Classifying Quadrilaterals

This project is all about exploring quadrilaterals!

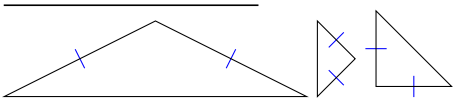
Part 1: Create a "fact file" for each type of quadrilateral. It must include:

- The name of the quadrilateral
- An accurate drawing of a few examples
- Its definition
- At least one property about its edge lengths
- At least one property about its angles

You may choose to include more information, such as properties of its diagonals (do they bisect one another, are they perpendicular), area, symmetry (mirror symmetry, rotational symmetry), whether it will tessellate, and etymology. As a challenge, provide proofs for as many properties as possible.

Here is an example of a very advanced fact file for isosceles triangles:

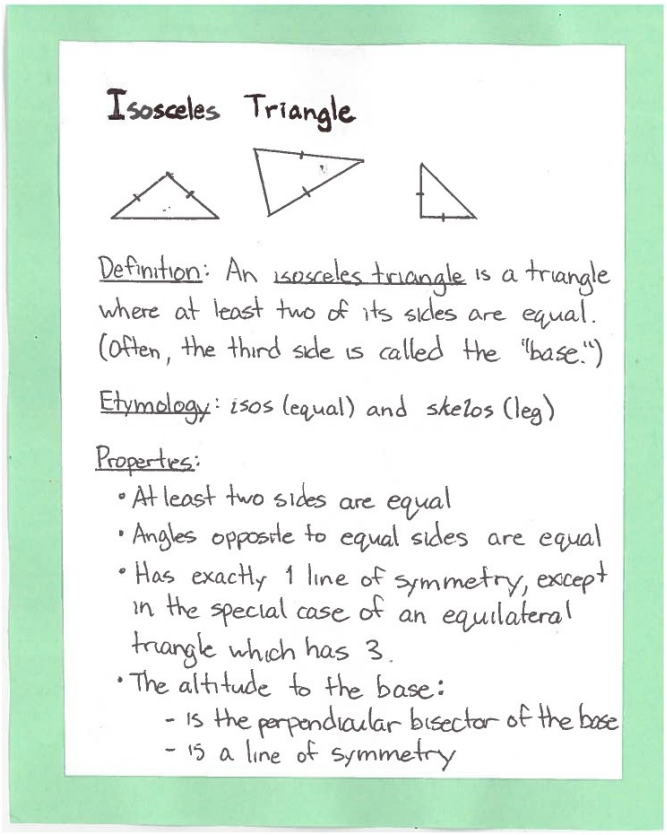
Isosceles Triangle



An **isosceles triangle** is a triangle where at least two of its sides are equal.
Note: often, the side length which is not equal is called the "base," if there is no confusion otherwise.
Etymology: "Isosceles" comes from the Greek roots *isos* (*equal*) and *skelos* (*leg*).
Properties:

- At least two side lengths are equal.
- Angles that are opposite equal side lengths are equal.
- Every isosceles triangle has at least one line of symmetry. Only the special case of an equilateral triangle has a different number of lines of symmetry.
- The altitude to the base (as defined above) satisfies several properties:
  - it is the perpendicular bisector of the base
  - it is the angle bisector of the angle opposite the base
  - it is a line of symmetry (Proof: If ABC is isosceles with $AB = AC$, then let D be the midpoint of BC. Then $BD = CD$ and AD is a common side, so by SSS congruence, $\triangle ABD \cong \triangle ACD$. Therefore, AD is a line of symmetry.)
  - it is the median of the triangle
- As with all triangles, its height is given by $bh/2$ where b is its base and h is its height. There is no easy formula for area of an isosceles triangle in terms of its side lengths (a complex formula can be found as: $b\sqrt{4s^2 - b^2}/4$, where s is the length of the equal sides).

Here is an example of a fact file for isosceles triangles that is hand-made:



For your project, you will create a fact file for each of the seven quadrilaterals we discussed in class. Each fact file should be on a separate, standard-sized blank piece of paper (8.5" × 11"), but be sure to leave about 3 cm of margin all around to trim off, so that you can mount your fact file on a piece of coloured paper. We will use:

- Red for square
- Orange for rectangle
- Yellow for parallelogram
- Green for rhombus
- Blue for trapezoid
- Indigo for kite
- Violet for dart

Part 2: Create an Euler diagram which demonstrates the relationship between different types of quadrilaterals. Use the same colouring scheme as in part 1 for each of the quadrilaterals.

Below is an example of a Venn-like diagram which demonstrates the relationship between different types of triangles. Notice that the region representing a particular type of triangle is itself that type of triangle!