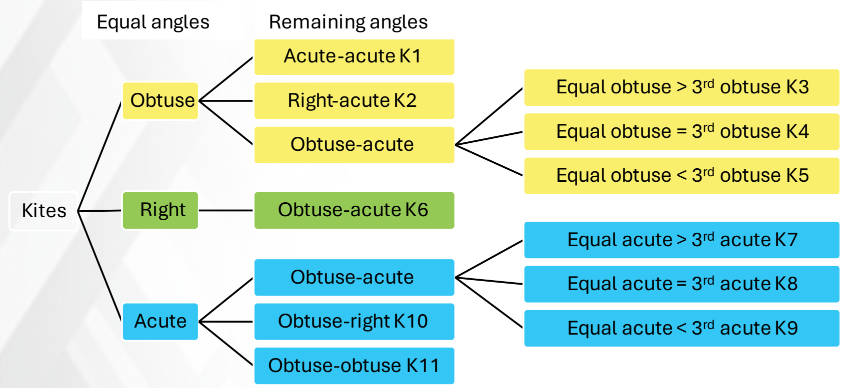
Kite Families: An investigation of a family tree!

There are 11 types of kites (excluding rhombi) according to the poster.

This poster will help your students make friends with these 11 types. Do give the students time to study it and come up with properties for each of the kites K1, K2… K11. Some important points are given below. Students are sure to come up with these or other points during the discussion, if they don't then do share at your discretion.

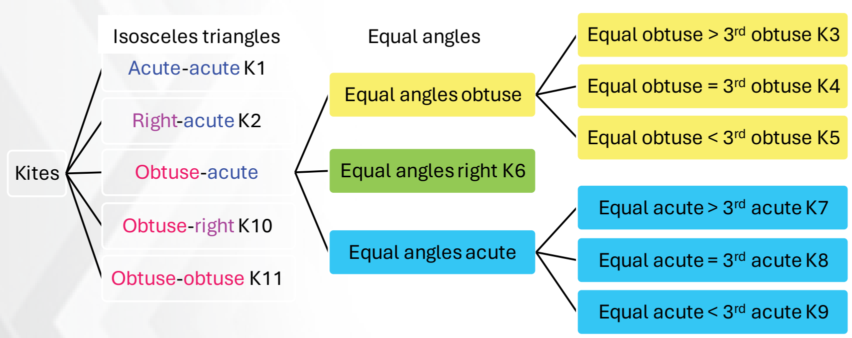
A. Along the line of symmetry



Two possibilities for rhombi:

i. Obtuse-acute, i.e., a non-square rhombus
ii. Right, i.e., square

B. As sum of two isosceles triangles



Rhombus: obtuse-obtuse or acute-acute depending upon the choice of diagonal
Square: right-right.

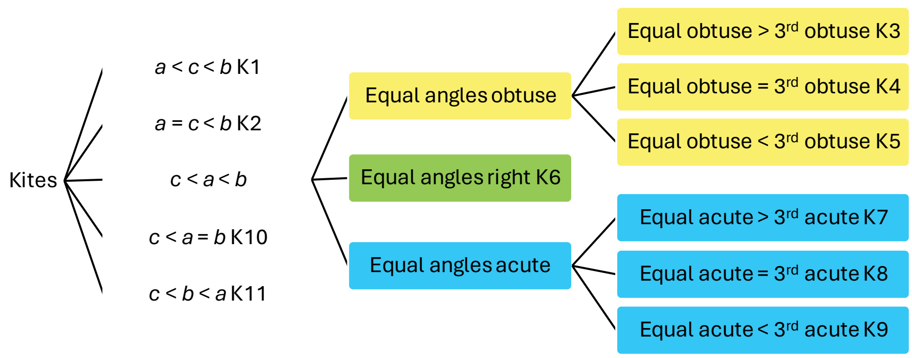
Keywords: *quadrilaterals, kites, properties, angles, classification, exploration*

C. Angle-wise

Classification identical to A.

K6 is the only cyclic kite with all four vertices on a circle.

D. Diagonal-wise



Halving diagonal longer for K1, K2… K6

Halving diagonal shorter for K8 (unless square), K9… K11

ABCD, PQRS, XYZW are K7 with equal acute angles > 3[rd] acute ones

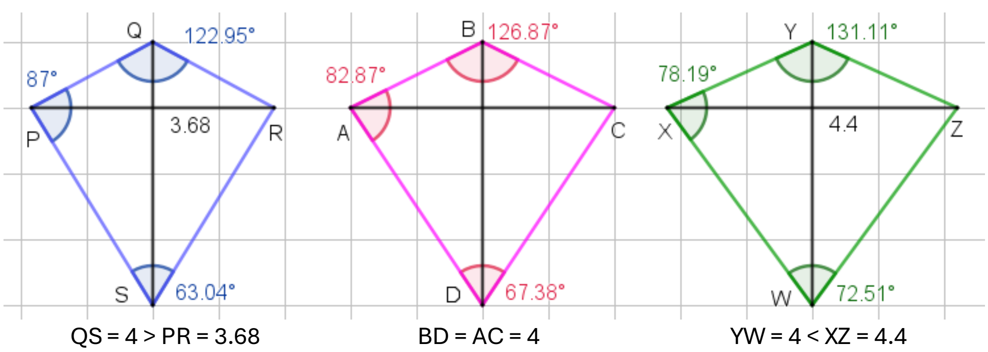


Figure 1

Proof:

Consider kite ABCD with AB = BC and AD = DC such that diagonals AC = BD intersect at O.

To show: ∠BCD < 90°

Construct circle with diameter BD.

Let the circle intersect OC at X. ∠BXD = 90° since it is an angle in a semicircle.

∠BCO + ∠XBC = ∠BXO (exterior angle equals sum of two opposite interior angles)

⇒ ∠BCO < ∠BXO

Similarly, ∠DCO < ∠DXO

∴ ∠BCD = ∠BCO + ∠DCO < ∠BXO + ∠DXO = ∠BXD = 90°

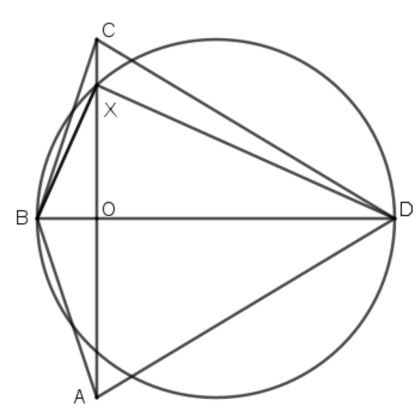


Figure 2