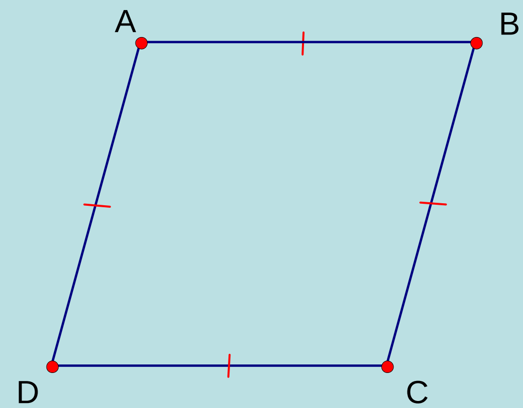
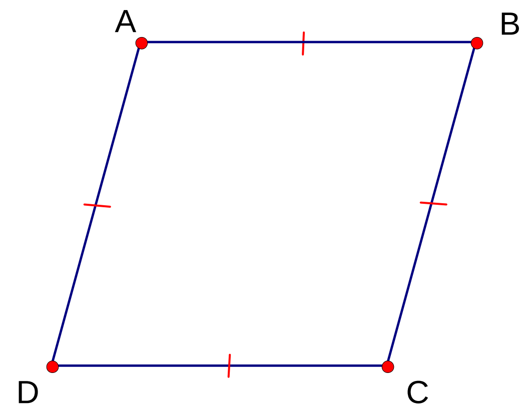
Given: $ABCD$ is a rhombus.
Prove: $ABCD$ is a parallelogram.



Statement	Justification
1. $\overline{AB} \cong \overline{CD}$ & $\overline{DA} \cong \overline{BC}$.	1. Property of a rhombus.
2. $\overline{AC} \cong \overline{AC}$.	2. Reflexive axiom.
3. $\Delta ACD \cong \Delta CAB$.	3. SSS.
4. $\angle CDA + (\angle DAC + ACD) = 180^o$.	4. Interior angle sum for a triangle.
5. $\angle ACD \cong \angle CAB$.	5. CPCTC
6. $\angle CDA + (\angle DAC + \angle CAB) = 180^o$.	6. Substitution.
7. $\angle CDA$ & $\angle DAB$ are supplementary.	7. $(\angle DAC + \angle CAB) = \angle DAB$.
8. $\overline{CD} \parallel \overline{AB}$.	8. Co-interior angles.
9. Repeat 4 – 8 to show $\overline{BC} \parallel \overline{DA}$.	■

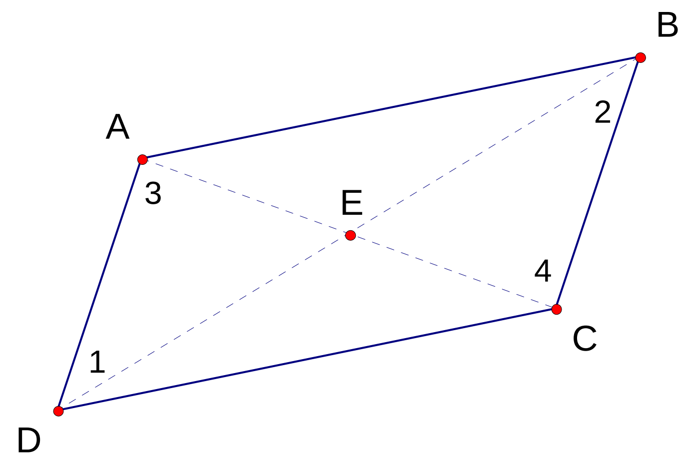
Given: $ABCD$ is a rhombus.
Prove: $ABCD$ is a parallelogram.



Statement	Justification
1. $\overline{AB} \cong \overline{CD}$ & $\overline{DA} \cong \overline{BC}$.	1. Property of a rhombus.
2. $\overline{AC} \cong \overline{AC}$.	2.
3. $\Delta ACD \cong \Delta CAB$.	3.
4. $\angle CDA + \left(\angle DAC + ACD\right) = 180^{o}$.	4.
5. $\angle ACD \cong \angle CAB$.	5.
6.	6. Substitution.
7. $\angle CDA$ & $\angle DAB$ are supplementary.	7.
8.	8.
9. Repeat 4 – 8 to show $\overline{BC} \parallel \overline{DA}$.	

Given: $ABCD$ is a parallelogram.

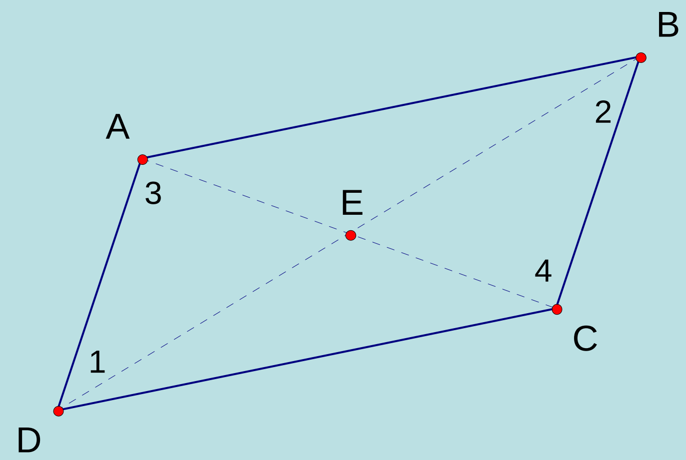
Prove: $\overline{AC}$ and $\overline{BD}$ bisect each other.



Statement	Justification
1. .	1. Alternate interior angles.
2. $\angle 3 \cong \angle 4$.	2. .
3. $\overline{DA} \cong \overline{BC}$.	3. Opp. Sides of a parallelogram.
4. .	4. ASA.
5. $\overline{AE} \cong \overline{EC}$.	5. .
6. .	6. CPCTC.
7. $\overline{DB}$ & $\overline{AC}$ bisect each other.	7. 5 & 6. ■

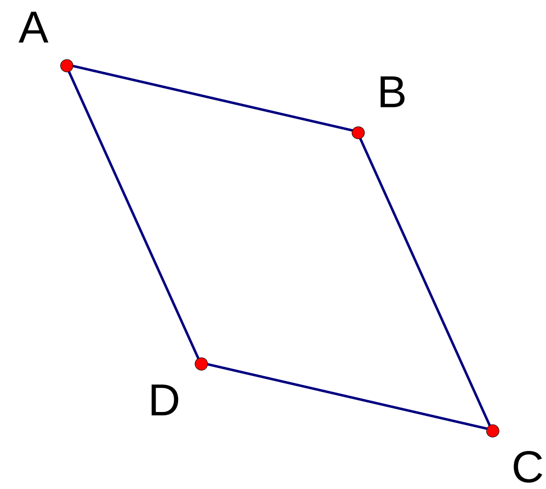
Given: $ABCD$ is a parallelogram.

Prove: $\overline{AC}$ and $\overline{BD}$ bisect each other.



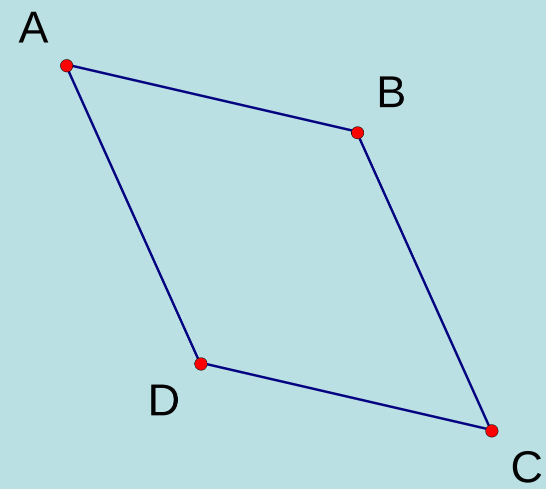
Statement	Justification
1. $\angle 1 \cong \angle 2$.	1. Alternate interior angles.
2. $\angle 3 \cong \angle 4$.	2. Alternate interior angles.
3. $\overline{DA} \cong \overline{BC}$.	3. Opp. Sides of a parallelogram.
4. $\Delta DAE \cong \Delta BCE$.	4. ASA.
5. $\overline{AE} \cong \overline{EC}$.	5. CPCTC.
6. $\overline{DE} \cong \overline{EB}$.	6. CPCTC.
7. $\overline{DB}$ & $\overline{AC}$ bisect each other.	7. 5 & 6. $\blacksquare$

Given: $ABCD$ is a parallelogram.
Prove: Opposite angles are congruent.



Statement	Justification
1. $m\angle A + m\angle B = 180^{o}$.	1. .
2. .	2. Property of Co-interior angles.
3. $m\angle A + m\angle B = m\angle B + m\angle C$.	3. .
4. .	4. Cancellation.
5. .	5. Angles with equal measure are cong.
6. Similarly $\angle B \cong \angle D$.	6. Steps 1-5. ■

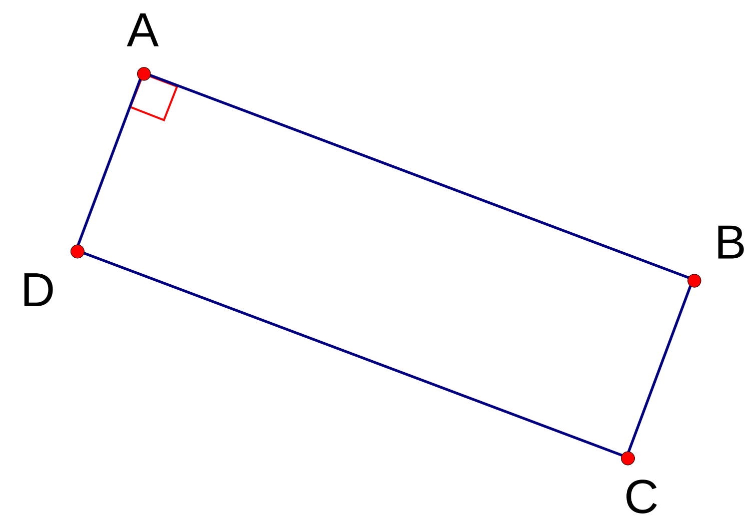
Given: $ABCD$ is a parallelogram.
Prove: Opposite angles are congruent.



Statement	Justification
1. $m\angle A + m\angle B = 180^{\circ}$.	1. Property of Co-interior angles.
2. $m\angle B + m\angle C = 180^{\circ}$.	2. Property of Co-interior angles.
3. $m\angle A + m\angle B = m\angle B + m\angle C$.	3. Substitution.
4. $m\angle A = m\angle C$.	4. Cancellation.
5. $\angle A \cong \angle C$.	5. Angles with equal measure are cong.
6. Similarly $\angle B \cong \angle D$.	6. Steps 1-5. ■

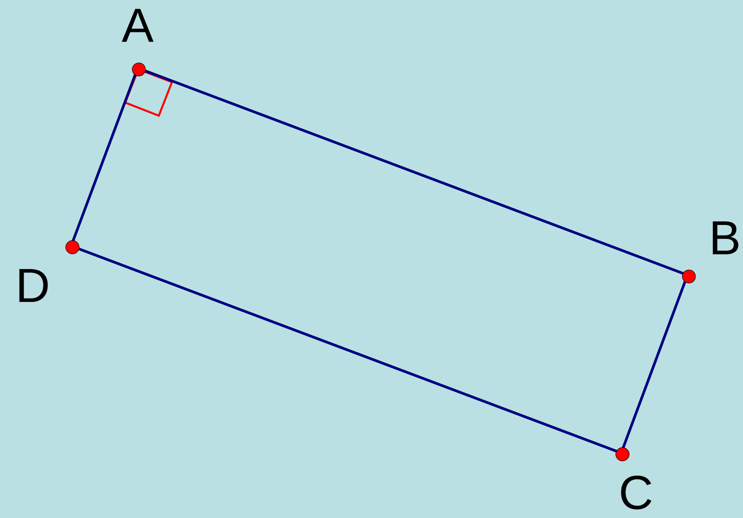
Given: $ABCD$ is a parallelogram & angle A is a right angle.

Prove: $ABCD$ has all right angles.



Statement	Justification
1. $\angle A \cong \angle C$.	1. .
2. $m\angle A = 90^{o}$.	2. Property of a right angle.
3. $m\angle A + m\angle B = 180^{o}$.	3. Property of Co-interior angles.
4. $90^{o} + m\angle B = 180^{o}$.	4. Substitution.
5. .	5. Subtraction.
6. $\angle B \cong \angle A$.	6. Angles have equal measure.
7. .	7. Property of parallelograms.
8. $\angle A \cong \angle D$.	8. .
9. All angles are right angles.	9. All angles are cong. to angle A. ■

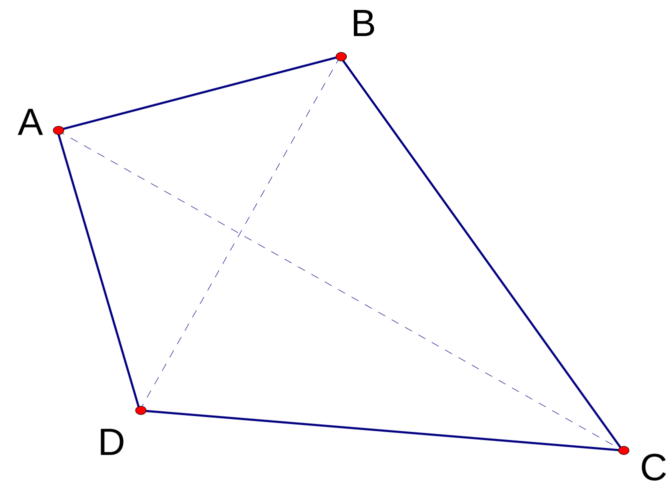
Given: $ABCD$ is a parallelogram & angle A is a right angle.
Prove: $ABCD$ has all right angles.



Statement	Justification
1. $\angle A \cong \angle C$.	1. Property of parallelograms.
2. $m\angle A = 90^{o}$.	2. Property of a right angle.
3. $m\angle A + m\angle B = 180^{o}$.	3. Property of Co-interior angles.
4. $90^{o} + m\angle B = 180^{o}$.	4. Substitution.
5. $m\angle B = 90^{o}$.	5. Subtraction.
6. $\angle B \cong \angle A$.	6. Angles have equal measure.
7. $\angle B \cong \angle D$.	7. Property of parallelograms.
8. $\angle A \cong \angle D$.	8. Transitive property.
9. All angles are right angles.	9. All angles are cong. to angle A. ■

Given: $ABCD$ is a kite (diagram is to scale).

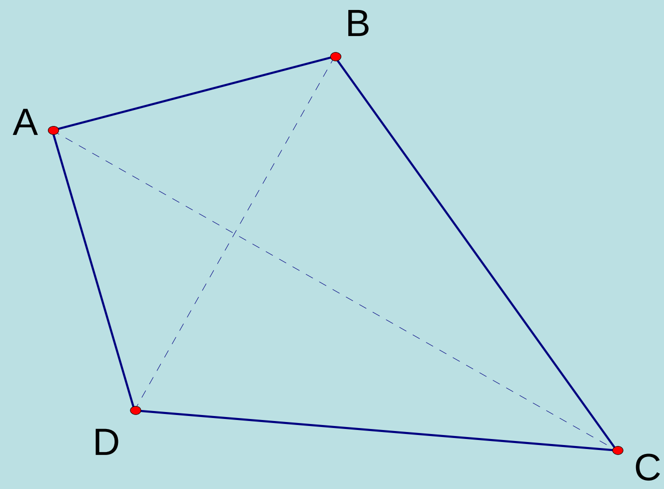
Prove: $\angle ABC \cong \angle ADC$ & $\overline{AC}$ bisects $\angle DAB$ & $\angle BCD$.



Statement	Justification
1. $\overline{AB} \cong \overline{DA}$ & $\overline{BC} \cong \overline{CD}$.	1. Property of a kite.
2. .	2. Reflexive axiom.
3. .	3. SSS.
4. .	4.
5. $\angle CAB \cong \angle CAD$ & $\angle BCA \cong \angle DCA$.	5.
6. $\overline{AC}$ bisects $\angle DAB$ & $\angle BCD$.	6. ∎

Given: $ABCD$ is a kite (diagram is to scale).

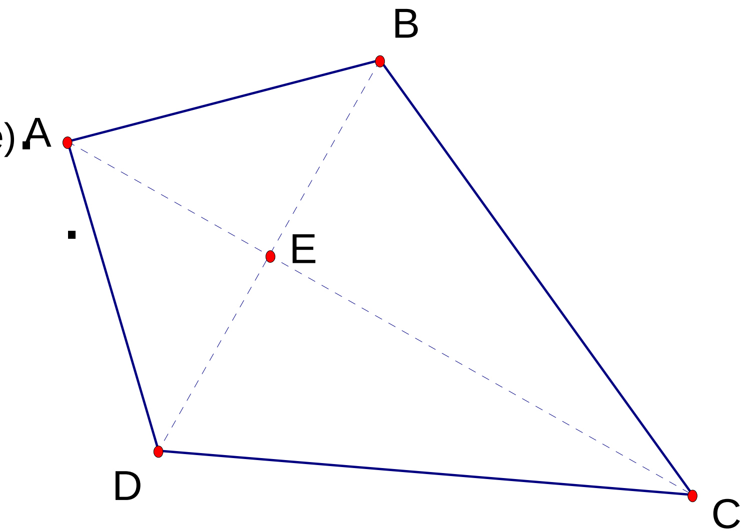
Prove: $\angle ABC \cong \angle ADC$ & $\overline{AC}$ bisects $\angle DAB$ & $\angle BCD$.



Statement	Justification
1. $\overline{AB} \cong \overline{DA}$ & $\overline{BC} \cong \overline{CD}$.	1. Property of a kite.
2. $\overline{AC} \cong \overline{AC}$.	2. Reflexive axiom.
3. $\Delta ABC \cong \Delta ADC$.	3. SSS.
4. $\angle ABC \cong \angle ADC$.	4. CPCTC
5. $\angle CAB \cong \angle CAD$ & $\angle BCA \cong \angle DCA$.	5. CPCTC
6. $\overline{AC}$ bisects $\angle DAB$ & $\angle BCD$.	6. Definition of angle bisector. ■

Given: $ABCD$ is a kite (diagram is to scale).

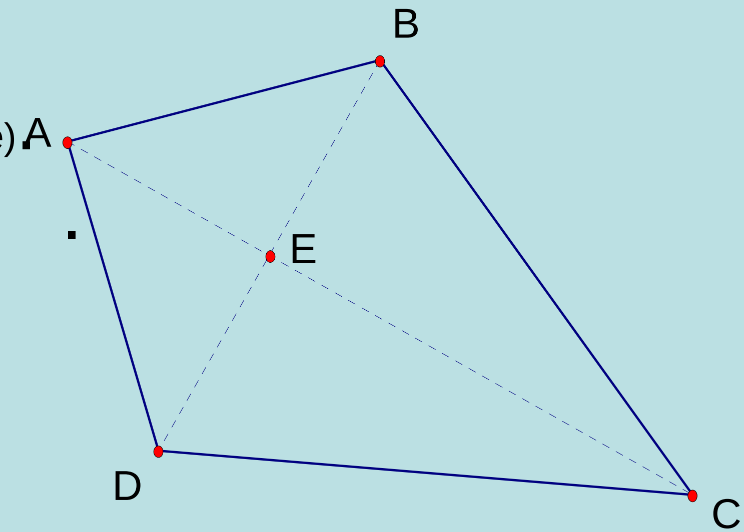
Prove: $\overline{AC} \perp \overline{BD}$ & $\overline{AC}$ bisects $\overline{BD}$.



Statement	Justification
1. & .	1. Property/definition of a kite.
2. .	2.
3. $\Delta ABE \cong \Delta ADE$.	3. SAS.
4. .	4. CPCTC
5. .	5. $\angle BEA \cong \angle DEA$ & form a straight line.
6. .	6.
7. $\overline{AC}$ bisects $\overline{BD}$.	7. Definition of segment bisector. ■

Given: $ABCD$ is a kite (diagram is to scale).

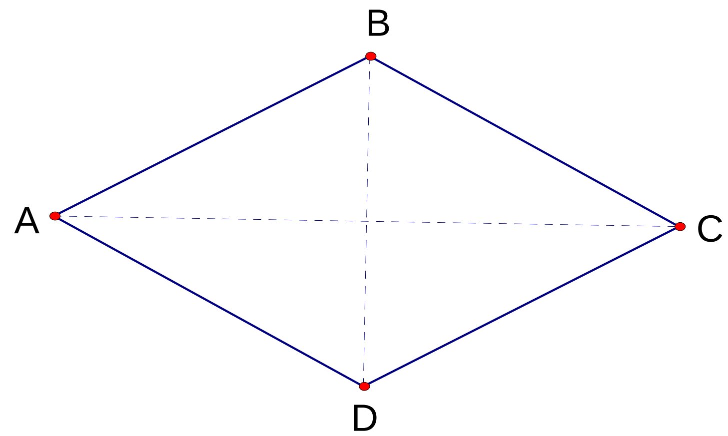
Prove: $\overline{AC} \perp \overline{BD}$ & $\overline{AC}$ bisects $\overline{BD}$.



Statement	Justification
1. $\angle EAB \cong \angle EAD$ & $\overline{AB} \cong \overline{AD}$.	1. Property of a kite.
2. $\overline{AE} \cong \overline{AE}$.	2. Reflexive axiom.
3. $\Delta ABE \cong \Delta ADE$.	3. SAS.
4. $\angle BEA \cong \angle DEA$.	4. CPCTC
5. $\overline{AC} \perp \overline{BD}$.	5. $\angle BEA \cong \angle DEA$ & form a straight line.
6. $\overline{BE} \cong \overline{DE}$.	6. CPCTC
7. $\overline{AC}$ bisects $\overline{BD}$.	7. Definition of segment bisector. ■

Given: $ABCD$ is a rhombus.

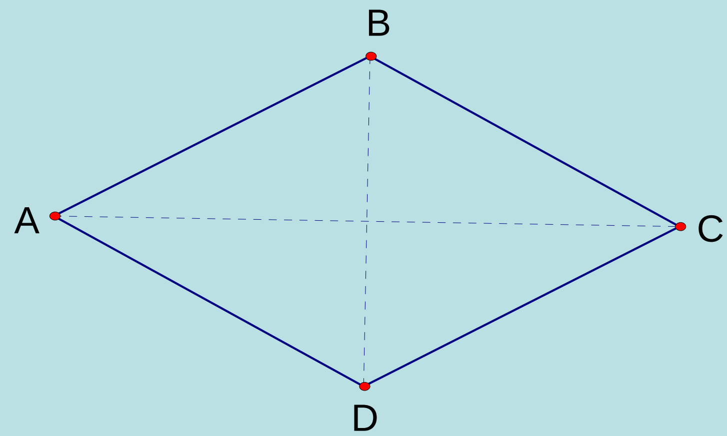
Prove: Diagonals are perpendicular bisectors.



Statement	Justification
1. Diagonals are perpendicular.	1. .
2. .	2. .
3. Diagonals are perpendicular bisectors.	3. Definition of perpendicular bisector. ■

Given: $ABCD$ is a rhombus.

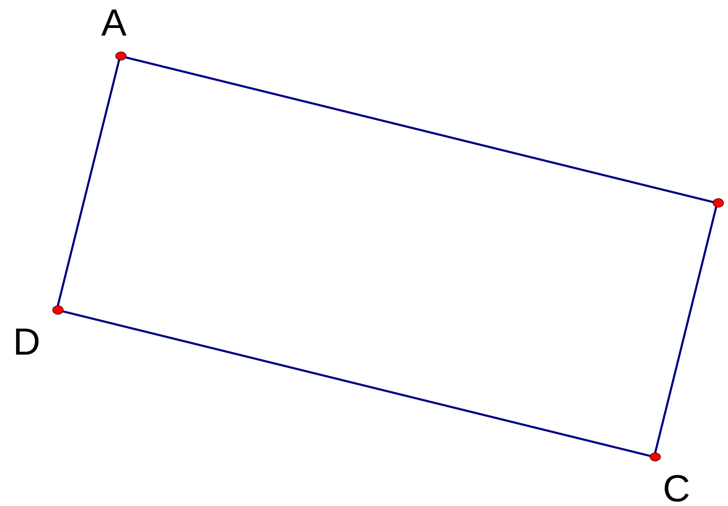
Prove: Diagonals are perpendicular bisectors.



Statement	Justification
1. Diagonals are perpendicular.	1. A rhombus is a kite.
2. Diagonals are bisectors.	2. A rhombus is a parallelogram.
3. Diagonals are perpendicular bisectors.	3. Definition of perpendicular bisector. ■

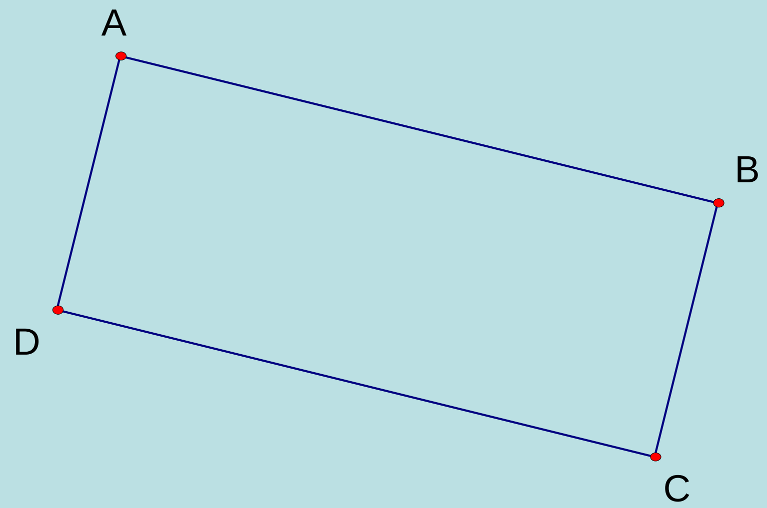
Given: $ABCD$ is a rectangle.

Prove: All interior angles are right angles.



Statement	Justification
1. .	1. Definition of a rectangle.
2. .	2. . ■

Given: $ABCD$ is a rectangle.
Prove: All interior angles are right angles.



Statement	Justification
1. One interior angle is a right angle.	1. Definition of a rectangle.
2. All interior angles are right angles.	2. A rectangle is a parallelogram & a parallelogram with one right angle has all right angles. $\blacksquare$