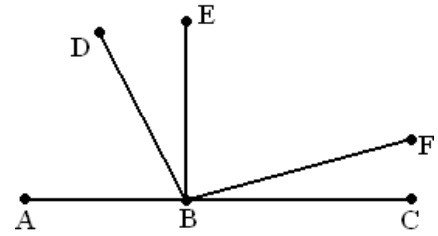# Practice Problems: Perpendicular Lines
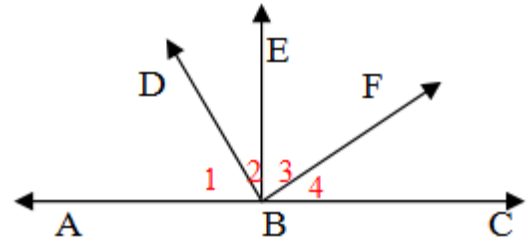
Directions: In the figure, $\overline{BE} \perp \overline{AC}$ and $\overline{BD} \perp \overline{BF}$. Complete the table.

m∠CBF	m∠EBF	m∠DBE	m∠DBA	m∠DBC
40°				
	70°			
		35°		
			65°	

Given: BE ⊥ AC, BD ⊥ BF. Find the value of x.

1) $m\angle 2 = 2x + 10$, $m\angle 3 = 40$.

   $x =$ _____

2) $m\angle 3 = 2x + 5$, $m\angle 4 = 3x$.

   $x =$ _____

3) $m\angle 1 = 2x$, $m\angle 2 = 2x + 10$,

   $m\angle 3 = 3x - 20$, $m\angle 4 = 3x - 10$.

   $x =$ _____

4) $m\angle 1 = 3x + 1$, $m\angle 2 = 4x + 5$, $m\angle 3 = 2x + 13$

   $x =$ _____

Complete the following proofs by supplying the missing statements and reasons.

5) **Given:** BA ⊥ AC;

   ∠1 is complementary to ∠3

   Prove: m∠2 = m∠3
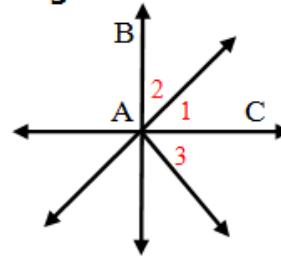
Statements	Reasons
1) BA ⊥ AC	**1)** _____
2) ∠1 and ∠2 are complementary	**2)** _____
3) _____	**3)** Given
4) m∠1 + m∠2 = 90; m∠1 + m∠3 = 90	**4)** _____
5) _____	**5)** _____
6) _____	**6)** Reflexive Property
7) _____	**7)** _____

Name the definition, postulate, or theorem that justifies the statement about the diagram.

6) If D is the midpoint of $\overline{BC}$, then $\overline{BD} \cong \overline{DC}$.

7) If $\angle 1 \cong \angle 2$, then $\overrightarrow{AD}$ is the bisector of $\angle BAC$.
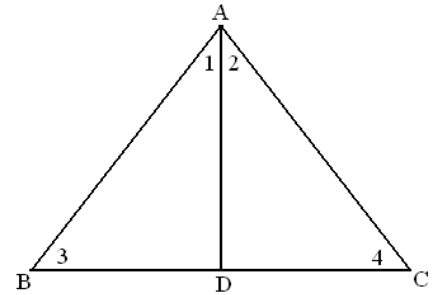
8) ~~$m\angle 3 + m\angle 4 = 180°$.~~

9) If $\overline{BD} \cong \overline{DC}$, then D is the midpoint of $\overline{BC}$.

10) If D is the midpoint of $\overline{BC}$, then $BD = \frac{1}{2} BC$.

11) If $\overrightarrow{AD}$ bisects $\angle BAC$, then $\angle 1 \cong \angle 2$.
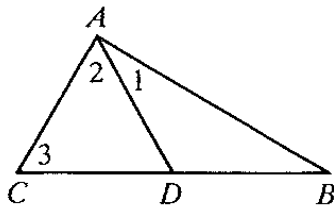
12) $m\angle 1 + m\angle 2 = m\angle BAC$

13) $BD + DC = BC$

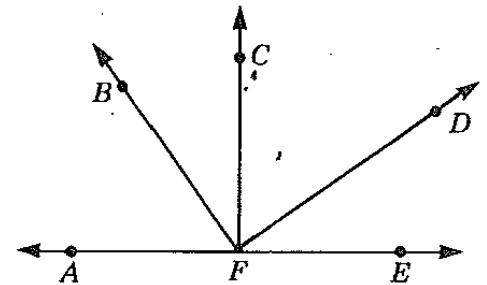**Complete the proof by supplying the missing statements and reasons.**

13. Given: $\overline{BA} \perp \overline{AC}$;
$\angle 1$ is complementary to $\angle 3$.

Prove: $m\angle 2 = m\angle 3$

Statements	Reasons
1. $\overline{BA} \perp \overline{AC}$	1. _____
2. $\angle 1$ and $\angle 2$ are complementary.	2. _____
3. $\angle 1$ and $\angle 3$ are complementary.	3. _____
4. $m\angle 1 + m\angle 2 = 90$; $m\angle 1 + m\angle 3 = 90$	4. _____
5. $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 3$	,5. _____
6. _____	6. Reflexive Prop.
7. $m\angle 2 =$ $m\angle 3$	7. _____

Write or name the definition or theorem that justifies the statement about the diagram above.

5. If $\overleftrightarrow{AE} \perp \overleftrightarrow{FC}$, then $\angle AFC \cong \angle EFC$. _____

6. If $\overleftrightarrow{FB} \perp \overleftrightarrow{FD}$, then $\angle BFD$ is a right angle. _____

7. If $\angle BFC$ and $\angle CFD$ are complementary, then
$m\angle BFC + m\angle CFD = 90$. _____

8. If $m\angle AFB + m\angle EFB = 180$, then $\angle AFB$ and $\angle EFB$ are
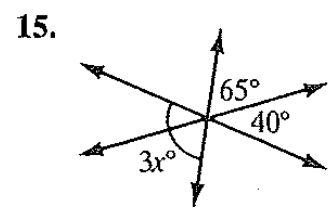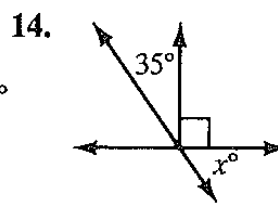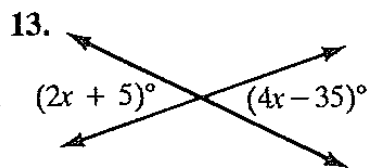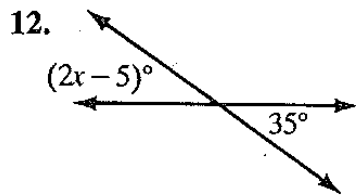supplementary. _____

9. If $\angle BFD$ is a right angle, then $\overleftrightarrow{FB} \perp \overleftrightarrow{FD}$. _____

10. If $\angle EFC$ is a right angle, then $m\angle EFC = 90$. _____

11. If $\angle AFC \cong \angle CFE$, then $\overleftrightarrow{CF}$ and $\overleftrightarrow{AE}$ are perpendicular. _____

Special Angles and Perpendicular Lines Practice

Find the value of x.

12.

$(2x-5)°$

$35°$

13.

$(2x + 5)°$ $(4x-35)°$

14.

$35°$

$x°$

15.

$65°$
$40°$
$3x°$

In the diagram, $\overrightarrow{OC}$ bisects $\angle BOD$, $m\angle BOD = 90$, and $m\angle BOA = 40$. Find:
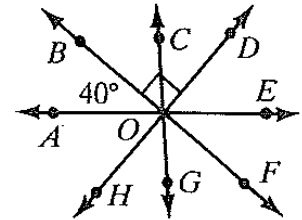
16. $m\angle BOC$ **17.** $m\angle FOG$ **18.** $m\angle AOH$

19. $m\angle HOE$ **20.** $m\angle DOE$ **21.** $m\angle AOE$
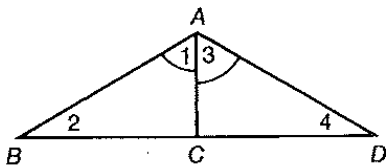
B C D
$40°$ E
A O
H G F

---

12. Complete the proof.

Given: $\overrightarrow{AC}$ bisects $\angle BAD$;
  $\angle 1$ and $\angle 2$ are comps.;
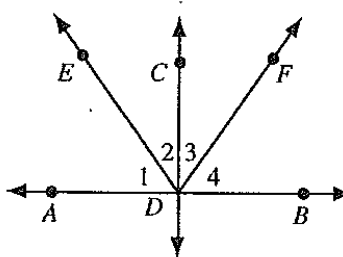 $\angle 3$ and $\angle 4$ are comps.

Prove: $m\angle 2 = m\angle 4$

A
1 3
2 4
B C D

Statements	Reasons
1. $\overrightarrow{AC}$ bisects $\angle BAD$.	1. _____
2. $m\angle 1 = m\angle 3$	2. _____
3. $\angle 1$ and $\angle 2$ are comps.; $\angle 3$ and $\angle 4$ are comps.	3. _____
4. _____	4. Def. of comp. $\angle s$
5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	5. _____
6. $m\angle 2 = m\angle 4$	6. _____

Supply the statements or reasons needed to complete the proof.

12. Given: $\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$;
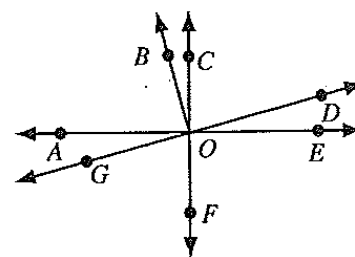 $\angle 1 \cong \angle 4$
Prove: $\angle 2 \cong \angle 3$

E C F
2 3
1 4
A D B

Proof:

Statements	Reasons
1. $\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$	1. _____
2. $\angle 1$ and $\angle 2$ are complementary; $\angle 3$ and $\angle 4$ are complementary.	2. _____
3. _____	3. Given
4. $\angle 2 \cong \angle 3$	4. _____

Section 5.4, 5.5 Practice Problems

In the diagram, $\overrightarrow{OB} \perp \overleftrightarrow{OD}$, $\overrightarrow{OC} \perp \overleftrightarrow{OE}$, and $m\angle AOG = 15$. Complete.

12. $m\angle BOD = $ _____

13. $m\angle DOE = $ _____

14. $m\angle BOE = $ _____

15. $m\angle COD = $ _____

16. $m\angle AOB = $ _____

17. $m\angle GOE = $ _____

Exs. 12–17

Supply the missing reasons in the proof.

18. Given: $\angle 1 \cong \angle 3$

Prove: $\angle 1$ and $\angle 2$ are supplementary.
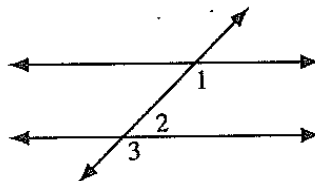
Proof:

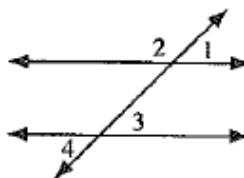| Statements	Reasons
1. $\angle 1 \cong \angle 3$, or $m\angle 1 = m\angle 3$	1. _____
2. $m\angle 3 + m\angle 2 = 180$	2. _____
3. $m\angle 1 + m\angle 2 = 180$	3. _____
4. $\angle 1$ and $\angle 2$ are supplementary	4. _____

Supply the missing reasons in the proof.

11. Given: $\angle 1 \cong \angle 3$

Prove: $\angle 1 \cong \angle 4$

Proof:

Statements	Reasons
1. $\angle 1 \cong \angle 3$	1. _____
2. $\angle 3 \cong \angle 4$	2. _____
3. $\angle 1 \cong \angle 4$	3. _____