Contents

1 Laws of Equality

Reflexive Law of Equality

A = A

Symmetric Law of Equality

If A = B then B = A

Transitive Law of Equality

If A = B and B = C then A = C

Substitution Law

If A = B, then A may be replaced by B, and B by A, in any equation or mathematical statement.

2 Properties of Equality

Addition Property of Equality

If equal quantities are added to both sides of an equation, the resulting quantities are still equal.

$$\begin{array}{rcl} A & = & B \\ +3 & = & +3 \\ \hline A+3 & = & B+3 \end{array}$$

Subtraction Property of Equality

If equal quantities are subtracted from both sides of an equation, the resulting quantities are still equal.

$$\begin{array}{rcl} A & = & B \\ -3 & = & -3 \\ \hline A-3 & = & B-3 \end{array}$$

Multiplication Property Equality

If equal quantities are multiplied by both sides of an equation, the resulting quantities are still equal.

A = B

3A = 3B

Symmetric Law of Equality

If A = B then B = A

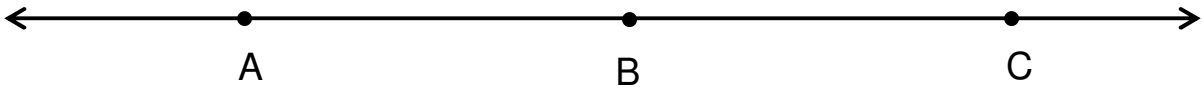
Transitive Law of Equality

If A = B and B = C then A = C

3 Postulate: Line Segment Addition

If three points A, B, and C are on the same line and B is between A and C, then:

$$AC = AB + BC$$

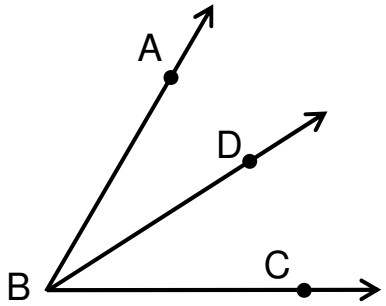


Note: *We can also say that B is an **interior** point of segment AC.*

4 Postulate: Angle Addition

If points A, B, and C define and angle, ∠ABC, and point D is in the interior of ∠ABC:

$$m(\angle ABC) = m(\angle ABD) + m(\angle DBC)$$

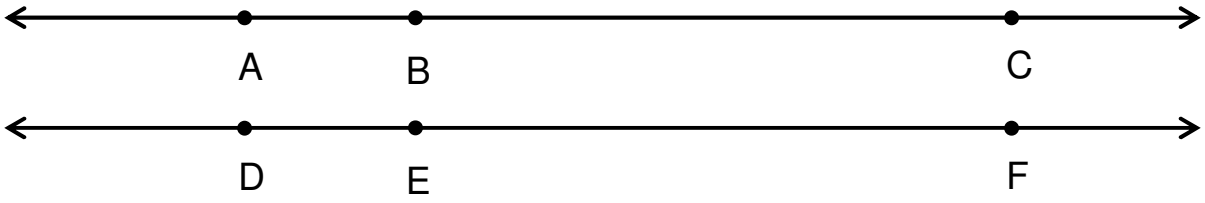


Note: *We can also say that D is an **interior** point of ∠ABC.*

5 Theorem: Addition of Equal Segments

Given line segments $\overline{AC}$ and $\overline{DF}$, with interior points B and E.

If segments $\overline{AB}$ and $\overline{DE}$ have equal measure; and $\overline{BC}$ and $\overline{EF}$ have equal measure then $\overline{AC}$ and $\overline{DF}$ have equal measure.



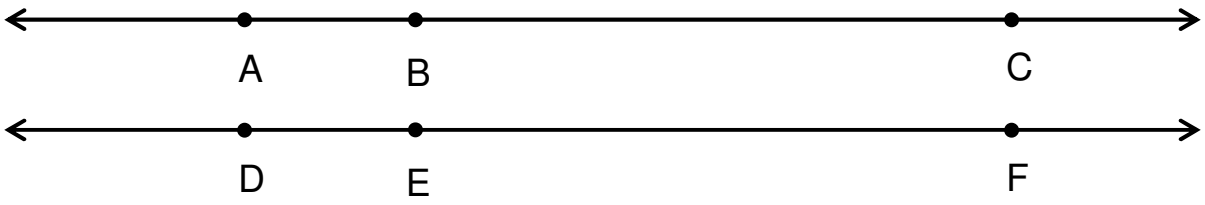
Proof

STATEMENT	REASON
1. $m(\overline{AB}) = m(\overline{DE})$.	Given.
2. $m(\overline{BC}) = m(\overline{EF})$.	Given.
3. Point B is an interior point of $\overline{AC}$.	Given.
4. Point E is an interior point of $\overline{DF}$.	Given.
5. $m(\overline{AB}) + m(\overline{BC}) = m(\overline{DE}) + m(\overline{EF})$.	Addition property of equality.
6. $m(\overline{AC}) = m(\overline{AB}) + m(\overline{BC})$.	Segment addition postulate.
7. $m(\overline{DF}) = m(\overline{DE}) + m(\overline{EF})$.	Segment addition postulate.
8. $m(\overline{AC}) = m(\overline{DF})$	Substitution.

6 Theorem: Subtraction of Equal Segments

Given line segments $\overline{AC}$ and $\overline{DF}$, with interior points B and E.

If segments $\overline{AC}$ and $\overline{DF}$ have equal measure; and $\overline{BC}$ and $\overline{EF}$ have equal measure then $\overline{AB}$ and $\overline{DE}$ have equal measure.



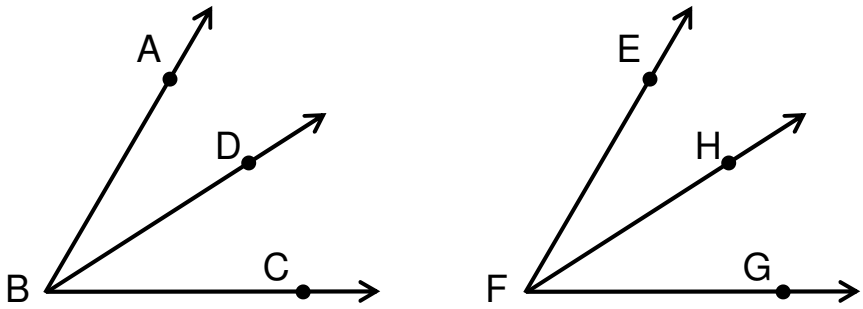
Proof

STATEMENT	REASON
1. $m(\overline{AB}) = m(\overline{DE})$.	Given.
2. $m(\overline{BC}) = m(\overline{EF})$.	Given.
3. Point B is an interior point of $\overline{AC}$.	Given.
4. Point E is an interior point of $\overline{DF}$.	Given.
5. $m(\overline{AB}) + m(\overline{BC}) = m(\overline{DE}) + m(\overline{EF})$.	Addition property of equality.
6. $m(\overline{AC}) = m(\overline{AB}) + m(\overline{BC})$.	Segment addition postulate.
7. $m(\overline{DF}) = m(\overline{DE}) + m(\overline{EF})$.	Segment addition postulate.
8. $m(\overline{AC}) = m(\overline{DF})$	Substitution.

7 Theorem: Addition of Equal Angles

Given ∠ABC and ∠EFG, with interior points D and H.

If ∠ABD and ∠EFH, have equal measure; and ∠DBC and ∠HFG have equal measure then ∠ABC and ∠EFG, have equal measure.



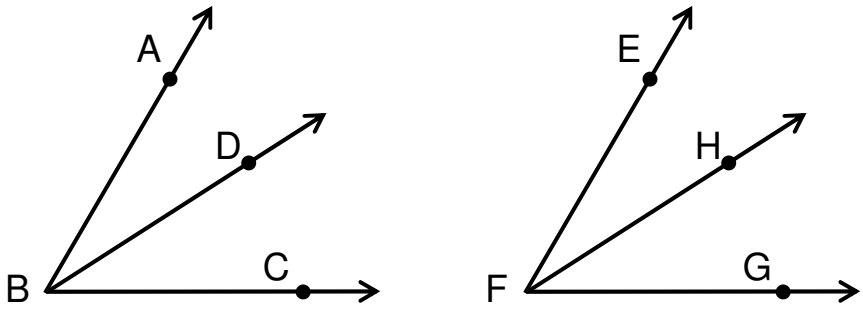
Proof

STATEMENT	REASON
1. m(∠ABD) = m(∠EFH).	Given.
2. m(∠DBC) = m(∠HFG)	Given.
3. Point D is an interior point of ∠ABC.	Given.
4. Point H is an interior point of ∠EFG.	Given.
5. m(∠ABD) + m(∠DBC) = m(∠EFH) + m(∠HFG).	Addition property of equality.
6. m(∠ABC) = m(∠ABD) + m(∠DBC).	Angle addition postulate.
7. m(∠EFG) = m(∠EFH) + m(∠HFG).	Angle addition postulate.
8. m(∠ABD = m(∠EFG).	Substitution.

8 Theorem: Subtraction of Equal Angles

Given ∠ABC and ∠EFG, with interior points D and H.

If ∠ABC and ∠EFG have equal measure, and ∠DBC and ∠HFG have equal measure then ∠ABD and ∠EFH have equal measure.



Proof

STATEMENT	REASON
1. m(∠ABC) = m(∠EFG).	Given.
2. m(∠DBC) = m(∠HFG).	Given.
3. Point D is an interior point of ∠ABC.	Given.
4. Point H is an interior point of ∠EFG.	Given.
5. m(∠ABC) - m(∠DBC) = m(∠EFG) - m(∠HFG).	Addition property of equality.
6. m(∠ABD) = m(∠ABC) - m(∠DBC).	Angle addition postulate.
7. m(∠EFH) = m(∠EFG) - m(∠HFG).	Angle addition postulate.
8. m(∠ABD) = m(∠EFH).	Substitution.

(source GeometryReview3.doc)

