# 5.21 Vectors: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** Column vectors are written in the form (x, y), where x is the top (horizontal) number and y is the bottom (vertical) number. u = (4, 1) and v = (-2, 5).

**(a)** Work out u + v as a column vector. **(1)**

.....

**(b)** Work out u - v as a column vector. **(1)**

.....

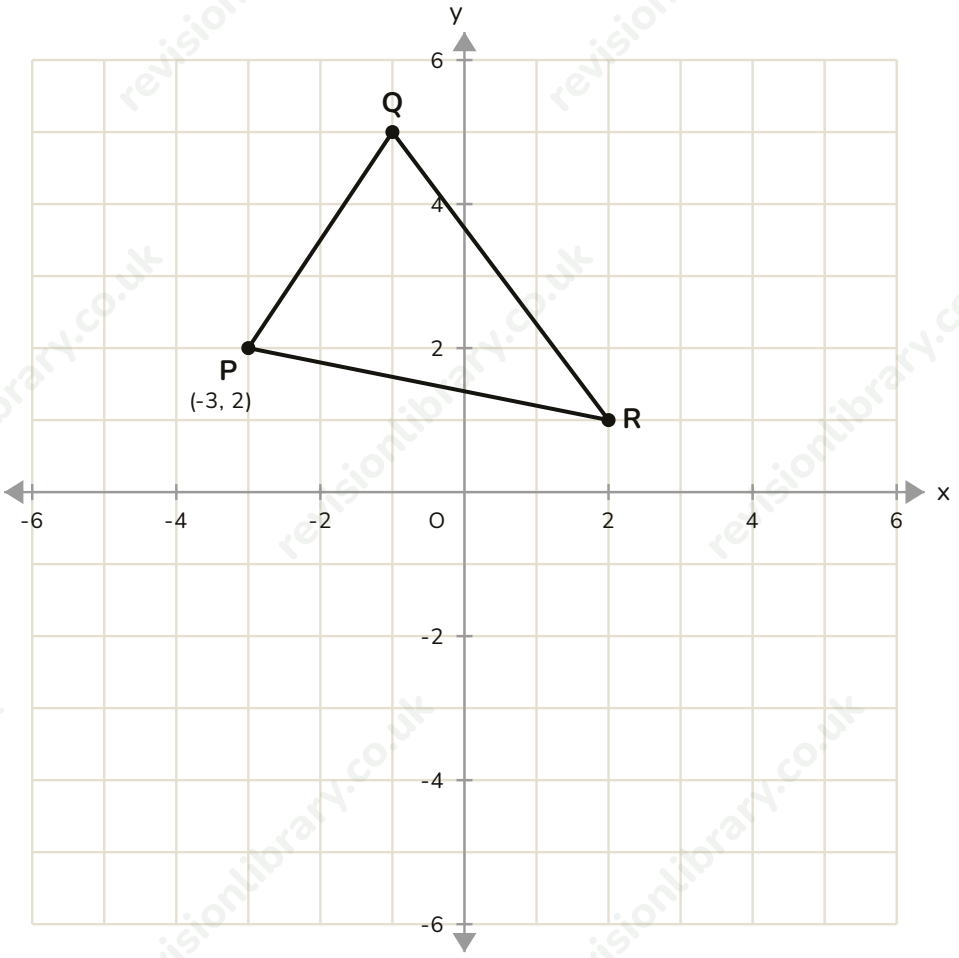
**(c)** Work out 3v as a column vector. **(1)**

.....

**(Total for Question 1 is 3 marks)**


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**2** Triangle PQR has vertex P at (-3, 2). Triangle PQR is translated by the vector (4, -5) to give triangle P'Q'R'.




**(a)** Write down the coordinates of P'. **(1)**

.....

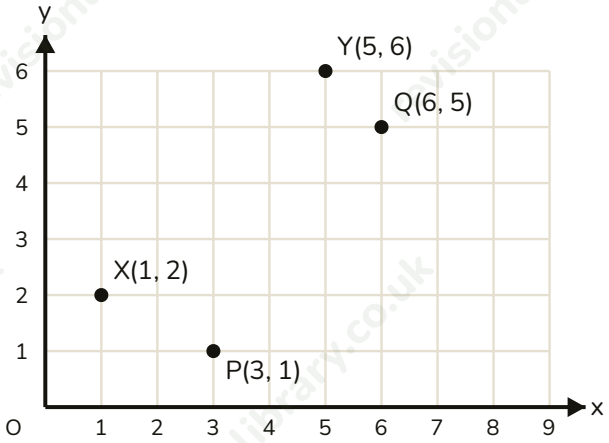
**(b)** Write down the column vector that translates P' back to P. **(1)**

.....

**(Total for Question 2 is 2 marks)**


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**3** On a centimetre grid, X is the point (1, 2), Y is the point (5, 6), P is the point (3, 1) and Q is the point (6, 5).




**(a)** Write the vector XY as a column vector. **(1)**

**(b)** Write the vector PQ as a column vector. **(1)**

**(Total for Question 3 is 2 marks)**

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**4** 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)**

.....

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

.....

**(Total for Question 4 is 5 marks)**


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**5** The vector a = (2, -1) and the vector b = ( -1, 2 ).

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

.....

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

.....

**(Total for Question 5 is 5 marks)**

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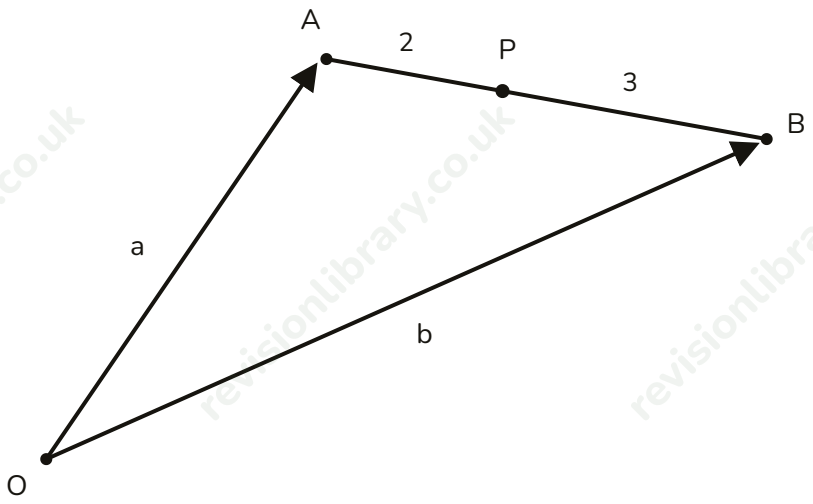
**6** Write down the vector from P to Q given P(2, -1) and Q( -3, 4).

**(Total for Question 6 is 2 marks)**


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**7** O is the origin. The position vectors of A and B, relative to O, are a and b. P lies on AB such that AP : PB = 2 : 3. Find the position vector of P, OP, in terms of a and b, giving your answer in its simplest form.

Diagram NOT accurately drawn




**(Total for Question 7 is 3 marks)**

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**8** A ship sails from a harbour with a displacement vector (12, 5) km. It then changes course and sails with a displacement vector (-4, 9) km.

**(a)** Find the total displacement of the ship from the harbour as a column vector. **(1)**

.....

**(b)** Calculate the total distance of the ship from the harbour, giving your answer correct to the nearest 0.1 km. **(2)**

.....

**(Total for Question 8 is 3 marks)**


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# Mark scheme · 5.21 Vectors: 30-minute Pack

## Question 1

(a) (2, 6) cao **B1**

**(a) Answer: (2, 6)**

(b) (6, -4) cao **B1**

**(b) Answer: (6, -4)**

(c) (-6, 15) cao **B1**

**(c) Answer: (-6, 15)**

## Question 2

(a) (1, -3) cao **B1**

**(a) Answer: (1, -3)**

(b) (-4, 5) ft from (a) **B1**

**(b) Answer: (-4, 5)**

## Question 3

(a) (4, 4) cao **B1**

**(a) Answer: (4, 4)**

(b) (3, 4) cao **B1**

**(b) Answer: (3, 4)**

## Question 4

(a) compute PQ = Q - P = (5 - 2, 4 - 1) or show subtraction **M1**

(a) (3, 3) cao **A1**

**(a) Answer: (3, 3)**

(b) equate components: (3,3) = (k, k) or show method **M1**

(b) solve k = 3 from one component or show both give same **M1**

(b) k = 3 cao **A1**

**(b) Answer: 3**

## Question 5

(a) add components: (2 + -1, -1 + 2) **M1**

(a) (1, 1) cao **A1**

**(a) Answer: (1, 1)**

(b) calculate 2a = (4, -2) and 3b = (-3, 6) or show component multiplication **M1**

(b) add results to get (1, 4) or show addition **M1**

(b) (1, 4) cao **A1**

**(b) Answer: (1, 4)**

## Question 6

Subtract coordinates: Q - P to form vector PQ **M1**

PQ = ( -5, 5) cao **A1**

**Answer: (-5, 5)**

## Question 7

AB = b - a **M1**

OP = a + (2/5)(b - a), correct method for the ratio **M1**

(3a + 2b)/5 oe, e.g. (3/5)a + (2/5)b **A1**

**Answer: OP = (3a + 2b)/5**

## Question 8

(a) (8, 14) cao **B1**

**(a) Answer: (8, 14)**

(b) $\sqrt{8^2 + 14^2}$ ft from (a) **M1**

(b) awrt 16.1 **A1**

**(b) Answer: 16.1 km**


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