HIGHER

3.4 Vectors in Two Dimensions: Notation, Magnitude and Arithmetic: 1-hour Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Are the vectors [3; -2] and [-5; 4] parallel? Give a reason.

(Total for Question 1 is 3 marks)

2 The point A has position vector OA = [-3; -3] and the point B has position vector OB = [-5; 3], where O is the origin.
Find the vector AB.

(Total for Question 2 is 2 marks)

3 a = [1; 3], b = [-3; 3] and c = [-5; -3].
c = ma + nb, where m and n are numbers. Find the value of m and the value of n.

(Total for Question 3 is 4 marks)

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4 The point P(-5, -5) is translated by the vector [-4; -4] to the point Q. Find the distance PQ. Give your answer as an integer or as a surd in its simplest form.

(Total for Question 4 is 3 marks)

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5 v = [5; 0] and w = [4; 0]
Find |v + 3w|. Give your answer as an integer or as a surd in its simplest form.

(Total for Question 5 is 3 marks)

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6 Are the vectors [-4; 3] and [5; -3] parallel? Give a reason.

(Total for Question 6 is 3 marks)

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7 The point A has position vector OA = [0; 1] and the point B has position vector OB = [4; -3], where O is the origin.
Find the vector BA.

(Total for Question 7 is 2 marks)

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8 a = [-1; -3], b = [-3; -4] and c = [-2; -1].
c = ma + nb, where m and n are numbers. Find the value of m and the value of n.

(Total for Question 8 is 4 marks)

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9 The point P(5, 0) is translated by the vector [0; 4] to the point Q. Find the distance PQ. Give your answer as an integer or as a surd in its simplest form.

(Total for Question 9 is 3 marks)

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10 p = [-6; -6] and q = [7; 4]
Work out 2p as a column vector.

(Total for Question 10 is 2 marks)

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11 Are the vectors [4; -1] and [13; -3] parallel? Give a reason.

(Total for Question 11 is 3 marks)

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12 The point A has position vector OA = [1; -4] and the point B has position vector OB = [-7; 7], where O is the origin.
Find the length of AB. Give your answer as an integer or as a surd in its simplest form.

(Total for Question 12 is 3 marks)

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13 a = [4; -5], b = [-2; -1] and c = [8; -3].
c = ma + nb, where m and n are numbers. Find the value of m and the value of n.

(Total for Question 13 is 4 marks)

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14 The vector r = [5; -2]. Calculate the magnitude |r| and give your answer to 3 significant figures.

(Total for Question 14 is 3 marks)

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Mark scheme · 3.4 Vectors in Two Dimensions: Notation, Magnitude and Arithmetic: 1-hour Pack

Question 1

compares the ratios of corresponding components **M1**

-5/3 and -2 **A1**

No, the components are not in the same ratio **A1**

Answer: No, the components are not in the same ratio

Question 2

uses AB = OB - OA **M1**

AB = [-2; 6] **A1**

Answer: [-2; 6]

Question 3

forms the equations m - 3n = -5 and 3m + 3n = -3 **M1**

eliminates one letter, for example by multiplying to match coefficients and adding or subtracting **M1**

m = -2 **A1**

n = 1 **A1**

Answer: m = -2, n = 1

Question 4

PQ is the magnitude of the translation vector **M1**

$\sqrt{(-4)^2 + (-4)^2} = \sqrt{32}$ **M1**

$PQ = 4\sqrt{2}$ **A1**

Answer: $4\sqrt{2}$

Question 5

finds v + 3w = [17; 0] **M1**

uses $\sqrt{(17)^2 + (0)^2} = \sqrt{289}$ **M1**

17 **A1**

Answer: |v + 3w| = 17

Question 6

compares the ratios of corresponding components **M1**

-5/4 and -1 **A1**

No, the components are not in the same ratio **A1**

Answer: No, the components are not in the same ratio

Question 7

uses BA = OA - OB **M1**

BA = [-4; 4] **A1**

Answer: [-4; 4]

Question 8

forms the equations -m - 3n = -2 and -3m - 4n = -1 **M1**

eliminates one letter, for example by multiplying to match coefficients and adding or subtracting **M1**

m = -1 **A1**

n = 1 **A1**

Answer: m = -1, n = 1

Question 9

PQ is the magnitude of the translation vector **M1**

$\sqrt{(0)^2 + (4)^2} = \sqrt{16}$ **M1**

PQ = 4 **A1**

Answer: 4

Question 10

multiplies both components of p by 2 **M1**

2p = [-12; -12] **A1**

Answer: [-12; -12]

Question 11

compares the ratios of corresponding components **M1**

13/4 and 3 **A1**

No, the components are not in the same ratio **A1**

Answer: No, the components are not in the same ratio

Question 12

AB = [-8; 11] **M1**

uses $\sqrt{(-8)^2 + (11)^2} = \sqrt{185}$ **M1**

$AB = \sqrt{185}$ **A1**

Answer: $\sqrt{185}$

Question 13

forms the equations 4m - 2n = 8 and -5m - n = -3 **M1**

eliminates one letter, for example by multiplying to match coefficients and adding or subtracting **M1**

m = 1 **A1**

n = -2 **A1**

Answer: m = 1, n = -2

Question 14

uses Pythagoras: $|r| = \sqrt{5^2 + (-2)^2}$ **M1**

evaluates the square root correctly, e.g. $\sqrt{25+4} = \sqrt{29}$ **M1**

gives |r| = 5.39 to 3 s.f., cao **A1**

Answer: 5.39

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