



5.21F Vectors: Foundation Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Write down the vector from point P to point Q. P has position vector $(2, 3)$ and Q has position vector $(5, 1)$.

(Total for Question 1 is 1 mark)

- 2** Calculate 3 times the vector $(1, -2)$.

(Total for Question 2 is 1 mark)

- 3** $A = (4, 0)$ and $B = (-1, 3)$. Work out $A + B$.

(Total for Question 3 is 2 marks)

- 4** Vector $u = (2, 5)$. Vector $v = (6, -1)$. Work out $2u - v$.

(Total for Question 4 is 2 marks)

5 In a square grid, point A has position vector $(1, 2)$ and point B has position vector $(4, 5)$.

a) Find the vector AB. (2 marks)

b) Give the position vector of the point C which is $\frac{1}{3}$ of the way from A to B. Give your answer as a coordinate pair. (3 marks)

(a) Find the vector AB. (2)

(b) Give the position vector of point C which is $\frac{1}{3}$ of the way from A to B. (3)

(Total for Question 5 is 5 marks)

6 Point X has position vector $(0, 0)$. Point Y has position vector $(0, 6)$. Point Z has position vector $(8, 6)$.

Work out the vector ZX and state its components. (3 marks)

(Total for Question 6 is 3 marks)

7 On a diagram, P is at (2, 1) and Q is at (5, 4). The vector PQ is k times the vector (1, 1).

a) Find PQ. (2 marks)

b) Hence find k. (3 marks)

(a) Find PQ. (2)

(b) Hence find k where $PQ = k(1, 1)$. (3)

(Total for Question 7 is 5 marks)

8 The vector $a = (2, -1)$ and the vector $b = (-1, 2)$.

a) Find $a + b$. (2 marks)

b) Find $2a + 3b$. (3 marks)

(a) Find $a + b$. (2)

(b) Find $2a + 3b$. (3)

(Total for Question 8 is 5 marks)

9 Points A, B and C have position vectors $\mathbf{a} = (1, 0)$, $\mathbf{b} = (4, 0)$ and $\mathbf{c} = (7, 0)$.

a) Write down the vectors AB and BC. (2 marks)

b) Show that B is the midpoint of AC by using vectors. Give clear working. (3 marks)

c) Hence or otherwise, write AC as a multiple of AB. (4 marks)

(a) Write down AB and BC. (2)

(b) Show that B is the midpoint of AC using vectors. (3)

(c) Hence or otherwise, write AC as a multiple of AB. (4)

(Total for Question 9 is 9 marks)

10 On a diagram, O is the origin. Point M has position vector $\mathbf{m} = (3, 2)$. Point N has position vector $\mathbf{n} = (-1, 4)$.

a) Find the vector MN. (2 marks)

b) Express MN in the form $p\mathbf{m} + q\mathbf{n}$, where p and q are scalars. Show full working. (5 marks)

(a) Find MN. (2)

(b) Express MN in the form $p\mathbf{m} + q\mathbf{n}$, where p and q are scalars. Show full working. (5)

(Total for Question 10 is 7 marks)

Mark scheme · 5.21F Vectors: Foundation Tier Practice

Question 1

- **B1** vector $PQ = (3, -2)$ cao
- **Answer:** $(3, -2)$

Question 2

- **B1** $3(1, -2) = (3, -6)$ cao
- **Answer:** $(3, -6)$

Question 3

- **M1** add components: $(4 + -1, 0 + 3)$ or correct method shown
- **A1** $(3, 3)$ cao
- **Answer:** $(3, 3)$

Question 4

- **M1** calculate $2u = (4, 10)$ and subtract v or show component method
- **A1** $(-2, 11)$ cao
- **Answer:** $(-2, 11)$

Question 5

- (a) **M1** subtract components: $(4 - 1, 5 - 2)$ or equivalent
- (a) **A1** $(3, 3)$ cao
- (a) **Answer:** $(3, 3)$
- (b) **M1** use $A + (1/3)AB$ or calculate fraction of difference
- (b) **M1** compute coordinates: $(1 + 1, 2 + 1)$ shown or equivalent
- (b) **A1** $(2, 3)$ cao
- (b) **Answer:** $(2, 3)$

Question 6

- **M1** use $ZX = X - Z$ or show correct subtraction of components
- **M1** compute components: $(0 - 8, 0 - 6)$ or shown method
- **A1** $(-8, -6)$ cao
- **Answer:** $(-8, -6)$

Question 7

- (a) **M1** compute $PQ = Q - P = (5 - 2, 4 - 1)$ or show subtraction
- (a) **A1** $(3, 3)$ cao
- (a) **Answer:** $(3, 3)$
- (b) **M1** equate components: $(3, 3) = (k, k)$ or show method
- (b) **M1** solve $k = 3$ from one component or show both give same
- (b) **A1** $k = 3$ cao
- (b) **Answer:** 3

Question 8

- (a) **M1** add components: $(2 + -1, -1 + 2)$
- (a) **A1** $(1, 1)$ cao
- (a) **Answer:** $(1, 1)$
- (b) **M1** calculate $2a = (4, -2)$ and $3b = (-3, 6)$ or show component multiplication
- (b) **M1** add results to get $(1, 4)$ or show addition
- (b) **A1** $(1, 4)$ cao
- (b) **Answer:** $(1, 4)$

Question 9

- (a) **M1** $AB = b - a = (3, 0)$ or $BC = c - b = (3, 0)$ shown
- (a) **A1** $AB = (3, 0)$ and $BC = (3, 0)$ cao
- (a) **Answer: $AB = (3, 0)$, $BC = (3, 0)$**
- (b) **M1** show $AC = c - a = (6, 0)$ or equivalent
- (b) **M1** show that $AB = 1/2 AC$ or that $A + 1/2 AC = B$
- (b) **A1** state B is midpoint cao
- (b) **Answer: $AC = (6, 0)$, $AB = (3, 0) = 1/2 AC$ so B is midpoint**
- (c) **M1** relate AC and AB using components or scalar k with $AC = k AB$
- (c) **M1** substitute numbers to get $(6,0) = k(3,0)$ or equivalent
- (c) **A1** $k = 2$ cao
- (c) **A1** $AC = 2 AB$ cao
- (c) **Answer: $AC = 2 AB$**

Question 10

- (a) **M1** compute $MN = n - m$ or show subtraction
- (a) **A1** $(-4, 2)$ cao
- (a) **Answer: $(-4, 2)$**
- (b) **M1** set up equation $p(3,2) + q(-1,4) = (-4,2)$ or equivalent
- (b) **M1** equate components and form linear system: $3p - q = -4$ and $2p + 4q = 2$
- (b) **M1** solve the system correctly, e.g. substitute $q = 3p + 4$ into the second equation
- (b) **A1** $p = -1$ cao
- (b) **A1** $q = 1$ cao
- (b) **Answer: $MN = -m + n$ ($p = -1, q = 1$)**