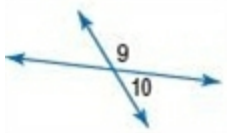
2-8 Proving Angle Relationships

Find the measure of each numbered angle and name the theorems used that justify your work.

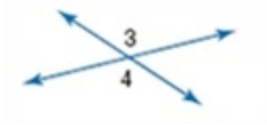
11. $m\angle 9 = 3x + 12$
$m\angle 10 = x - 24$



ANSWER:

$m\angle 9 = 156, m\angle 10 = 24$ (Supp. Thm.)

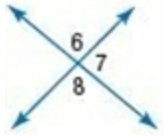
12. $m\angle 3 = 2x + 23$
$m\angle 4 = 5x - 112$



ANSWER:

$m\angle 3 = 113, m\angle 4 = 113$ (Vert. $\angle s$ Thm.)

13. $m\angle 6 = 2x - 21$
$m\angle 7 = 3x - 34$

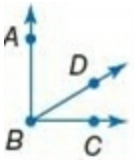


ANSWER:

$m\angle 6 = 73, m\angle 7 = 107, m\angle 8 = 73$ ($\cong$ Supp. Thm. and Vert. $\angle s$ Thm.)

PROOF Write a two-column proof.

14. Given: $\angle ABC$ is a right angle.
Prove: $\angle ABD$ and $\angle CBD$ are complementary.



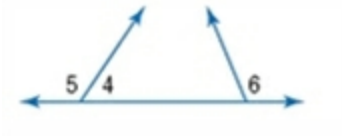
ANSWER:

Proof:

Statements (Reasons)

1. $\angle ABC$ is a right angle. (Given)
2. $m\angle ABC = 90$ (Def. of rt. angle)
3. $m\angle ABC = m\angle ABD + m\angle CBD$ ($\angle$ Add. Post.)
4. $m\angle ABD + m\angle CBD = 90$ (Subs.)
6. $\angle ABD$ and $\angle CBD$ are complementary. (Def. of compl. $\angle s$)

15. Given:. $\angle 5 \cong \angle 6$
Prove: $\angle 4$ and $\angle 6$ are supplementary.



ANSWER:

Proof:

Statements (Reasons)

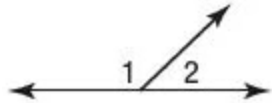
1. $\angle 5 \cong \angle 6$ (Given)
2. $m\angle 5 = m\angle 6$ (Def. of $\cong \angle s$)
3. $\angle 4$ and $\angle 5$ are supplementary. (Def. of linear pairs)
4. $m\angle 4 + m\angle 5 = 180$ (Def. of supp. $\angle s$)
5. $m\angle 4 + m\angle 6 = 180$ (Subst.)
6. $\angle 4$ and $\angle 6$ are supplementary. (Def. of supp. $\angle s$)

Write a proof for each theorem.

16. Supplement Theorem

ANSWER:

Given: Two angles form a linear pair.
Prove: The angles are supplementary.



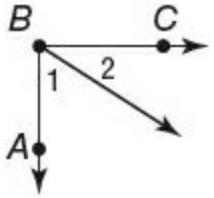
Paragraph Proof:

When two angles form a linear pair, the resulting angle is a straight angle whose measure is 180. By definition, two angles are supplementary if the sum of their measures is 180. By the Angle Addition Postulate, $m\angle 1 + m\angle 2 = 180$. Thus, if two angles form a linear pair, then the angles are supplementary.

17. Complement Theorem

ANSWER:

Given: $\angle ABC$ is a right angle..
Prove: $\angle 1$ and $\angle 2$ are complementary angles.



Proof:

Statements (Reasons)

1. $\angle ABC$ is a right angle. (Given)
2. $m\angle ABC = 90$ (Def. of rt. $\angle s$)
3. $m\angle ABC = m\angle 1 + m\angle 2$ ($\angle$ Add. Post.)
4. $m\angle 1 + m\angle 2 = 90$ (Subst.)
5. $\angle 1$ and $\angle 2$ are complementary angles. (Def. of comp. $\angle s$)