

2.1

Exploring Parallel Lines

YOU WILL NEED

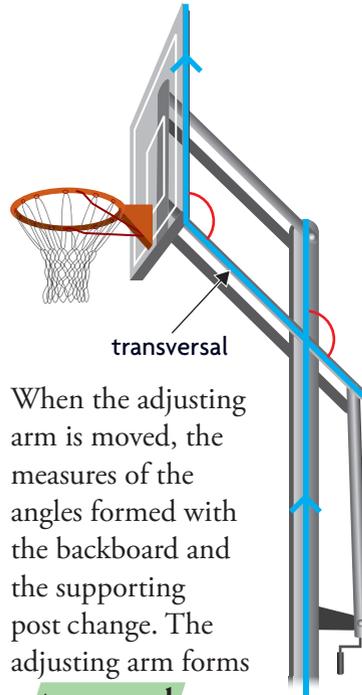
- dynamic geometry software
OR ruler and protractor

GOAL

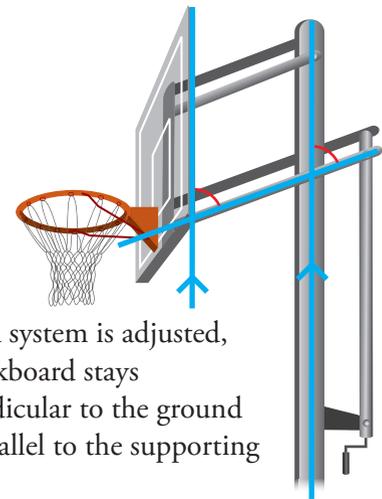
Identify relationships among the measures of angles formed by intersecting lines.

EXPLORE the Math

A sports equipment manufacturer builds portable basketball systems, like those shown here. These systems can be adjusted to different heights.



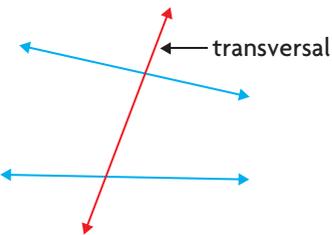
When the adjusting arm is moved, the measures of the angles formed with the backboard and the supporting post change. The adjusting arm forms a **transversal**.



When a system is adjusted, the backboard stays perpendicular to the ground and parallel to the supporting post.

transversal

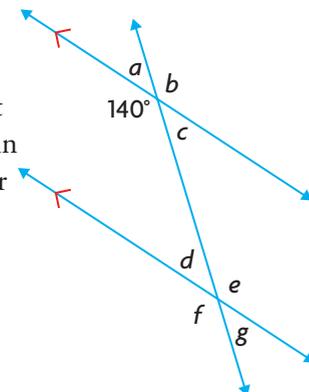
A line that intersects two or more other lines at distinct points.



- ?** When a transversal intersects two parallel lines, how are the angle measures related?

Reflecting

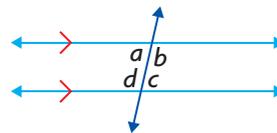
- A.** Use the relationships you observed to predict the measures of as many of the angles a to g in this diagram as you can. Explain each of your predictions.



- B. Jonathan made the following conjecture: “When a transversal intersects two parallel lines, the **corresponding angles** are always equal.” Do you agree or disagree? Explain, using examples.
- C. Did you discover any counterexamples for Jonathan’s conjecture? What does this imply?
- D. Sarah says that the **converse** of Jonathan’s conjecture is also true: “When a transversal intersects two lines and creates corresponding angles that are equal, the two lines are parallel.” Do you agree or disagree? Explain.
- E. Do your conjectures about angle measures hold when a transversal intersects a pair of non-parallel lines? Use diagrams to justify your decision.

interior angles

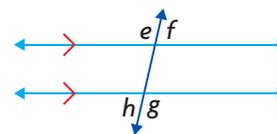
Any angles formed by a transversal and two parallel lines that lie inside the parallel lines.



a , b , c , and d are interior angles.

exterior angles

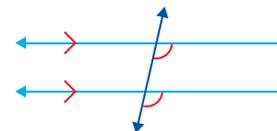
Any angles formed by a transversal and two parallel lines that lie outside the parallel lines.



e , f , g , and h are exterior angles.

corresponding angles

One interior angle and one exterior angle that are non-adjacent and on the same side of a transversal.



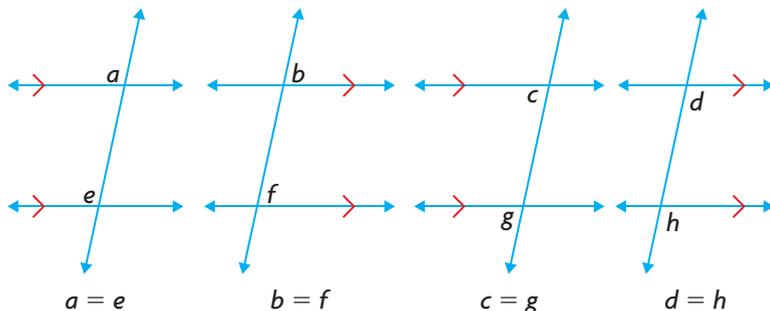
converse

A statement that is formed by switching the premise and the conclusion of another statement.

In Summary

Key Ideas

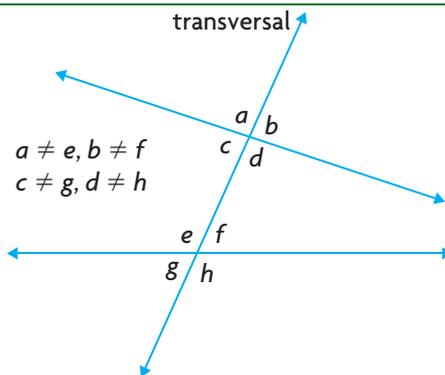
- When a transversal intersects a pair of parallel lines, the corresponding angles that are formed by each parallel line and the transversal are equal.



- When a transversal intersects a pair of lines creating equal corresponding angles, the pair of lines is parallel.

Need to Know

- When a transversal intersects a pair of non-parallel lines, the corresponding angles are not equal.
- There are also other relationships among the measures of the eight angles formed when a transversal intersects two parallel lines.



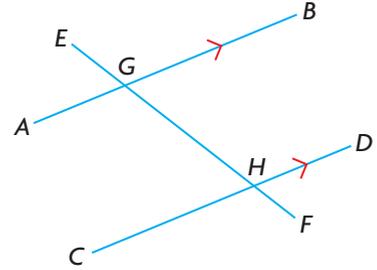


Edmonton's High Level Bridge was designed to carry trains, streetcars, autos, and pedestrians over the North Saskatchewan River. The railway has since been closed, but streetcars still cross, mainly as a tourist attraction.

FURTHER Your Understanding

- Identify examples of parallel lines and transversals in this photograph of the High Level Bridge in Edmonton.
 - Can you show that the lines in your examples really are parallel by measuring angles in a tracing of the photograph? Explain.

- Which pairs of angles are equal in this diagram? Is there a relationship between the measures of the pairs of angles that are not equal?

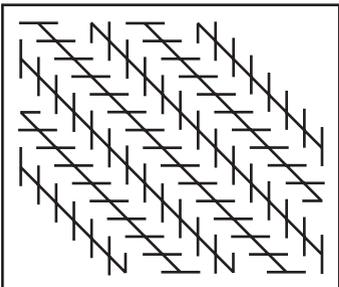
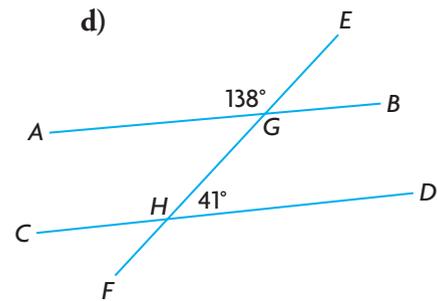
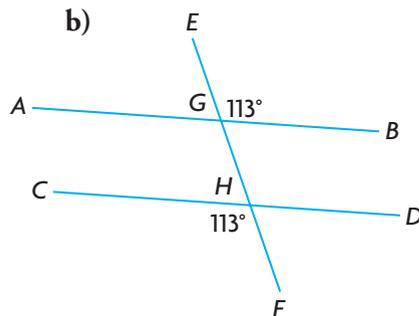
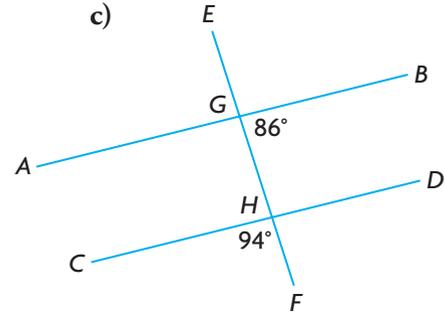
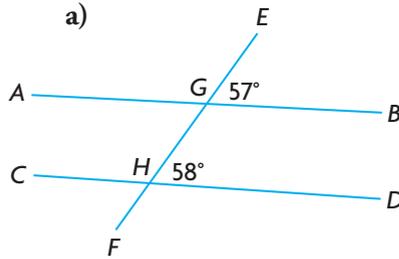


- Explain how you could construct parallel lines using only a protractor and a ruler.

- An adjustable T-bevel is used to draw parallel lines on wood to indicate where cuts should be made. Explain where the transversal is located in the diagram and how a T-bevel works.



- In each diagram, is AB parallel to CD ? Explain how you know.



- Nancy claims that the diagonal lines in the diagram to the left are not parallel. Do you agree or disagree? Justify your decision.