Geometry: Two-Column Proofs — Kite & Trapezoid

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Name: _____ Date: _____ Score: / 3 proofs

DIRECTIONS *Fill in the BLANK statements or reasons to complete each two-column proof. Use proper notation and geometric theorems.*

1 Proof 1 | Kite: Proving Non-Vertex Angles Are Congruent

Given: Kite $ABCD$ with $\overline{AB} \cong \overline{AD}$ and $\overline{CB} \cong \overline{CD}$

Prove: $\angle B \cong \angle D$

Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$, $\overline{CB} \cong \overline{CD}$	1. Given
2. $\overline{AC} \cong \overline{AC}$	2. _____
3. $\triangle ABC \cong \triangle ADC$	3. SSS Congruence Postulate
4. _____	4. CPCTC

2 Proof 2 | Kite: Proving the Diagonals Are Perpendicular

Given: Kite $ABCD$; $\overline{AB} \cong \overline{AD}$, $\overline{CB} \cong \overline{CD}$; diagonals intersect at E

Prove: $AC \perp BD$

Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$, $\overline{CB} \cong \overline{CD}$	1. Given
2. $\overline{AE} \cong \overline{AE}$	2. _____
3. _____	3. SSS Congruence Postulate
4. $\angle AEB \cong \angle AED$	4. CPCTC
5. $AC \perp BD$	5. _____

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3 Proof 3 | Isosceles Trapezoid: Proving the Diagonals Are Congruent

Given: Isosceles trapezoid $ABCD$; $AB \parallel CD$; $\overline{AD} \cong \overline{BC}$; $\angle DAB \cong \angle CBA$

Prove: $\overline{AC} \cong \overline{BD}$

Statements	Reasons
1. $\overline{AD} \cong \overline{BC}$, $\angle DAB \cong \angle CBA$	**1.** Given
2. $\overline{AB} \cong \overline{AB}$	**2.** _____
3. $\triangle DAB \cong \triangle CBA$	**3.** _____
4. $\overline{AC} \cong \overline{BD}$	**4.** CPCTC

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Answer Key & Solutions

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TEACHER NOTES

Blanks: Proof 1 — Step 2 reason: Reflexive Property; Step 4 statement: angle B = angle D (CPCTC). Proof 2 — Step 2 reason: Reflexive; Step 3 statement: triangles ABE = ADE (SSS); Step 5 reason: congruent supplementary angles. Proof 3 — Steps 2 & 3 reasons: Reflexive Property; SAS Congruence Postulate.

1 Proof 1 | Kite: Proving Non-Vertex Angles Are Congruent

Given: Kite $ABCD$ with $\overline{AB} \cong \overline{AD}$ and $\overline{CB} \cong \overline{CD}$

Prove: $\angle B \cong \angle D$

Statements	Reasons
1. $\overline{AB} \cong \overline{AD},\ \overline{CB} \cong \overline{CD}$	**1.** Given
2. $\overline{AC} \cong \overline{AC}$	**2.** Reflexive Property
3. $\triangle ABC \cong \triangle ADC$	**3.** SSS Congruence Postulate
4. $\angle B \cong \angle D$	**4.** CPCTC

2 Proof 2 | Kite: Proving the Diagonals Are Perpendicular

Given: Kite $ABCD$; $\overline{AB} \cong \overline{AD},\ \overline{CB} \cong \overline{CD}$; diagonals intersect at E

Prove: $AC \perp BD$

Statements	Reasons
1. $\overline{AB} \cong \overline{AD},\ \overline{CB} \cong \overline{CD}$	**1.** Given
2. $\overline{AE} \cong \overline{AE}$	**2.** Reflexive Property
3. $\triangle ABE \cong \triangle ADE$	**3.** SSS Congruence Postulate
4. $\angle AEB \cong \angle AED$	**4.** CPCTC
5. $AC \perp BD$	**5.** Congruent supplementary angles form right angles

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3 Proof 3 | Isosceles Trapezoid: Proving the Diagonals Are Congruent

Given: Isosceles trapezoid $ABCD$; $AB \parallel CD$; $\overline{AD} \cong \overline{BC}$; $\angle DAB \cong \angle CBA$

Prove: $\overline{AC} \cong \overline{BD}$

Statements	Reasons
1. $\overline{AD} \cong \overline{BC}$, $\angle DAB \cong \angle CBA$	**1.** Given
2. $\overline{AB} \cong \overline{AB}$	**2.** Reflexive Property
3. $\triangle DAB \cong \triangle CBA$	**3.** SAS Congruence Postulate
4. $\overline{AC} \cong \overline{BD}$	**4.** CPCTC

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