Interior Angle Sums

Curriculum connections

Australian:

Year 7

- Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166)

USA Common Core:

Year 8

- CCSS.MATH.CONTENT.8.G.A.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

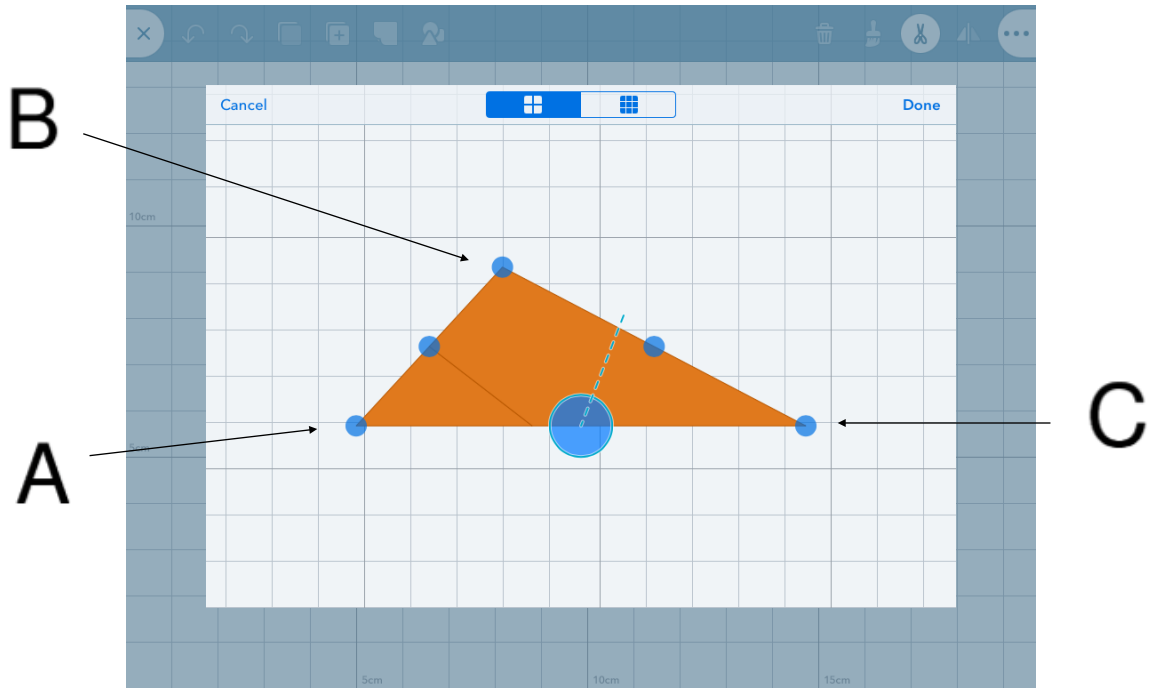
Lesson Overview

Students investigate the sum of the interior angles of triangles and use what they discover to determine the sum of the interior angles of quadrilaterals.

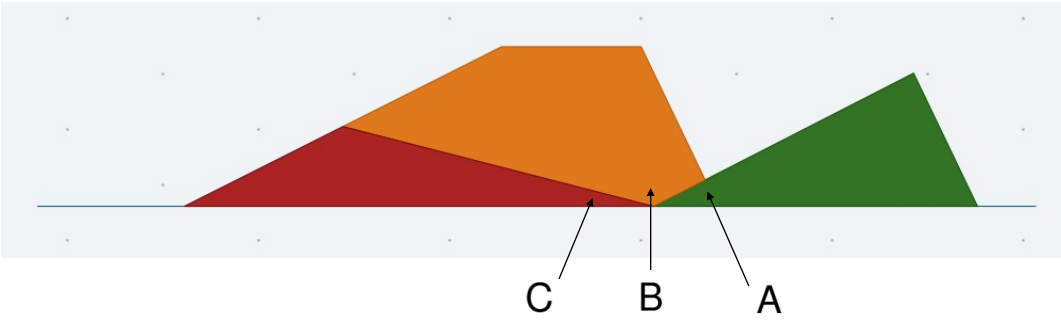
Lesson Objectives

1. Connect iPad to a screen and open Shape Lab (not 100% necessary, but good if you can).
    - Draw a triangle.
    - Using the mark up tool, show the students what an interior angle is, and explain that you are going to find the sum of the interior angles in a triangle.
    - What do they think the sum might be? Will these two triangles (draw examples) have the same sum? Why?

2. Ask students to draw a triangle of reasonable size (within a 12 × 6 unit area) on their iPads. It can be any kind of triangle, in fact, they should try to draw a different triangle to the person next to them (it might be helpful to demonstrate some of these steps on your iPad).
    - Ask students to use the cutting tool to cut the triangle in a way to separate the vertices. e.g.



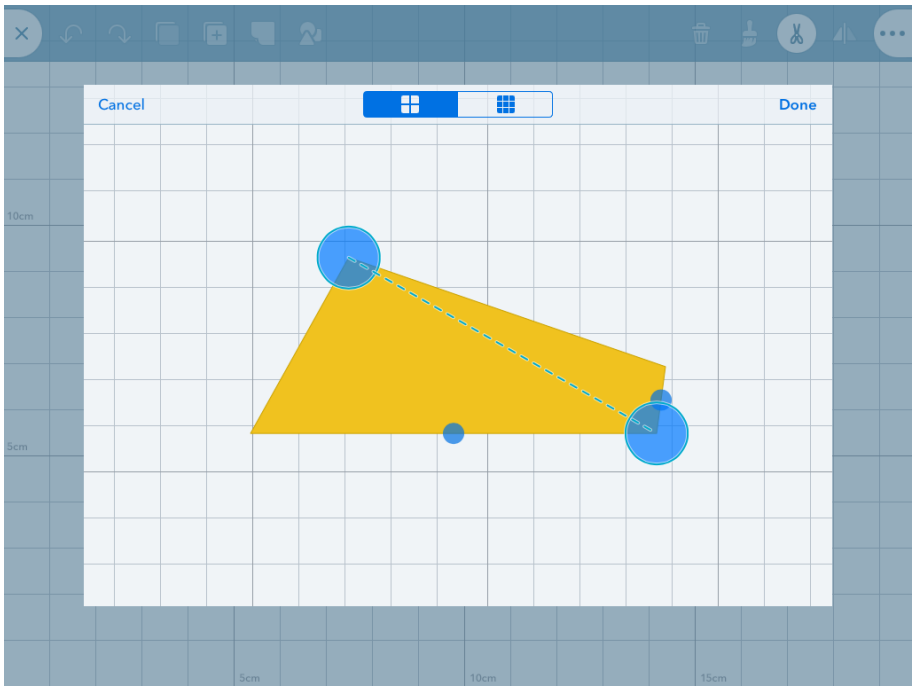
    - Make the three sections different colours if desired (to help distinguish them from each other).
    - Draw a straight, horizontal line towards the bottom of the iPad (or students can use a protractor background).
    - One by one, lie the vertices on the straight line in a ray to demonstrate that they add up to 180° (a protractor background can also be used here). e.g.



    - Additionally, students can make three copies of the triangle and arrange the three vertices so they appear to form a line.
    - Ask the class if all of their different types of triangles fit the 180° line.

- Give the class 5 minutes to discuss, in pairs, other methods they might be able to use to work out the sum of the interior angles.

3. Bring the focus back to the screen and ask the students to save that document and open a new one.
    - Now you are going to investigate the sum of the interior angles of a quadrilateral.
    - Ask the class if they have any ideas about this, knowing what they do about the interior angles of triangles and the composition of quadrilaterals (prompt explanations of their answers).
    - After a short discussion, ask the class to draw a quadrilateral, as irregular or irregular as they like.
    - Now, using the cutting tool, cut the quadrilateral from one corner to the opposite corner, e.g.



    - Ask the class what shapes they have made.
    - Now ask what they think the sum of its interior angles is and how they figured it out (add the interior angles of both triangles to get 360°, which is the same for all quadrilaterals).

4. Distribute the worksheet and ask students to find the missing angle using what they have learned as well as other knowledge about angles and triangles (e.g. supplementary angles, properties of an isosceles triangle).

Resources

- iPads with Shape Lab installed
- *Interior Angle Sums* worksheet.

Extension

- What methods can be used to work out the interior angles of other regular polygons, e.g. pentagons, hexagons and octagons?