

## UNIT 19 *Vectors*

## Overhead Slides

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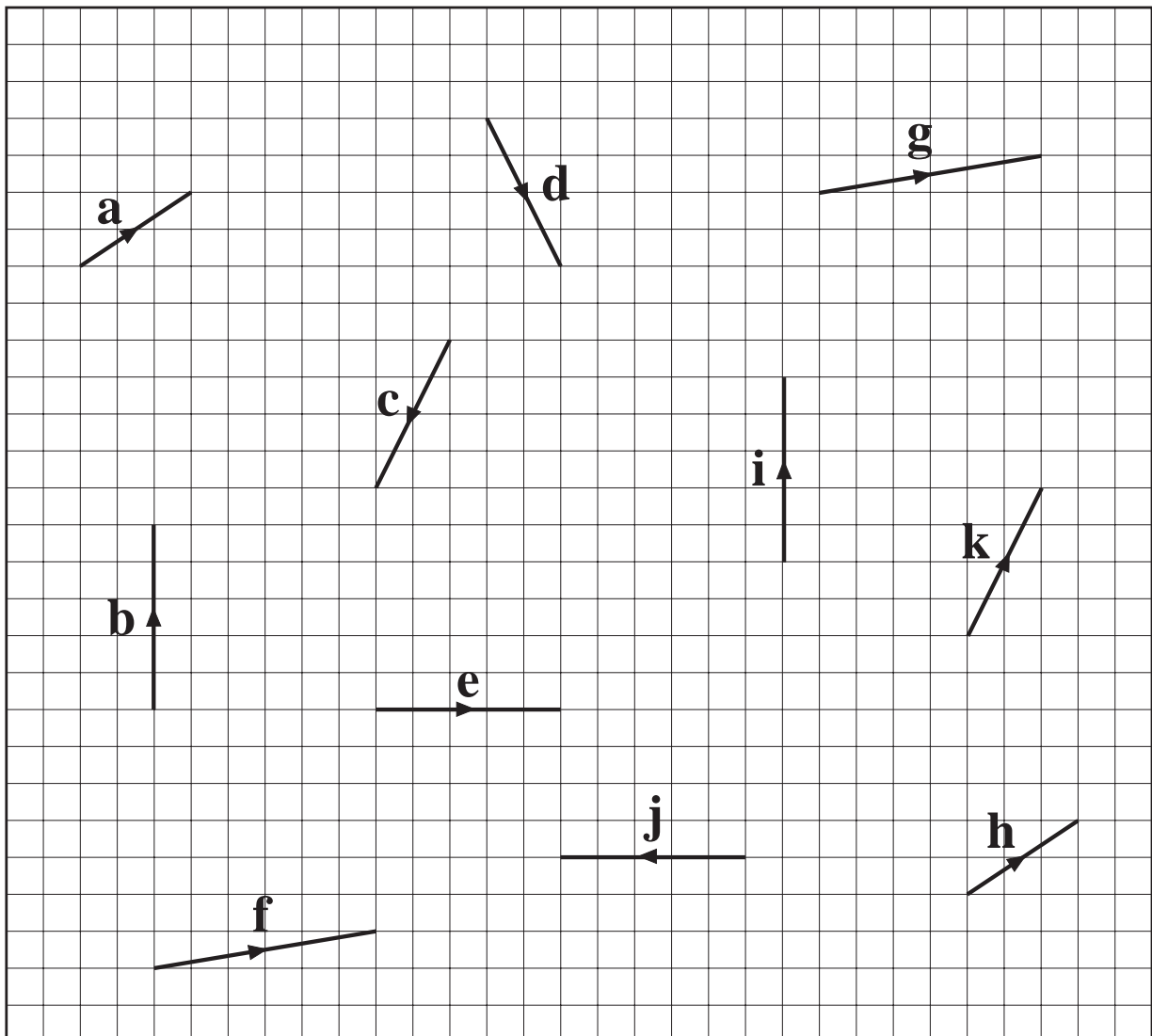
- 19.1 Equal Vectors
- 19.2 Components
- 19.3 Vector Expressions
- 19.4 Addition and Subtraction of Vectors
- 19.5 Vector Geometry

## OS 19.1

## Equal Vectors

In the following diagram, state

- (a) which pairs of vectors are *equivalent*,
- (b) which pairs of vectors are in *opposite* directions.



## OS 19.2

*Components*

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Given that  $\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ ,  $\mathbf{b} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$

find

(a)  $\mathbf{a} + \mathbf{b}$

(b)  $\mathbf{a} - \mathbf{b}$

(c)  $2\mathbf{a}$

(d)  $2\mathbf{a} + 5\mathbf{b}$

(e)  $|\mathbf{a}|$

(f)  $|\mathbf{b}|$

(g)  $|\mathbf{a} + \mathbf{b}|$

Does  $|\mathbf{a}| + |\mathbf{b}| = |\mathbf{a} + \mathbf{b}|$ ?

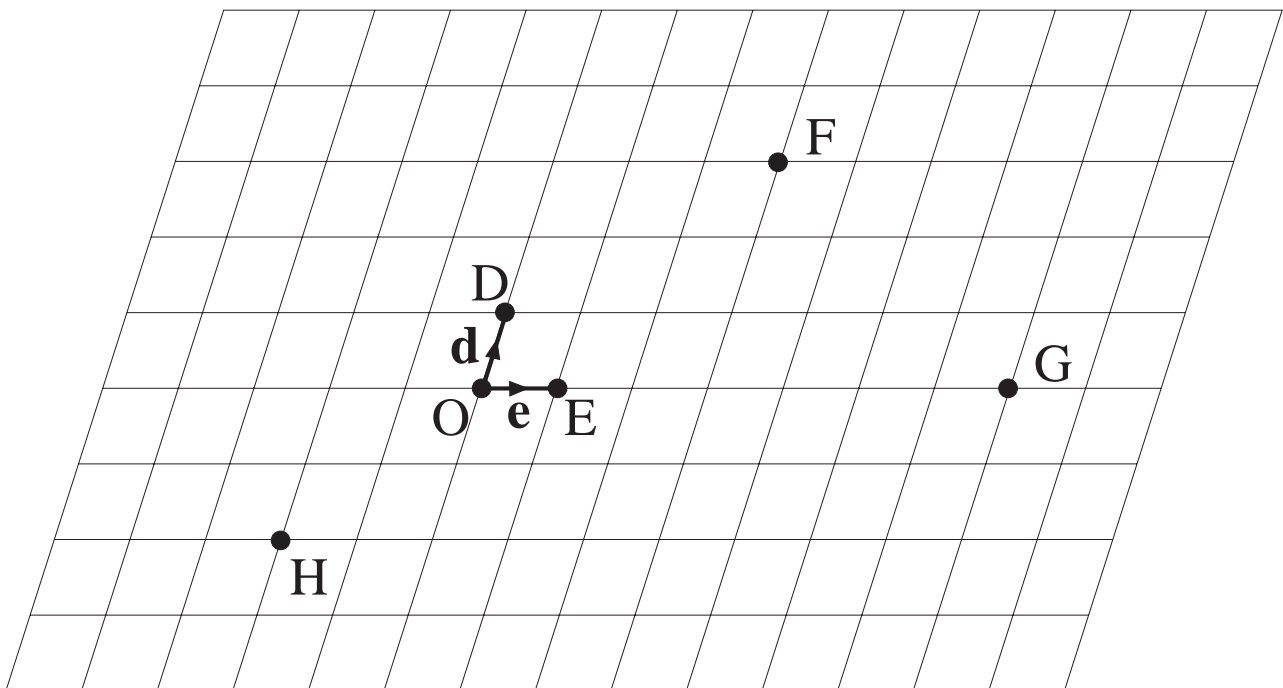
## OS 19.3

## Vector Expressions

1. Mark clearly on the diagram,

(a) the point P such that  $\vec{OP} = -2\mathbf{d}$

(b) the point Q such that  $\vec{OQ} = -3(\mathbf{e} - \mathbf{d})$



2. Write down each of the following in terms of  $\mathbf{d}$  and/or  $\mathbf{e}$ .

(a)  $\vec{OF}$

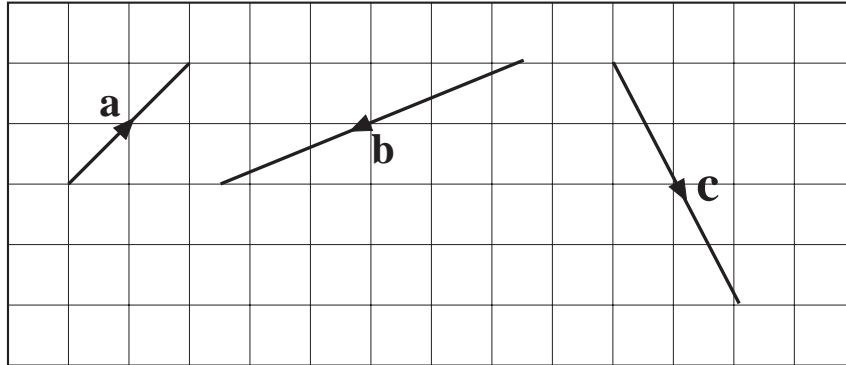
(b)  $\vec{OG}$

(c)  $\vec{OH}$

# OS 19.4

## Addition and Subtraction of Vectors

Given that



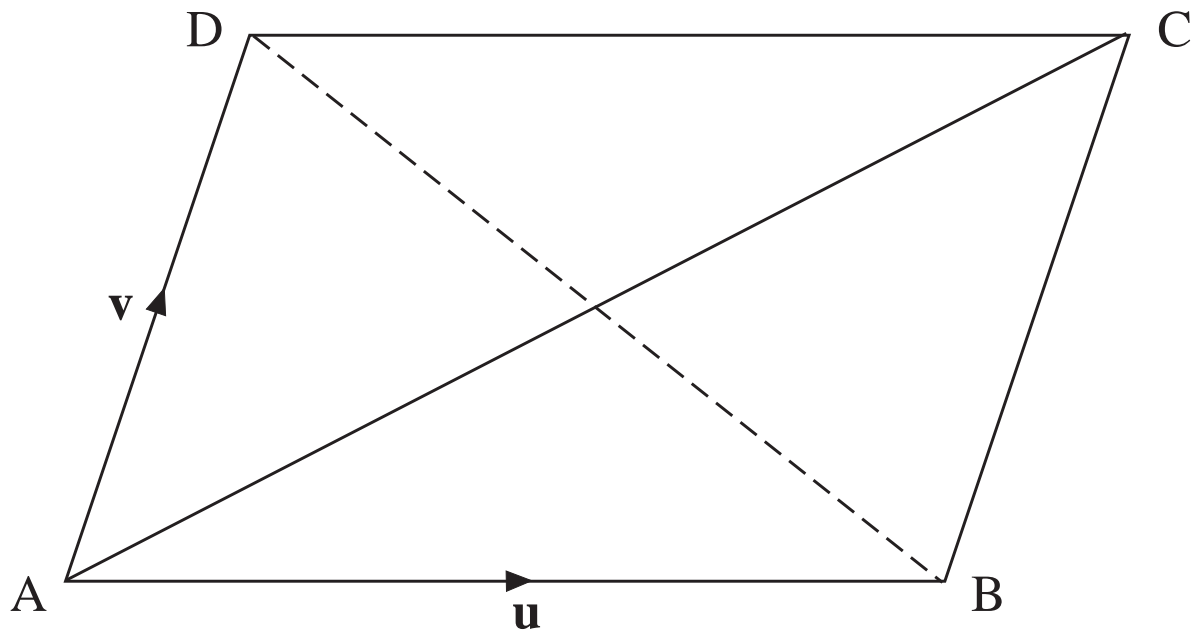
on the grid below, illustrate the following vectors.

- (a)  $\mathbf{b} - \mathbf{c}$       (b)  $\mathbf{a} + \mathbf{b}$       (c)  $\mathbf{c} + \mathbf{a}$       (d)  $\mathbf{a} + \mathbf{c} - \mathbf{b}$



## OS 19.5

## Vector Geometry



Express, in terms of  $\mathbf{u}$  and  $\mathbf{v}$ ,

- (a)  $\vec{BC}$
- (b)  $\vec{AC}$
- (c)  $\vec{AM}$ , where M is the midpoint of AC
- (d)  $\vec{BD}$
- (e)  $\vec{BN}$ , where N is the midpoint of BD
- (f)  $\vec{AN}$

From  $\vec{AM}$  and  $\vec{AN}$ , what can you deduce about the points M and N?

What result have you proved?