Guide to:
Vector proof

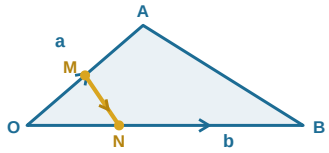
maths Links

Explanation:

To find a vector between two points, trace a known path along the diagram, reversing the sign of a vector when travelling against its arrow (e.g. **AB = AO + OB = −a + b = b − a**). If a point divides a line in the ratio m : n, use the fraction $\frac{m}{m+n}$ of the full vector.

To prove two vectors are **parallel**, factorise both so they are scalar multiples of the same bracketed vector (e.g. PQ = k × RS). If they also share a **common point** (such as P, Q, R where PQ = k × QR), then the three points are **collinear** (lie on a straight line).

Example 1: In ΔOAB, OA = **a** and OB = **b**. M is the midpoint of OA and N divides OB in the ratio 1 : 2. Find MN in terms of **a** and **b**.



Solution:

MO = $-\frac{1}{2}$**a**; ON = $\frac{1}{3}$**b** (ratio 1 : 2)

MN = MO + ON ⇒ **Answer:** $\frac{1}{3}$**b** − $\frac{1}{2}$**a**

Example 2: Given PQ = 2**a** + 4**b** and QR = 3**a** + 6**b**, prove that P, Q, and R lie on a straight line.

Solution:

Factorise both vectors:

PQ = **2(a + 2b)** and QR = **3(a + 2b)**

Therefore QR = $\frac{3}{2}$PQ, so PQ and QR are **parallel**

Since they also share the **common point Q**, P, Q, and R are collinear.

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ken@mathslinks.co.uk