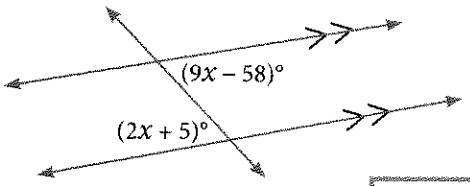
EXAMPLE 3

**Use the figure at right.**
**a. Solve for $x$.**
**b. Find the measure of each identified angle.**




**SOLUTIONS**

**a.** The lines are parallel so alternate interior angles are congruent.

Subtract $2x$ from each side of the equation.

Add 58 to each side of the equation.

Divide each side of the equation by 7.

$$\begin{array}{r|l} 9x - 58 = 2x + 5 & \\ -2x \quad\quad -2x & \\ \hline 7x - 58 = 5 & \\ +58 \quad\quad +58 & \\ \hline 7x = 63 & \\ \frac{7x}{7} = \frac{63}{7} & \end{array}$$

$x = 9$

The identified angles are the unknown angles that are marked with algebraic expressions.

**b.** Write the given expression for each angle.
Substitute 9 for $x$.
Multiply.
Simplify.

| $(9x - 58)°$ | $(2x + 5)°$ |
|---|---|
| $(9(9) - 58)°$ | $(2(9) + 5)°$ |
| $(81 - 58)°$ | $(18 + 5)°$ |
| $23°$ | $23°$ |

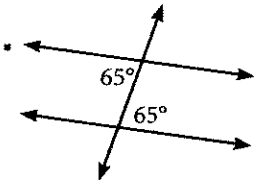
Each angle measures 23°. Alternate interior angles are congruent so **part b** verifies the solution for $x$.

## EXERCISES

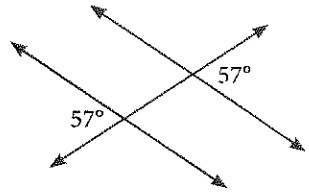
**Use one of the following special angle pairs to identify the relationship of the angles shown.**

| Alternate Exterior | Alternate Interior | Vertical | Linear Pair |
|---|---|---|---|

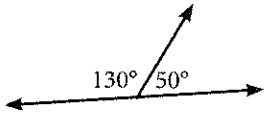
**1.**



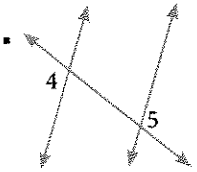

**2.**



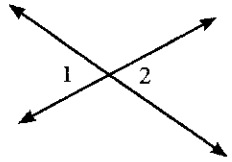

**3.**



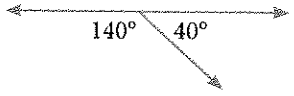

**4.**



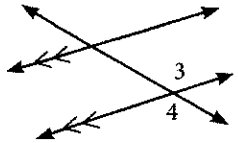

**5.**



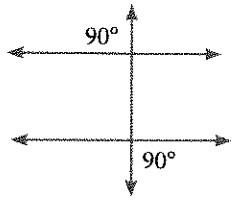

**6.**



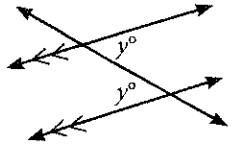

**7.**




**8.**

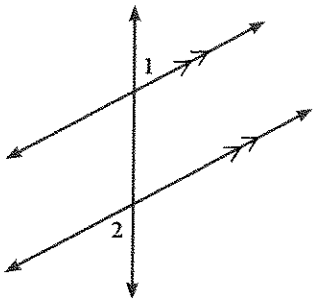



**9.**

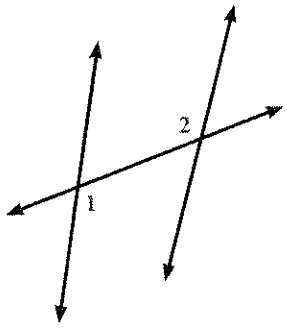


**Name the special angle pair relationship between $\angle 1$ and $\angle 2$. Explain whether $\angle 1 \cong \angle 2$.**

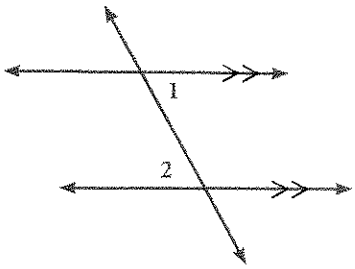
**10.**




**11.**

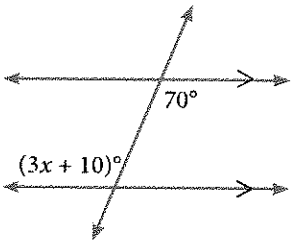



**12.**

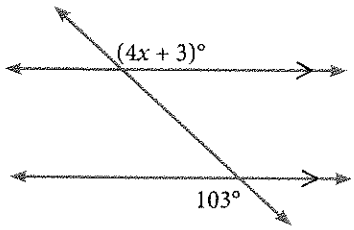



**Identify each special angle pair relationship between the angles shown. Solve for $x$.**

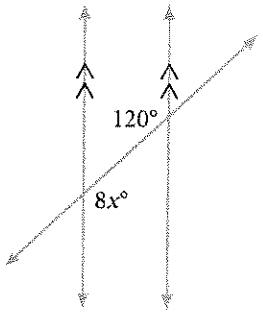
**13.**




**14.**

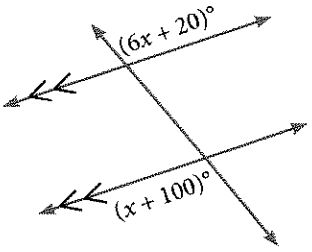



**15.**

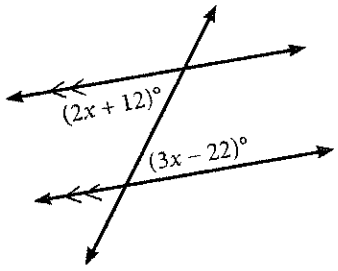



**Solve for $x$. Then find the measure of each identified angle. Check your solution.**

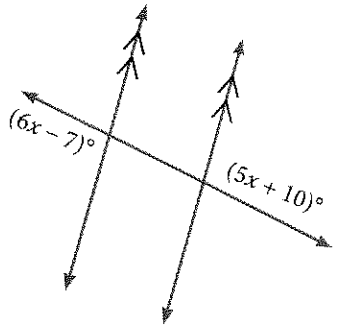
**16.**



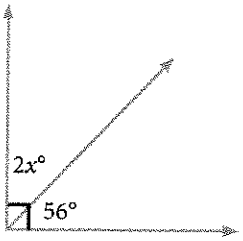

**17.**




**18.**




**19.**




**20.** $\angle 1$ and $\angle 2$ are vertical angles
$m\angle 1 = (5x + 7)°$
$m\angle 2 = (3x + 15)°$

**21.** $\angle 5$ and $\angle 8$ are supplementary
$m\angle 5 = (3x - 40)°$
$m\angle 8 = (7x - 120)°$

**22.** Explain how to distinguish between alternate exterior angles and alternate interior angles.

**23.** Martin knows two angles form a linear pair. The angles have measures of $(2x)°$ and $(8x + 10)°$. His work solving for $x$ is at right. Identify Martin's mistake and then find the value of $x$.

| Martin's Work |
|---|
| $2x + 8x + 10 = 90$ |
| $10x + 10 = 90$ |
| $10x = 80$ |
| $x = 8$ |