Module 2: Part 2
Congruence

Parallel Lines, Transversals, and Angle Relationships
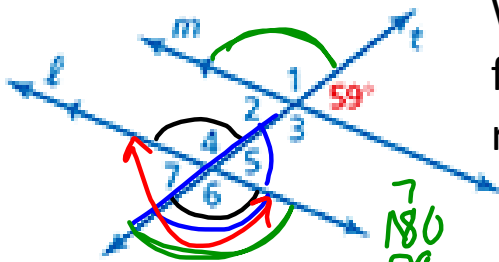
1 parallel lines
   tranversal line

2 vertical angles

3 alternate interior angles

4 alternate exterior angles

5 consecutive interior angles

6 corresponding angles

7 supplemental angles

8 $\cong$ vs. $=$
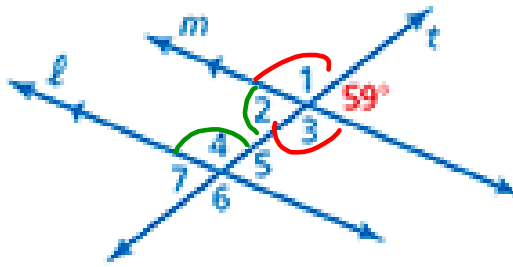
$\angle 4 \cong \angle 6 -$
vertical angles
$\angle 1 \cong \angle 3 -$ vertical $\angle s$

Which lines are parallel?   What is line t called?
What is this symbol? $\cong$

Example

What is the measurement of the
following angles. Explain your
reasoning.

7
180
- 59
121

$\angle 1 = 121° -$ Supplementary $\angle$ w/ $\angle 59°$

$\angle 2 = 59° -$ vertical $\angle$ w/ $\angle 59°$

$\angle 3 = 121° -$ Vertical $\angle$ w/ $\angle 1$

$\angle 4 - 121° -$ alt. int. w/ $\angle 3$
= 59° alt. interior $\angle$ w/ $\angle 2$

$\angle 5 = 59° -$ corresponding $\angle$ w/ $\angle 59°$
59° = vertical $\angle$ w/ $\angle 7$

$\angle 6 = 121° >$ vertical $\angle$ w/ $\angle 4$

$\angle 7 = 59° -$ alternate exterior $\angle$ w/ $\angle 59°$
= 59° corresponding $\angle$ w/ $\angle 2$

2

alternate exterior angles

$\angle 1 \cong \angle 8$

vertical angles

$\angle 6 = \angle 7$ $\angle 2 \cong \angle 3$

alternate interior angles

$\angle 2 = \angle 7$

supplemental angles   corresponding angles

$\angle 1 + \angle 3 = 180°$ $\angle 4 \cong \angle 8$

What is the measurement of the following angles. Explain your reasoning.

$\angle 5$

$\angle 1$

$\angle 6$

$\angle 2$

$\angle 7$

$\angle 3$

$\angle 8$

$\angle 4 = 85°$

Assignment:

Big Ideas 3.1 #3-11 odd, 15-23 odd

ENY Lesson 12
Angles Associated with
Parallel Lines

Lesson 12: Angles Associated with Parallel Lines

Exploratory Challenge 1   S63

In the figure below, 1 is not parallel to 2, and   is a transversal. Use a protractor to measure angles 1–8. Which, if any, are equal? Explain why.
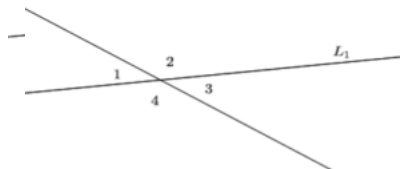
L_2

COMMON CORE

engage^{ny}

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Exploratory Challenge 2   S64

In the figure below, $1 \parallel 2$, and   is a transversal. Use a protractor to measure angles 1–8. List the angles that are equal in measure.

L_1

c.   What did you notice about the measures of ∠4 and ∠5? Why do you think this is so? (Use your transparency, if needed). Is there another pair of angles with this same relationship?

5.64

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5
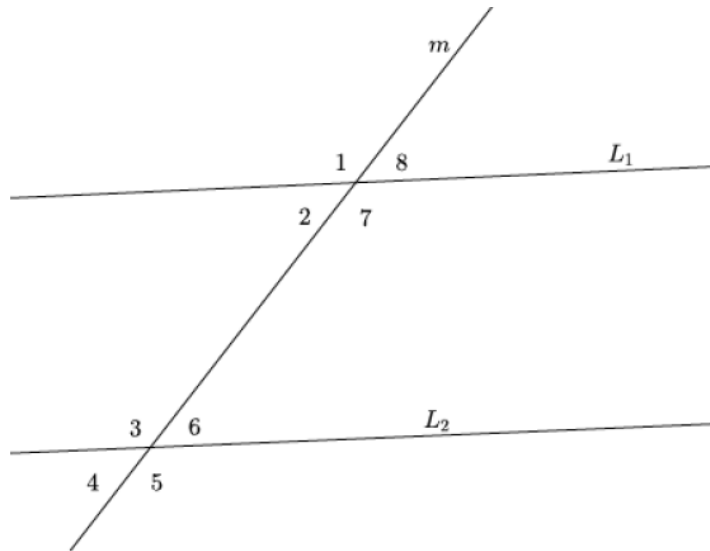
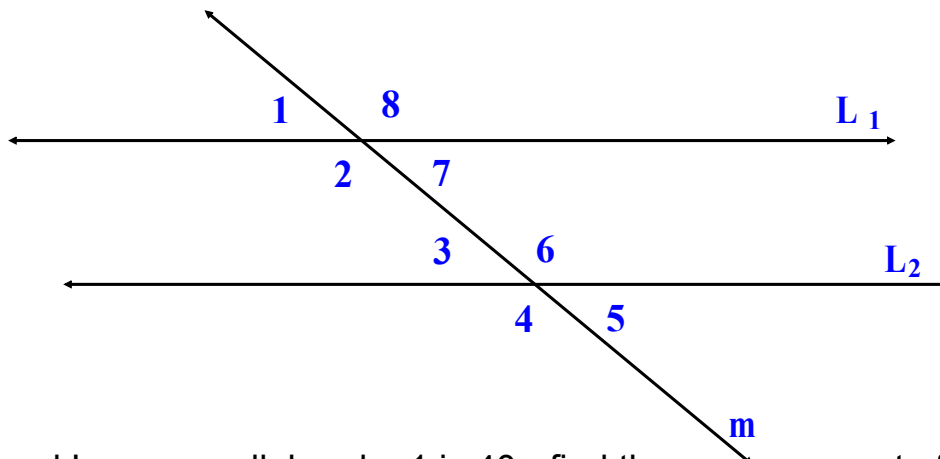If $L_1 \parallel L_2$, what do you know about $\angle 2$ and $\angle 6$? Use informal arguments to support your claim.

If $L_1 \parallel L_2$, what do you know about $\angle 1$ and $\angle 3$? Use informal arguments to support your claim.

If $\angle 3$ is 130°, what is the measurment of $\angle 6$. What is the angle relationship?

If L_1 and L_2 are parallel and $\angle 1$ is 40°, find the measurement of the following angles and describe the angle relationship.
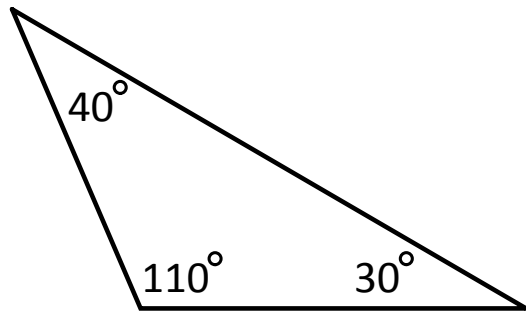
$\angle 3 =$ _____
$\angle 6 =$ _____
$\angle 8 =$ _____

Complete the Exit Ticket and it hand in.

Assignment:

ENY 2.12 #1-10

For Exercises 26–29, use the diagram below. Lines l_a and l_b are parallel. Lines l_c, l_d, and l_e are parallel.
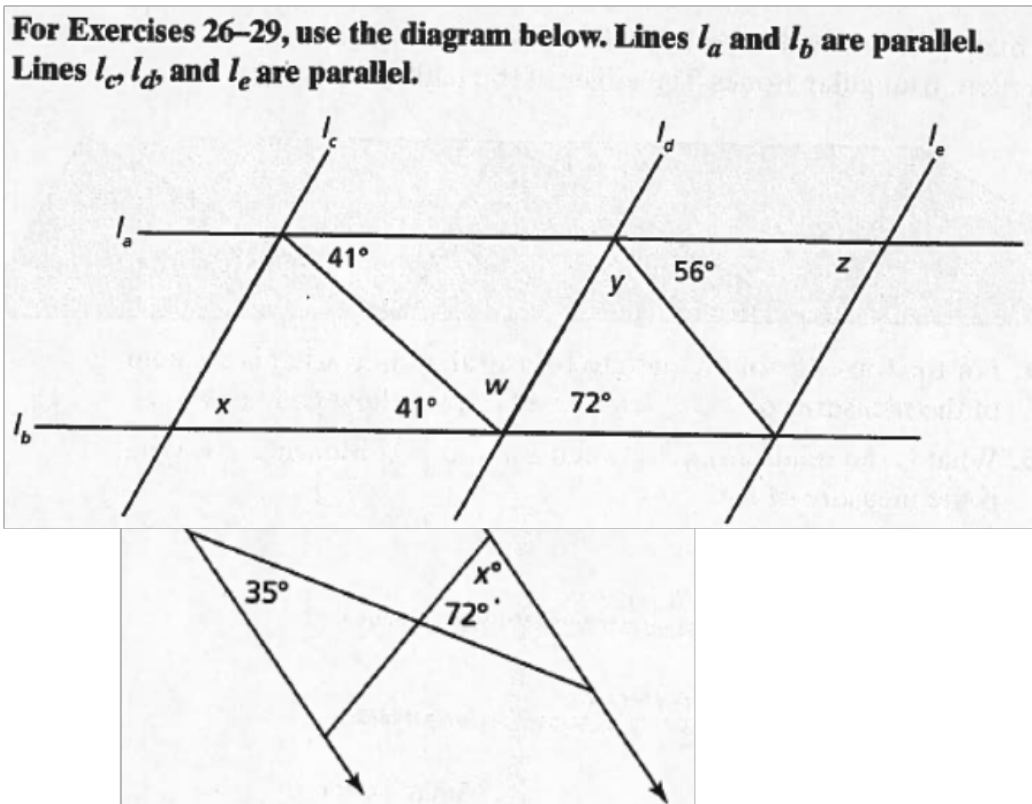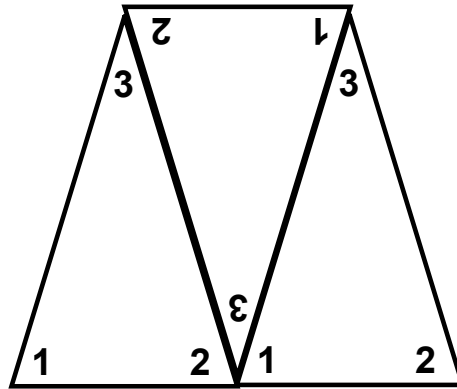
Angles Sum of a Triangle

$40°$

$110°$ $30°$

What do you notice about the angles?

I will prove to you that all 3 angles will equal 180º!
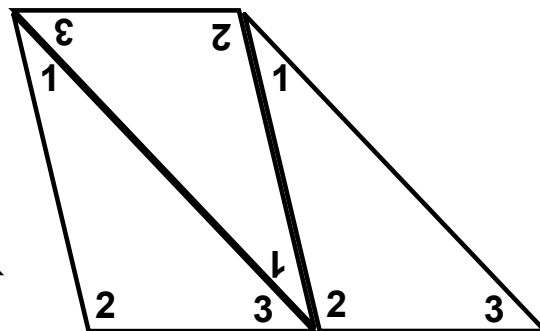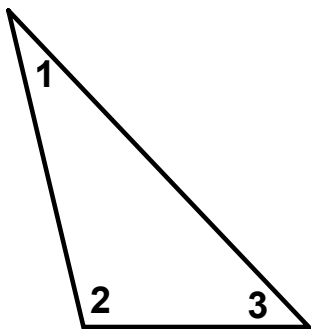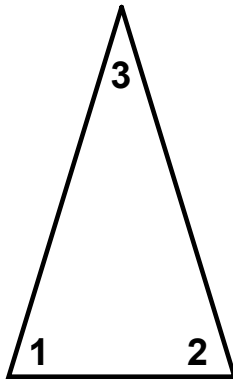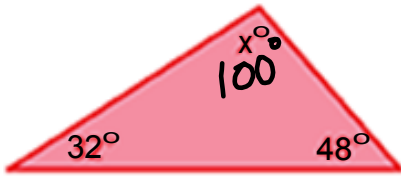
x°
100
32°   48°

Find the measurement of x.

$$32$$
$$+48$$
$$\overline{80}$$ $$X° = 100°$$

$$180$$
$$-80$$
$$\overline{100}$$

81°
x° 74°   25°

Find the measurement of x.

$$81$$
$$+25$$
$$\overline{106°}$$ $$180$$
$$-106$$
$$X° = 74°$$

x° = 86°

$$86$$
$$-35$$
$$\overline{51}$$

(x − 35)°   43°

→ 51°
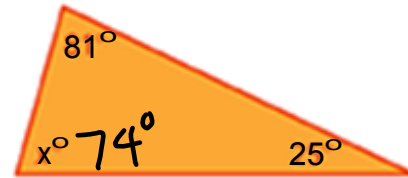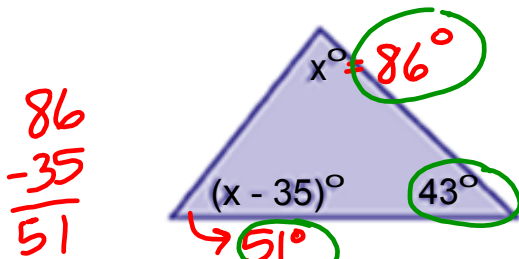
Find the measurement of x.

$$\angle A + \angle B + \angle C = 180$$
$$X° + (x° - 35°) + 43° = 180$$
$$2x + 8° = 180°$$
$$-8 \quad\quad -8$$
$$\frac{2x}{2} = \frac{172°}{2}$$
$$X = 86°$$

B = 59°

(x + 28)°   31 + 28 = 59°
90°   31°
A   x°   C
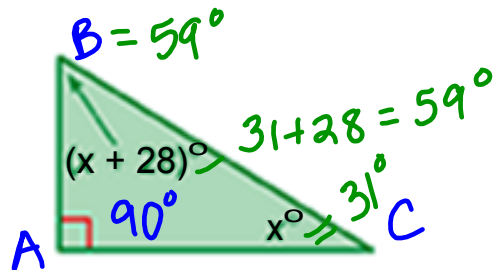
Find the measurement of x.

$$\angle A + \angle B + \angle C = 180$$
$$90 + (x + 28) + x = 180$$
$$118 + 2x = 180$$
$$-118 \quad\quad -116$$
$$\frac{2x}{2} = \frac{62}{2}$$
$$X = 31$$

$k = 55°$

$180°$ *interior angles*

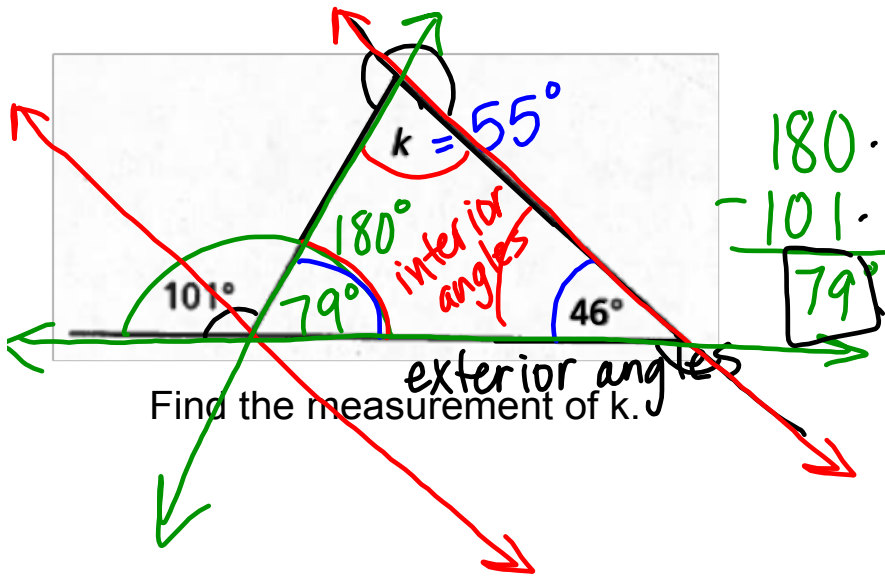$101°$　$79°$　　$46°$

exterior angles

Find the measurement of k.

$180 \cdot$
$-101 \cdot$
$\boxed{79}$

$\begin{array}{r} 79 \\ +46 \\ \hline 125 \end{array}$

$\begin{array}{r} 180 \\ -125 \\ \hline 55° \end{array}$

How do you think you can find an outside angle measurement?
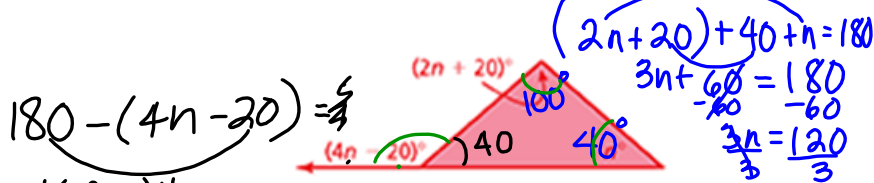
$(2n+20)°$　$100°$

$(4n-20)°$)40　$40°$

$(2n+20)+40+n=180$
$3n+60 = 180$
$-60 \quad -60$
$\dfrac{3n}{3} = \dfrac{120}{3}$

$180-(4n-30) = \dfrac{6}{?}$

$160 - 4n =$
$+4n \quad +4n$
$\dfrac{160}{4} = \dfrac{4n}{4}$
$40 = n$

What about these angle measurements?
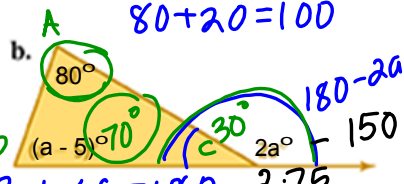
$2(40)+20 \qquad h=40$
$80+20=100$

Find the measurement of a.

b.

A
$80°$

B　$(a-5)°$ $70°$　c $30°$　$2a°$ ⌐ 150
$180-2a$
$2 \cdot 75$

$\angle A + \angle B + \angle C = 180$
$\overset{\angle A}{80} + \overset{\angle B}{(a-5)} + \overset{\angle C}{(180-2a)} = 180$

$75+180$

$80+70+30$

$\begin{array}{r} 180 \\ 150 \\ \hline 30 \end{array}$

$255-a = 180$
$-255 \quad\quad -255$
$\dfrac{-a}{-1} = \dfrac{-75}{-1}$
$a = 75$

$75°$

62.8°

X

$(2x - 44.8)°$

Find the measurement of angle x.

Complete the Exit Ticket and it hand in.
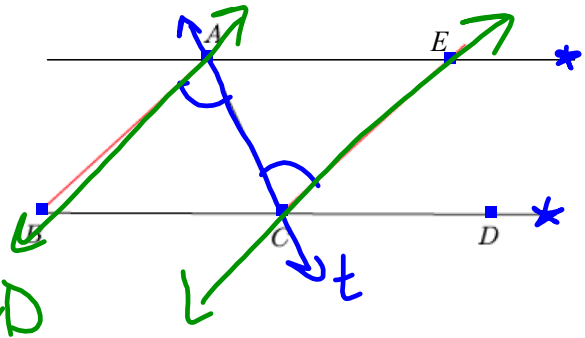
x°

36°

72°
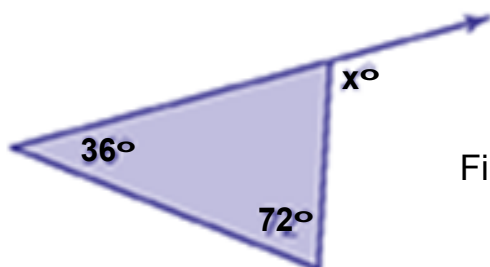
Find the measurement of x.

Assignment:

Big Ideas 3.2 #5-17

ENY Lesson 13
Angle Sum of a Triangle

a) $\overline{AE} \parallel \overline{BC}$. Name the three interior angles of triangle ABC.

$\angle ACB$

$\angle ABC$ $\angle BAC$

b) Name the straight angle.

$\angle BCD$

c) What kinds of angles are $\angle ABC$ and $\angle ECD$? What does that mean about their measures?

acute $\angle s$, corresponding $\angle s$ are $\cong$

d) What kinds of angles are $\angle BAC$ and $\angle ECA$? What does that mean about their measures?
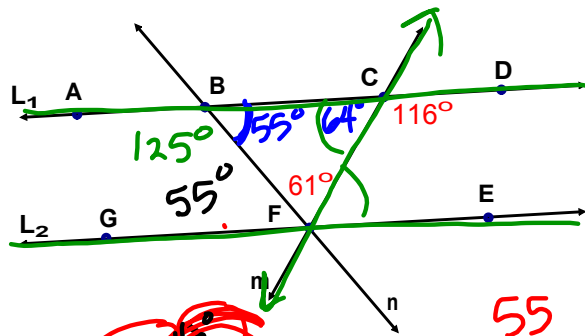
$\overset{\frown}{AC} = t$, $\overline{AB} \parallel \overline{CE}$

alternate interior angles

a) Name the triangle in the figure.

$\triangle BCF$

b) Name the straight angle that we will use to prove that the sum of interior angles of a triangle is 180°.

$\angle GFE$

$125°$ $55°$ 64 $116°$

$55°$ $61°$

c) Find the measurements of the following angles and explain your reasoning.

$\angle BFG = 55°$ alternate interior w/ $\angle CBF$

$\angle ABF = 125°$ Supplementary w/ $\angle CBF$

$\angle CFE$

$\angle BCF$ $64°$

$\angle CBF = 55°$

Supplementary $\angle DCF$

$\triangle$ sum

Straight angle relationship

55
$+ 61$
116

180
$- 116$
64

$64°$

Complete the Exit Ticket and it hand in.

Assignment:

ENY 2.13 #1-9

Angles in Parallel Lines and Transversals

47°
A   B   E   F
   C   D64G H I
      J K L   O P
         M   N   Q R

∠ F
∠ G = 64°
∠ H
∠ I
∠ J
∠ K
∠ L
∠ M
∠ N
∠ O
∠ P
∠ Q
∠ R

Draw the parallel lines with the red transversal and list the angles in your notebook. Find the missing angle measurements with your group.
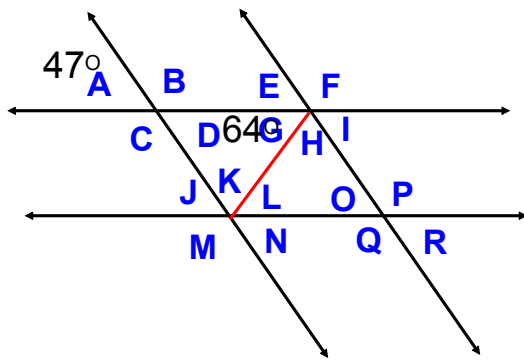
∠ A = 47°
∠ B
∠ C
∠ D = 47° vertical to angle A
∠ E

47°   133° 47°
A   B   E   F 133°
133°C 47°D 64°G 69°I 47°
       47°J 69° 64°47° P133°
            64°O
       M   N47° Q   R 47°
       133°   133°
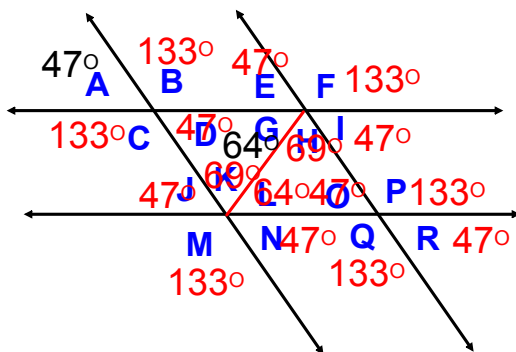
∠ F = 133°
∠ G = 64°
∠ H = 69°
∠ I = 47°
∠ J = 47°
∠ K = 69°
∠ L = 64°
∠ M = 133°
∠ N = 47°
∠ O = 47°
∠ P = 133°
∠ Q = 133°
∠ R = 47°

∠ A = 47°
∠ B = 133°
∠ C = 133°
∠ D = 47°
∠ E = 47°
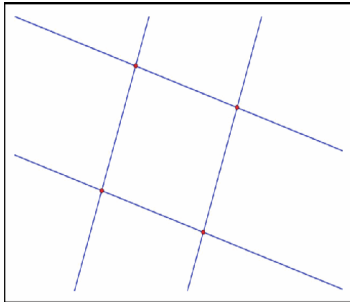
Complete the Exit Ticket and it hand in.

Assignment:

Multiple Transversals copied page