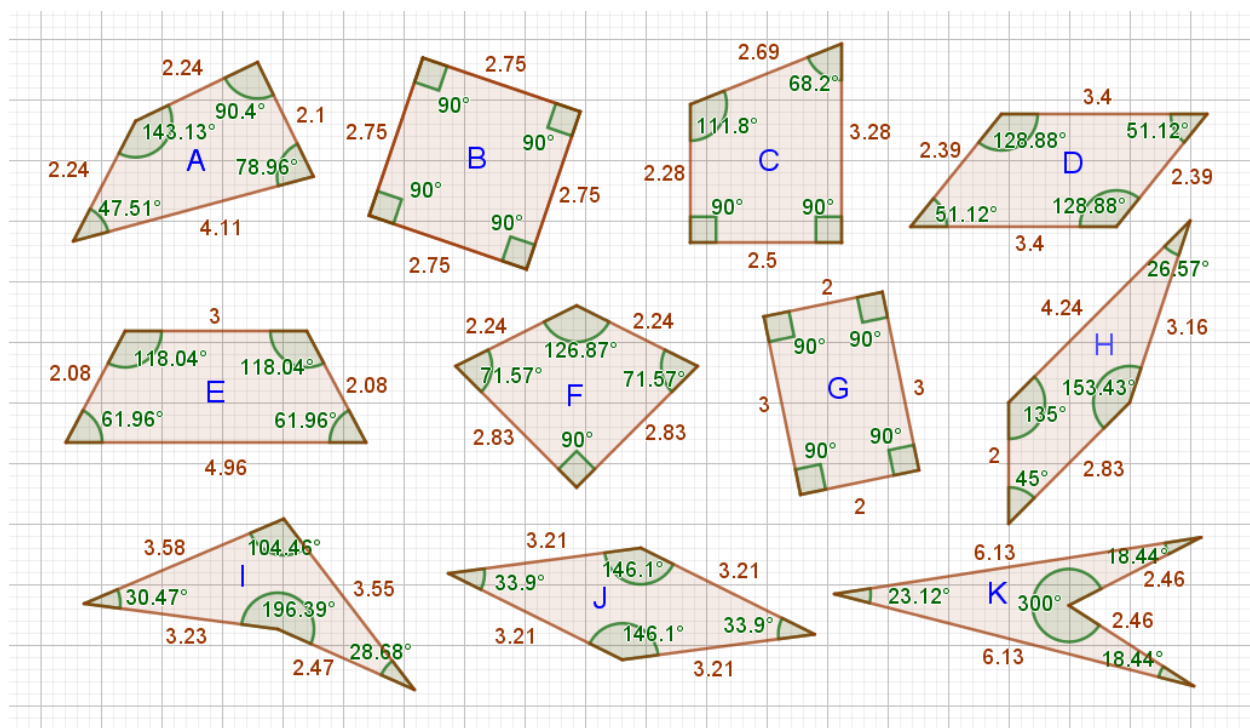


Classifying quadrilaterals

➤ How can we classify the quadrilaterals of the picture?



➤ Which quadrilaterals are convex?

Attend the

Definition: A quadrilateral is **convex** if all line segment joining two vertices are contained in the quadrilateral.

we can say that the quadrilaterals **A**, **B**, **C**, **D**, **E**, **F**, **G**, **H** and **J** are **convex**.
Quadrilaterals **I** and **K** are **non-convex**.

➤ Which quadrilaterals are kites?

Attend the

Definition: A **kite** is a quadrilateral with two pairs of consecutive sides congruent.

we can say that the quadrilaterals **F**, **J** and **K** are **kites**.

➤ Which quadrilaterals are trapezoids?

Attend the

Definition: A **trapezoid** is a quadrilateral with at least one pair of parallel sides.

we can say that the quadrilaterals **B, C, D, E, G, H** and **J** are **trapezoids**.

Observation 1: Some authors consider one slightly different definition, this is, a Trapezoid is a quadrilateral with exactly one pair of parallel sides (exclusive definition). In this case, only the quadrilaterals C, E and H are trapezoids.

Observation 2: Within the scope of MathE we consider the first definition (inclusive definition) of trapezoid and the others indicated below.

Particular cases of trapezoids:

- If the non-parallel sides are congruent – **Isosceles trapezoids**
 - Quadrilateral **E**
- If the non-parallel sides are not congruent – **Scalene trapezoids**
 - Quadrilateral **H**
- If one of the opposing non-parallel sides is perpendicular to the bases – **Right trapezoids**
 - Quadrilateral **C**

Attend to the number of the pairs of parallel sides, we have:

- Trapezoids **with exactly one pair** of parallel sides – **Non-parallelograms**
 - Quadrilaterals **C, E** and **H**
- Trapezoids **with two pairs** of parallel sides – **Parallelograms**
 - Quadrilaterals **B, D, G** and **J**

➤ **How can we classify the parallelograms?**

Considering the congruence of the internal angles:

- Parallelograms with all congruent angles – **Rectangles**
 - Quadrilaterals **B** and **G**
- Parallelograms with exactly two pairs of congruent angles – **Non-rectangles (oblique parallelograms)**
 - Quadrilateral **D** and **J**

Considering the congruence of the sides:

- Parallelograms with all congruent sides – **Rhombus**
 - Quadrilaterals **B** and **J**
- Parallelograms with exactly two pairs of congruent sides – **Non-rhombus**
 - Quadrilaterals **D** and **G**

Considering the congruence of the angles and the sides:

- Parallelograms with all angles congruent and all sides congruent – **Squares (regular quadrilaterals)**
 - Quadrilateral **B**

Note: A **regular polygon** is a polygon with all internal angles congruent and all sides congruent.

To think: What other criteria can we use to classify the quadrilaterals?