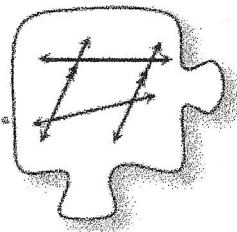


2.1.5 What is the relationship?



Applying Angle Relationships

During Section 2.1, you have been learning about various special angle relationships that are created by intersecting lines. Today you will investigate those relationships a bit further, then apply what you know to explain how Mr. Douglas's hinged mirror trick (from problem 2-1) works. As you work in your teams today, keep the following questions in mind to guide your discussion:

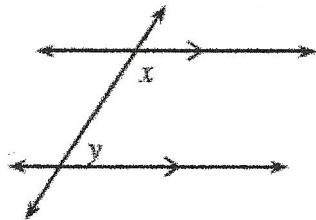
What's the relationship?

Are the angles equal? Are they supplementary?

How can I be sure?

2-46. Use your knowledge of angle relationships to answer the questions below.

- a. In the diagram below, what is the sum of angles x and y ? How do you know?

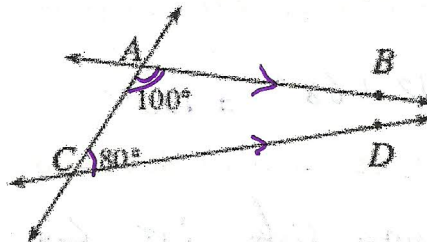


$$x + y = 180^\circ$$

Same side int

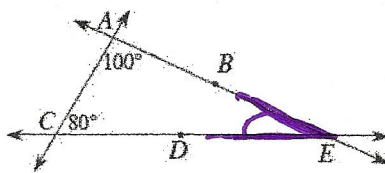
Supplementary

- b. While looking at the diagram below, Rianna exclaimed, "I think something is wrong with this diagram." What do you think she is referring to? Be prepared to share your thinking with the class.



Don't assume the diagram is right

2-47. Maria is not convinced that the lines in part (b) of problem 2-46 *must* be parallel. She decides to assume that they are not parallel and draws the diagram below.



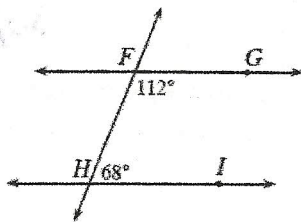
a. Why must lines ~~\overline{AB}~~ and ~~\overline{CD}~~ intersect in Maria's diagram?

b. What is $m\angle BED$? Discuss this question with your team and explain what it tells you about \overline{AB} and \overline{CD} .

$$m\angle BED = 0^\circ$$

c. If the angle measures at points A and C are as marked, could \overline{AB} and \overline{CD} intersect at a point on the other side of \overline{AC} ? Why or why not?

2-48. Examine the diagram below.



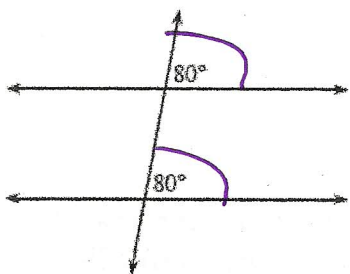
a. In this diagram, must \overline{FG} and \overline{HI} be parallel? Explain how you know.

$$\text{Yes, } 112^\circ + 68^\circ = 180^\circ$$

b. Write a theorem based on your conclusion to this problem.

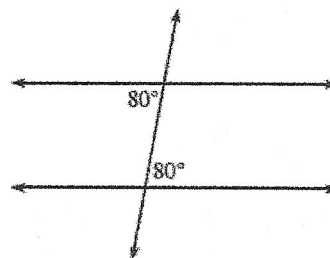
If same side int \angle s add to 180° ,
then lines are \parallel

2-49. Use your theorem from problem 2-48 to explain why lines must be parallel in the diagrams below.



a.

Corresponding \angle s
 \cong



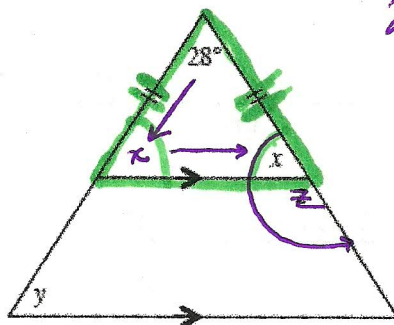
b.

Alt Int \angle s \cong

- c. Looking back at the diagrams in parts (a) and (b), write two new theorems that begin, "If corresponding angles are congruent, ..." and "If the measures of alternate interior angles are congruent, ...".

... then lines are

2-53. Use what you have learned in Section 2.1 to find the measures of x , y , and z below. Justify each conclusion with the name of a geometric relationship from your Angle Relationships Toolkit.



$$28 + x + z = 180$$

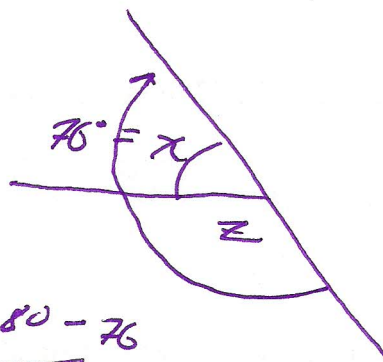
$$28 + 2x = 180$$

$$\frac{2x = 152}{2} \quad \frac{z}{2}$$

$$\boxed{x = 76^\circ}$$

$$\angle x \cong \angle y \text{ (corresponding } \angle \text{s)}$$

$$\angle y = 76^\circ$$



$$z = 180 - 76$$

$$\boxed{z = 104^\circ}$$