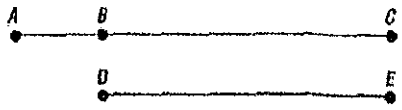
NAME _____ DATE _____

2-6 Reteaching Worksheet

Two-Column Proofs with Segments

Proofs in geometry follow the same format that you used in Lesson 2–4. The steps in a two-column proof are arranged in a step-by-step order so that each step follows logically from the preceding one. The reasons can be given information, definitions, postulates of geometry, or rules of algebra. You may also use information that it is safe to assume from a given figure.

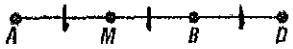
Example: Write a two-column proof.
Given: $\overline{BC} \cong \overline{DE}$
Prove: $AC = AB + DE$



Statements	Reasons
a. $\overline{BC} \cong \overline{DE}$	**a.** Given
b. $BC = DE$	**b.** Definition of congruent segments
c. $AC = AB + BC$	**c.** Segment addition postulate
d. $AC = AB + DE$	**d.** Substitution property of equality

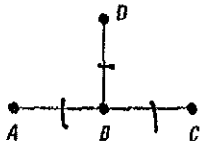
Complete each proof by naming the property that justifies each statement.

1. Given: M is the midpoint of $\overline{AB}$.
B is the midpoint of $\overline{MD}$.
Prove: $MD = 2MB$



Statements	Reasons
a. M is the midpoint of $\overline{AB}$. B is the midpoint of $\overline{MD}$.	**a.** given
b. $\overline{AM} \cong \overline{MB}$ b.1 $AM = MB$; $\overline{MB} \cong \overline{BD}$ $MB = BD$	**b.** defn. of midpoint b.1 $\cong$ segs are $=$.
c. $MD = MB + BD$	**c.** seg. add. postulate
d. $MD = MB + MB$	**d.** Substitution
e. $MD = 2MB$	**e.** Simplify.

2. Given: A, B, and C are collinear,
$AB = BD$
$BD = BC$
Prove: B is the midpoint of $\overline{AC}$.



Statements	Reasons
a. A, B, and C are collinear, $AB = BD$ $BD = BC$	**a.** given
b. $AB = BC$ b.1 $\overline{AB} \cong \overline{BC}$	**b.** Substitution b.1 equal segments are congruent
c. B is the midpoint of $\overline{AC}$.	**c.** defn. of mid point.

NAME _____ DATE _____

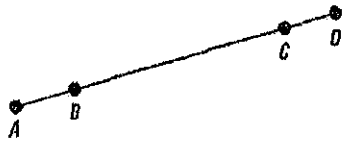
2-6

Practice Worksheet

Two-Column Proofs with Segments

Complete each proof.

1. Given: $AD = 2AB + BC$
   Prove: $\overline{AB} \cong \overline{CD}$



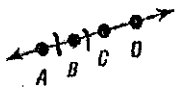
Statements	Reasons
a. $AD = 2AB + BC$	a. given
b. $AD = AB + BC + CD$	b. seg. add. postulate
c. $2AB + BC = AB + BC + CD$	c. substitution
c.1 $AB = AB$; $BC = BC$	c.1 reflexive
d. $AB = CD$	d. add. property of equality.
e. $\overline{AB} \cong \overline{CD}$	e. Equal segments are congruent.

2. Given: B is between A and D.
   C is between A and D.
   Prove: $AB + BD = AC + CD$

Statements	Reasons
a. B is between A and D. C is between A and D.	a. given
b. $AB + BD = AD$	b. seg. add. postulate
c. $AC + CD = AD$	c. seg. add. postulate.
d. $AD = AC + CD$ (not really needed)	d.
e. $AB + BD = AC + CD$	e. substitution.

Write a two-column proof.

3. Given: B is the midpoint of $\overline{AC}$.
   Prove: $\overline{AB} + CD = BD$



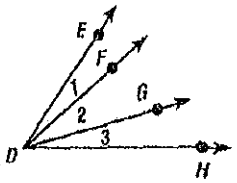
Statements	Reasons
① B is midpoint of $\overline{AC}$	① given
② $\overline{AB} \cong \overline{BC}$	② defn. of mid point
③ $AB = BC$	③ $\cong$ seg are $=$
④ $BC + CD = BD$	④ Substitution
⑤ $AB + CD = BD$	⑤ ↑ seg. add. postulate.

NAME _____ DATE _____

2-7 Reteaching Worksheet

Two-Column Proofs with Angles

Many relationships involving angles can be proved by applying the rules of algebra, as well as the definitions and postulates of geometry.

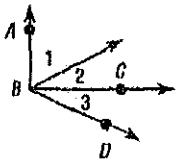


Example: Given: $\angle EDG \cong \angle FDH$
Prove: $m\angle 1 = m\angle 3$

Statements	Reasons
a. $\angle EDG \cong \angle FDH$	**a.** Given
b. $m\angle EDG = m\angle FDH$	**b.** Definition of congruent angles
c. $m\angle EDG = m\angle 1 + m\angle 2$ $m\angle FDH = m\angle 2 + m\angle 3$	**c.** Angle addition postulate
d. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	**d.** Substitution property of equality
e. $m\angle 1 = m\angle 3$	**e.** Subtraction property of equality

Complete the following proof.

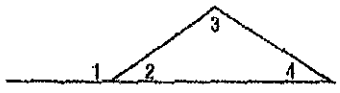
1. Given: $\overline{AB} \perp \overline{BC}$
$m\angle 2 = m\angle 3$
Prove: $m\angle 1 + m\angle 3 = 90$



Statements	Reasons
a. $\overline{AB} \perp \overline{BC}$ $m\angle 2 = m\angle 3$	**a.** given
b. ABC is a right angle	**b.** defn. of ⊥ lines.
c. $m\angle ABC = 90$	**c.** defn. of a right angle
d. $m\angle ABC = m\angle 1 + m\angle 2$	**d.** angle add postulate
e. $m\angle 1 + m\angle 2 = 90$	**e.** substitution.
f. $m\angle 1 + m\angle 3 = 90$	**f.** substitution.

Write a two-column proof.

2. Given: $\angle 1$ and $\angle 2$ form a linear pair.
$m\angle 2 + m\angle 3 + m\angle 4 = 180$
Prove: $m\angle 1 = m\angle 3 + m\angle 4$



Statements	Reasons
a. $\angle 1$ and 2 form a linear pair. $m\angle 2 + m\angle 3 + m\angle 4 = 180$	**a.** given.
b. $\angle 1$ and $\angle 2$ are supplementary.	**b.** defn. of a linear pair
c. $m\angle 1 + m\angle 2 = 180$	**c.** defn of supplementary angles
d. $m\angle 1 + m\angle 2 =$ $m\angle 2 + m\angle 3 + m\angle 4$ $m\angle 2 = m\angle 2$	**d.** substitution **d.** reflexive
e. $m\angle 1 = m\angle 3 + m\angle 4$	**e.** add. prop. of equality.

2-7 NAME _____ DATE _____

Practice Worksheet

Two-Column Proof with Angles

Complete each statement if m∠BGC = 43 and m∠DGE = 56.

1. $\angle FGA \cong$ ___?___

2. $\angle BGF$ and ___?___ are supplementary.

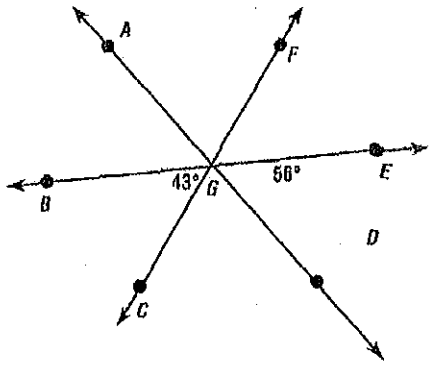
3. $m\angle CGD =$ ___?___

4. $m\angle AGF =$ ___?___

5. $\angle EGC$ and ___?___ are supplementary.

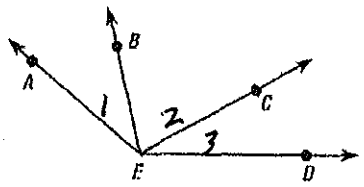
6. $m\angle AGB =$ ___?___

7. $m\angle AGC =$ ___?___



Write a two-column proof.

8. Given: $\angle AEC \cong \angle DEB$
   Prove: $\angle AEB \cong \angle DEC$



(1) (3)

Statements	Reasons
(1) $\angle AEC \cong \angle DEB$	(1) given
(2) $m\angle AEC = m\angle DEB$	(2) $\cong$ ∠'s are =.
(3) $m\angle 1 + m\angle 2 = m\angle AEC$ $m\angle 2 + m\angle 3 = m\angle DEB$	(3) Ang. Add. Postulate
(4) $m\angle 2 + m\angle 3 = m\angle AEC$	(4) Substitution
(4.5) $m\angle 2 = m\angle 2$	(4.5) reflexive.
(5) $m\angle 1 = m\angle AEC - m\angle 2$ $m\angle 3 = m\angle DEB - m\angle 2$	(5) Add. Prop. of equalities.
(6) $m\angle 1 = m\angle 3$	(6) transitive
(7) $\angle 1 \cong \angle 3$	(7) if = seg. then $\cong$.