

Lesson 3.3: Auxiliary Lines

AGENDA:

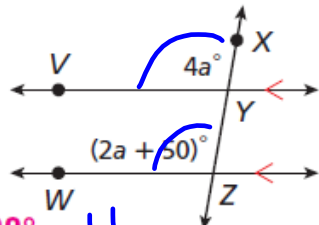
- Homework Check & Review 3-2
- Lesson 3.3 Notes
- Guided Individual Practice

Homework:

- Day 3 Worksheet (MathBits)

3-2 Homework P158 #7-11 odds, 12, 27, 28

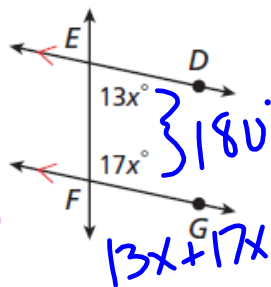
7. $m\angle VYX$



($a=25$)
 $m\angle VYX = 100^\circ$

$4a = 2a + 50$

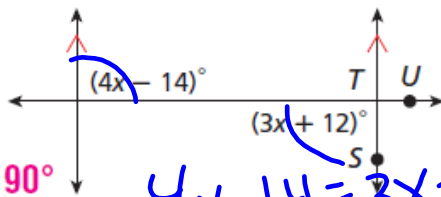
9. $m\angle EFG$



($x=6$)
 $m\angle EFG = 102^\circ$

$13x + 17x = 180$

11. $m\angle STU$



($x=26$)
 $m\angle STU = 90^\circ$

$4x - 14 = 3x + 12$

12. **Parking** In the parking lot shown, the lines that mark the width of each space are parallel.

$m\angle 1 = (2x - 3y)^\circ = 60$

$+ m\angle 2 = (x + 3y)^\circ = 120$

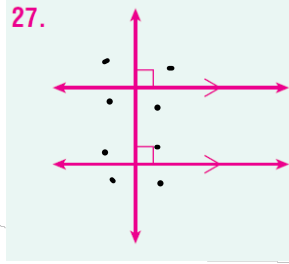
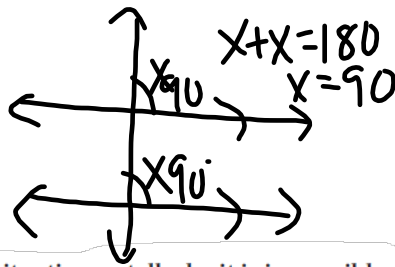
Find x and y .

$x = 60, y = 20$

$3x = 180$
 $x = 60$



3-1 Homework P158 Continued

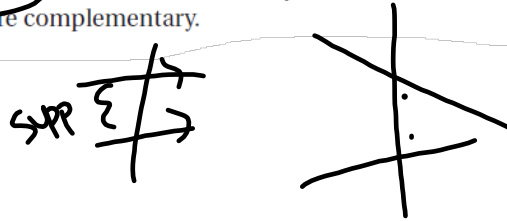


28. The situation is impossible because when \parallel lines are intersected by a transv., same-side int. \angle are supp.

Draw the given situation or tell why it is impossible.

27. Two parallel lines are intersected by a transversal so that the corresponding angles are supplementary.

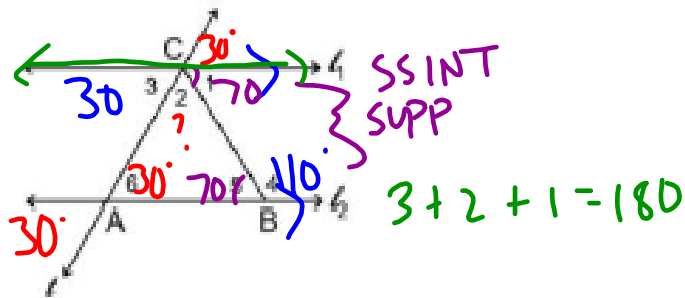
28. Two parallel lines are intersected by a transversal so that the same-side interior angles are complementary.



Review

A. In the diagram, line l_1 is parallel to line l_2 , $m\angle 3 = 30$ and $m\angle 4 = 110$. Find $m\angle 2$.

- [1] 60°
- [2] 80°
- [3] 100°
- [4] 120°



B. In the accompanying diagram,

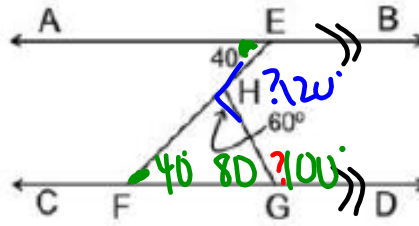
Hint: The measures of the 3 angles of a triangle add to 180

$\overline{AB} \parallel \overline{CD}$, \overline{FHE} , $m\angle AEF = 40$, and $m\angle FHG = 60$.

Find $m\angle HGD$.

[1] 95° [3] 120°

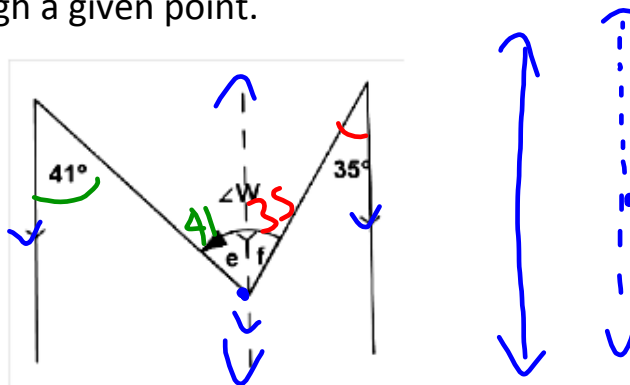
[2] 100° [4] 140°



Now find $m\angle EHG$. How did you do it?

An **auxiliary line** or segment is sometimes useful when solving for unknown angles. Note: there is only one line that can be drawn parallel to a given line through a given point.

Example:



Proof In the figure, $\overline{AB} \parallel \overline{CD}$.
 Prove that $m\angle AEC = a + c$.

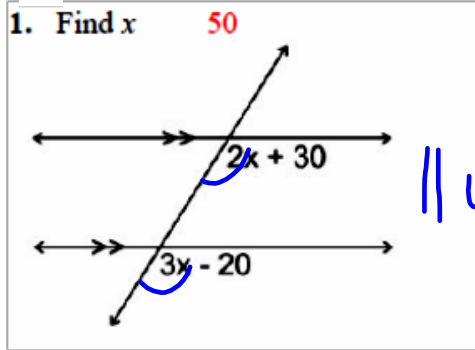
SINCE $\overline{AB} \parallel \overline{CD}$ AND THERE IS ONLY 1 LINE PARALLEL TO A GIVEN LINE THROUGH A GIVEN POINT, THEN $\overline{AB} \parallel \overline{EG} \parallel \overline{CD}$.
 SINCE THE LINES ARE PARALLEL & $\angle 1$ & $\angle 2$, $\angle 3$ & $\angle 4$ ARE ALT INT. \angle 'S BY DEFINITION, THEN $\angle 1 \cong \angle 2$ AND $\angle 3 \cong \angle 4$. SINCE $\cong \leftrightarrow =$ MEASURE, THEN $m\angle 1 = m\angle 2$ & $m\angle 3 = m\angle 4$.
 GIVEN $m\angle 1 = a$ AND $m\angle 3 = c$, THEN $m\angle 2 = a$ AND $m\angle 4 = c$ BY SUBSTITUTION. BY THE \angle ADDITION POSTULATE, $a + c = m\angle AEC$.

Practice: Given the drawing, determine the value of x as an informal proof.

\parallel LINES \rightarrow SAME SIDE INT \angle 'S SUPP $\rightarrow \angle$ SUM 180
 ONLY 1 LINE \parallel TO A GIVEN LINE THROUGH A GIVEN POINT
 \angle ADDITION POSTULATE & \parallel LINES \rightarrow ALT INT \angle 'S $\cong \rightarrow =$
 $x + 50 = 70$
 $x = 20$

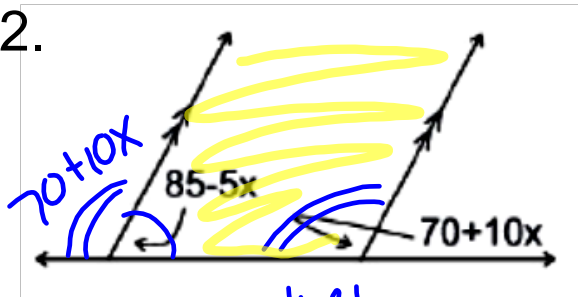
Use your knowledge of parallel lines to solve the following:

1. Find x 50



|| LINES \rightarrow CORRESP \angle 'S $\approx \rightarrow =$
 $2x + 30 = 3x - 20$
 $x = 50$

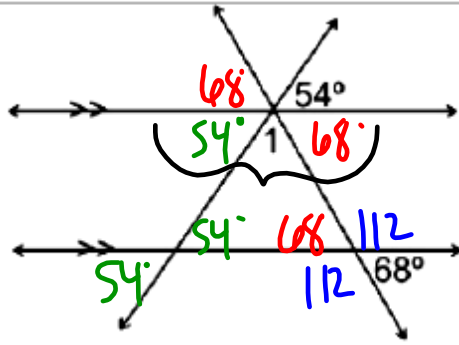
2.



5

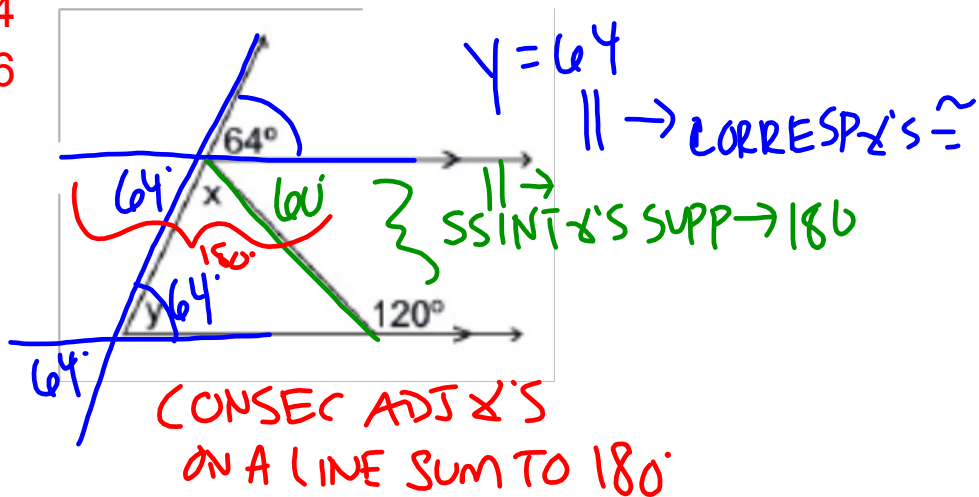
|| L' S \rightarrow SAME SIDE INT \angle 'S SUPP
 $(70 + 10x) + (85 - 5x) = 180$

3. Find $m\angle 1$
 58°



Solve for the given variable(s), writing down any relationships used.

1. $x=64$
 $y=56$

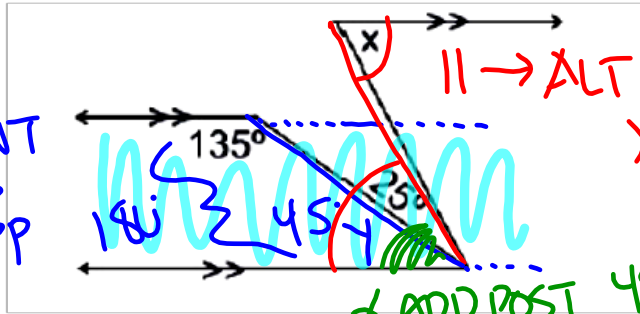


Solve for the given variable(s), writing down any relationships used.

2.



|| → SSINT
∠'S
SUPP

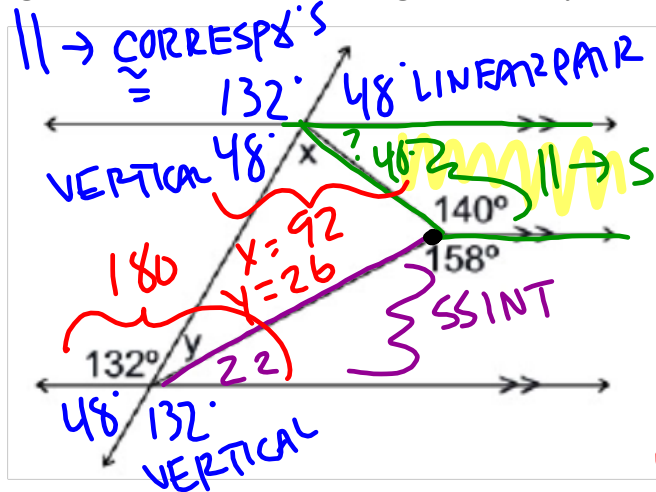


|| → ALT INT ∠'S ≅ → =
x = 70°

∠ ADD POST 45 + 25 = 70

Solve for the given variable(s), writing down any relationships used.

3. x=92
y=26



$$\begin{array}{r} 180 \\ -132 \\ \hline 48 \end{array}$$

|| → CORRESP ∠'S
≅

48° LINEAR PAIR

VERTICAL 48°

|| → SSINT SUPP

180
x = 92
y = 26

SSINT

CONSEC ADJ
∠'S ON A LINE
SUM TO 180

$$48 + x + 40 = 180$$

$$x = 92$$

$$132 + y + 22 = 180$$

$$26 = y$$