

Mathematics 10D

2.6 – Exploring Properties: Centroid

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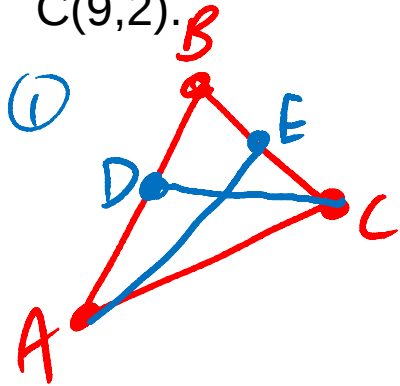
Centroid: Find the **centroid** of the triangle with vertices at A(-2,6), B(-4,-1) and C(9,2).

The centroid is the intersection of the medians. It is the centre of mass of a triangle.

Steps to finding the centroid:

1. Make a sketch of the triangle.
2. Calculate a midpoint. Label it on your sketch.
3. Calculate the slope from the above midpoint to the opposite corner/vertice.
4. Find the equation ($y=mx+b$) of that line (the median)
5. Repeat steps 2-4 starting with a different midpoint
6. Find the point of intersection using the two equations. That is your centroid.

Centroid: Find the centroid of the triangle with vertices at A(-2,6), B(-4,-1) and C(9,2).



② $M_{AB} \left(\frac{-2 + -4}{2}, \frac{6 + -1}{2} \right)$
 $M_{AB} \left(-3, \frac{5}{2} \right) = D$

③ Slope:

$$m_{DC} = \frac{2.5 - 2}{-3 - 9} = \frac{0.5}{-12} = \frac{-1}{24} = 0.041\bar{6} = 0.04$$

④ Equation

$$y = \frac{-1}{24}x + b$$

$$2 = \frac{-1}{24} \left(\frac{9}{1} \right) + b$$

$$2 = \frac{-39}{24} + b$$

$$2 = \frac{-3}{8} + b$$

$$\frac{16}{8} + \frac{3}{8} = b$$

$$\frac{19}{8} = b$$

$$\therefore y = \frac{-1}{24}x + \frac{19}{8}$$

$$M_{BC} \left(\frac{-4+9}{2}, \frac{-1+2}{2} \right)$$

$$M_{BC} \left(\frac{5}{2}, \frac{1}{2} \right) = (2.5, 0.5) = E$$

Slope

$$m_{EA} = \frac{0.5 - 6}{2.5 - -2} = \frac{-5.5}{4.5} = \frac{-11}{9} = -1.2$$

Equation

$$y = -\frac{11}{9}x + b \rightarrow \frac{54}{9} - \frac{22}{9} = b$$

$$6 = -\frac{11}{9}(-2) + b \quad \frac{32}{9} = b$$

$$6 = \frac{22}{9} + b \quad \therefore y = -\frac{11}{9}x + \frac{32}{9}$$

$$\left(-\frac{11}{9}x + \frac{32}{9} = -\frac{1}{24}x + \frac{19}{8} \right) \times 72$$

$$-88x + 256 = -3x + 171$$

$$85 = 85x$$

$$\boxed{1 = x}$$

$$y = -\frac{11}{9}(1) + \frac{32}{9}$$

$$y = -\frac{11}{9} + \frac{32}{9}$$

$$y = \frac{21}{9} = \frac{7}{3}$$

$\therefore$ the centroid is $\left(1, \frac{7}{3} \right)$