

Pearson Edexcel

A Level Mathematics 9MA0

Unit Test

12 Vectors

Time allowed: 50 minutes

School:

Name:

Teacher:

Question	Points	Score
1	6	
2	6	
3	3	
4	10	
5	6	
6	9	
7	10	
Total:	50	



1. (a) The coordinates of A and B are $(-1, 7, k)$ and $(4, 1, 10)$ respectively. [3]

Given that the distance from A to B is $5\sqrt{5}$ units, find the possible values of the constant k .

- (b) For the larger value of k , find the unit vector in the direction of \overrightarrow{OA} . [3]

Total: 6



2. A triangle has vertices $A(-2, 0, -4)$, $B(-2, 4, -6)$ and $C(3, 4, 4)$. By considering the side lengths of the triangle, show that the triangle is a right-angled triangle. [6]



3. Find the angle that the vector $\mathbf{a} = 4\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ makes with the positive y -axis.

[3]



4. (a) Show that in $\triangle KLM$ with $\overrightarrow{KL} = 3\mathbf{i} + 0\mathbf{j} - 6\mathbf{k}$ and $\overrightarrow{LM} = 2\mathbf{i} + 5\mathbf{j} + 4\mathbf{k}$, $\angle KLM = 66.4^\circ$ to one decimal place. [7]
- (b) Hence find $\angle LKM$ and $\angle LMK$. [3]

Total: 10



5. Given that

[6]

$$(b - a)\mathbf{i} - 2abc\mathbf{j} + 2\mathbf{k} = 10\mathbf{i} - 96\mathbf{j} + (7a + 5b)\mathbf{k},$$

find the values of a , b and c .



6. A particle of mass 3 kg is acted on by three forces, $F_1 = (2\mathbf{i} + 6\mathbf{j} - 3\mathbf{k})\text{N}$, $F_2 = (7\mathbf{i} + 8\mathbf{k})\text{N}$ and $F_3 = (-3\mathbf{i} - 3\mathbf{j} - 2\mathbf{k})\text{N}$.

(a) Find the resultant force R acting on the particle. [2]

(b) Find the acceleration of the particle, giving your answer in the form $(p\mathbf{i} + q\mathbf{j} + r\mathbf{k}) \text{ms}^{-2}$. [2]

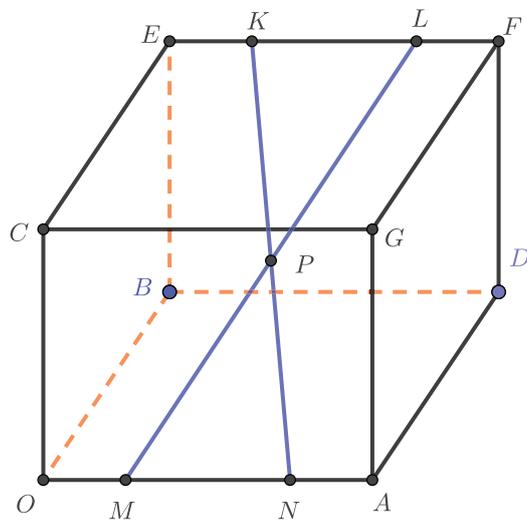
(c) Find the magnitude of the acceleration. [2]

(d) Given that the particle starts at rest, find the exact distance travelled by the particle in the first 10s. [3]

Total: 9



7. The diagram shows a cuboid whose vertices are O, A, B, C, D, E, F and G . \mathbf{a} , \mathbf{b} and \mathbf{c} are the vectors \overrightarrow{OA} , \overrightarrow{OB} and \overrightarrow{OC} respectively. The points M and N lie on OA such that $OM : MN : NA = 1 : 2 : 1$. The points K and L lie on EF such that $EK : KL : LF = 1 : 2 : 1$. [10]



Prove that the diagonals KN and ML bisect each other at P .

