



7.4 Midpoints and Medians in Triangles

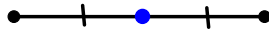
7.5 Diagonals in Quadrilaterals

Learning Goals:

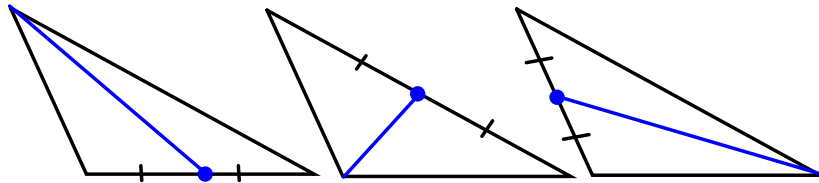
You will understand the properties of line segments that divide triangles and quadrilaterals in various ways.

7.4 Midpoints and Medians in Triangles

Midpoint: the point that divides a line segment in half

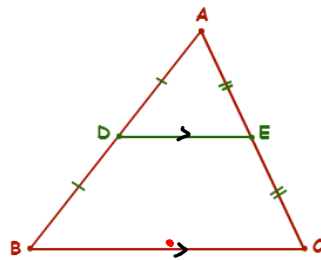


Median: a line segment from a vertex to the midpoint of the opposite side (a triangle has three medians)



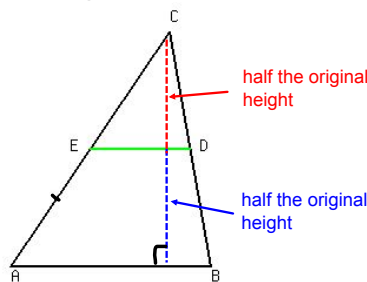
Three properties of midpoints and medians:

- A line segment joining the **midpoints** of two sides of a triangle is **parallel to the third side and half as long**



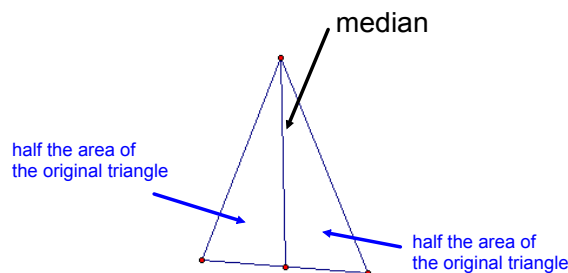
Length of **DE** is half the length of **BC**

- The **height of the triangle** formed by joining the **midpoints** of two sides of a triangle is **half the height of the original triangle**.



height of $\triangle CDE$ is half height of $\triangle ACB$

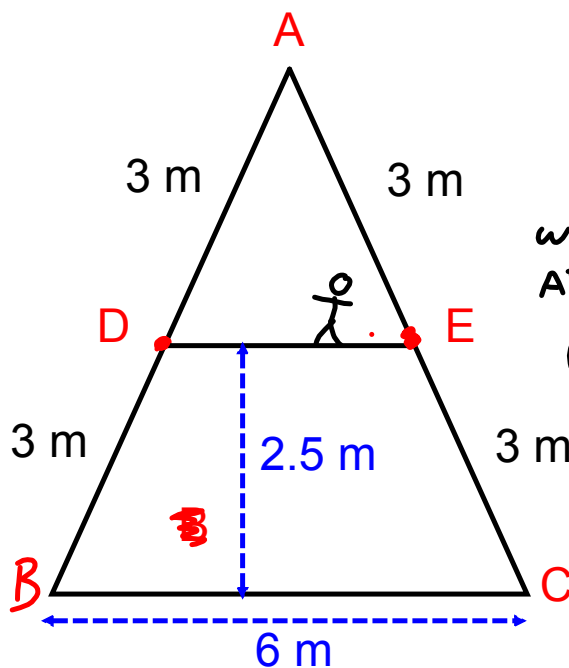
- The **medians** of a triangle **bisect its area**



Example 1:

In areas that get a lot of snow, cottages are often built with a triangular shape called an A-frame. This shape helps prevent damage from heavy loads of snow on the roof.

- Find the width of the floor of the upper room of this cottage.
- Find the height of the upper room.



length of DE

we know D is the midpoint of AB, since $AD = DB$.

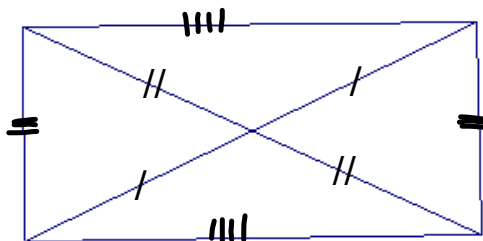
(and E is m.p. of AC)

so we know DE is half of BC.

$$DE = 3\text{m}$$

7.5 Midpoints and Diagonals in Quadrilaterals

- Joining opposite vertices of a quadrilateral makes **diagonals** of the quadrilateral.
- The diagonals of a **rectangle or parallelogram bisect** each other



- When we join the **midpoint** of a side in a quadrilateral with the midpoint of an **adjacent** side, we produce a **parallelogram**.

