

# Pearson Edexcel AS Mathematics 8MA0

## Unit Test 5 Vectors

Time allowed: 50 minutes

School:

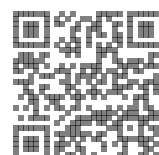
Name:

Teacher:

How I can achieve better:

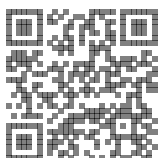
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Question	Points	Score
1	3	
2	5	
3	6	
4	7	
5	8	
6	8	
7	13	
Total:	50	

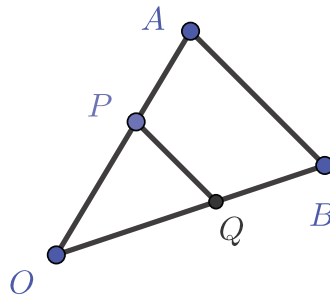


1. Find in exact form the unit vector in the same direction as  $\mathbf{a} = 4\mathbf{i} - 7\mathbf{j}$ .

[3]

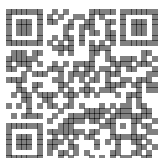


2. In  $\triangle OAB$ ,  $\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .  $P$  divides  $\vec{OA}$  in the ratio 3 : 2 and  $Q$  divides  $\vec{OB}$  in the ratio 3 : 2.



- (a) Show that  $PQ$  is parallel to  $AB$ . [4]
- (b) Given that  $AB$  is 10 cm in length find the length of  $PQ$ . [1]

Total: 5

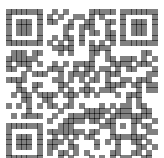


3. Given that the resultant of the vectors  $\mathbf{a} = 2p\mathbf{i} - 5\mathbf{j}$  and  $\mathbf{b} = 6\mathbf{i} - 3p\mathbf{j}$  is parallel to the vector  $\mathbf{c} = 4\mathbf{i} - 5\mathbf{j}$ , find

(a) the value of  $p$ , [4]

(b) the resultant of the vectors  $\mathbf{a}$  and  $\mathbf{b}$ . [2]

Total: 6

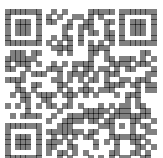


4. Given that point  $A$  has the position vector  $4\mathbf{i} + 7\mathbf{j}$  and point  $B$  has the position vector  $10\mathbf{i} + q\mathbf{j}$ , where  $q$  is a constant, find

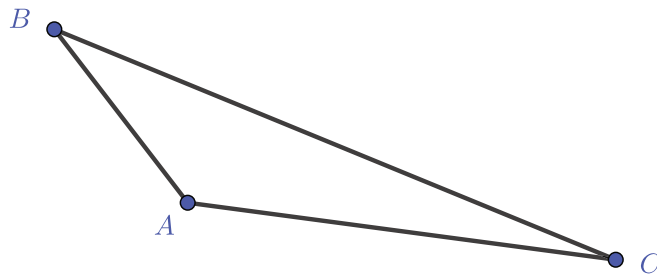
(a) the vector  $\overrightarrow{AB}$  in terms of  $q$ . [2]

(b) Given further that  $|\overrightarrow{AB}| = 2\sqrt{13}$ , find the two possible values of  $q$  showing detailed reasoning in your working. [5]

Total: 7



5. In  $\triangle ABC$ ,  $\overrightarrow{AB} = -3\mathbf{i} + 6\mathbf{j}$  and  $\overrightarrow{AC} = 10\mathbf{i} - 2\mathbf{j}$ .



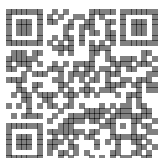
(a) Find the size of  $\angle BAC$ , in degrees, to 1 decimal place.

[5]

(b) Find the exact value of the area of  $\triangle ABC$ .

[3]

Total: 8



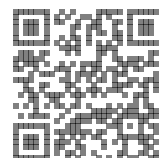
6. A particle  $P$  of mass 6 kg moves under the action of two forces,  $F_1$  and  $F_2$ , where  $F_1 = (8\mathbf{i} - 10\mathbf{j})N$  and  $F_2 = (p\mathbf{i} + q\mathbf{j})N$ ,  $p$  and  $q$  are constants. The acceleration of  $P$  is  $a = (3\mathbf{i} - 2\mathbf{j}) \text{ ms}^{-2}$ .

(a) Find, to 1 decimal place, the angle between the acceleration and  $\mathbf{i}$ . [2]

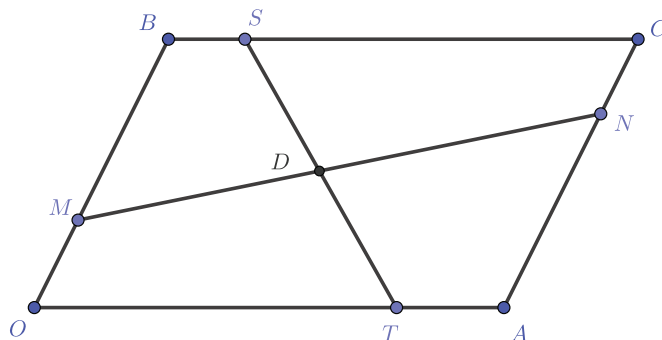
(b) Find the values of  $p$  and  $q$ . [3]

(c) Find the magnitude of the resultant force  $R$  of the two forces  $F_1$  and  $F_2$ . Simplify your answer fully. [3]

Total: 8



7.  $OACB$  is a parallelogram.  $\overrightarrow{OA} = \mathbf{a}$  and  $\overrightarrow{OB} = \mathbf{b}$ . The points  $M, S, N$  and  $T$  divide  $OB, BC, CA$  and  $AO$  in the ratio  $1 : 4$  respectively. The lines  $ST$  and  $MN$  intersect at the point  $D$ .



- (a) Express  $\overrightarrow{MN}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ . [2]
- (b) Express  $\overrightarrow{ST}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ . [2]
- (c) Show that the lines  $MN$  and  $ST$  bisect one another. [9]

Total: 13

