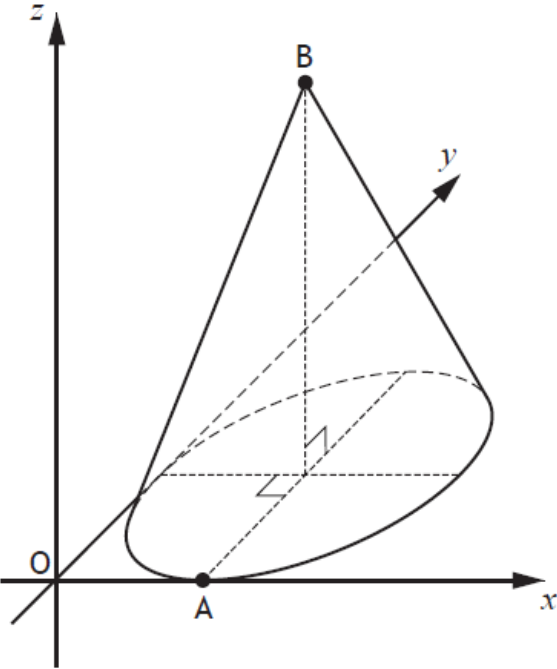
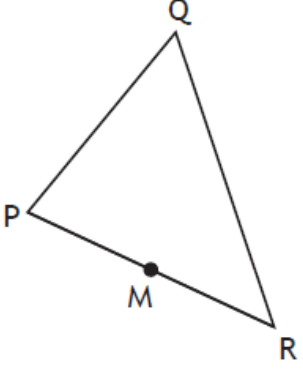
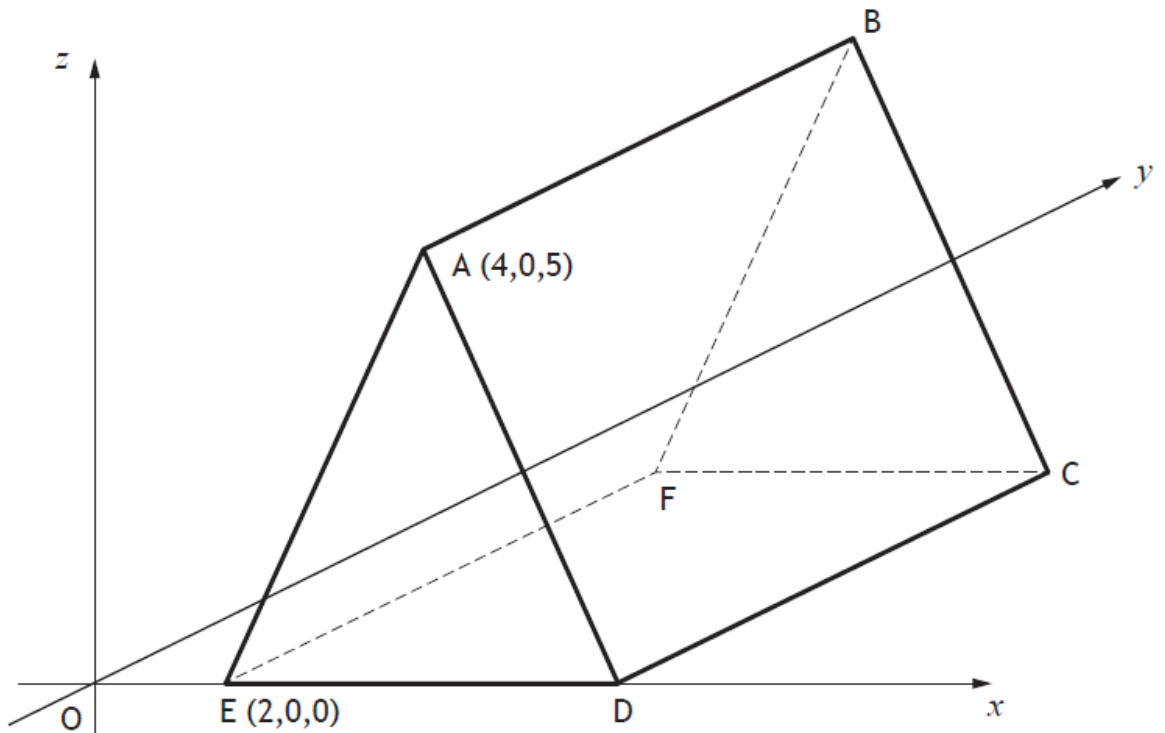


Nat 5/Credit/Int 2: Vectors

Nat 5 2019 P2 Q2	<p>2. Find \mathbf{p}, the magnitude of vector $\mathbf{p} = \begin{pmatrix} 6 \\ 27 \\ -18 \end{pmatrix}$.</p>	2	2
Ans	33		
Nat 5 2019 P2 Q5	<p>5. The diagram shows a cone with diameter 6 units and height 8 units.</p>  <ul style="list-style-type: none"> • The x-axis and the y-axis are tangents to the base • A is the point of contact between the base and the x-axis • B is directly above the centre of the base <p>Write down the coordinates of A and B.</p>	2	2
Ans	A(3,0,0) and B(3,3,8)		

<p style="text-align: center;">Nat 5 2019 P1 Q10</p>	<p>10. In triangle PQR, $\vec{PR} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$ and $\vec{RQ} = \begin{pmatrix} -1 \\ 8 \end{pmatrix}$.</p> <div style="text-align: center;">  </div> <p>(a) Express \vec{PQ} in component form. M is the midpoint of PR.</p> <p>(b) Express \vec{MQ} in component form.</p>	<p style="text-align: center;">1 2</p>
<p style="text-align: center;">Ans</p>	<p>(a) $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$</p> <p>(b) $\begin{pmatrix} 2 \\ 6 \end{pmatrix}$</p>	
<p style="text-align: center;">Nat 5 2018 P1 Q4</p>	<p>4. Two vectors are given by $\mathbf{u} = \begin{pmatrix} 1 \\ 5 \\ 1 \end{pmatrix}$ and $\mathbf{u} + \mathbf{v} = \begin{pmatrix} 6 \\ -4 \\ 3 \end{pmatrix}$.</p> <p>Find vector \mathbf{v}.</p> <p>Express your answer in component form.</p>	<p style="text-align: center;">2 2</p>
<p style="text-align: center;">Ans</p>	<p>$\begin{pmatrix} 5 \\ -9 \\ 2 \end{pmatrix}$</p>	

13. The diagram shows a triangular prism, ABCDEF, relative to the coordinate axes.



- $AD = AE$.
- $DC = 8$ units.
- Edges EF , DC and AB are parallel to the y -axis.

Write down the coordinates of B and C.

2

2

Ans

B(4,8,5) and C(6,8,0)

Nat 5
2018
P2 Q3

3. Find $|\mathbf{r}|$, the magnitude of vector $\mathbf{r} = \begin{pmatrix} 24 \\ -12 \\ 8 \end{pmatrix}$.

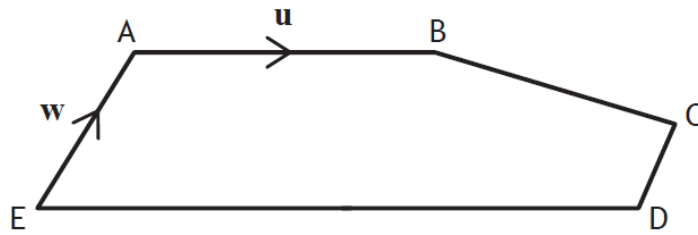
2

2

Ans

28

10. In the diagram below, \vec{AB} and \vec{EA} represent the vectors \mathbf{u} and \mathbf{w} respectively.



- $\vec{ED} = 2\vec{AB}$

- $\vec{EA} = 2\vec{DC}$

Express \vec{BC} in terms of \mathbf{u} and \mathbf{w} .

Give your answer in its simplest form.

2

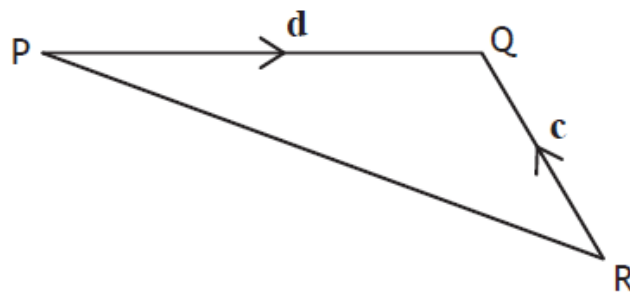
2

Nat 5
2018
P2
Q10

Ans

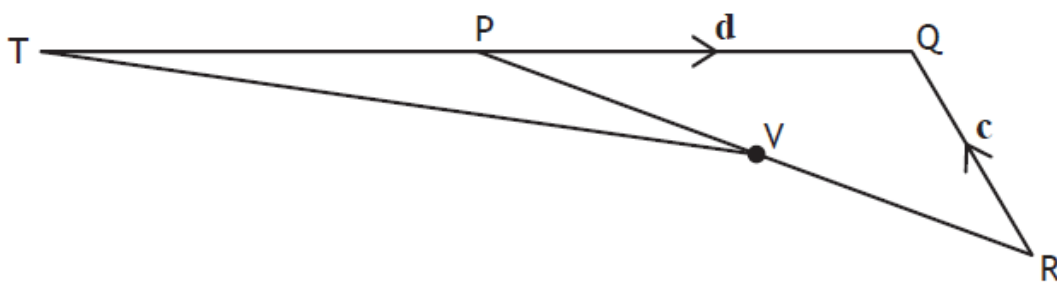
$$\mathbf{u} - \frac{1}{2}\mathbf{w}$$

In the diagram below, \vec{RQ} and \vec{PQ} represent the vectors \mathbf{c} and \mathbf{d} respectively.



(a) Express \vec{PR} in terms of \mathbf{c} and \mathbf{d} .

The line QP is extended to T.



- $TP = PQ$
- V is the midpoint of PR

(b) Express \vec{TV} in terms of \mathbf{c} and \mathbf{d} .
Give your answer in simplest form.

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

(b) $\frac{3}{2}\mathbf{d} - \frac{1}{2}\mathbf{c}$

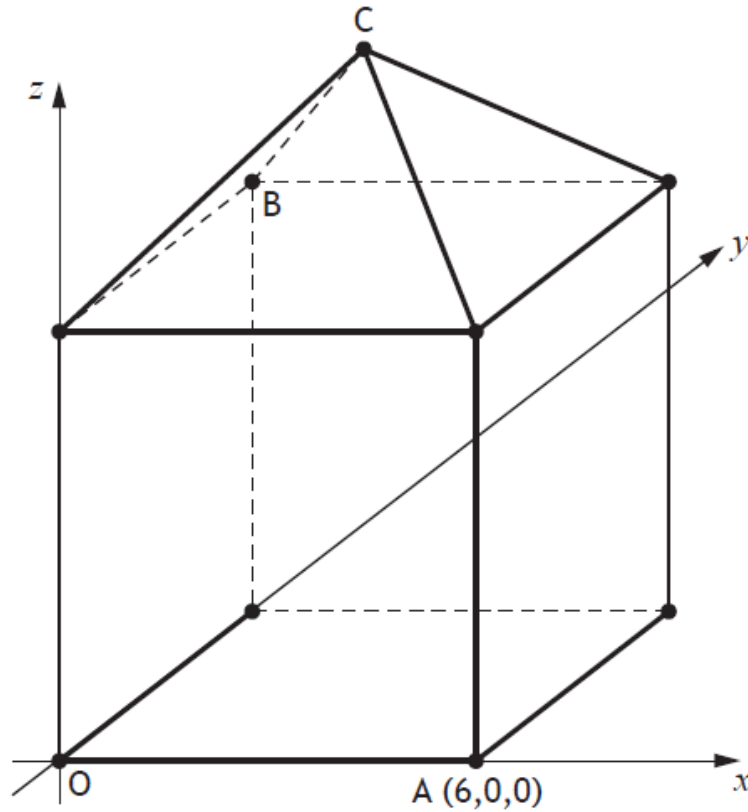
Nat 5 2017
P2 Q1

Find $|\mathbf{v}|$, the magnitude of vector $\mathbf{v} = \begin{pmatrix} 18 \\ -14 \\ 3 \end{pmatrix}$.

Ans

23

The diagram shows a square-based pyramid placed on top of a cube, relative to the coordinate axes.



The height of the pyramid is half of the height of the cube.

A is the point $(6,0,0)$.

The point C is directly above the centre of the base.

Write down the coordinates of B and C.

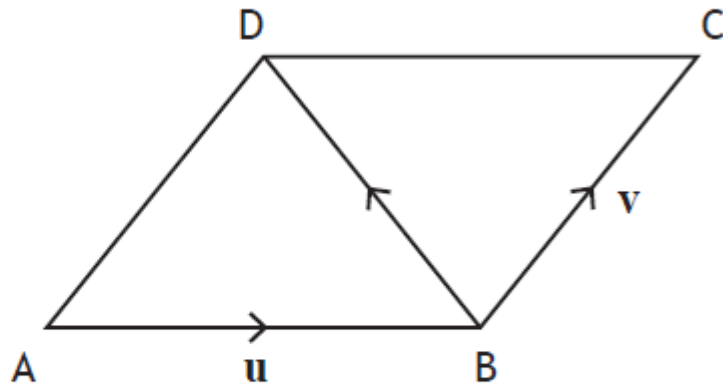
Ans

B $(0, 6, 6)$ C $(3, 3, 9)$

2

Nat 5 2016 P2 Q3

The diagram below shows parallelogram ABCD.



\vec{AB} represents vector \mathbf{u} and \vec{BC} represents vector \mathbf{v} .

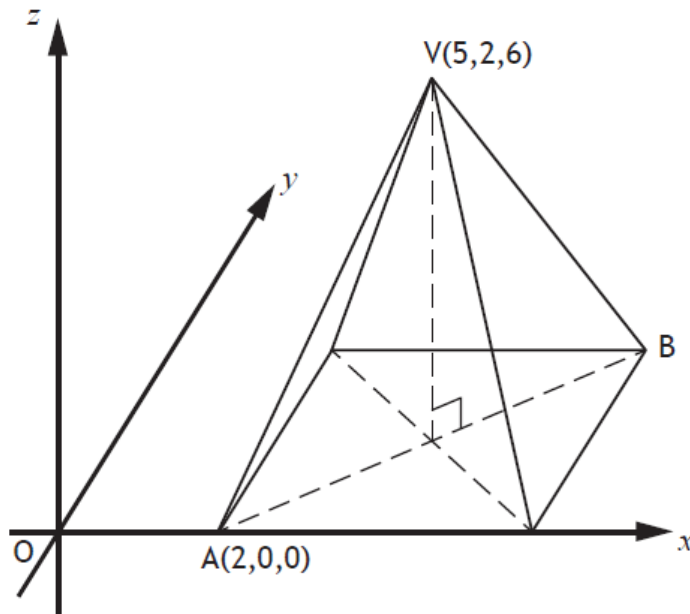
Express \vec{BD} in terms of \mathbf{u} and \mathbf{v} .

1

Ans $\mathbf{v} - \mathbf{u}$

Nat 5 2016 P1 Q7

The diagram shows a rectangular based pyramid, relative to the coordinate axes.



- A is the point (2,0,0).
- V is the point (5,2,6).

- (a) Write down the coordinates of B.
 (b) Calculate the length of edge AV of the pyramid.

1
3

Ans

- (a) (8, 4, 0)
 (b) 7

Nat 5 2016 P1 Q1

Given $\mathbf{p} = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} -5 \\ -1 \end{pmatrix}$.

Find the resultant vector $\frac{1}{2}\mathbf{p} + \mathbf{q}$.

Express your answer in component form.

Ans

$$\begin{pmatrix} -3 \\ -4 \end{pmatrix}$$

Nat 5 2015 P2 Q4

Find $|\mathbf{u}|$, the magnitude of vector $\mathbf{u} = \begin{pmatrix} 6 \\ -13 \\ 18 \end{pmatrix}$.

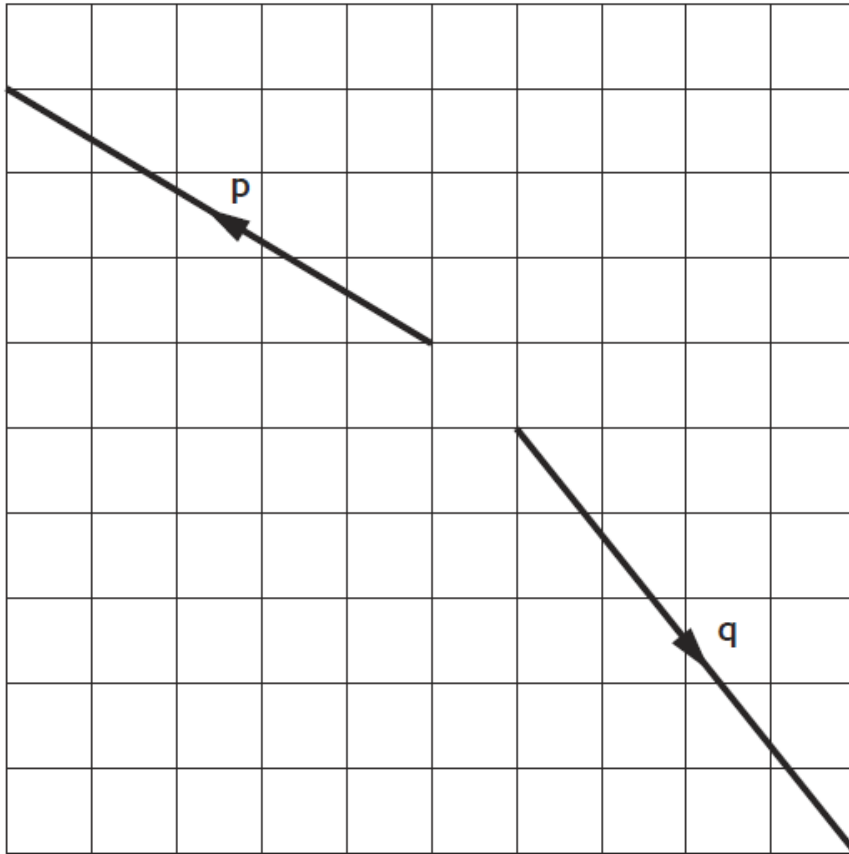
2

Ans

23

Nat 5 2015 P2 Q5

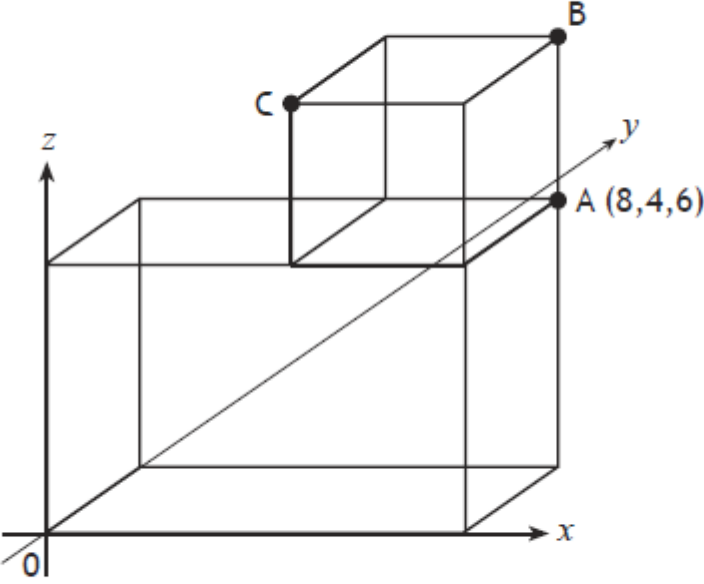
The vectors \mathbf{p} and \mathbf{q} are shown in the diagram below.
 Find the resultant vector $\mathbf{p} + \mathbf{q}$.
 Express your answer in component form.



2

Ans

$\begin{pmatrix} -1 \\ -2 \end{pmatrix}$

<p>Nat 5 2014 P1 Q4</p>	<p>Find the resultant vector $2\mathbf{u} - \mathbf{v}$ when $\mathbf{u} = \begin{pmatrix} -2 \\ 3 \\ 5 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$.</p> <p>Express your answer in component form.</p>	<p>2</p>
<p>Ans</p>	<p>$\begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$</p>	<p></p>
<p>Nat 5 2014 P2 Q2</p>	<p>The diagram shows a cube placed on top of a cuboid, relative to the coordinate axes.</p>  <p>A is the point (8, 4, 6).</p> <p>Write down the coordinates of B and C.</p>	<p>2</p>
<p>Ans</p>	<p>B (8, 4, 10) and C (4, 0, 10)</p>	<p></p>

Nat 5 Specimen P1 Q3

Two forces acting on a rocket are represented by vectors \mathbf{u} and \mathbf{v} .

$$\mathbf{u} = \begin{pmatrix} 2 \\ -5 \\ -3 \end{pmatrix} \text{ and } \mathbf{v} = \begin{pmatrix} 7 \\ 4 \\ -1 \end{pmatrix}.$$

Calculate $|\mathbf{u} + \mathbf{v}|$, the magnitude of the resultant force.

Express your answer as a surd in its simplest form.

3

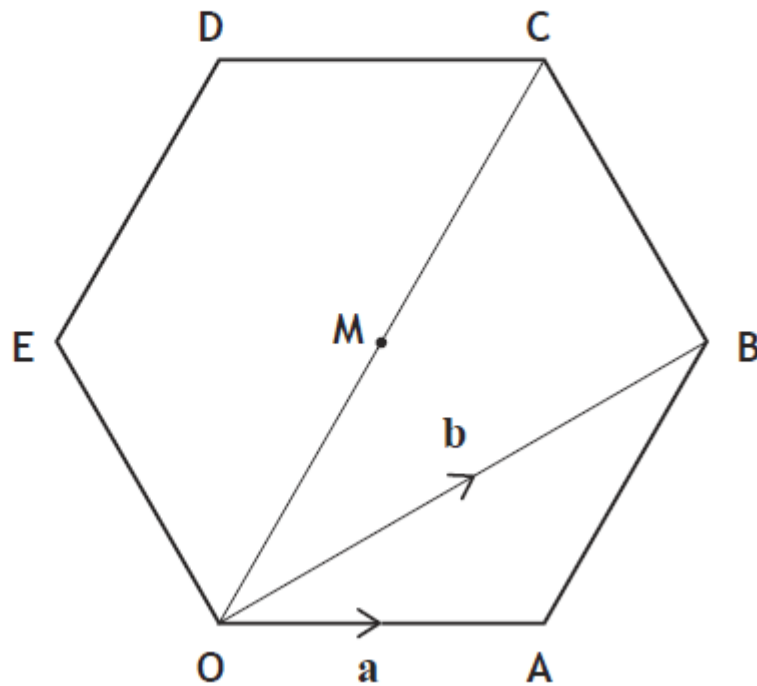
Ans

$$7\sqrt{2}$$

Nat 5 Specimen P2 Q3

In the diagram, OABCDE is a regular hexagon with centre M.

Vectors \mathbf{a} and \mathbf{b} are represented by \overrightarrow{OA} and \overrightarrow{OB} respectively.



(a) Express \overrightarrow{AB} in terms of \mathbf{a} and \mathbf{b} .

(b) Express \overrightarrow{OC} in terms of \mathbf{a} and \mathbf{b} .

2

Ans

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