

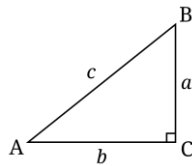
3.1 3.2 Properties of Triangles

A Right Triangle

A triangle is a right triangle if either:

- one angle is right (90°)
- two sides are perpendicular to each other
- sides satisfy the Pythagorean Theorem

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



Note. The area of any triangle may be calculated by using:

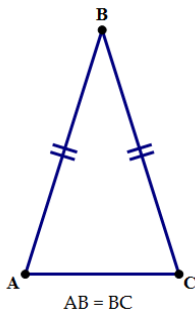
$$A = \frac{\text{base} \times \text{height}}{2}$$

Ex 1. Prove that the triangle ABC where A(-3,-2), B(2,2) and C(-7,3) is a right triangle and find its area.

B Isosceles Triangle

A triangle is an isosceles triangle if:

- Two sides are equal
- Two angles are equal

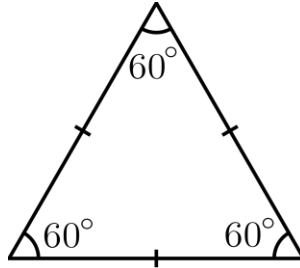


Ex 2. Prove that the triangle ABC where $A(-1,-2)$, $B(-3,1)$ and $C(2,0)$ is an isosceles triangle.

C Equilateral Triangle

A triangle is an equilateral triangle if:

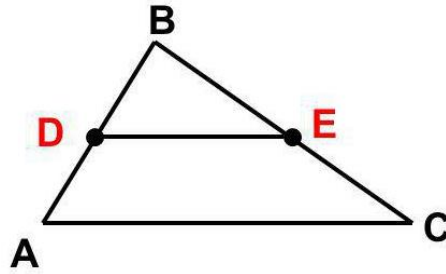
- All sides are equal
- All angles are equal (60°)



Ex 3. Find the coordinates of vertex C of the equilateral triangle ABC where A(-4,0) and B(4,0).

D Mid-segment

The mid-segment is the line segment that joins the midpoints of two sides of a triangle.



The following two facts are true about the mid-segment:

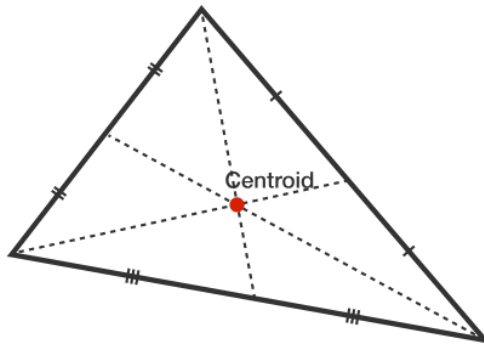
$$m_{DE} = m_{AC}$$
$$DE = \frac{1}{2} AC$$

Ex 4. Let consider the triangle ABC where A(-4,-5) and B(8,3), and C(6,-1).

- Find the midpoint D of the side AB
- Find the midpoint E of the side BC
- Compare the slopes of DE and AC
- Compare the lengths of DE and AC

E Centroid

The centroid of a triangle is the point of intersection of all medians.



The coordinates of the centroid of a triangle $\triangle ABC$ are given by:

$$x = \frac{x_A + x_B + x_C}{3}$$
$$y = \frac{y_A + y_B + y_C}{3}$$

Ex 5. Find the centroid D of the triangle ABC where A(-4,-5) and B(8,3), and C(5,-1).

Notes: Textbook Pages 110-113 and 117-123

Homework: Textbook Pages 124 #2, 3, 4, 6, 7, 13,