Geometry: Solving Kites Using Properties

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DIRECTIONS *Use kite properties to solve for x and find missing measures. ABCD is a kite where AB=AD and CB=CD, with AC as the main diagonal.*

1 Kite — Consecutive sides equal. Solve for x:

$AB = 3x + 2, \quad AD = 5x - 8$

Answer: _____

2 Kite — Other pair of sides equal. Solve for x:

$CB = 4x - 3, \quad CD = 2x + 7$

Answer: _____

3 Kite — Opposite angles equal. Find x and m∠B:

$\angle B = (4x - 5)^\circ, \quad \angle D = (2x + 15)^\circ$

Answer: _____

4 Kite — Diagonal bisects vertex angle ∠A. Find x:

$\angle BAC = (2x + 8)^\circ, \quad \angle DAC = (4x - 12)^\circ$

Answer: _____

5 Kite — Main diagonal bisects cross diagonal. Find x:

$BE = 3x - 1, \quad DE = 4x - 7$

Answer: _____

6 Kite — Vertex angle bisected at C. Find x:

$\angle BCA = (x + 12)^\circ, \quad \angle DCA = (3x - 16)^\circ$

Answer: _____

7 Kite — Find x and m∠B. Use sum of angles = 360°:

$\angle B = \angle D = (3x + 5)^\circ, \quad \angle A = 80^\circ, \quad \angle C = 60^\circ$

Answer: _____

8 Kite — Find x and the perimeter:

$AB = AD = 4x - 1, \quad CB = CD = 2x + 3, \quad P = 40$

Answer: _____

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Answer Key & Solutions

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TEACHER NOTES *Kite: 2 pairs consecutive sides equal. ∠B=∠D (opp. angles between unequal sides). Main diagonal (AC) bisects vertex angles and bisects BD. Diagonals are perpendicular.*

1 Kite — Consecutive sides equal. Solve for x:

$AB = 3x + 2, \quad AD = 5x - 8$

= $x = 5, \quad AB = AD = 17$

Consecutive sides equal: 3x+2=5x–8 → 10=2x → x=5.

2 Kite — Other pair of sides equal. Solve for x:

$CB = 4x - 3, \quad CD = 2x + 7$

= $x = 5, \quad CB = CD = 17$

CB=CD: 4x–3=2x+7 → 2x=10 → x=5.

3 Kite — Opposite angles equal. Find x and m∠B:

$\angle B = (4x - 5)^\circ, \quad \angle D = (2x + 15)^\circ$

= $x = 10, \quad m\angle B = m\angle D = 35^\circ$

∠B=∠D (angles between unequal sides): 4x–5=2x+15 → 2x=20 → x=10.

4 Kite — Diagonal bisects vertex angle ∠A. Find x:

$\angle BAC = (2x + 8)^\circ, \quad \angle DAC = (4x - 12)^\circ$

= $x = 10, \quad m\angle BAC = m\angle DAC = 28^\circ$

Main diagonal bisects ∠A: ∠BAC=∠DAC → 2x+8=4x–12 → 20=2x → x=10.

5 Kite — Main diagonal bisects cross diagonal. Find x:

$BE = 3x - 1, \quad DE = 4x - 7$

= $x = 6, \quad BE = DE = 17$

Main diagonal bisects BD: BE=DE → 3x–1=4x–7 → 6=x.

6 Kite — Vertex angle bisected at C. Find x:

$\angle BCA = (x + 12)^\circ, \quad \angle DCA = (3x - 16)^\circ$

= $x = 14, \quad m\angle BCA = m\angle DCA = 26^\circ$

Main diagonal bisects ∠C: ∠BCA=∠DCA → x+12=3x–16 → 28=2x → x=14.

7 Kite — Find x and m∠B. Use sum of angles = 360°:

$\angle B = \angle D = (3x + 5)^\circ, \quad \angle A = 80^\circ, \quad \angle C = 60^\circ$

= $x = 35, \quad m\angle B = m\angle D = 110^\circ$

∠A+∠C+2∠B=360°: 80+60+2(3x+5)=360 → 6x+150=360 → 6x=210 → x=35.

8 Kite — Find x and the perimeter:

$AB = AD = 4x - 1, \quad CB = CD = 2x + 3, \quad P = 40$

= $x = 3, \quad AB = 11, \quad CB = 9$

2(4x–1)+2(2x+3)=40 → 12x+4=40 → 12x=36 → x=3.

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