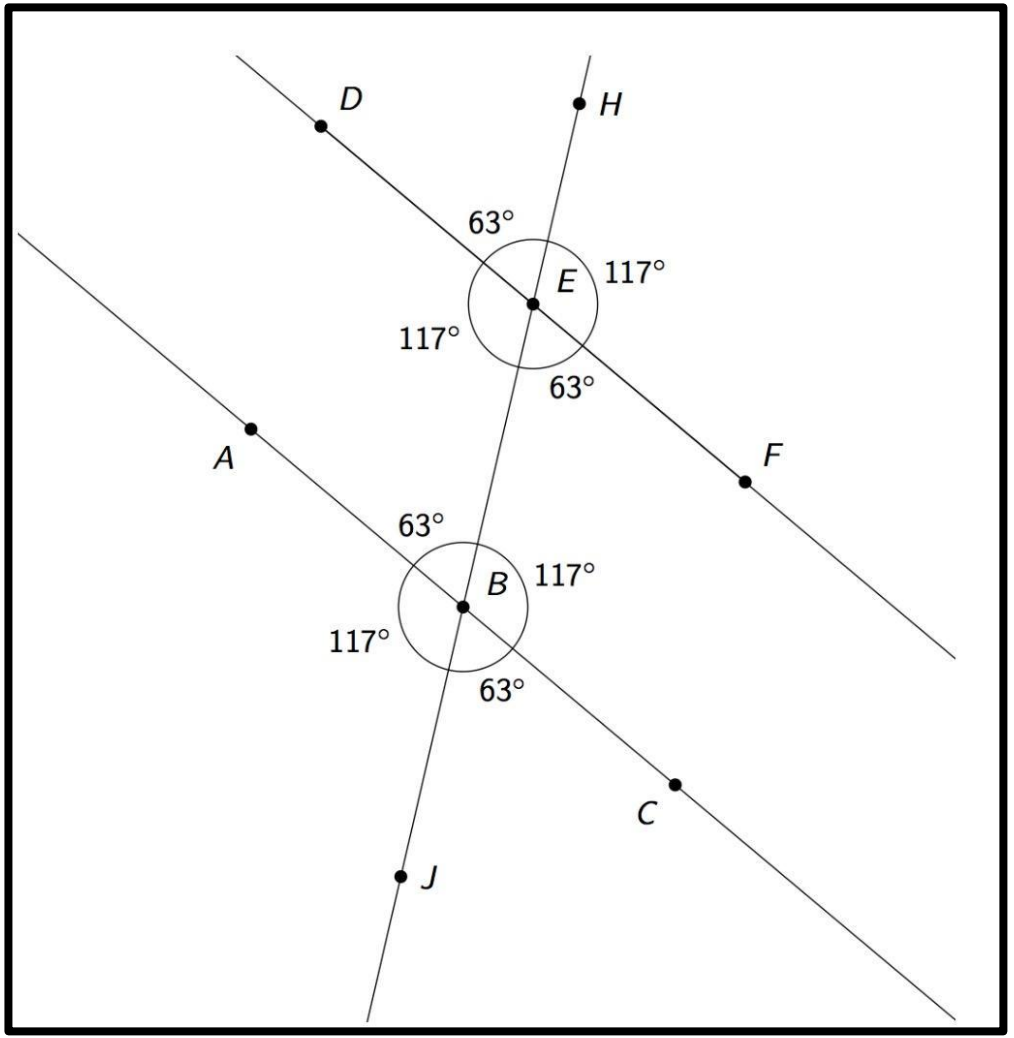


Begin with Quiet Think Time. (1 min)

Work with your partner on this task!

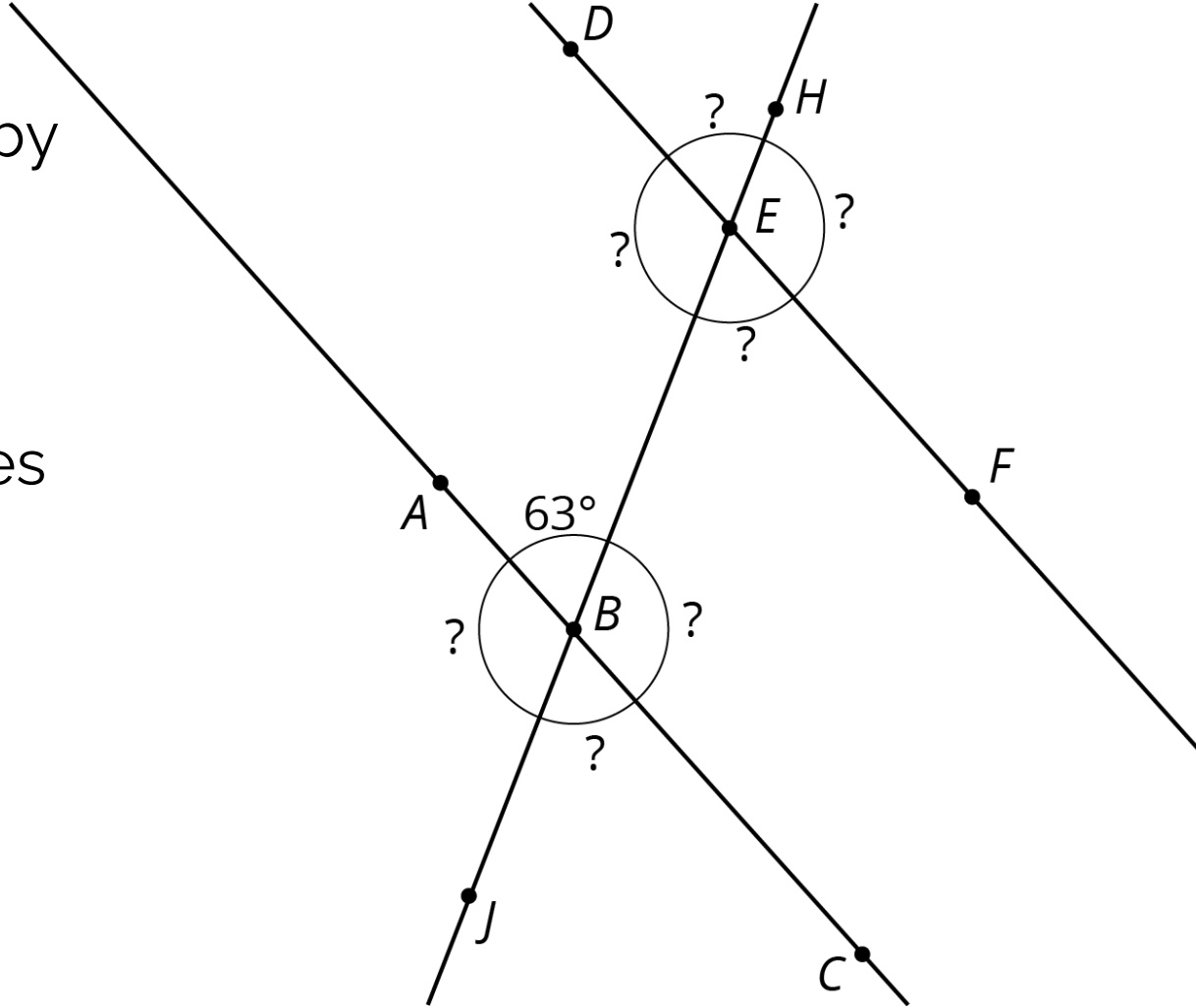
—

What did you notice with the angles in vertex B and the angles in vertex E?



Lines *AC* and *DF* are parallel. They are cut by **transversal** *HJ*.

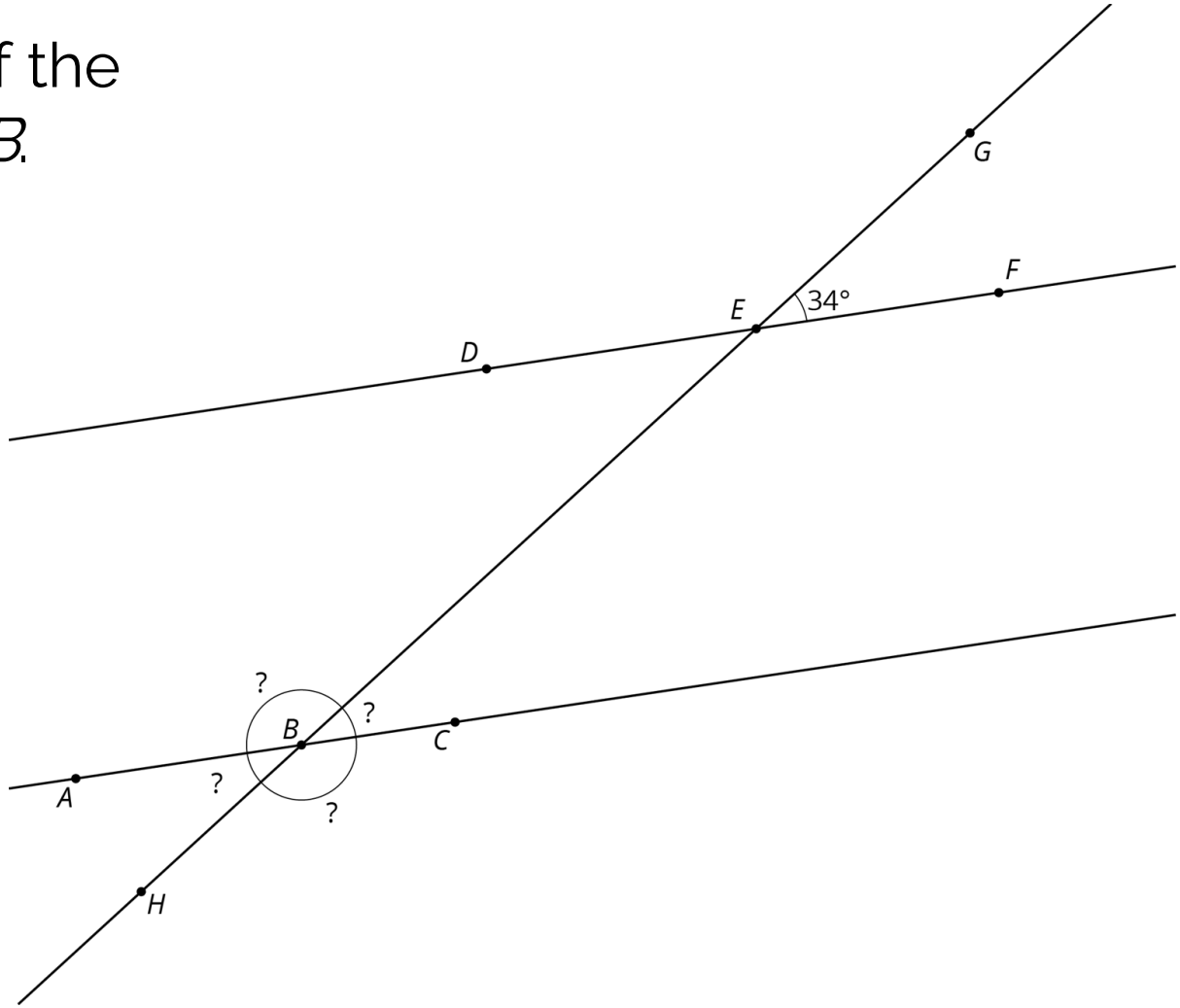
What do you notice about the angles with vertex *B* and the angles with vertex *E*?



#1-2

Find the measures of the four angles at point *B*.

Lines *AC* and *DF* are parallel.



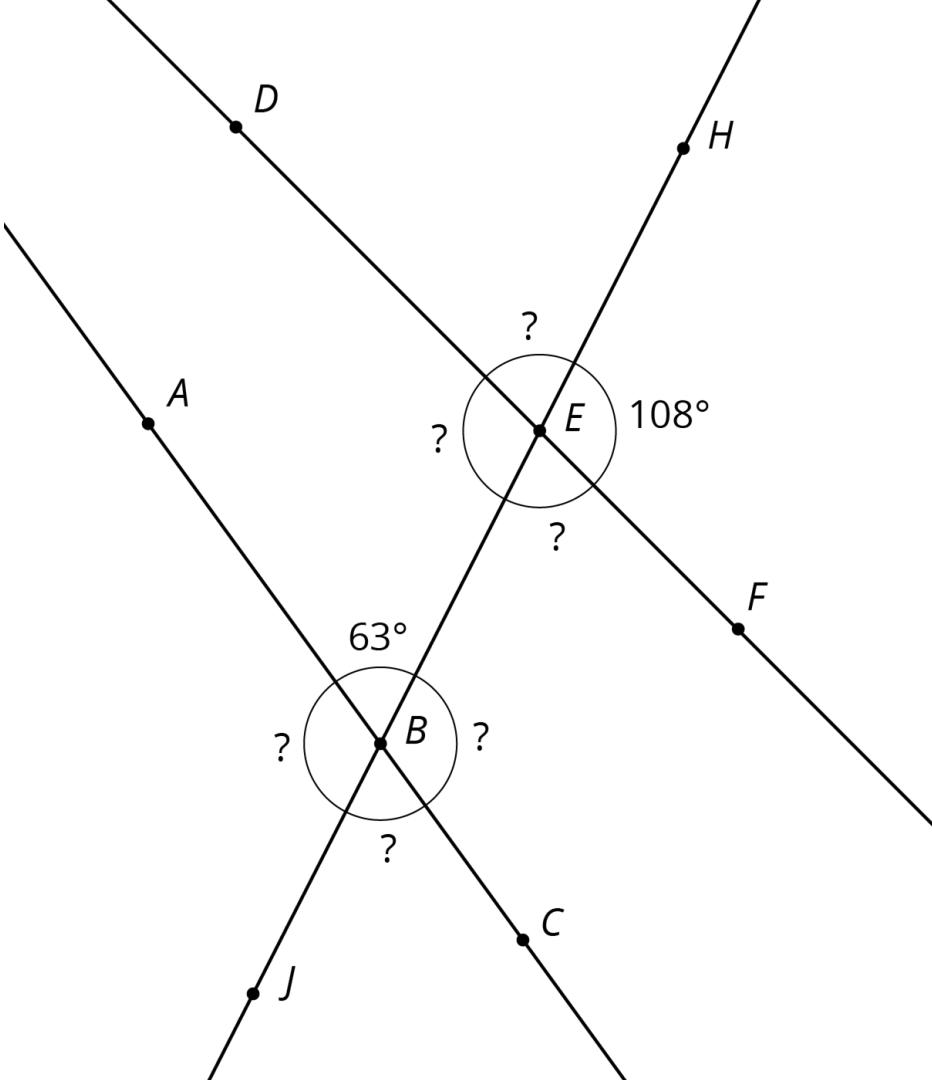
#3

Find the six unknown angles with vertices at points *B* and *E*.

What do you notice about the angles in this diagram as compared to the earlier diagram?

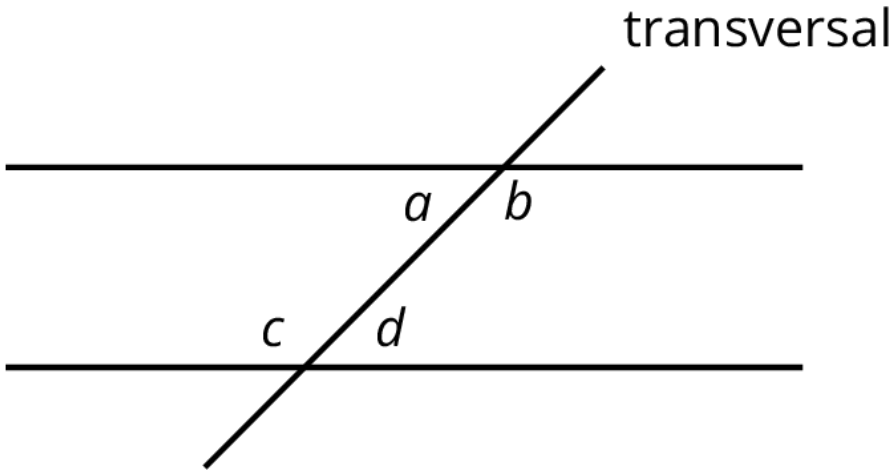
How are the two diagrams different?

How are they the same?



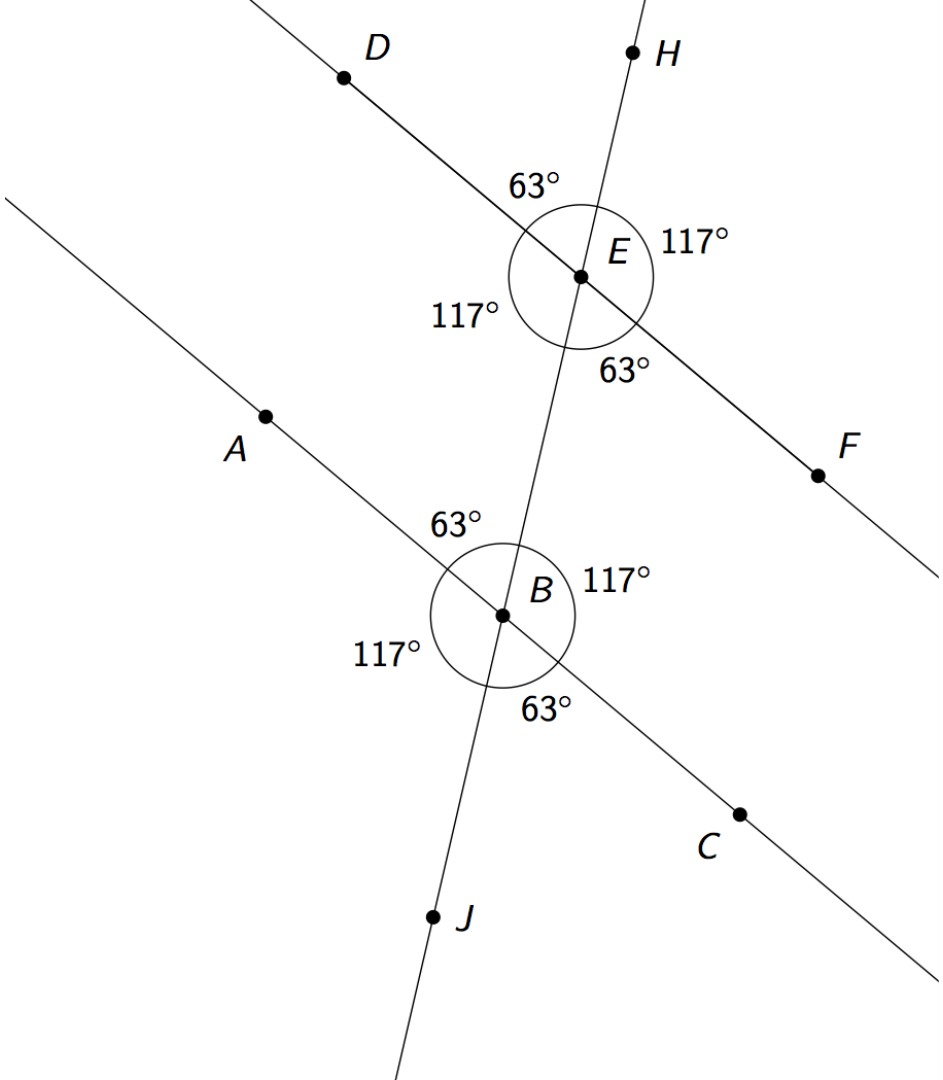
#4-

alternate interior angles



two interior angles that lie on opposite sides of the transversal

In the figure, *a* and *d* are **alternate interior angles**, and *b* and *c* are, as well!



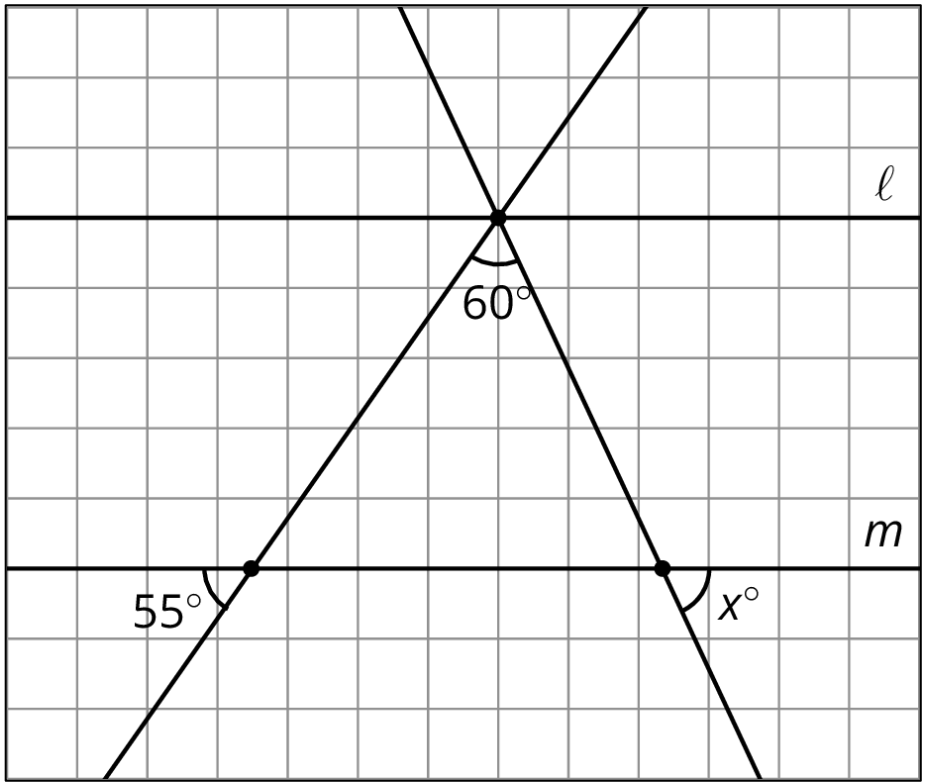
- What were some tools you used to find or confirm angle measures?
- What are some angle relationships you used to find missing measures?
- What do you notice about the angles at vertex *B* compared to vertex *E*?

“Are you ready for more?”

Parallel lines l and m are cut by two transversals which intersect l in the same point.

Two angles are marked in the figure.

Find the measure x of the third angle.

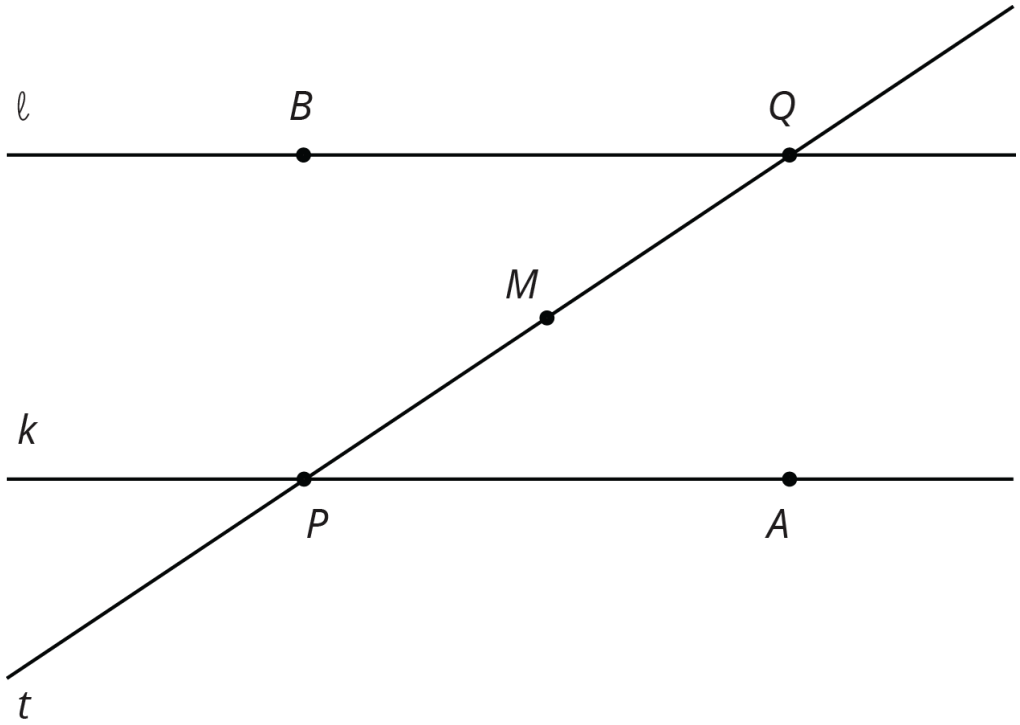


Alternate Interior Angles Are Congruent

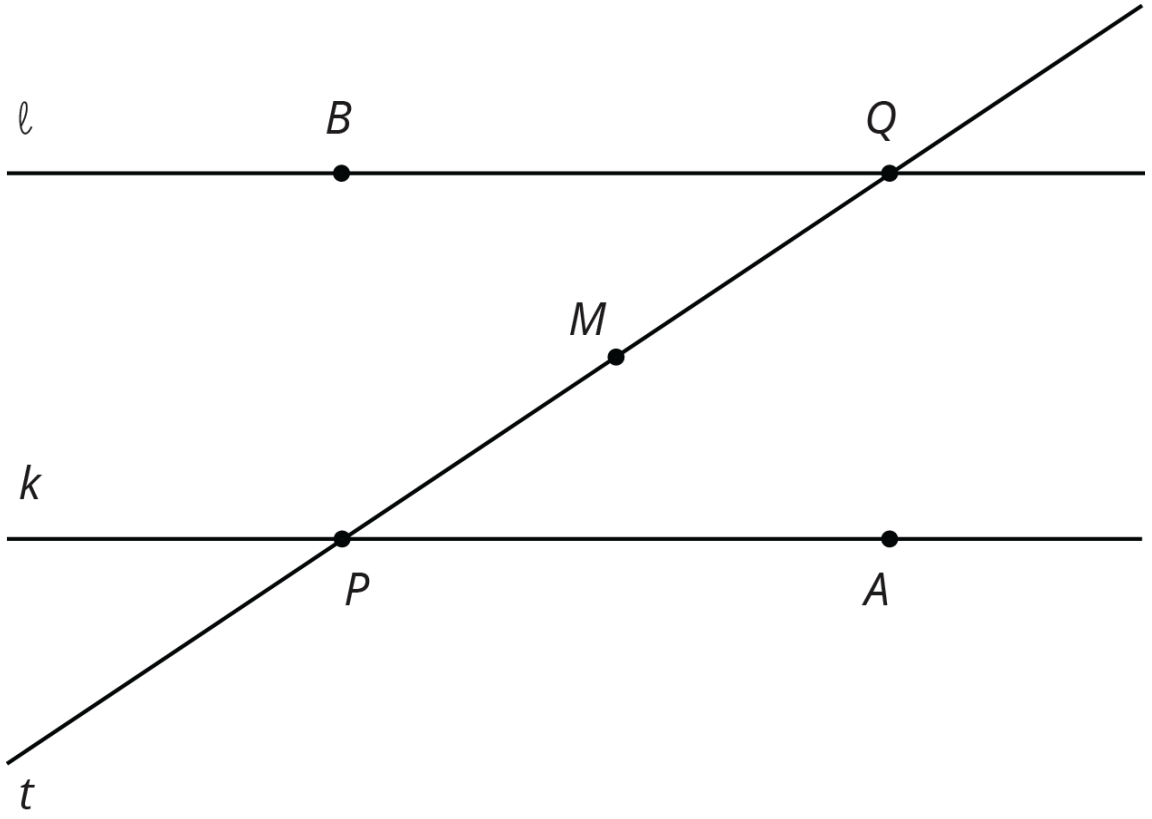
Activity 14.3

In this activity, we will try to figure out why we saw all the matching angles in the last activity!

Work as a team on these tasks!



Find a rigid transformation showing that angles *MPA* and *MPQ* are congruent.



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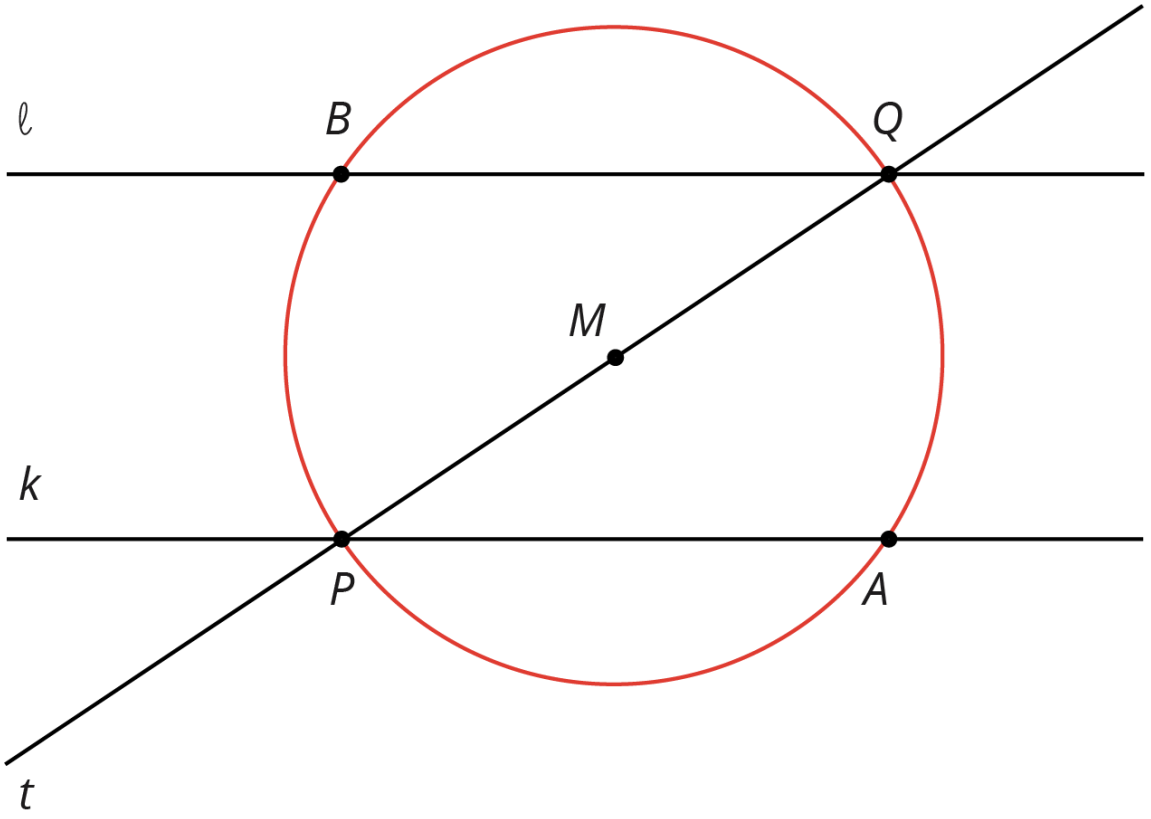
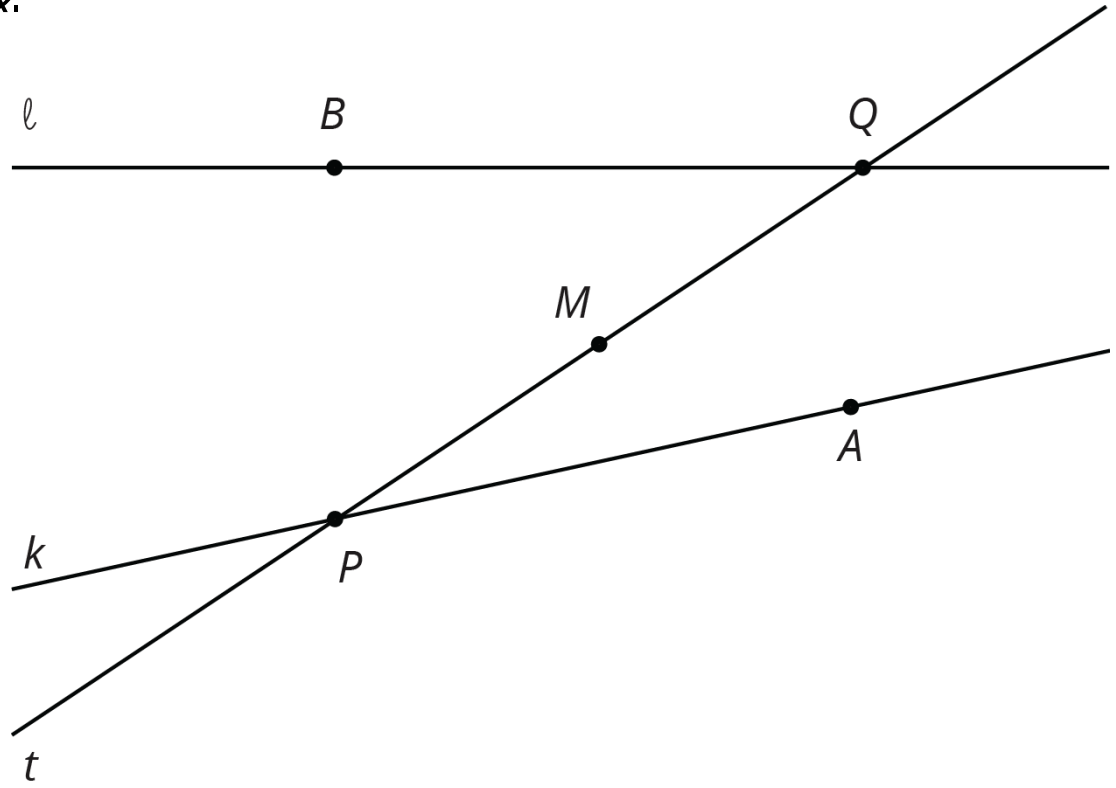
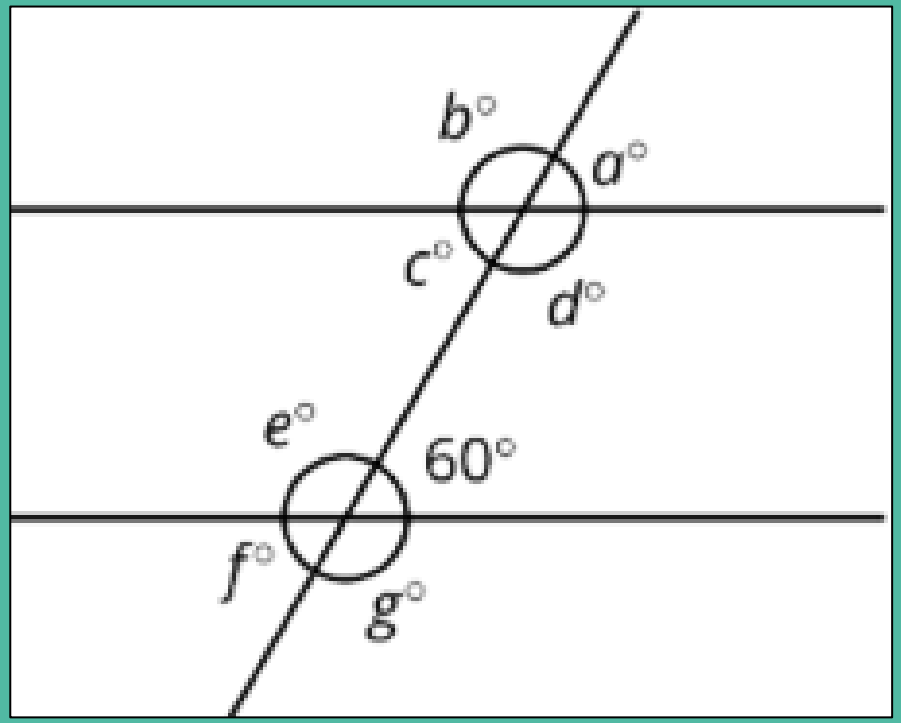


In this picture, lines l and k are no longer parallel. M is still the midpoint of segment PQ.

Does your argument in the earlier problem apply in this situation?Explain.



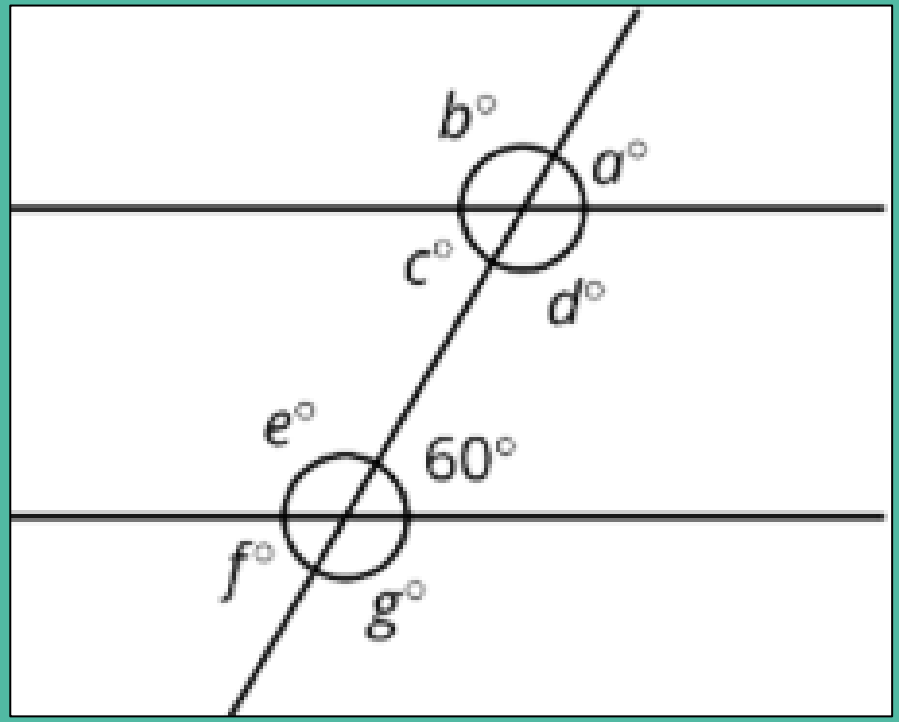
In cases like this, translations and rotations can be useful in figuring out angle measurements since they move angles to new positions, but the angle measure does not change.



Can you find all of the missing angle measures?

Point out examples of the following angle types:

- **alternate interior** angles
- vertical angles
- supplementary angles



Today's Goal

- ❑ If I have two parallel lines cut by a transversal, I can identify alternate interior angles and use that to find missing angle measurements.

All The Rest

Cool Down 14.4