

GCSE HIGHER

Vector Ratios and Intersections

Short workbook

m and n have positive lengths and are not parallel throughout this workbook.

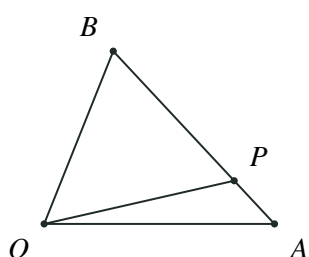
Q1

OAB is a triangle with $\overrightarrow{OA} = m$ and $\overrightarrow{OB} = n$.

P lies on AB with $AP : PB = 1 : 3$.

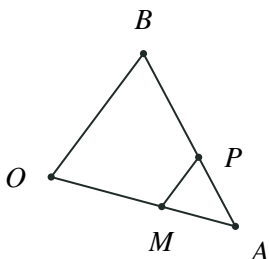
(a) Express $\overrightarrow{OP}$ in terms of m and n .

(b) Express $\overrightarrow{PB}$ in terms of m and n .

**Q2**

Find x and y if $x(3m + n) + y(m - 2n) = 11m - n$.

Use vectors to find $AP : PB$.



Finding where two lines intersect

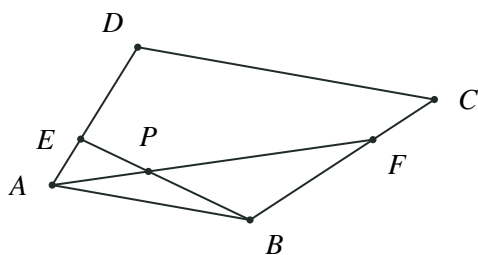
Q4

ABCD is a trapezium with $\overrightarrow{AB} = \mathbf{m}$, $\overrightarrow{AD} = \mathbf{n}$ and $\overrightarrow{DC} = \frac{3}{2}\mathbf{m}$.

E lies on AD with $AE : ED = 1 : 2$. F lies on BC with $BF : FC = 2 : 1$. AF and BE intersect at P.

(a) Find $AP : PF$.

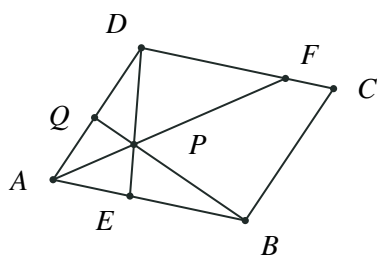
(b) Find $BP : PE$.



Finding a second intersection

Q5

ABCD is a parallelogram with $\overrightarrow{AB} = \mathbf{m}$ and $\overrightarrow{AD} = \mathbf{n}$.
 E lies on AB with $AE : EB = 2 : 3$. F lies on DC with $DF : FC = 3 : 1$. AF and DE intersect at P. The straight line BP meets AD at Q.
 Find $AQ : QD$.



GCSE MATHS

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Answers**Q1**

(a) $\frac{3}{4}m + \frac{1}{4}n$

(b) $-\frac{3}{4}m + \frac{3}{4}n$

Q2

$x = 3, \quad y = 2$

Q3

$AP : PB = 2 : 3$

Q4

(a) $AP : PF = 3 : 7$ **(b)** $BP : PE = 3 : 2$

Q5

$AQ : QD = 8 : 9$