Launch:

Write down your definition of parallel lines. (Do not look it up)

2.7 Parallel Lines

Objective: Students will identify pairs of congruent angles when a transversal cuts parallel lines.

You see parallel lines in your everyday life. You have probably studied them in previous mathematics courses. Parallel lines will be the focus of this lesson and the following lesson. You will address these questions.
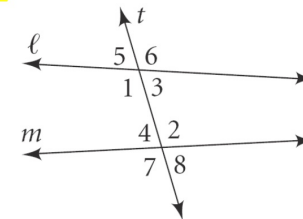
1. How can you determine whether two lines are parallel?
2. What information can you draw from parallel lines?

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parallel lines - lines in the same plane that do not intersect.

transversal - a line that intersects two or more lines

Example 1

Vertical angles -
$\angle 1$ and $\angle 6$
$\angle 3$ and $\angle 5$
$\angle 4$ and $\angle 8$
$\angle 2$ and $\angle 7$

Alternate interior angles - $\angle 1$ and $\angle 2$
$\angle 3$ and $\angle 4$

Same-side interior angles - $\angle 1$ and $\angle 4$
$\angle 2$ and $\angle 3$

Corresponding angles - $\angle 1$ and $\angle 7$, $\angle 5$ and $\angle 4$,
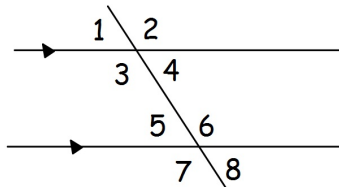$\angle 6$ and $\angle 2$, $\angle 3$ and $\angle 8$

When two <u>parallel lines</u> are cut by a transversal, there are several relationships between the angles created.

Vertical angles are congruent
Alternate interior angles are congruent
Same side interior angles add to 180°
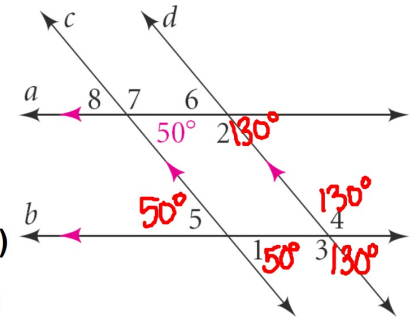Corresponding angles: are congruent

EXAMPLE 2:

Which angles shown here are congruent?

Example 3:
Find the measure. Justify each answer.

a) $m\angle 1 = 50$ (corr. angles)

b) $m\angle 2 = 130$ (same-side int.)

c) $m\angle 3 = 130$ (corr. angles)

d) $m\angle 4 = 130$ (vertical angles)

e) $m\angle 5 = 50$ (alt. int. angles)

EXAMPLE 4: Find the value of *x*. Then find the measure of each labeled angle.

a)

$(x + 40)°$
$70 + 40 = 110°$

$x° = 70°$

Same Side interior

$X + 40 + X = 180$

$2X + 40 = 180$
$\quad -40 \quad -40$

$\dfrac{2X}{2} = \dfrac{140}{2}$

$X = 70$

b)

$(3x - 10)°$
$65°$

$(x + 40)°$
$65°$

corresponding

$3X - 10 = X + 40$
$-X + 10 \quad -X + 10$

$\dfrac{2X}{2} = \dfrac{50}{2}$

$X = 25$