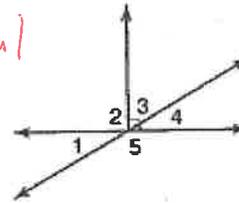


Angle Relationships

Identify each pair of angles as adjacent, vertical, complementary, supplementary, and/or as a linear pair.

1. $\angle 1$ and $\angle 2$ *ADJACENT*

2. $\angle 1$ and $\angle 4$ *VERTICAL*



3. $\angle 3$ and $\angle 4$
ADJACENT, Complementary

4. $\angle 1$ and $\angle 5$
*ADJACENT
Supplementary
Linear Pair*

Find the value of x .

5.
 $5x = x + 16$
 $4x = 16$
 $x = 4$

6.
 $7x + 10 + 3x = 180$
 $10x + 10 = 180$
 $10x = 170$
 $x = 17$

7.
 $4x + 3 + x - 8 = 90$
 $5x - 5 = 90$
 $5x = 95$
 $x = 19$

8. $\angle 1$ is a complement of $\angle 2$. $\angle 1 = 68$. Find $\angle 2$.
 $68 + \angle 2 = 90$
 $\angle 2 = 22$

9. $\angle 3$ is a supplement of $\angle 4$. $\angle 4 = 56$. Find $\angle 3$.
 $56 + \angle 3 = 180$
 $\angle 3 = 124$

10. Find x .
 $18x - 9 + 4x + 13 = 180$
 $22x + 4 = 180$
 $22x = 176$
 $x = 8$

11. Find x .
 $6x + 4x = 90$
 $10x = 90$
 $x = 9$

12. The measure of one angle is 24° more than its complement. What are the measures of the angles?
 $x + (x + 24) = 90$ $2x = 66$ 33 AND 57
 $2x + 24 = 90$ $x = 33$

13. The measure of one angle is three times the measure of its complement. Find the measure of each angle. $x + 3x = 90$ $x = 22.5$ 22.5 AND 67.5

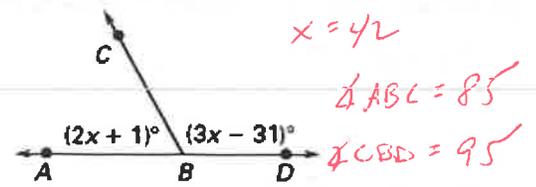
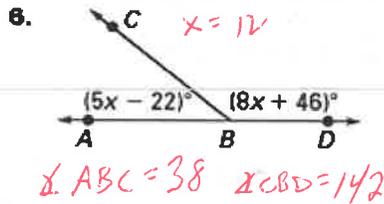
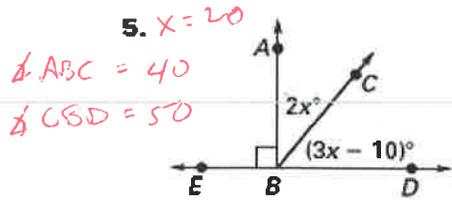
14. Two angles form a linear pair. The measure of one angle is 8 times the measure of the other angle. Find the measure of each angle. $x + 8x = 180$ $x = 20$ 20 AND 160

15. The measure of one angle is 38° less than the measure of its supplement. Find the measure of each angle.
 $x + (x - 38) = 180$ 109 AND 71
 $2x = 218$
 $x = 109$

$\angle 1$ and $\angle 2$ are complementary angles and $\angle 2$ and $\angle 3$ are supplementary angles. Given the measure of $\angle 1$, find $m\angle 2$ and $m\angle 3$.

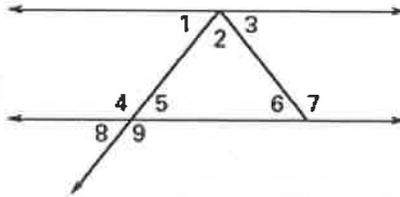
1. $m\angle 1 = 80^\circ$ $\angle 2 = 10$ $\angle 3 = 170$
 2. $m\angle 1 = 33^\circ$ $\angle 2 = 57$ $\angle 3 = 123$
 3. $m\angle 1 = 72^\circ$ $\angle 2 = 18$ $\angle 3 = 108$
 4. $m\angle 1 = 7^\circ$ $\angle 2 = 83$ $\angle 3 = 97$

Find $m\angle ABC$ and $m\angle CBD$.

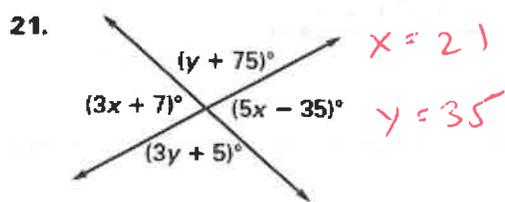
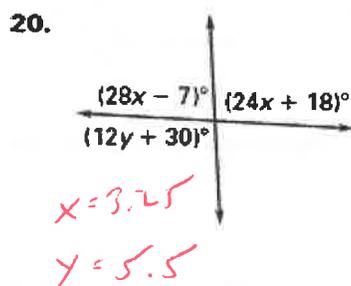
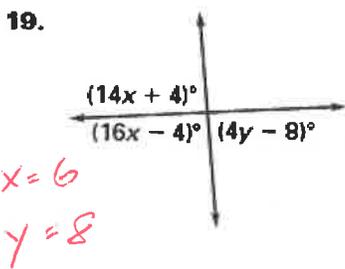
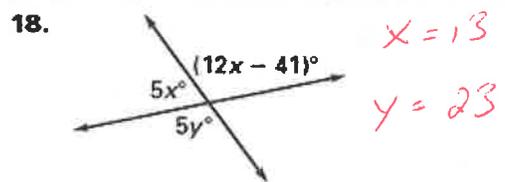
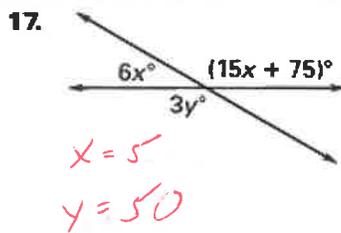
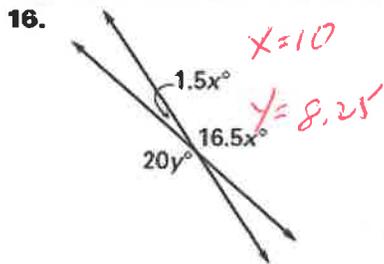


In Exercises 8–12, use the diagram. Tell whether the angles are vertical angles, a linear pair, or neither.

8. $\angle 1$ and $\angle 3$ N
 9. $\angle 2$ and $\angle 3$ N
 10. $\angle 4$ and $\angle 5$ linear pair
 11. $\angle 5$ and $\angle 8$ vertical
 12. $\angle 4$ and $\angle 9$ vertical



Find the values of x and y .



22. Let $\angle A$ and $\angle B$ be complementary angles and let $m\angle A = (2x^2 + 35)^\circ$ and $m\angle B = (x + 10)^\circ$. What is (are) the value(s) of x . What are the measures of the angles?

$2x^2 + 35 + x + 10 = 90$
 $2x^2 + x - 45 = 0$
 $(x + 5)(2x - 9) = 0$
 $x = -5$ and $\frac{9}{2}$

2 solutions
 $x = -5$ $\angle A = 85$ $\angle B = 5$
 $x = \frac{9}{2}$ $\angle A = 75.5$ $\angle B = 14.5$

23. Let $\angle A$ and $\angle B$ be supplementary angles and let $m\angle A = (x^2 + 12x)^\circ$ and $m\angle B = (3x^2 + 20)^\circ$. What is the value of x ? What are the measures of the angles?

$x^2 + 12x + 3x^2 + 20 = 180$
 $4x^2 + 12x - 160 = 0$
 $4(x + 8)(x - 5) = 0$
 $x = -8$ and 5

1 solution
 $x = 5$ $\angle A = 85$ $\angle B = 95$