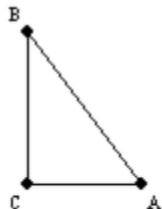


Chapter 01: Proof Problems



1. Given: In $\triangle ABC$, $m\angle A + m\angle B + m\angle C = 180$;
 $\angle C$ is a right angle.

Prove: $\angle A$ and $\angle B$ are complementary.

Provide all *statements and reasons* for this proof.

ANSWER:

Proof:

S1. $m\angle A + m\angle B + m\angle C = 180$ R1. Given

S2. $\angle C$ is a right angle. R2. Given

S3. $m\angle C = 90$ R3. Definition of right angle

S4. $m\angle A + m\angle B + 90 = 180$

R4. Substitution Prop. of Equality

S5. $m\angle A + m\angle B = 90$ R5. Subtraction Property of Equality

S6. $\angle A$ and $\angle B$ are comp. R6. Definition of complementary angles

2. Given: $2(x - 3) + 5 = 13$

Prove: $x = 7$

Provide the missing *reasons* for this proof:

S1. $2(x - 3) + 5 = 13$ R1.

S2. $2x - 6 + 5 = 13$ R2.

S3. $2x - 1 = 13$ R3.

S4. $2x = 14$ R4.

S5. $x = 7$ R5.

ANSWER:

R1. Given

R2. Distributive Law

R3. Substitution Property of Equality

R4. Addition Property of Equality

R5. Division (or Multiplication) Prop. of Eq.

3. Given: $(x + 5)(x - 4) = x^2 - 11$

Prove: $x = 9$

Provide the *statements* for this proof.

S1. R1. Given

S2. R2. Distributive Law (FOIL)

S3. R3. Substitution Property of Equality

Chapter 01: Proof Problems

S4. R4. Addition Property of Equality

ANSWER:

$$S1. (x+5)(x-4) = x^2 - 11$$

$$S2. x^2 + x - 20 = x^2 - 11$$

$$S3. x - 20 = -11$$

$$S4. x = 9$$

4. Given: $\frac{x}{3} + 5 = 2$

Prove: $x = -9$

Supply all *statements and reasons* for the proof.

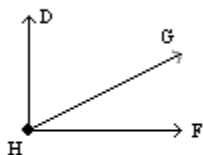
ANSWER:

Proof:

$$S1. \frac{x}{3} + 5 = 2 \quad R1. \text{ Given}$$

$$S2. \frac{x}{3} = -3 \quad R2. \text{ Subtraction Prop. of Equality}$$

$$S3. x = -9 \quad R3. \text{ Multiplication Property of Equality}$$



5. Given: $\angle DHF$ is a right angle

Prove: $\angle DHG$ and $\angle GHF$ are complementary

Supply missing *statements* and missing *reasons* for this proof.

S1. R1. Given

S2. $m\angle DHF = 90$

R2.

S3. $m\angle DHG + m\angle GHF = m\angle DHF$ R3. Angle-Addition Postulate

S4. $m\angle DHG + m\angle GHF = 90$

R4.

S5. R5.

ANSWER:

S1. $\angle DHF$ is a right angle

R2. Definition of right angle

R4. Substitution Property of Equality

S5. $\angle DHG$ and $\angle GHF$ are complementary

R5. Definition of complementary angles

Chapter 01: Proof Problems



6. Given: $A-B-C-D$ as shown

Prove: $AB + BC + CD = AD$

Supply missing *statements* and missing *reasons* for this proof:

S1. R1.

S2. $AB + BD = AD$ R2.

S3. $BC + CD = BD$ R3. Segment-Addition Postulate

S4. R4. Substitution Property of Equality

ANSWER:

S1. $A-B-C-D$ as shown

R1. Given

R2. Segment-Addition Postulate

S4. $AB + BC + CD = AD$

7. Given: $\angle 1$ is complementary to $\angle 2$;

$\angle 3$ is complementary to $\angle 2$ (no drawing provided)

Prove: $\angle 1 \cong \angle 3$

Supply missing *reasons* for this proof.

S1. $\angle 1$ is complementary to $\angle 2$ R1.

S2. $\angle 3$ is complementary to $\angle 2$ R2.

S3. $m\angle 1 + m\angle 2 = 90$ R3.

S4. $m\angle 3 + m\angle 2 = 90$ R4.

S5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$ R5.

S6. $m\angle 1 = m\angle 3$ R6.

S7. $\angle 1 \cong \angle 3$ R7.

ANSWER:

R1. Given

R2. Given

R3. Definition of complementary angles

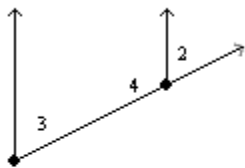
R4. Definition of complementary angles

R5. Substitution Property of Equality

R6. Subtraction Property of Equality

R7. Definition of Congruent Angles

Chapter 01: Proof Problems



8. Given: $\angle 3$ and $\angle 4$ are supplementary

Prove: $\angle 3 \cong \angle 2$

Supply missing *statements* and missing *reasons* for this proof.

S1. $\angle 3$ and $\angle 4$ are supplementary R1.

S2. R2. If the exterior sides of 2 adjacent angles form a straight line, the angles are supplementary.

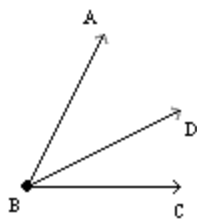
S3. R3. Two angles that are supplementray to the same angle are congruent.

ANSWER:

R1. Given

S2. $\angle 2$ and $\angle 4$ are supplementary.

S3. $\angle 3 \cong \angle 2$



9. Provide missing *statements* and *reasons* for the following proof.

Given: $\overrightarrow{BD}$ bisects $\angle ABC$

Prove: $m\angle ABC = 2(m\angle ABD)$

S1. R1. Given

S2. $m\angle ABD = m\angle DBC$ R2.

S3. R3. Angle-Addition Postulate

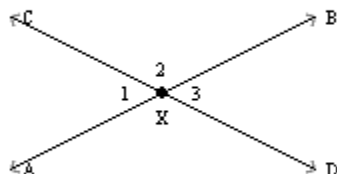
S4. $m\angle ABC = m\angle ABD + m\angle ABD$ R4.

or

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ANSWER:

- S1. Given
- R2. Definition of angle-bisector
- S3. $m\angle ABC = m\angle ABD + m\angle DBC$
- S4. $m\angle ABC = 2(m\angle ABD)$
- R4. Substitution Property of Equality



10. Supply missing *statements* and *reasons* for the following proof.

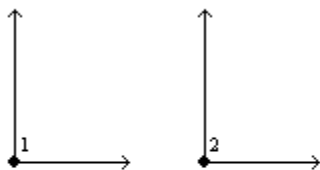
Given: $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point X

Prove: $\angle 1 \cong \angle 3$

- S1. R1.
- S2. $\angle 1$ and $\angle 2$ are supp. R2.
- S3. R3. If the exterior sides of two adjacent angles form a straight line, these angles are supplementary.
- S4. R4. Two angles that are supplementary to the same angle are congruent.

ANSWER:

- S1. $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at point X
- R1. Given
- S3. $\angle 1$ and $\angle 2$ are supp.
- S4. $\angle 1 \cong \angle 3$



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11. Prove: Any two right angles are congruent.

Use the following drawing. Provide all *statements* and *reasons*.

Given: Right angles 1 and 2

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

ANSWER:

S1. Right angles 1 and 2

R1. Given

S2. $m\angle 1 = 90$ and $m\angle 2 = 90$

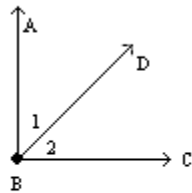
R2. The measure of a right angle is 90.

S3. $m\angle 1 = m\angle 2$

R3. Substitution Property of Equality

S4. $\angle 1 \cong \angle 2$

R4. Definition of congruent angles.



12. Supply all *statements* and *reasons* in the following proof.

Given: $\angle ABC$ is a right angle.

Prove: $\angle 1$ and $\angle 2$ are complementary.

ANSWER:

S1. $\angle ABC$ is a right angle. R1. Given

S2. $m\angle ABC = 90$

R2. Definition of right angle

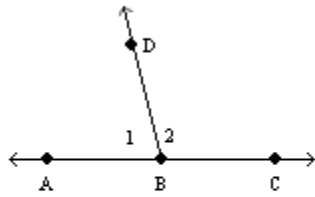
S3. $m\angle ABC = m\angle 1 + m\angle 2$ R3. Angle-Addition Postulate

S4. $m\angle 1 + m\angle 2 = 90$

R4. Substitution Property of Equality

S5. $\angle 1$ and $\angle 2$ are complementary. R5. Definition of complementary angles.

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13. In the figure, $A-B-C$. Explain why $\angle 1$ and $\angle 2$ must be supplementary.

ANSWER: In the figure, $\angle ABC$ is a straight angle. By definition, $m\angle ABC = 180$.
But $m\angle 1 + m\angle 2 = m\angle ABC$ by the Angle-Addition Postulate.
Then $m\angle 1 + m\angle 2 = 180$ by substitution.
By definition, $\angle 1$ and $\angle 2$ are supplementary.