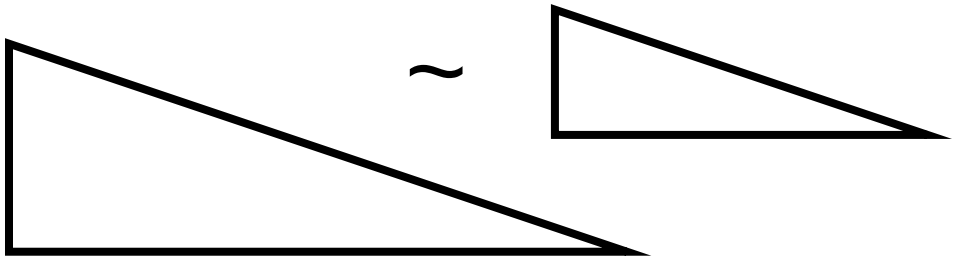
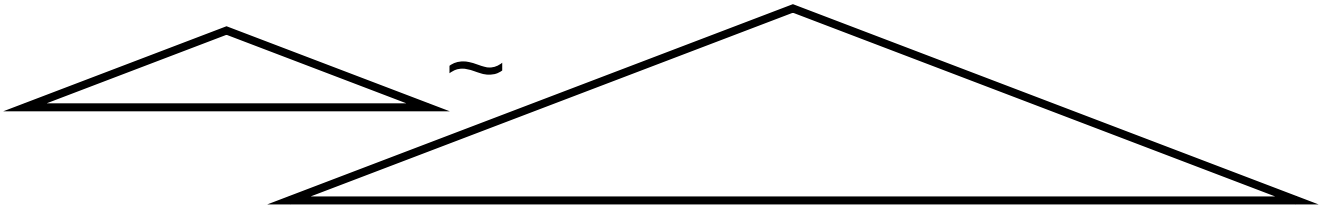
Properties of triangles

- The angles of a triangle always add up to 180^{o}.
- The biggest angle of a triangle is always across from the biggest side, and the longest angle is always across from the shortest side.
- In an **isosceles** triangle (2 equal sides), the angles across from the equal sides are also equal.

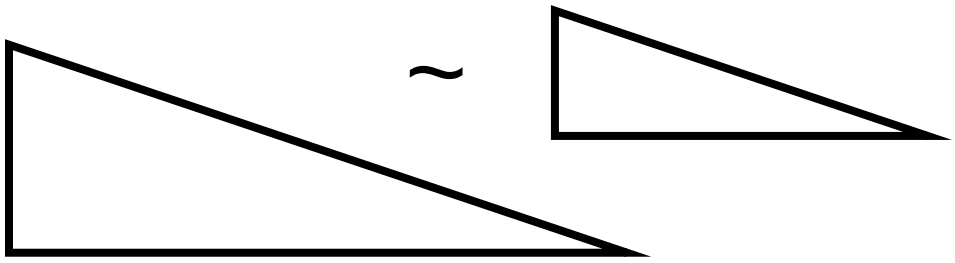
Similar triangles

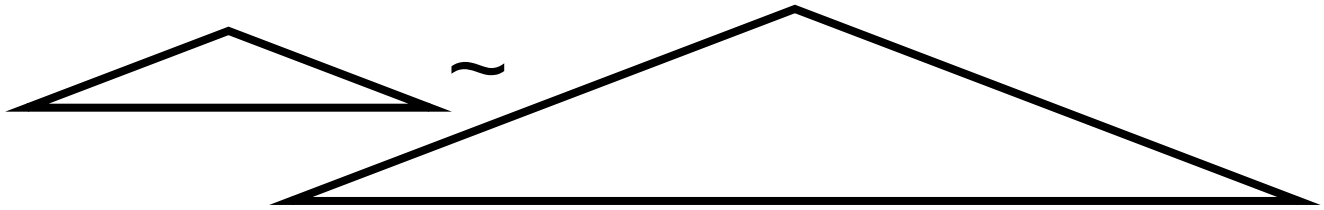
- Same shape, but different sizes.
- Symbol ~



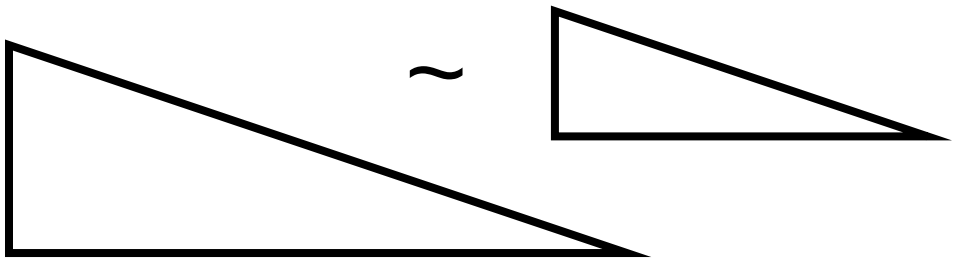


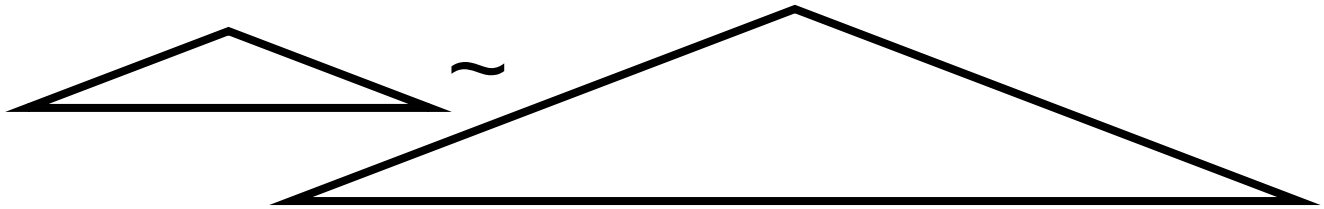
- Corresponding angles of similar triangles are equal.



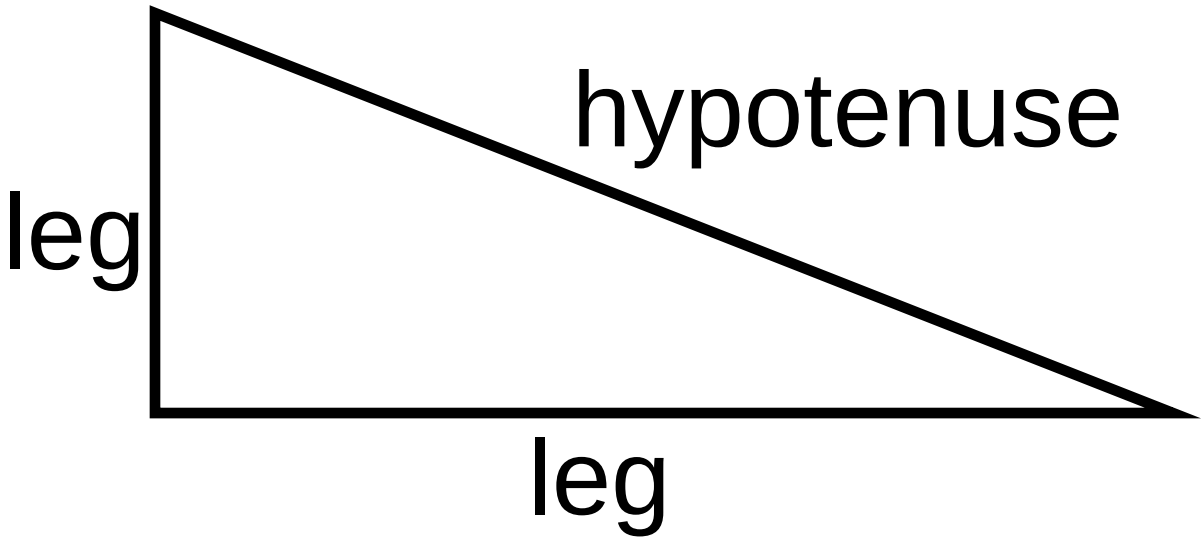


- Corresponding sides of similar triangles are proportional.

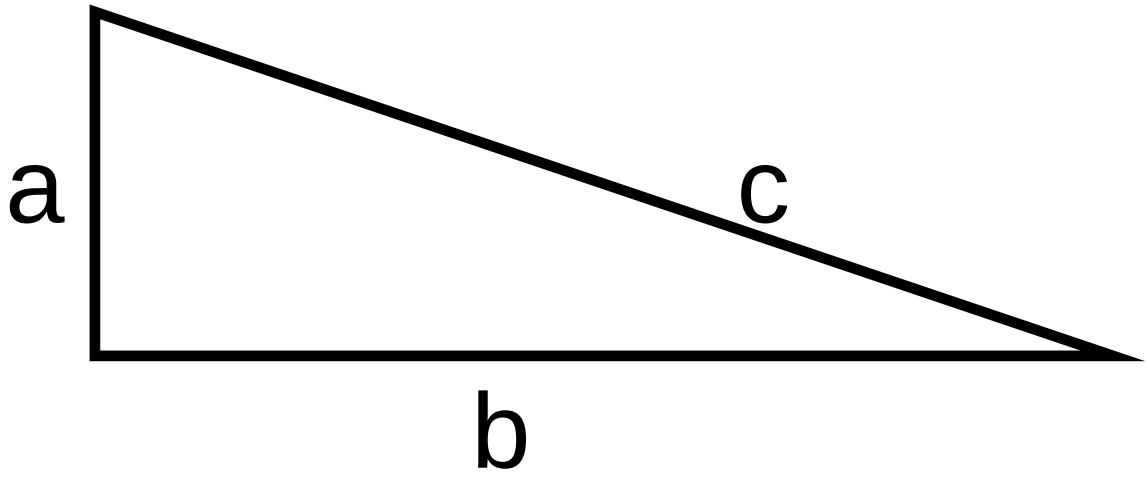




Pythagorean Theorem



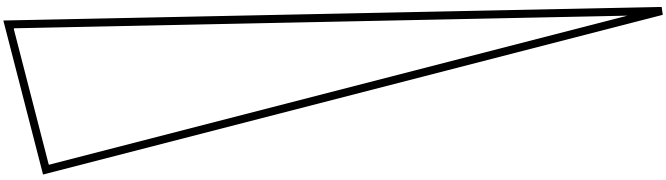
- The square of the hypotenuse is equal to the sum of the squares of the legs.



- $a^2 + b^2 = c^2$

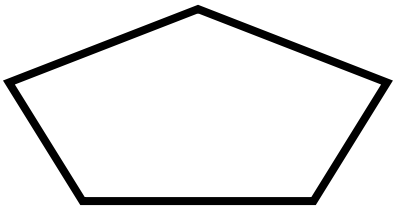
Polygon

- A closed shape in a plane formed by line segments
- We often name polygons by their number of sides:
    - 3-sides = triangle

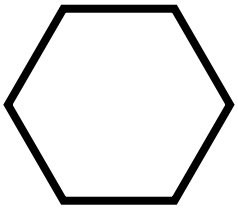


    - 4-sides = quadrilateral

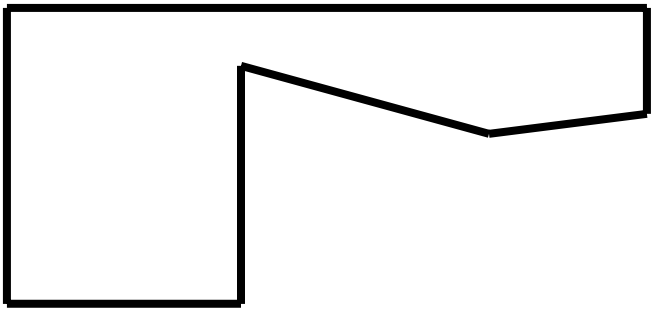
- 5-sides = pentagon



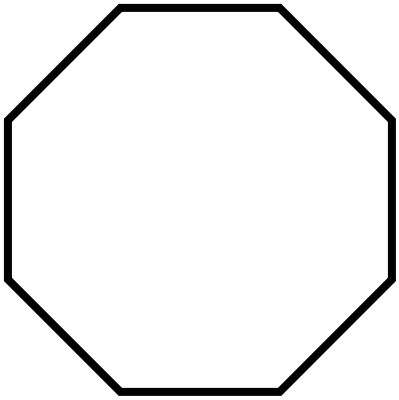
- 6-sides = hexagon



- 7-sides = heptagon



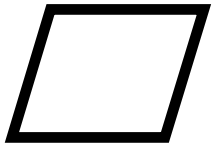
- 8-sides = octagon



Types of Quadrilaterals

- Parallelogram

  - Both pairs of opposite sides are parallel
  - Opposite sides and angles are also equal
- Rhombus

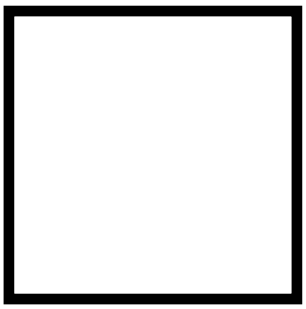


- All 4 sides are equal
- (Also a parallelogram)

- Rectangle

- All 4 angles are right angles.
- (Also a parallelogram)

- Square



- All sides are equal and all angles are right angles.
- **Both** a rhombus and a rectangle, in one.

- Trapezoid

- **One** pair of opposite sides is parallel

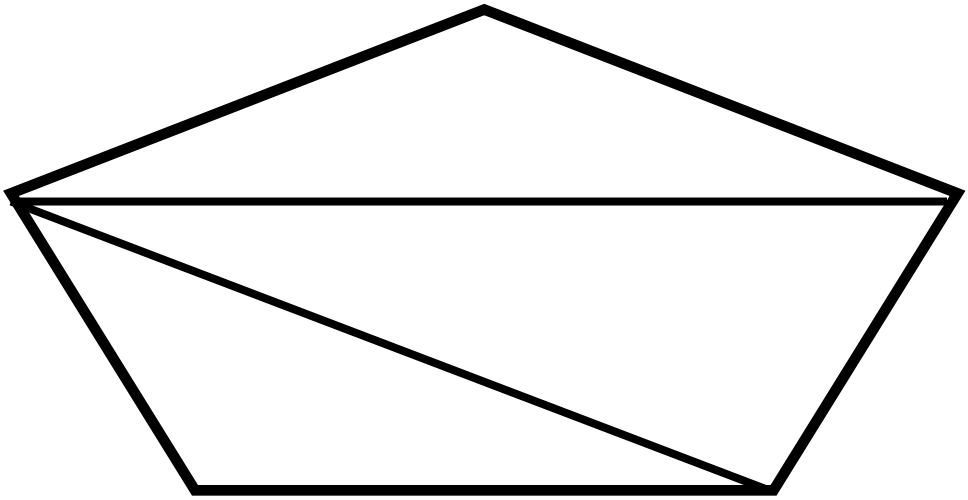
Perimeter

- distance around a polygon
- sum of the lengths of the sides
- Formula for perimeter of a rectangle (or any parallelogram)
  - $P = 2\ell + 2w$
- Formula for perimeter of a square (or rhombus)
  - $P = 4s$

Angles of Polygons

- If you add up the interior angles of a polygon with "n" sides, the total is $(n - 2)180$ degrees.

Why?????



If you draw diagonals from one vertex of a pentagon, you get 5 – 2 or 3 triangles. Each triangle has 180 degrees, so the pentagon must have
3 x 180 degrees.

Similarly an octagon has 8 – 2 or 6 triangles, so it has
6 x 180 degrees.