



# Exploring Triangles

## Curriculum connections

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### Australian:

#### Year 2

- Describe and draw two-dimensional shapes, with and without digital technologies (ACMMG042)
  - identifying key features of squares, rectangles, triangles, kites, rhombuses and circles, such as straight lines or curved lines, and counting the edges and corners
- Investigate the effect of one-step slides and flips with and without digital technologies (ACMMG045)
  - understanding that objects can be moved but changing position does not alter an object's size or features

### USA Common Core:

#### Kindergarten

- CCSS.MATH.CONTENT.K.G.A.2. Correctly name shapes regardless of their orientations or overall size.
- CCSS.MATH.CONTENT.K.G.B.4. Analyse and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

#### Grade 1

- CCSS.MATH.CONTENT.1.G.A.1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., colour, orientation, overall size); build and draw shapes to possess defining attributes.

## Lesson Overview

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Students explore the properties of triangles to determine the critical and non-critical attributes.

## Lesson Objectives

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1. Ask the students what attributes or properties make a triangle.
  - Write down the attributes they name on the board, even if incorrect. Use the heading “Critical Attributes”.
  - Also write a heading for a list that will contain the non-critical attributes of triangles when identified.
  - Decide on a class definition.
2. Students draw a triangle on their device.
  - Ask students to count the vertices and edges of their triangles. Make sure the properties of their triangle match the class definition.
  - If in tables, they can also look at the triangles drawn by others on their table to see any variations.
3. Ask the students to change the colour of their triangle to whatever they want.
  - Is it still a triangle? Why or why not?
  - Determine that colour differences do not have an impact on shape.
  - Write “colour” under the non-critical attributes list.
4. Now ask students to rotate their triangle so it is “upside down” or “sideways”.
  - Is it still a triangle? Why or why not?
  - Ask the class to match the properties of their triangle to the definition on the board.
  - If the listed properties specifies a “flat base” for the triangle or any other condition dependant on orientation, move it to the “non-critical attributes” list and determine that a triangle rotated is still the same shape.
5. Ask students to flip their triangle.
  - Is it still a triangle? Why or why not?
  - Again, match up the properties with the class definition.
6. This time, ask the students to move each of the three points to make their triangle look different. They can make it as silly-looking as they want.
  - Once done, ask the class if their new shape is a triangle. Why or why not?
  - Count the vertices and the edges together. Match the new shape to the definition on the board.
  - With the three straight edges and the three pointy vertices, the shape is still a triangle, even if it doesn’t look like the prototypical triangles they are used to seeing.

- Write anything relevant (e.g. “doesn’t look like a normal triangle”) on the non-critical attributes list.
7. Once done, finalise the class definition by listing the critical attributes of a triangle.
    - Closed shape.
    - Three straight edges.
    - Three pointy vertices.
    - Also identify those properties that do not change the nature of the shape.
  8. Present the students with the sheet of triangles and non-triangles.
    - Go through each example and ask students if it is a triangle. Why or why not?
    - Match each to the definitions on the board and determine which non-critical attributes they can see.
  9. Now ask students to draw three non-examples of triangles on their device (can be limited due to the tendency of the program to create straight lines and pointy vertices) or their worksheet.
    - Students can compare their non-examples with a partner as you walk around the class and observe their examples. Ask them to explain why they are not triangles, encouraging reasons such as number of edges, number of vertices, closed shape and curved lines rather than, “it isn’t a triangle because it’s a square”.

## Resources

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- iPads with Shape Lab installed
- *Exploring Triangles* worksheet.