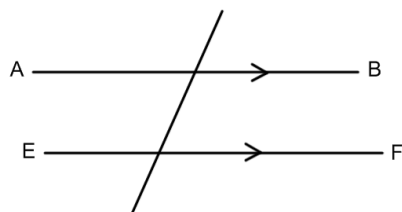
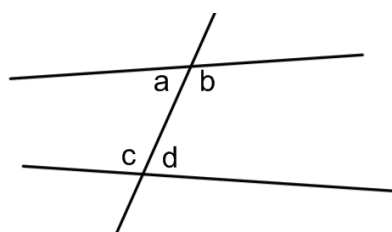
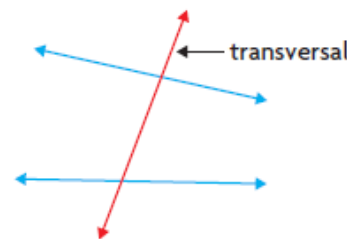


# Exploring Parallel Lines



**Parallel lines** – lines that lie in the same plane and are exactly the same distance apart. No matter how far parallel lines are extended, the distance between them does not change. The symbol  $\parallel$  is used to show that lines are parallel. Read  $\overline{AB} \parallel \overline{EF}$  as “line AB is parallel to line EF”.

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



a, b, c, and d are interior angles

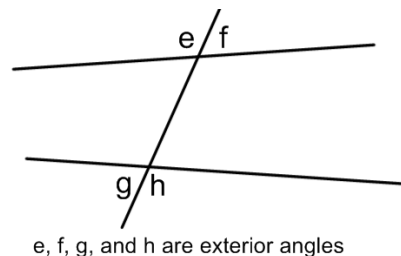
**Interior Angles** – Any angles formed by a transversal and two lines that lie **inside** the two lines.

**Alternate Interior Angles** – Interior angles that lie on alternate sides of the transversal (eg. a & d are alternate interior angles)

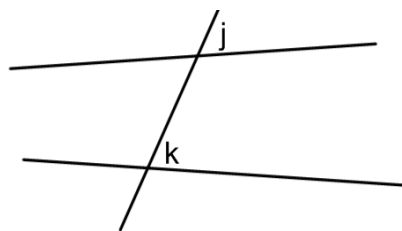
**Co-interior Angles** – Interior angles that lie on the same side of the transversal (eg. a & c are co-interior angles)

**Exterior Angles** – Any angles formed by a transversal and two lines that lie **outside** the two lines.

**Alternate Exterior Angles** – Exterior angles that lie on alternate sides of the transversal (eg. e & h are alternate exterior angles)



e, f, g, and h are exterior angles

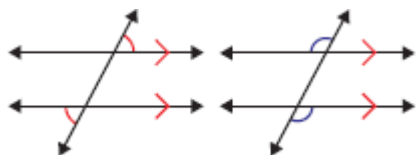
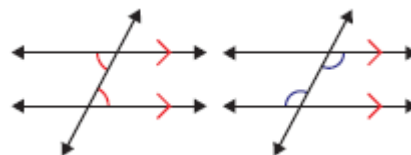


j and k are corresponding angles

**Corresponding Angles** – One interior and one exterior angle that are on the same side of the transversal and non-adjacent; the angles are in “corresponding” or “matching” positions.

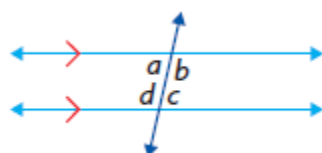
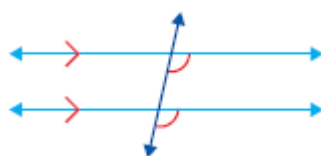
When a transversal intersects two *parallel* lines,

- **alternate interior** angles are **equal**.



- **alternate exterior** angles are **equal**.

- **corresponding** angles are **equal**.



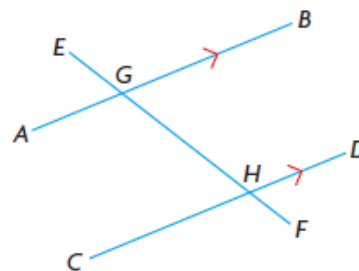
- **co-interior** angles are **supplementary**.

$$a + d = 180^\circ$$

$$b + c = 180^\circ$$

### Example 1: Angles Formed by Transversals

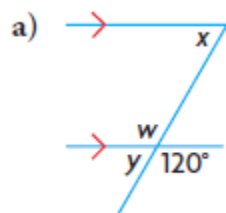
Refer to the diagram shown to answer the following questions.



- Name a pair of equal corresponding angles. \_\_\_\_\_
- $\angle EGB$  and  $\angle CHF$  are equal \_\_\_\_\_ angles.
- Name a pair of equal alternate interior angles. \_\_\_\_\_
- $\angle AGH$  and  $\angle CHG$  are \_\_\_\_\_ angles whose sum is \_\_\_\_\_.

## Example 2: Use Reasoning to Determine Unknown Angles

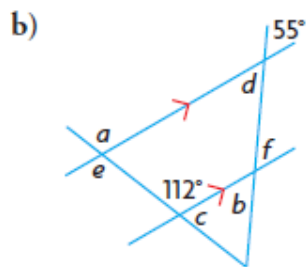
Determine the measures of the indicated angles. Give your reasoning for each measure.



$x =$  \_\_\_\_\_ reason: \_\_\_\_\_

$y =$  \_\_\_\_\_ reason: \_\_\_\_\_

$w =$  \_\_\_\_\_ reason: \_\_\_\_\_



$a =$  \_\_\_\_\_ reason: \_\_\_\_\_

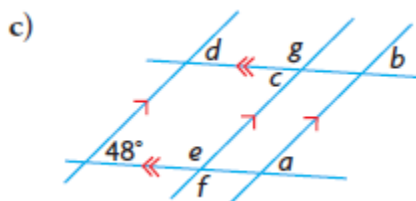
$b =$  \_\_\_\_\_ reason: \_\_\_\_\_

$c =$  \_\_\_\_\_ reason: \_\_\_\_\_

$d =$  \_\_\_\_\_ reason: \_\_\_\_\_

$e =$  \_\_\_\_\_ reason: \_\_\_\_\_

$f =$  \_\_\_\_\_ reason: \_\_\_\_\_



$a =$  \_\_\_\_\_ reason: \_\_\_\_\_

$b =$  \_\_\_\_\_ reason: \_\_\_\_\_

$c =$  \_\_\_\_\_ reason: \_\_\_\_\_

$d =$  \_\_\_\_\_ reason: \_\_\_\_\_

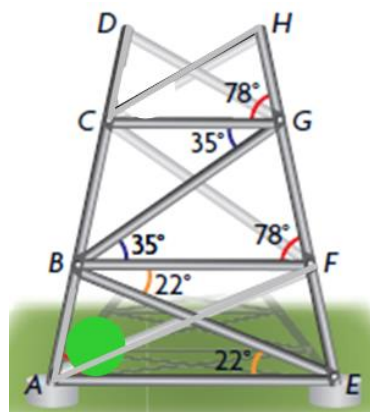
$e =$  \_\_\_\_\_ reason: \_\_\_\_\_

$f =$  \_\_\_\_\_ reason: \_\_\_\_\_

$g =$  \_\_\_\_\_ reason: \_\_\_\_\_

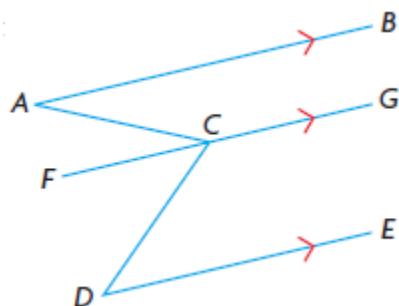
## Example 3: Use Angle Properties to Prove that Lines are Parallel

One side of a cell phone tower will be built as shown. Use the angle measures to prove that braces CG and AE are parallel.



Statement	Justification

### Example 4: Write a Proof Using Angle Properties



Given:  $AB$ ,  $DE$  and  $FG$  are all parallel

Prove:  $\angle ACD = \angle BAC + \angle CDE$

Statement	Justification

### YOU TRY:

Given:

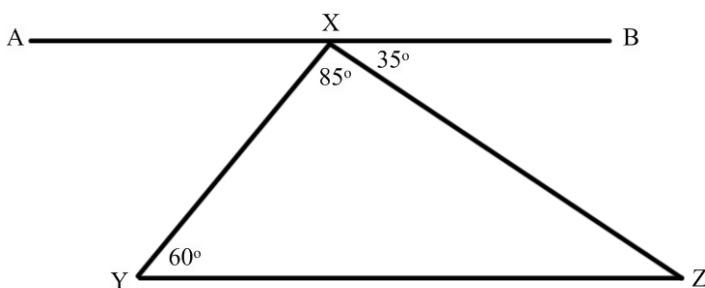
Points  $A$ ,  $X$ , and  $B$  are collinear

$$\angle BXZ = 35^\circ$$

$$\angle YXZ = 85^\circ$$

$$\angle XYZ = 60^\circ$$

Prove:  $AB \parallel YZ$



Statement	Justification