HIGHER

8.10 Vectors Proof Questions: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 OA = <1, 0>, OB = <4, 3>, OC = <7, 6>. Show that A, B and C are collinear.

(Total for Question 1 is 2 marks)

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2 Two vectors are given by p = (5, -12) and q = (-10, 24), written as column vectors.

(a) Find |p|. **(2)**

(b) Show that q is parallel to p. **(2)**

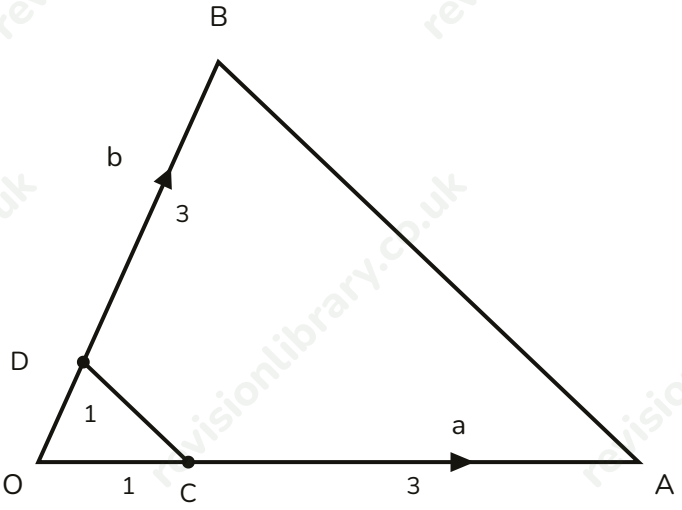
(c) Find |q|. **(1)**

(Total for Question 2 is 5 marks)

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3 OAB is a triangle with OA = a and OB = b. C is the point on OA such that OC:CA = 1:3. D is the point on OB such that OD:DB = 1:3.

Diagram NOT accurately drawn



(a) Find OC in terms of a. **(1)**

.....

(b) Find OD in terms of b. **(1)**

.....

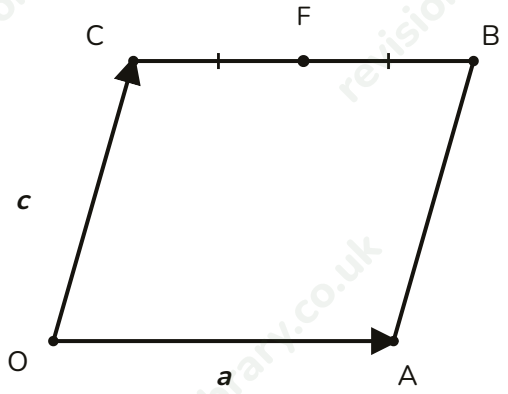
(c) Prove that CD is parallel to AB, and state the ratio CD:AB. **(3)**

(Total for Question 3 is 5 marks)

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4 OABC is a parallelogram, with vertices in the order O, A, B, C. OA = a and OC = c.

Diagram NOT accurately drawn



(a) Write down AB in terms of c. **(1)**

.....

(b) Find OB in terms of a and c. **(1)**

.....

(c) F is the midpoint of CB. Find OF in terms of a and c. **(2)**

.....

(Total for Question 4 is 4 marks)

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5 OAB is a triangle. OA = a and OB = b. M is the midpoint of AB. N is the point on OB such that ON:NB = 2:3. Find MN in terms of a and b.

(Total for Question 5 is 3 marks)

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6 OP = 4a - b, OQ = 2a + 6b and OR = 8a - 15b. Show that P, Q and R lie on a straight line.

(Total for Question 6 is 4 marks)

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Mark scheme · 8.10 Vectors Proof Questions: 30-minute Pack

Question 1

calculate OC - OA = <6,6> and OB - OA = <3,3> and show OC - OA = 2(OB - OA) oe	**M1**
state A, B and C are collinear cao	**A1**

Answer: Collinear, since OC - OA = 2(OB - OA).

Question 2

(a) $\sqrt{5^2 + (-12)^2}$ (oe)	**M1**
(a) 13 (cao)	**A1**

(a) Answer: |p| = 13

(b) compares components, e.g. -10/5 = -2 and 24/-12 = -2 (oe)	**M1**
(b) q = -2p, so q is parallel to p (cso)	**A1**

(b) Answer: q = -2p, so q is parallel to p

(c) 26 (cao) (ft 2 x their part (a) if q = -2p used)	**B1**

(c) Answer: |q| = 26

Question 3

(a) (1/4)a (oe) (cao)	**B1**

(a) Answer: OC = (1/4)a

(b) (1/4)b (oe) (cao)	**B1**

(b) Answer: OD = (1/4)b

(c) CD = OD - OC = (1/4)b - (1/4)a (oe)	**M1**
(c) AB = OB - OA = b - a (oe)	**M1**
(c) CD = (1/4)AB, so CD is parallel to AB; CD:AB = 1:4 (cso)	**A1**

(c) Answer: CD is parallel to AB; CD:AB = 1:4

Question 4

(a) c (oe) (cao)	**B1**

(a) Answer: AB = c

(b) a + c (oe) (ft their part (a))	**B1**

(b) Answer: OB = a + c

(c) correct method, e.g. CB = OA = a, so OF = OC + (1/2)CB	**M1**
(c) (1/2)a + c (oe) (cao)	**A1**

(c) Answer: OF = (1/2)a + c

Question 5

OM = 1/2(a + b)	**M1**
ON = 2/5b	**M1**
MN = -(1/2)a - (1/10)b oe	**A1**

Answer: MN = -(1/2)a - (1/10)b

Question 6

PQ = OQ - OP = -2a + 7b	**M1**
PR = OR - OP = 4a - 14b	**M1**
PR = -2PQ	**A1**
common point P and conclusion that P, Q and R are collinear	**B1**

Answer: PR = -2PQ, so P, Q and R are collinear

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