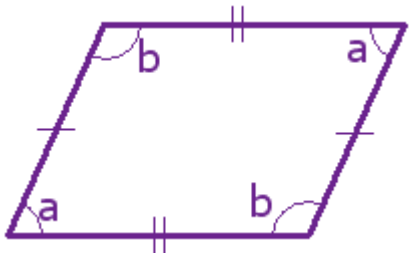
HOMEWORK: Due last day of class, pp 68-79, textbook

Parallelogram



Definition: A 4-sided flat shape with straight sides where opposite sides are parallel.

Also:
* opposite sides are equal in length, and
* opposite angles are equal (angles "a" are the same, and angles "b" are the same

Other Definitions of parallelogram:

A quadrilateral with both pairs of opposite sides parallel.

A parallelogram is a quadrilateral with opposite sides parallel. It is the "parent" of some other quadrilaterals, which are obtained by adding restrictions of various kinds:

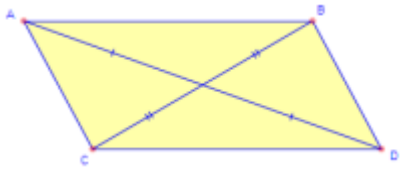
- A rectangle is a parallelogram but with all four interior angles fixed at 90°
- A rhombus is a parallelogram but with all sides equal in length
- A square is a parallelogram but with all sides equal in length and all angles fixed at 90°

Properties of a parallelogram

These facts and properties are true for parallelograms and the descendant shapes: square, rectangle and rhombus.

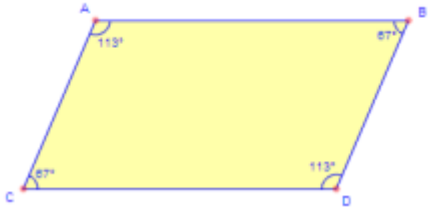
Base	Any side can be considered a base. Choose any one you like. If used to calculate the area (see below) the corresponding altitude must be used. In the figure above, one of the four possible bases and its corresponding altitude has been chosen.
Altitude (height)	The altitude (or height) of a parallelogram is the perpendicular distance from the base to the opposite side (which may have to be extended).
Area	The area of a parallelogram can be found by multiplying a base by the corresponding altitude.
Perimeter	The distance around the parallelogram. The sum of its sides.
Opposites	Opposite sides are congruent (equal in length).

Diagonals Each diagonal cuts the other diagonal into two equal parts, as in the diagram below.



Interior angles

1. Opposite angles are equal as can be seen below.
2. Consecutive angles are always supplementary (add to 180°)



Rhombus plural: rhombi
Definition: A quadrilateral with all four sides equal in length.

A rhombus is actually just a special type of parallelogram. Recall that in a parallelogram each pair of opposite sides are equal in length. With a rhombus, *all four* sides are the same length. It therefore has all the properties of a parallelogram.

Its a bit like a square that can 'lean over' and the interior angles need *not* be 90°. Sometimes called a 'diamond' shape.

Properties of a rhombus

Base	Any side can be considered a base. Choose any one you like. If used to calculate the area (see below) the corresponding altitude must be used.
Altitude	The altitude of a rhombus is the perpendicular distance from the base to the opposite side (which may have to be extended). In the figure above, the altitude corresponding to the base CD is shown.
Area	There are several ways to find the area of a rhombus. The most common is (base × altitude).
Perimeter	Distance around the rhombus. The sum of its side lengths.
Diagonals	Each of the two diagonals is the perpendicular bisector of the other.

Theorems for Parallelogram (and rhombus):

1. Opposite Angles of parallelogram are equal.
2. Each pair of angles between 2 parallel sides add up to 180 degrees.

Trapezoid (USA definition)

From Greek: trapeze, -oid -"like"

A quadrilateral which has at least one pair of parallel sides
(but see definition notes below)

Attributes

Base	One of the parallel sides. Every trapezoid has two bases, b1 and b2.
Leg	The non-base sides are called the legs of the trapezoid, and are usually not parallel. Every trapezoid has two legs.
Altitude	The altitude of a trapezoid is the perpendicular distance from one base to the other. (One base may need to be extended).
Median	The median of a trapezoid is a line joining the midpoints of the two legs.
Area	The usual way to calculate the area is the average base length times altitude. (1/2)(b1+b2)*Altitude
Perimeter	The distance around the trapezoid. The sum of its side lengths.

If both legs are the same length, this is called an **isosceles trapezoid**, and both base angles are the same.

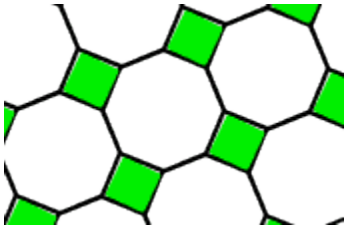
If the legs are parallel, it now has *two* pairs of parallel sides, and is a parallelogram.

Definition notes

There is considerable confusion over the definition of 'trapezoid' due to differences in the British and US versions.

	British	USA
Trapezoid	A quadrilateral with no sides parallel	A quadrilateral with one pair of parallel sides

Tessellation



A pattern made of identical shapes:
* the shapes must fit together without any gaps
* the shapes should not overlap

Example: This tessellation is made with squares and octagons.