Lesson 7: Solve for Unknown Angles—Transversals

Classwork

Opening Exercise

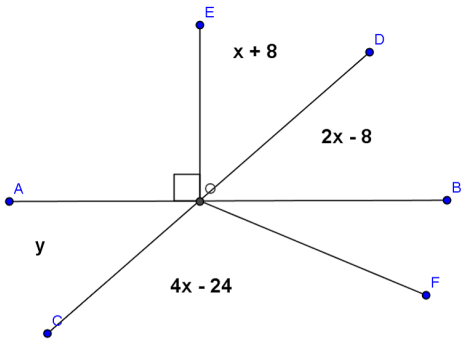
Use the diagram at the right to determine x and y. AB and CD are straight lines.

x = _____

y = _____

Name a pair of vertical angles:

_____



Find the measure of $\angle BOF$. Justify your calculation.

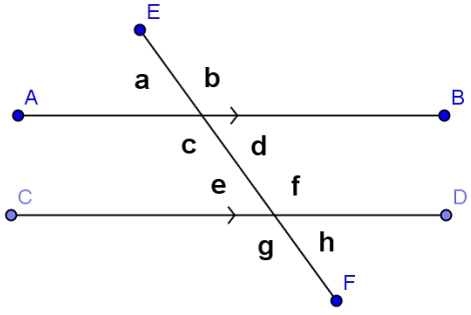
_____

_____

Discussion

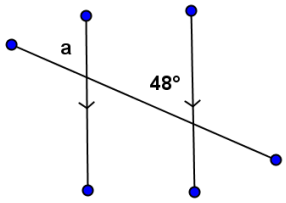
Given a pair of lines AB and CD in a plane (see the diagram below), a third line EF is called a ***transversal*** if it intersects AB at a single point and intersects CD at a single but different point. The two lines AB and CD are parallel if and only if the following types of angle pairs are congruent or supplementary:

- Corresponding Angles are equal in measure
  Abbreviation: _____
  _____
- Alternate Interior Angles are equal in measure
  Abbreviation: _____
  _____
- Same Side Interior Angles are supplementary
  Abbreviation: _____
  _____



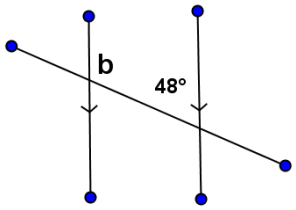
Examples

a.



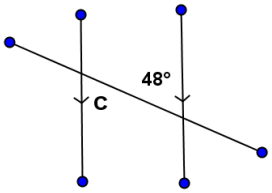
$\angle a$ = _____

b.



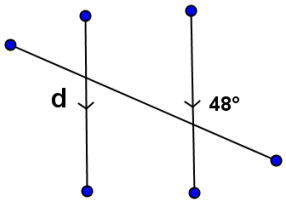
$\angle b$ = _____

c.



$\angle c$ = _____

d.

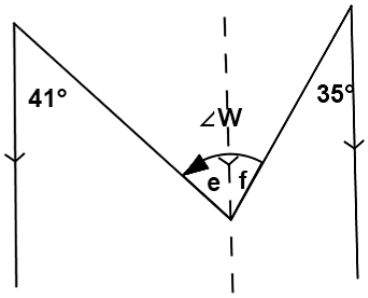


$\angle d$ = _____

e. An _____is sometimes useful when solving for unknown angles.

In this figure, we can use the auxiliary line to find the measures of $\angle e$ and $\angle f$ (how?), then add the two measures together to find the measure of $\angle W$.

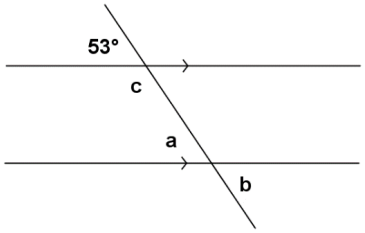
What is the measure of $\angle W$?



Exercises

In each exercise below, find the unknown (labeled) angles. Give reasons for your solutions.

1.

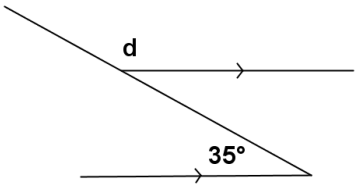


$\angle a$ = _____

$\angle b$ = _____

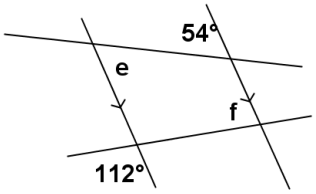
$\angle c$ = _____

2.



$\angle d$ = _____

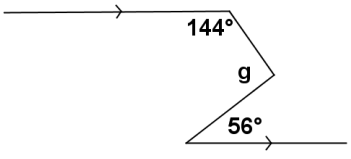
3.



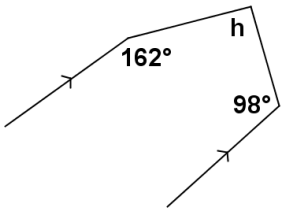
$\angle e$ = _____

$\angle f$ = _____

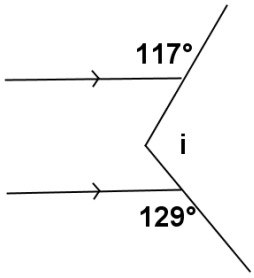
4.



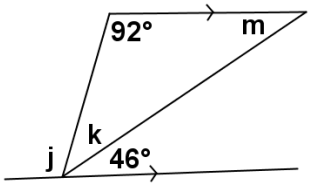
$\angle g$ = _____

5. 

$\angle h$ = _____

6. 

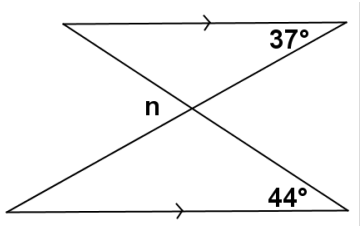
$\angle i$ = _____

7. 

$\angle j$ = _____

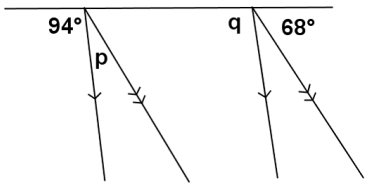
$\angle k$ = _____

$\angle m$ = _____

8. 

$\angle n$ = _____

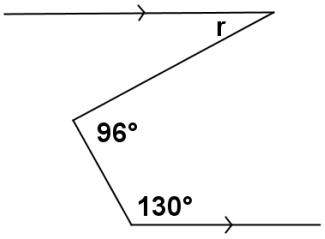
9.



$\angle p$ = _____

$\angle q$ = _____

10.



$\angle r$ = _____

Relevant Vocabulary

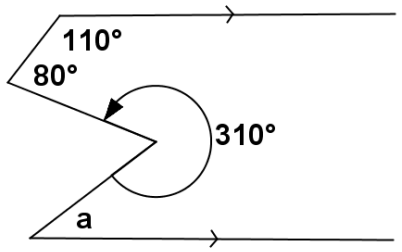
Alternate Interior Angles: Let line T be a transversal to lines L and M such that T intersects L at point P and intersects M at point Q. Let R be a point on L, and S be a point on M such that the points R and S lie in opposite half-planes of T. Then the angle $\angle RPQ$ and the angle $\angle PQS$ are called *alternate interior angles* of the transversal T with respect to M and L.

Corresponding Angles: Let line T be a transversal to lines L and M. If $\angle x$ and $\angle y$ are alternate interior angles, and $\angle y$ and $\angle z$ are vertical angles, then $\angle x$ and $\angle z$ are *corresponding angles*.

Problem Set

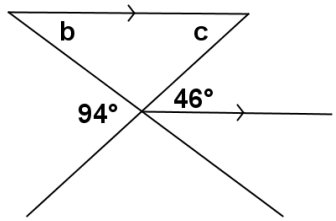
Find the unknown (labeled) angles. Give reasons for your solutions.

1.



$\angle a =$ _____

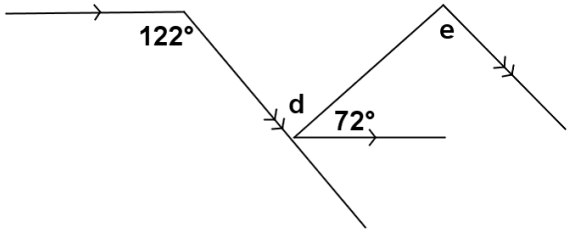
2.



$\angle b =$ _____

$\angle c =$ _____

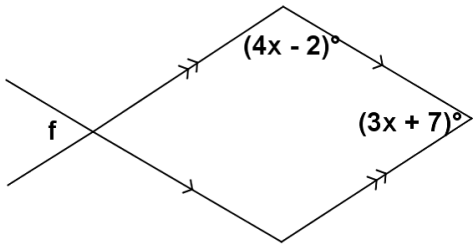
3.



$\angle d =$ _____

$\angle e =$ _____

4.



$\angle f =$ _____