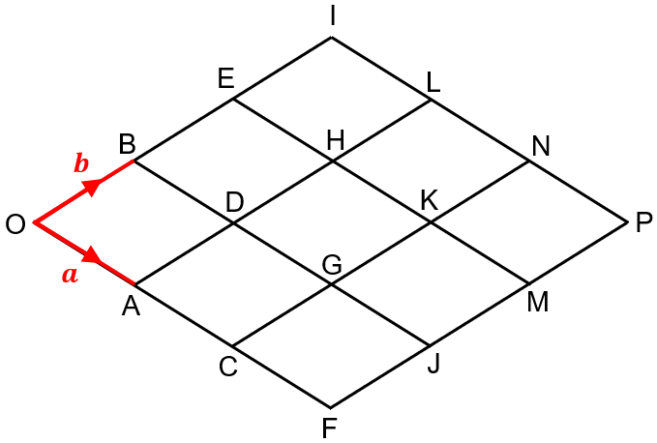
Defining Vectors

(a)

The diagram is made up of nine congruent rhombuses.

$\overrightarrow{OA} = \boldsymbol{a}$ and $\overrightarrow{OB} = \boldsymbol{b}$.



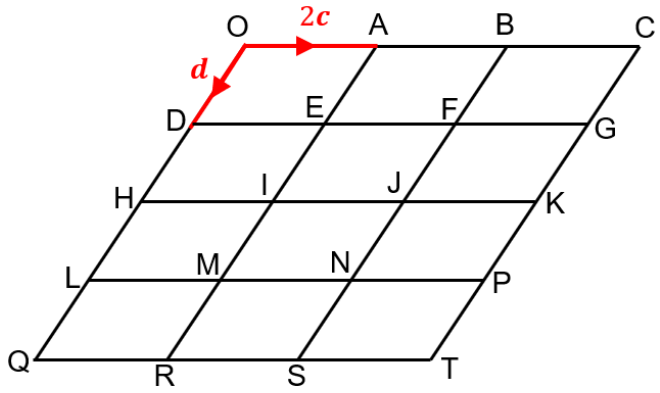
Define the following vectors in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$.

(a) $\overrightarrow{OE}$	$2\boldsymbol{b}$	(g) $\overrightarrow{OH}$	$\boldsymbol{a} + 2\boldsymbol{b}$
(b) $\overrightarrow{OF}$	$3\boldsymbol{a}$	(h) $\overrightarrow{DP}$	$2\boldsymbol{a} + 2\boldsymbol{b}$
(c) $\overrightarrow{GJ}$	$\boldsymbol{a}$	(i) $\overrightarrow{IM}$	$3\boldsymbol{a} - \boldsymbol{b}$
(d) $\overrightarrow{MP}$	$\boldsymbol{b}$	(j) $\overrightarrow{MD}$	$-2\boldsymbol{a} - \boldsymbol{b}$
(e) $\overrightarrow{AO}$	$-\boldsymbol{a}$	(k) $\overrightarrow{CB}$	$-2\boldsymbol{a} + \boldsymbol{b}$
(f) $\overrightarrow{LD}$	$-2\boldsymbol{b}$	(l) $\overrightarrow{NO}$	$-2\boldsymbol{a} - 3\boldsymbol{b}$

(b)

The diagram is made up of twelve congruent parallelograms.

$\overrightarrow{OA} = 2\boldsymbol{c}$ and $\overrightarrow{OD} = \boldsymbol{d}$.



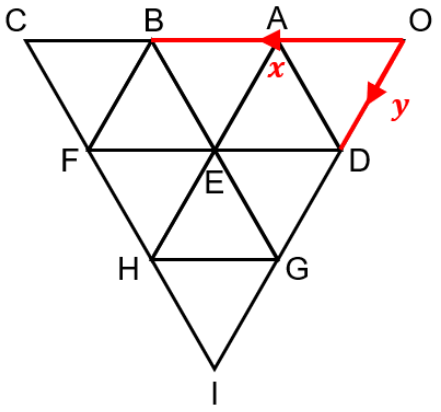
Define the following vectors in terms of $\boldsymbol{c}$ and $\boldsymbol{d}$.

(a) $\overrightarrow{EG}$	$4\boldsymbol{c}$	(g) $\overrightarrow{MJ}$	$2\boldsymbol{c} - \boldsymbol{d}$
(b) $\overrightarrow{BS}$	$4\boldsymbol{d}$	(h) $\overrightarrow{QF}$	$4\boldsymbol{c} - 3\boldsymbol{d}$
(c) $\overrightarrow{KJ}$	$-2\boldsymbol{c}$	(i) $\overrightarrow{IL}$	$-2\boldsymbol{c} + \boldsymbol{d}$
(d) $\overrightarrow{RE}$	$-3\boldsymbol{d}$	(j) $\overrightarrow{HB}$	$4\boldsymbol{c} - 2\boldsymbol{d}$
(e) $\overrightarrow{OF}$	$4\boldsymbol{c} + \boldsymbol{d}$	(k) $\overrightarrow{TE}$	$-4\boldsymbol{c} + 3\boldsymbol{d}$
(f) $\overrightarrow{JT}$	$2\boldsymbol{c} + 2\boldsymbol{d}$	(l) $\overrightarrow{KD}$	$-6\boldsymbol{c} - \boldsymbol{d}$

(c)

The diagram is made up of nine congruent equilateral triangles.

$\overrightarrow{OB} = \boldsymbol{x}$ and $\overrightarrow{OD} = \boldsymbol{y}$.



Define the following vectors in terms of $\boldsymbol{x}$ and $\boldsymbol{y}$.

(a) $\overrightarrow{FD}$	$-\boldsymbol{x}$	(g) $\overrightarrow{FO}$	$-\boldsymbol{x} - \boldsymbol{y}$
(b) $\overrightarrow{HA}$	$-2\boldsymbol{y}$	(h) $\overrightarrow{CE}$	$-\boldsymbol{x} + \boldsymbol{y}$
(c) $\overrightarrow{GH}$	$\frac{1}{2}\boldsymbol{x}$	(i) $\overrightarrow{HI}$	$-\frac{1}{2}\boldsymbol{x} + \boldsymbol{y}$
(d) $\overrightarrow{OC}$	$\frac{3}{2}\boldsymbol{x}$	(j) $\overrightarrow{BG}$	$-\boldsymbol{x} + 2\boldsymbol{y}$
(e) $\overrightarrow{DB}$	$\boldsymbol{x} - \boldsymbol{y}$	(k) $\overrightarrow{HD}$	$-\frac{1}{2}\boldsymbol{x} - \boldsymbol{y}$
(f) $\overrightarrow{OE}$	$\frac{1}{2}\boldsymbol{x} + \boldsymbol{y}$	(l) $\overrightarrow{IF}$	$\boldsymbol{x} - 2\boldsymbol{y}$