Basic Triangle and Quadrilateral

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1 Triangles

1.1 Acute Triangle

Definition: All angles less than 90°.

1.2 Right-Angled Triangle

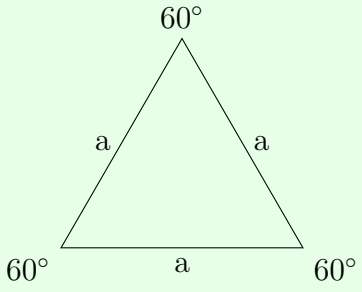
Definition: One angle equals 90°.

1.3 Obtuse Triangle

Definition: One angle greater than 90°.

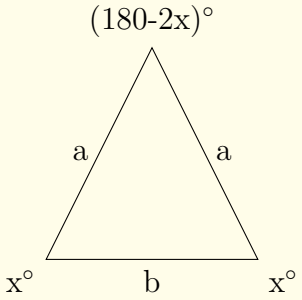
1.4 Equilateral Triangle

Definition: A triangle with all sides equal and all angles equal to 60°.
Note: Equilateral triangle is an acute triangle and also an isosceles triangle.
Area: $\frac{\sqrt{3}}{4}a^2$, **Perimeter:** $3a$



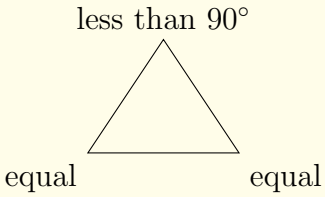
1.5 Isosceles Triangle

Definition: A triangle with two equal sides and two equal angles.
Area: $\frac{b}{4}\sqrt{4a^2 - b^2}$, **Perimeter:** $2a + b$

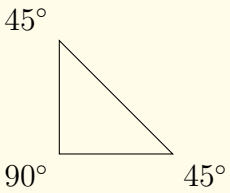


Types of Isosceles Triangles:

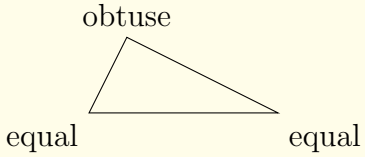
Acute



Right-Angled

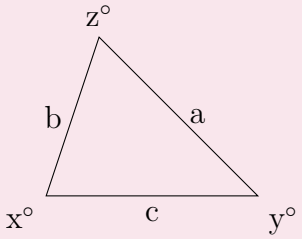


Obtuse



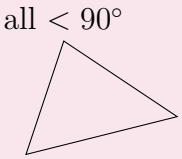
1.6 Scalene Triangle

Definition: A triangle with no equal sides or angles.
Area: $\sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$, **Perimeter:** $a+b+c$

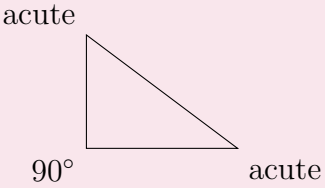


Types of Scalene Triangles:

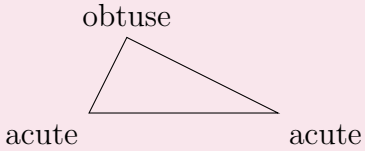
Acute



Right-Angled



Obtuse



1.7 Area Formulas for Triangles

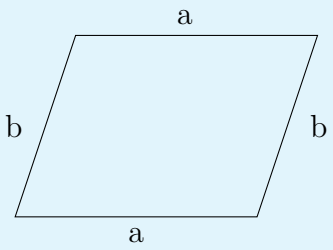
There are several ways to calculate the area of a triangle, depending on the given information:

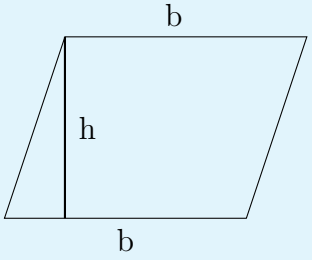
- **Base and Height:** $A = \frac{1}{2} \times b \times h$
- **Using All Three Sides (Heron's Formula):** $A = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$ is the semi-perimeter
- **Using Semiperimeter and Inradius:** $A = s \times r$, where r is the inradius
- **Using Two Sides and Angle:** $A = \frac{1}{2} \times a \times b \times \sin(\theta)$
- **Circumradius Formula:** $A = \frac{abc}{4R}$, where R is the circumradius

2 Quadrilateral

2.1 Parallelogram

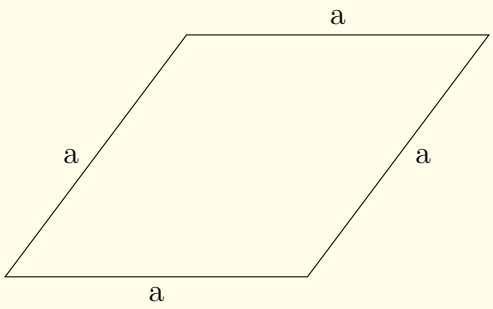
Definition: A quadrilateral with opposite sides parallel and equal. The opposite angles are equal.
Area: $A = b \times h$, **Perimeter:** $2(a + b)$





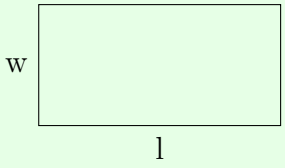
2.2 Rhombus

Definition: A quadrilateral with all sides equal and opposite angles equal.
Area: $A = \frac{1}{2} \times d_1 \times d_2$, **Perimeter:** $4a$



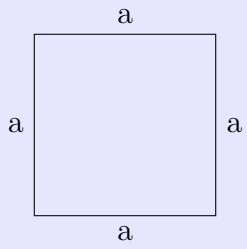
2.3 Rectangle

Definition: A quadrilateral with equal opposite sides and all angles 90°.
Area: $A = l \times w$, **Perimeter:** $2(l + w)$



2.4 Square

Definition: A quadrilateral with all sides equal and all angles 90°.
Area: $A = a^2$, **Perimeter:** $4a$

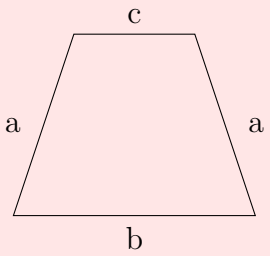


2.5 Trapezium

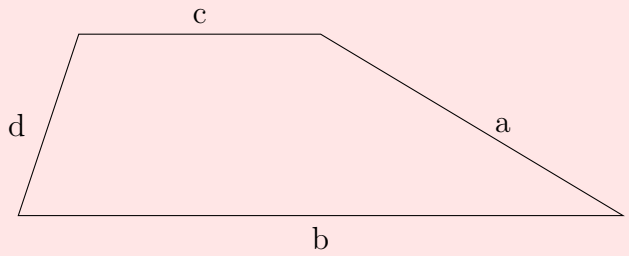
Definition: A quadrilateral with a pair of opposite sides parallel.

Types of Trapezium:

Isosceles Trapezium:



Non-Isosceles Trapezium:



2.6 Notes

- a) Square, Rectangle, and Rhombus are all types of parallelograms.
- b) All squares are rhombuses.
- c) All squares are rectangles.