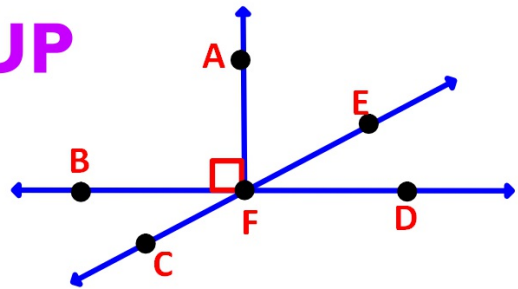


WARMUP

Name the figures described

1) Two noncongruent supplementary angles



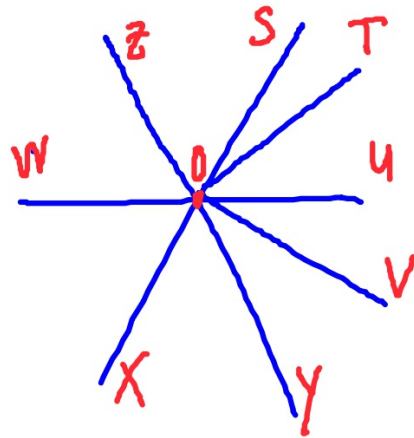
2) Two obtuse vertical angles

OT bisects $\angle SOU$; $m\angle UOV = 35$ and $m\angle YOW = 120$. Find the measure of each angle and $m\angle SOZ = 70$

3) $m\angle ZOW$

4) $m\angle SOU$

5) $m\angle ZOT$



SECTION 2.5: PERPENDICULAR LINES

Standards:

1.0 - Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning

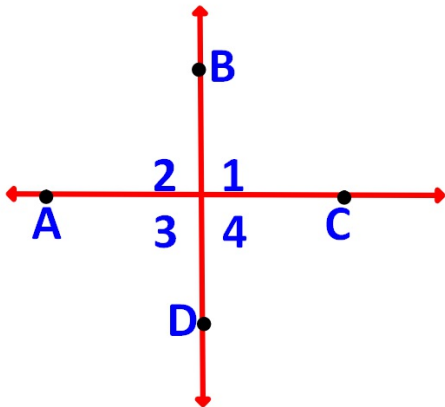
2.0 - Students write geometric proofs, including proofs by contradiction.

4.0 - Students prove basic theorems involving

PERPENDICULAR LINES

label perp: \perp

Definition: Two lines that intersect to form right angles are perpendicular lines.



1. Given: $\overleftrightarrow{AC} \perp \overleftrightarrow{BD}$

Then $m\angle 1 = 90$, $m\angle 2 = 90$, $m\angle 3 = 90$, $m\angle 4 = 90$
Then $\angle 1, \angle 2, \angle 3, \angle 4$ are rt angles

2. Given $m\angle 3 = 90$

Then $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$

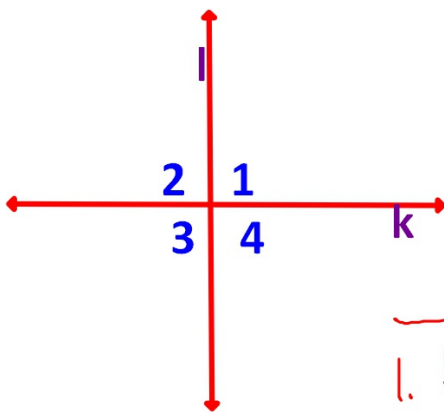
could be lines, rays or segments

Def. of \perp lines

THEOREM

GIVEN:

If 2 lines are perpendicular then they form congruent adjacent angles



Given : $k \perp l$

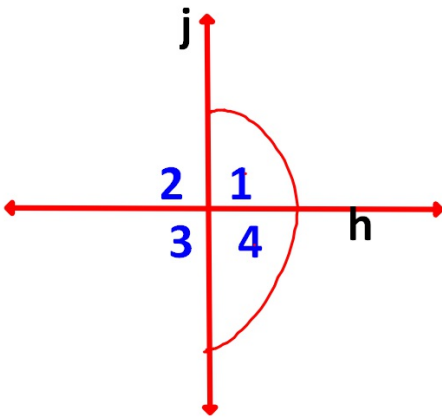
Then:

$$\angle 1 \cong \angle 2, \angle 2 \cong \angle 3, \angle 3 \cong \angle 4, \angle 4 \cong \angle 1$$

1. $k \perp l$	1. GIVEN
2. $m\angle 1 = m\angle 2 = m\angle 3 = m\angle 4 = 90$	2. Def. of \perp lines
3. $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	3. Def. of \cong \angle 's

THEOREM

If 2 lines form congruent adjacent angles, then the lines are perpendicular.



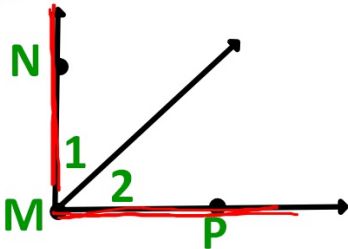
Given: $\angle 1 \cong \angle 4$

Then $h \perp j$

- | | |
|---|--------------------------|
| 1. $\angle 1 \cong \angle 4$ | 1. GIVEN |
| 2. $m\angle 1 + m\angle 4 = 180$ | 2. Angle Add. Post, |
| 3. $m\angle 1 + m\angle 1 = 180$ | 3. SUB. |
| 4. $2m\angle 1 = 180$
$m\angle 1 = 90$ | 4. Div. prop. of = |
| 5. $h \perp j$ | 5. Def. of \perp lines |

THEOREM

If the exterior sides of two adjacent acute angles are perpendicular, then the angles are complementary.



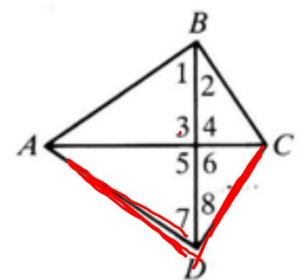
Given : $\overrightarrow{MN} \perp \overrightarrow{MP}$

Then $\angle 1$ & $\angle 2$ are complementary angles

- | | |
|--|------------------------------|
| 1. $\overrightarrow{MN} \perp \overrightarrow{MP}$ | 1. GIVEN |
| 2. $m\angle NMP = 90$ | 2. Def. of \perp lines |
| 3. $m\angle 1 + m\angle 2 = m\angle NMP$ | 3. Angle Add. post |
| 4. $m\angle 1 + m\angle 2 = 90$ | 4. SUB. |
| 5. $\angle 1$ and $\angle 2$ are comp. \angle 's | 5. Def. of Comp. \angle 's |

Name the definition or state the theorem that justifies each statement about the diagram.

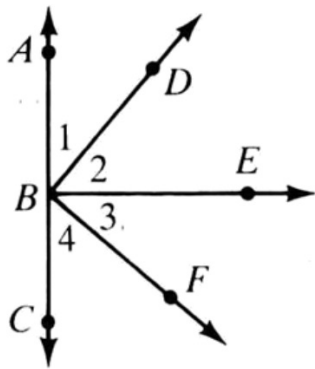
1. If $\overline{AB} \perp \overline{BC}$, then $\angle ABC$ is a **right** angle.
2. If $\overline{BD} \perp \overline{AC}$, then $\angle 3 \cong \angle 4$.
3. If $\overline{DC} \perp \overline{DA}$, then $\angle 7$ and $\angle 8$ are complementary.
4. If $\angle 7$ and $\angle 8$ are complementary, then $m\angle 7 + m\angle 8 = 90$.
5. If $\angle 4 \cong \angle 6$, then $\overline{AC} \perp \overline{BD}$.
6. $\angle 4 \cong \angle 5$
7. If $\angle ADC$ is a right angle, then $m\angle ADC = 90$.



1. Def of perp lines
2. If 2 lines are perp then they form \cong adj angles
3. If the ext sides of 2 adj acute angles are perp then the angles are comp
4. Def of comp angles
5. If 2 lines form \cong adj angles, then the lines are perp.
6. Vert angles are \cong
7. Def of rt angles

Given: $\overrightarrow{BE} \perp \overleftrightarrow{AC}$; $\overrightarrow{BD} \perp \overrightarrow{BF}$. Find the value of x .

8) $m(\angle 2) = 2x + 10$; $m(\angle 3) = 40$



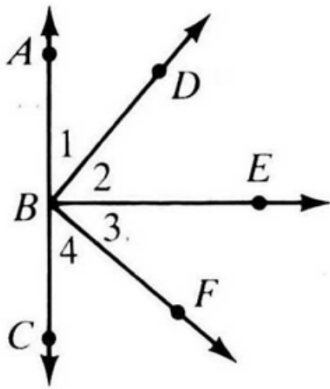
$$2x + 10 + 40 = 90$$

$$2x = 40$$

$$x = 20$$

Given: $\overrightarrow{BE} \perp \overleftrightarrow{AC}$; $\overleftrightarrow{BD} \perp \overrightarrow{BF}$. Find the value of x .

9) $m(\angle 3) = 2x + 5$; $m(\angle 4) = 3x$



$$3x + 2x + 5 = 90$$

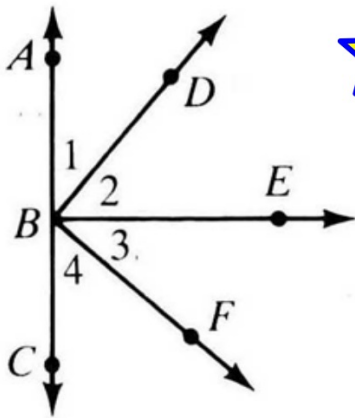
$$5x = 85$$

$$x = 17$$

Given: $\overrightarrow{BE} \perp \overleftrightarrow{AC}$; $\overleftrightarrow{BD} \perp \overrightarrow{BF}$. Find the value of x .

10) $m(\angle 1) = 2x$; $m(\angle 2) = 2x + 10$;

$m(\angle 3) = 3x - 20$; $m(\angle 4) = 3x - 10$



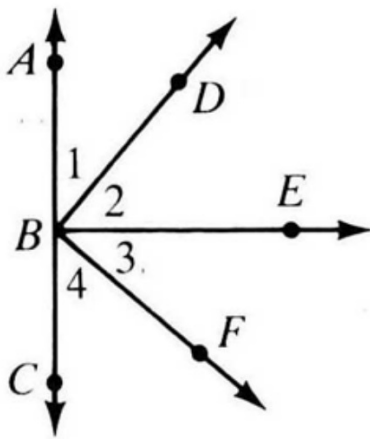
$$2x + 2x + 10 = 90$$

$$4x = 80$$

$$x = 20$$

Given: $\overrightarrow{BE} \perp \overleftrightarrow{AC}$; $\overleftrightarrow{BD} \perp \overleftrightarrow{BF}$. Find the value of x .

$$\begin{aligned} \text{I I) } m(\angle 1) &= 7x; & m(\angle 2) &= 7x + 6; \\ m(\angle 3) &= 5x + 12; & m(\angle 4) &= 8x \end{aligned}$$



$$7x + 7x + 6 = 90$$

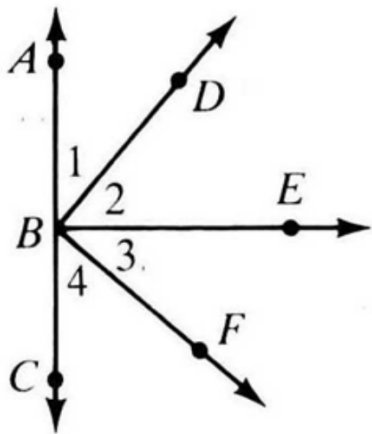
$$14x = 84$$

$$x = 6$$

Given: $\vec{BE} \perp \vec{AC}$; $\vec{BD} \perp \vec{BF}$. Find the value of x .

$$12) m(\angle 1) = 3x + 1; m(\angle 2) = 4x + 5;$$

$$m(\angle 3) = 2x + 13$$



$$3x + 1 + 4x + 5 = 90$$

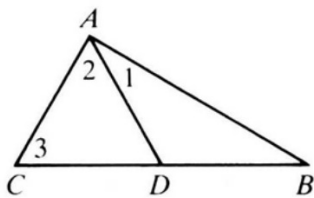
$$7x = 84$$

$$x = 12$$

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. <u>Given</u>
●	2. $\angle 1$ and $\angle 2$ are complementary.	2. <u>If the ext sides</u>
●	3. $\angle 1$ and $\angle 3$ are complementary.	3. <u>Given</u>
●	4. $m\angle 1 + m\angle 2 = 90$; $m\angle 1 + m\angle 3 = 90$	4. <u>Def of comp</u>
●	5. $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 3$	5. <u>Substitution</u>
●	6. $m\angle 1 \cong m\angle 1$	6. Reflexive Prop.
●	7. $m\angle 2 = m\angle 3$	7. <u>Subtr. POE</u>

★ If the exterior sides of 2 acute adjacent angles are perp., then the angles are comp.