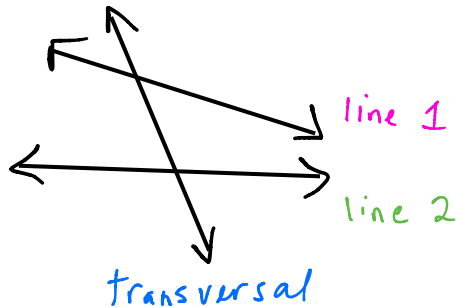# PROPERTIES OF PARALLEL LINES

When you have a transversal that intersects two lines, those two lines are <u>not necessarily</u> parallel:

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line 1

line 2

transversal

However, **SOMETIMES,** those two lines are parallel. When the two lines that are intersected by a transversal are parallel, then the angle pairs that are formed have very special relationships.

<u>Note</u>: The red markings on the diagram indicate parallel lines.

line 1

line 2
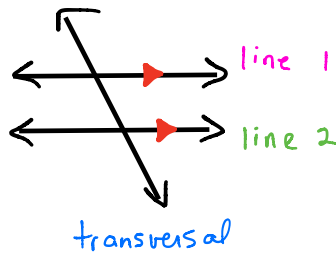
transversal

<u>Note:</u> If a transversal intersects two parallel lines, then the following relationships are true:
- ○ Corresponding angles are congruent
- ○ Alternate interior angles are congruent
- ○ Alternate exterior angles are congruent
- ○ Same-side interior angles are supplementary.   (Same-Side Supp.)
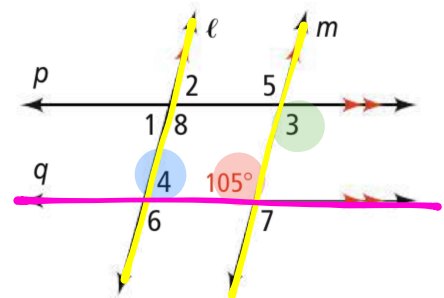
Ex 1) The measure of ∠3 is 55 degrees. Which angles are supplementary to ∠3 ? How do you know?
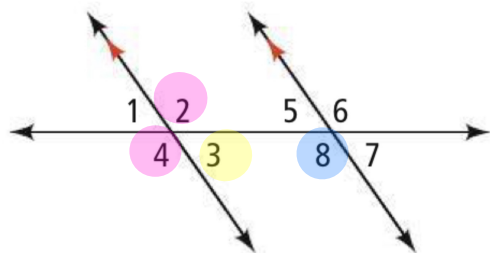
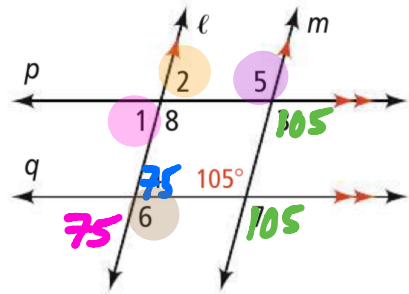Ex 2) Use the diagram below to answer the following questions.

a) What are the measures of ∠3 and ∠4 ? Justify your answers.

b) What is the m∠1 ? Justify your answer.

c) What is the m∠2 ? Justify your answer.

d) What is the m∠5 ? Justify your answer.

e) What is the m∠6 ? Justify your answer.
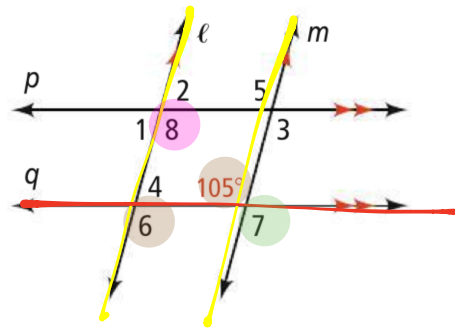
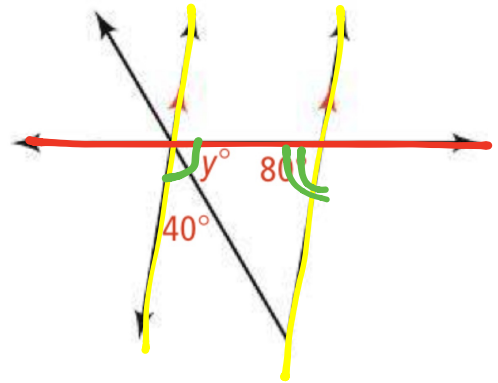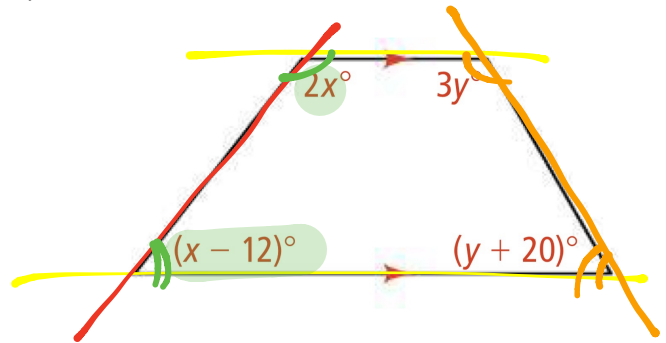**f)** What is the m∠7? Justify your answer.

g) What is the m∠8? Justify your answer.

Ex 3) What is the value of y?

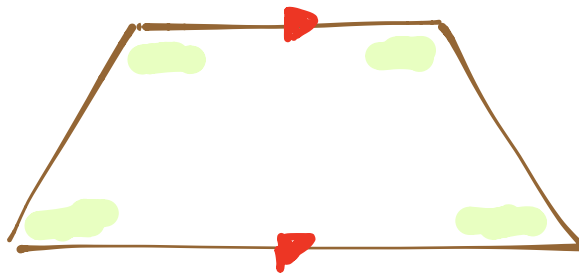Same-side int. supp

$$(40 + y) + 80 = 180$$

Ex 4a) In the figure shown, what are the values of x and y?

$2x°$ $3y$

$(x - 12)°$ $(y + 20)°$

Ex 4b) What are the measures of the four angles in the figure?

Lesson Check

Do you know HOW?

Use the diagram for Exercises 1–4.

1. Identify four pairs of congruent angles. (Exclude vertical angle pairs.)

2. Identify two pairs of supplementary angles. (Exclude linear pairs.)

3. If $m\angle 1 = 70$, what is $m\angle 8$?

4. If $m\angle 4 = 70$ and $m\angle 7 = 2x$, what is the value of x?

Do you UNDERSTAND? ⓒ **MATHEMATICAL PRACTICES**

ⓒ 5. **Compare and Contrast** How are the Alternate Interior Angles Theorem and the Alternate Exterior Angles Theorem alike? How are they different?

6. In Problem 2, you proved that $\angle 1$ and $\angle 8$, in the diagram below, are supplementary. What is a good name for this pair of angles? Explain.

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Homework:
Textbook p. 153-155
#7-10, 12-20, 22-24, 28
(17 problems total)

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