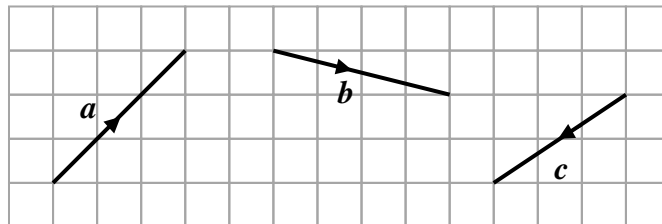


Mathematics (National 5) USAP 4(b) Homework – Ink Exercise

1. The diagram shows 3 vectors  $a$ ,  $b$  and  $c$ .



(a) Write down the components of vectors  $a$ ,  $b$  and  $c$  (3)

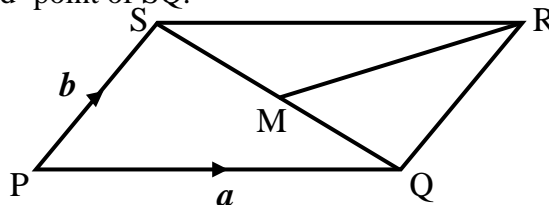
(b) Draw diagrams on squared paper to represent:

(i)  $a + b$       (ii)  $a - c$       (iii)  $b + c$

(iv)  $(a + b) + c$       (v)  $a + (b - c)$  (9)

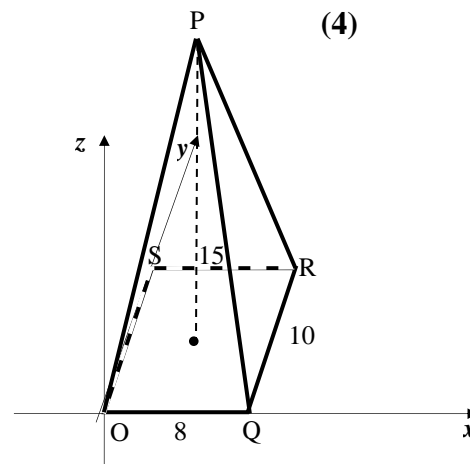
(c) For the resultant vectors in (i) and (iii) from part (b), state the components and calculate its magnitude correct to one decimal place. (4)

2. PQRS is a parallelogram.  $\vec{PQ}$  is represented by vector  $a$  and  $\vec{PS}$  is represented by vector  $b$  as shown in the diagram. M is the mid-point of SQ.



Express, in terms of  $a$  and  $b$ : (a)  $\vec{PR}$  (b)  $\vec{SQ}$  (c)  $\vec{SM}$  (6)

3. State the coordinates of each vertex of the rectangular based pyramid shown in the diagram. (4)



Mathematics (National 5) USAP 4(b) Homework – Ink Exercise

4 Two forces are acting on an object.

They are represented by the vectors  $F_1 = 3\mathbf{i} + \mathbf{j} - \mathbf{k}$  and  $F_2 = \mathbf{i} + 3\mathbf{j}$ .

Find the components and magnitude of the resultant force  $F_1 + F_2$ .

(4)

5. Write down the exact values of :

(a)  $\sin 60^\circ$       (b)  $\tan 225^\circ$       (c)  $\cos 300^\circ$       (d)  $\sin 315^\circ$

(4)

6. Write down the period of the following

(a)  $y = 3 \cos 2x^\circ$       (b)  $y = 2 \sin 5x^\circ$       (c)  $y = 4 \cos \frac{1}{2} x^\circ$

(3)

7. Solve for  $0 \leq x \leq 360$ , giving your answer correct to 3 significant figures.

(a)  $\sin x^\circ = 0.839$       (b)  $4\cos x^\circ + 7 = 6$       (c)  $\tan^2 x^\circ = 25$

(11)

8. Prove the following identities:

(a)  $(\sin x^\circ + \cos x^\circ)^2 = 1 + 2 \sin x^\circ \cos x^\circ$

(b)  $\tan x^\circ \times \sin x^\circ = \frac{1}{\cos x^\circ} - \cos x^\circ$  (6)

**Total – 54 marks**