PROPERTIES OF POLYGONS #1

MINI-LESSON

For the Properties of Polygons key concept

Summary

Students investigate and compare the characteristics of quadrilaterals.

Suitable for 2-6 students

Length 30 min (approximately)

Lesson Preparation

- Print **Properties of Polygons** sheet (download) – one copy for each pair of students. Cut out one set of shapes before for the lesson to use as a demonstration.
- **Pairs of scissors** – one for each pair of students (for cutting out shapes)
- Print **Properties of Polygons: Quadrilateral characteristics sheet** (download) – one copy for each student

Optional:

- Print **Properties of Polygons Answer sheet** (download) – one copy for your reference
- Print **Properties of Polygons Facts sheet** (download) – one copy for your reference

LEARNING INTENTIONS

This activity helps students to:

- Identify the characteristics (equal side length, equal angle, lines of symmetry, order of rotational symmetry) of quadrilaterals

CURRICULUM LINKS

- Identifying right angles (ACMMG089)
- Rotating shapes and symmetry (ACMMG114)
- Shape transformations (ACMMG142)
- Geometric notation and quadrilateral classification (ACMMG165)
- Line and rotational symmetry (ACMMG181)

AFTER THE LESSON

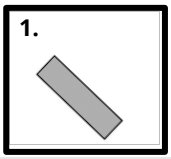
Follow up with 'Quadrilaterals Mini-Lesson II',which guides students through the idea that some sets of quadrilaterals are special cases of other quadrilaterals.

INTRODUCTION — 2 MINUTES

Ask students what different four-sided shapes they know. Explain that they will be exploring the characteristics of some of these. Ask, "What is the name given for all types of four-sided shapes?" [quadrilaterals.]

Whole group:
Share ideas with the group.

INTRODUCTION — 3 MINUTES

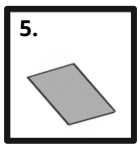


Using a cut out copy of shape **1**, show students how to complete the column for shape **1** on the **Quadrilaterals Characteristics sheet**.
As you go down the column, define each characteristic as necessary [see **Quadrilaterals Answer sheet**].

Whole group:
Listen, complete shape 1 column on sheet.

DIRECT STUDENTS — 5 MINUTES

Check for understanding: Go through the characteristics of shape **5** with the group, getting input from students:



Now ask students to identify similarities and differences between the characteristics of shapes **1** and **5** [e.g. both shapes have opposite sides that are parallel; shape **1** has right angles]. Students write ideas on their sheet.

Whole group:
Describe and draw features of shape 5. Compare shapes 1 and 5.

DIRECT PAIRS OF STUDENTS — 10 MINUTES

Direct pairs of students: In pairs, students use cut out copies of the quadrilaterals to complete the characteristics for shapes **2, 3** and **4** on their sheet. Students then write what they notice on the table of similarities and differences.

Prompt student thinking: As students work, ask scaffolding questions, e.g.:

- What do you notice about the sides of shapes 1 and 2?
- What do you notice about the lines of symmetry for shapes 2 and 3?
- What makes shape 4 different from all the other shapes?

In pairs:
Complete characteristics for shapes 2-4 and similarities / differences table.

DISCUSSION — 5 MINUTES

Ask students questions about what they have learned, such as:

- the similarities and differences they have identified for shapes **1** & **2** and shapes **2** & **3**. Highlight characteristics not mentioned by students.
- The common names that can be used for each shape [i.e. *rectangle, square, rhombus, kite, parallelogram*]

Whole group:
Identify and explain characteristics of quadrilaterals.

PROPERTIES OF POLYGONS #2

MINI-LESSON

For the Properties of Polygons key concept

Summary

Students investigate how one type of quadrilateral can be a special case of another type of quadrilateral.

Suitable for 2-6 students

Length 30 min (approximately)

Lesson Preparation

- Print **Quadrilaterals sheet** (download) – one copy for each pair of students. Cut out one set of shapes before for the lesson to use as a demonstration.
- **Pairs of scissors** – one for each pair of students (for cutting out shapes)
- Print **Venn Diagram A3 sheet** (download) – one copy for each pair of students (or if A3 not possible, *Venn Diagram A4* - download)

Optional:

- Print **Quadrilaterals Answer sheet** (download) – one copy for your reference

LEARNING INTENTIONS

This activity helps students to:

- Appreciate that some quadrilaterals are special cases of other quadrilaterals.

Note, this lesson is for students who understand the Learning Intention from Quadrilaterals Mini-Lesson I. Specifically, being able to identify whether quadrilaterals share particular properties.

CURRICULUM LINKS

- Identifying right angles (ACMMG089)
- Geometric notation and quadrilateral classification (ACMMG165)

AFTER THE LESSON

In later lessons, you could follow up with related activities about the characteristics of shapes, e.g.:

- exploring the characteristics of other 2-dimensional shapes
- exploring the characteristics of 3-dimensional shapes
- tangrams, three-piece puzzles, four-piece puzzles (RIME activities)
- isometric drawings using dot paper

INTRODUCTION — 5 MINUTES

Using an A3 copy, introduce the Venn Diagram to students:

- Explain how to read the Venn Diagram
  [e.g. "with all angles 90°" refers to the whole of the small oval on the right].
- Ask students to explain the terms on the Venn Diagram
  [i.e. quadrilateral, parallel, equal sides, 90o angles].
- Get students to cut out their shapes.

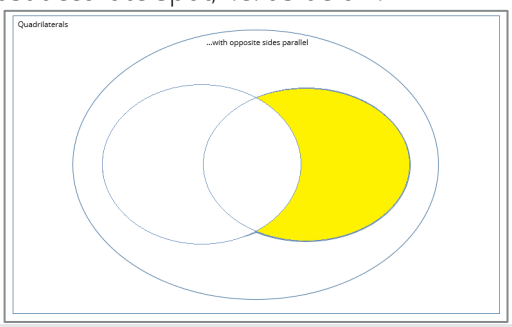
Whole group:
Listen and explain terms in Venn Diagram. Cut out shapes.

INTRODUCTION — 2 MINUTES

Check for understanding: Take shape 1 and place it in a spot on the Venn Diagram that is not the most accurate. Explain why shape 1 can go there.

e.g. the opposite sides are parallel, so shape 1 can go in the large oval

Ask students, where is a better place to put shape 1? Keep asking students this question until shape 1 is in the most accurate spot, i.e. as below:



Whole group:
Listen and help to place shape 1.

DIRECT STUDENTS — 5-10 MINUTES

In pairs, students have a Venn Diagram and set of shapes

1. one student in the pair places a shape on the Venn Diagram.
2. The other student either puts that shape somewhere else that they think is more accurate OR places a new shape on the Venn Diagram.
3. The pair of students continue until all shapes have been placed.

Whole group:
Place shapes 2-4 on a Venn Diagram.

DISCUSSION — 5 MINUTES

Students share their Venn Diagrams with the group.

Ask students what is the same/different across the Venn Diagrams.

If the group has not come to a conclusion about the best placement of shapes, share this with the group [Quadrilaterals answer sheet shows this].

Check carefully that each student is following and understand the placement of shapes here! It is easy to nod along and not understand.

Whole group:
Contributing to discussion.

DISCUSSION — 5-10 MINUTES

Ask students about what is shown in the Venn Diagram, including:

- Which segment of the Venn Diagram is for squares? For rectangles? For rhombuses? For parallelograms? Label each segment as appropriate.
- Are rectangles types of parallelograms? Why?
- Are squares types of rectangles? Why?
- Are squares types of rhombuses? Why?

Whole group:
Identify and explain characteristics of quadrilaterals.