



Name: \_\_\_\_\_

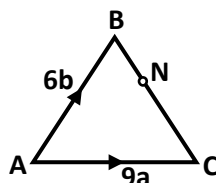


Find the following vectors in terms of  $\mathbf{a}$  and  $\mathbf{b}$

a) ABC is a triangle.

$$\overrightarrow{BN} = \frac{1}{2}\overrightarrow{NC}$$

Express  $\overrightarrow{AN}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

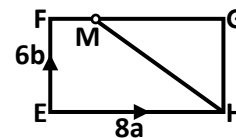


$$3\mathbf{a} + 4\mathbf{b}$$

b) EFGH is a rectangle.

$$\overrightarrow{FM} : \overrightarrow{MG} = 1 : 3.$$

Express  $\overrightarrow{MH}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

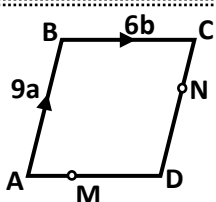


$$6\mathbf{a} - 6\mathbf{b}$$

c) ABCD is a parallelogram.

$$2\overrightarrow{AM} = \overrightarrow{MD} \text{ and } 2\overrightarrow{CN} = \overrightarrow{ND}$$

Express  $\overrightarrow{MN}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

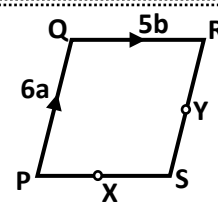


$$6\mathbf{a} + 4\mathbf{b}$$

d) PQRS is a parallelogram.

$$\overrightarrow{PX} : \overrightarrow{XS} = 2 : 3.$$

Y is the midpoint of  $\overrightarrow{RS}$   
Express  $\overrightarrow{YX}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$



$$-3\mathbf{a} - 3\mathbf{b}$$

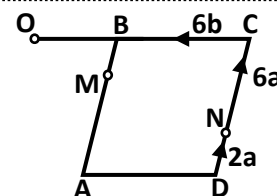
e) ABCD is a parallelogram.  $\overrightarrow{DN} = 2\mathbf{a}$  and  $\overrightarrow{NC} = 6\mathbf{a}$

M is the point on AB such that  $\overrightarrow{AM} = 3\overrightarrow{MB}$

OC is a straight line and  $\overrightarrow{OB} = \frac{1}{2}\overrightarrow{BC}$

i) Write an expression for  $\overrightarrow{MO}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

$$2\mathbf{a} + 3\mathbf{b}$$



ii) Determine if OMN is a straight line.

$$\overrightarrow{ON} = -6\mathbf{a} - 9\mathbf{b} = -3(2\mathbf{a} + 3\mathbf{b}) \text{ So OMN is a straight line}$$

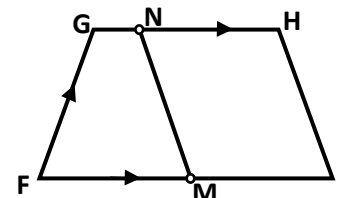
f) FGHI is an isosceles trapezium.

$$\overrightarrow{FG} = 2\mathbf{b}, \overrightarrow{FI} = 6\mathbf{a}, \overrightarrow{GH} = 4\mathbf{a}, \overrightarrow{GN} : \overrightarrow{NH} = 1 : 3$$

M is the midpoint of FI

i) Write an expression for  $\overrightarrow{HI}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

$$2\mathbf{a} - 2\mathbf{b}$$



ii) Prove that NM is parallel to HI.

$$\overrightarrow{NM} = 2\mathbf{a} - 4\mathbf{b} = \overrightarrow{HI} \text{ so parallel}$$

**Exam question:**

ABCD is a parallelogram.  $\overrightarrow{AB} = 2\mathbf{a}$  and  $\overrightarrow{BC} = 4\mathbf{b}$   
U is the midpoint of AD and T is the midpoint of DC.

a) Write an expression for  $\overrightarrow{UT}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

$$\mathbf{a} + 2\mathbf{b}$$

b) Prove that UT is Parallel to AC.

$$\overrightarrow{AC} = 2\mathbf{a} + 4\mathbf{b} = 2(\mathbf{a} + 2\mathbf{b}) \text{ so parallel}$$

