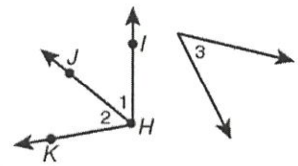
Name KEY Date ________ Class ________

LESSON 2-6

Practice A

Geometric Proof

Write the letter of the correct justification next to each step. (Use one justification twice.)



Given: $\overrightarrow{HJ}$ is the bisector of $\angle IHK$ and $\angle 1 \cong \angle 3$.

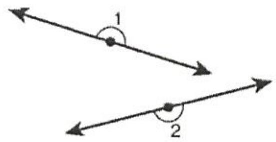
1. $\overrightarrow{HJ}$ is the bisector of $\angle IHK$. B
2. $\angle 2 \cong \angle 1$ A
3. $\angle 1 \cong \angle 3$ B
4. $\angle 2 \cong \angle 3$ C

A. Definition of $\angle$ bisector
B. Given
C. Transitive Prop. of $\cong$

5. In a two-column proof, each step in the proof is on the left and the reason for the step is on the right.

Fill in the blanks with the justifications and steps listed to complete the two-column proof. Use this list to complete the proof.

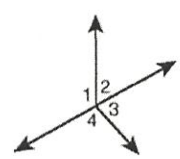
$\angle 1 \cong \angle 2$
Def. of straight $\angle$
$\angle 1$ and $\angle 2$ are straight angles.



6. **Given:** $\angle 1$ and $\angle 2$ are straight angles.
Prove: $\angle 1 \cong \angle 2$
Proof:

Statements	Reasons
1. a. $\angle 1$ and $\angle 2$ are straight angles	1. Given
2. $m\angle 1 = 180°$, $m\angle 2 = 180°$	2. b. def. of straight $\angle$'s
3. $m\angle 1 = m\angle 2$	3. Subst. Prop. of =
4. c. $\angle 1 \cong \angle 2$	4. Def. of $\cong$ $\angle$s

Follow the plan to fill in the blanks in the two-column proof.



7. **Given:** $\angle 1$ and $\angle 2$ form a linear pair, and $\angle 3$ and $\angle 4$ form a linear pair.
Prove: $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$
Plan: The Linear Pair Theorem shows that $\angle 1$ and $\angle 2$ are supplementary and $\angle 3$ and $\angle 4$ are supplementary. The definition of supplementary says that $m\angle 1 + m\angle 2 = 180°$ and $m\angle 3 + m\angle 4 = 180°$. Use the Addition Property of Equality to make the conclusion.

Statements	Reasons
1. $\angle 1$ and $\angle 2$ form a linear pair, and $\angle 3$ and $\angle 4$ form a linear pair.	1. a. given
2. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 4$ are supplementary.	2. b. Linear Pair Thm.
3. c. $m\angle 1 + m\angle 2 = 180°$ $m\angle 3 + m\angle 4 = 180$	3. Def. of supp. $\angle$s
4. $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$	4. d. Add prop. of =

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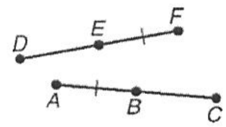
LESSON 2-6

Practice B

Geometric Proof

Write a justification for each step.

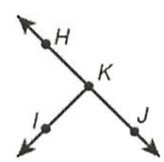
Given: $AB = EF$, B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$.



1. B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$. — given
2. $\overline{AB} \cong \overline{BC}$, and $\overline{DE} \cong \overline{EF}$. — def. of midpoint
3. $AB = BC$, and $DE = EF$. — def. of congruent
4. $AB + BC = AC$, and $DE + EF = DF$. — seg. add. post.
5. $2AB = AC$, and $2EF = DF$. — Substitution POE
6. $AB = EF$ — given (picture)
7. $2AB = 2EF$ — mult. POE
8. $AC = DF$ — subst. POE
9. $\overline{AC} \cong \overline{DF}$ — def. of congruent

Fill in the blanks to complete the two-column proof.

10. **Given:** $\angle HKJ$ is a straight angle. $\overrightarrow{KI}$ bisects $\angle HKJ$.
Prove: $\angle IKJ$ is a right angle.



Proof:

Statements	Reasons
1. a. $\angle HKJ$ is a straight angle	1. Given
2. $m\angle HKJ = 180°$	2. b. def. of straight $\angle$
3. c. $\overrightarrow{KI}$ bisects $\angle HKJ$	3. Given
4. $\angle IKJ \cong \angle IKH$	4. Def. of $\angle$ bisector
5. $m\angle IKJ = m\angle IKH$	5. Def. of $\cong$ $\angle$s
6. d. $m\angle IKJ + m\angle IKH = m\angle HKJ$	6. $\angle$ Add. Post.
7. $2m\angle IKJ = 180°$	7. e. Subst. (Steps 2, 5, 6)
8. $m\angle IKJ = 90°$	8. Div. Prop. of =
9. $\angle IKJ$ is a right angle.	9. f. def. of right $\angle$

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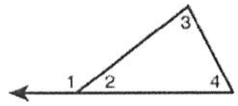
LESSON 2-6

Practice C

Geometric Proof

Write a two-column proof.

1. **Given:** The sum of the angle measures in a triangle is 180°.



Prove: $m\angle 1 = m\angle 3 + m\angle 4$

Statements	Justification
① $m\angle 2 + m\angle 3 + m\angle 4 = 180°$	① given
② $\angle 1$ and $\angle 2$ are a linear pair	② given
③ $\angle 1$ and $\angle 2$ are suppl.	③ Linear pair thm
④ $m\angle 1 + m\angle 2 = 180°$	④ def. of suppl.
⑤ $m\angle 2 + m\angle 3 + m\angle 4 = m\angle 1 + m\angle 2$	⑤ substitution POE
⑥ $m\angle 3 + m\angle 4 = m\angle 1$	⑥ subtr. POE
⑦ $m\angle 1 = m\angle 3 + m\angle 4$	⑦ symmetric POE

2. Peter drives on a straight road and stops at an intersection. The intersecting road is also straight. Peter notices that one of the angles formed by the intersection is a right angle. He concludes that the other three angles must also be right angles. Draw a diagram and write a two-column proof to show that Peter is correct.

Statements	Justification
① $\angle 1$ is a right angle	① given
② $\angle 1$ and $\angle 2$ are a linear pair $\angle 2$ and $\angle 3$ are a linear pair $\angle 1$ and $\angle 4$ are a linear pair	② given
③ $\angle 1$ and $\angle 2$ are suppl. $\angle 2$ and $\angle 3$ are suppl. $\angle 1$ and $\angle 4$ are suppl.	③ Linear pair thm
④ $m\angle 1 + m\angle 2 = 180°$ $m\angle 2 + m\angle 3 = 180°$ $m\angle 1 + m\angle 4 = 180°$	④ def. of suppl.
⑤ $m\angle 1 = 90°$	⑤ def. of right $\angle$
⑥ $90° + m\angle 2 = 180°$ $90° + m\angle 4 = 180°$	⑥ substitution POE
⑦ $m\angle 2 = 90°$ $m\angle 4 = 90°$	⑦ subtr. POE
⑧ $\angle 2$ and $\angle 4$ are right $\angle$'s	⑧ def. of right $\angle$'s
⑨ $\angle 1$, $\angle 3$ are vertical $\angle$'s	⑨ given
⑩ $\angle 1 \cong \angle 3$	⑩ def. of vertical $\angle$'s
⑪ $m\angle 1 = m\angle 3$	⑪ def. of $\cong$
⑫ $90° = m\angle 3$	⑫ subst.
⑬ $\angle 3$ is a right $\angle$	⑬ def. of right $\angle$

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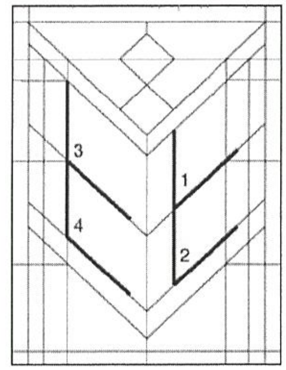
LESSON 2-6

Problem Solving

Geometric Proof

1. Refer to the diagram of the stained-glass window and use the given plan to write a two-column proof.



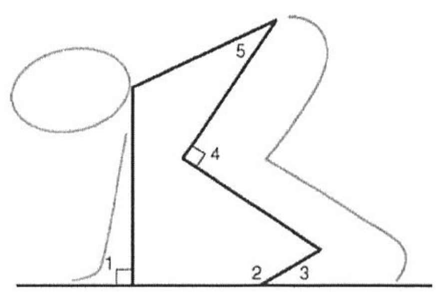
Given: $\angle 1$ and $\angle 3$ are supplementary.
$\angle 2$ and $\angle 4$ are supplementary.
$\angle 3 \cong \angle 4$

Prove: $\angle 1 \cong \angle 2$

Plan: Use the definition of supplementary angles to write the given information in terms of angle measures. Then use the Substitution Property of Equality and the Subtraction Property of Equality to conclude that $\angle 1 \cong \angle 2$.

1 $\angle 1, \angle 3$ are suppl. $\angle 2, \angle 4$ are suppl.	1 given
2 $m\angle 1 + m\angle 3 = 180°$ $m\angle 2 + m\angle 4 = 180°$	2 def. of suppl.
3 $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$	3 subst. POE
4 $\angle 3 \cong \angle 4$	4 given
5 $m\angle 3 = m\angle 4$	5 def. of $\cong$
6 $m\angle 1 + m\angle 4 = m\angle 2 + m\angle 4$	6 subst. POE
7 $m\angle 1 = m\angle 2$	7 subtr. prop of Eq.
8 $\angle 1 \cong \angle 2$	8 def. of congr.

The position of a sprinter at the starting blocks is shown in the diagram. Which statement can be proved using the given information? Choose the best answer.



2. **Given:** $\angle 1$ and $\angle 4$ are right angles.

A $\angle 3 \cong \angle 5$ C $m\angle 1 + m\angle 4 = 90°$
B $\angle 1 \cong \angle 4$ D $m\angle 3 + m\angle 5 = 180°$

3. **Given:** $\angle 2$ and $\angle 3$ are supplementary.
$\angle 2$ and $\angle 5$ are supplementary.

F $\angle 3 \cong \angle 5$ H $\angle 3$ and $\angle 5$ are complementary.
G $\angle 2 \cong \angle 5$ J $\angle 1$ and $\angle 2$ are supplementary.

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LESSON 2-6

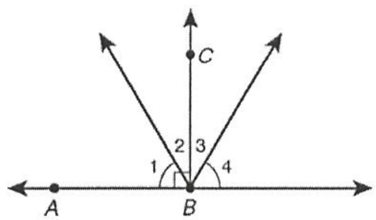
Challenge

Prove It!

In a proof, you can often determine the **Given** information from the figure.

Write the information that is given in each figure. Then make a conjecture about what you could prove using the given information.

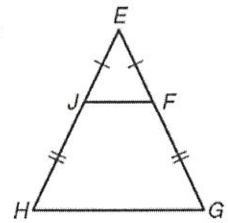
1.



Given: $\angle 1 \cong \angle 4$, $\angle ABC$ is a right $\angle$

Prove: $\angle 2 \cong \angle 3$ (answers may vary)

2.



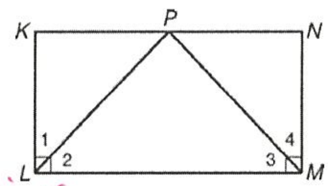
Given: $\overline{EF} \cong \overline{EJ}$, $\overline{FG} \cong \overline{JH}$

Prove: $\overline{EH} \cong \overline{EG}$

3. Write a two-column proof.

Given: $\angle KLM$ and $\angle NML$ are right angles.
$\angle 2 \cong \angle 3$

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



Statements	Reasons
1. $\angle KLM$, $\angle NML$ are right $\angle$'s	1. given
2. $\angle KLM \cong \angle NML$	2. Right $\angle$ Thm.
3. $m\angle KLM = m\angle NML$	3. def. of $\cong$
4. $m\angle KLM = m\angle 1 + m\angle 2$ $m\angle NML = m\angle 3 + m\angle 4$	4. angle add. post.
5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	5. Subst. prop. of eq.
6. $\angle 2 \cong \angle 3$	6. given
7. $m\angle 2 = m\angle 3$	7. def. of $\cong$
8. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 4$	8. Subst. POE
9. $m\angle 1 = m\angle 4$	9. Subtr. POE
10. $\angle 1 \cong \angle 4$	10. def. of $\cong$