# 4.16 Bearings: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

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

**1** Write each of the following angles as a three-figure bearing.

**(a)** 8 degrees **(1)**

.....

**(b)** 75 degrees **(1)**

.....

**(c)** 9 degrees **(1)**

.....

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

**2** Decide whether each statement about bearings is True or False.

**(a)** 'A bearing is always measured clockwise from North.' True or False? **(1)**

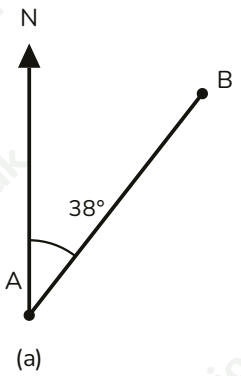
**(b)** 'A bearing can be written using fewer than three digits, for example 45 degrees instead of 045 degrees.' True or False? **(1)**

**(c)** 'A bearing of 270 degrees means facing due West.' True or False? **(1)**

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


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**3** In diagram (a), the clockwise angle from North at A to AB is 38 degrees. In diagram (b), the clockwise angle from North at A to AC is 7 degrees.



(a)



(b)

**(a)** Write down the bearing of B from A. **(1)**

.....

**(b)** Write down the bearing of C from A. **(1)**

.....

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

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**4** Fatima is making a scale drawing of a triangular field using a scale of 1 cm to 20 m. One side of the field is 130 m long. Work out the length of this side on the scale drawing.

**(Total for Question 4 is 2 marks)**


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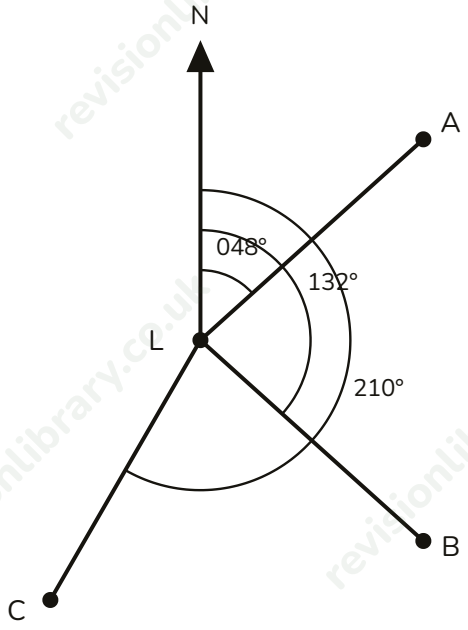
**5** Jamal was asked to find the bearing of A from B, given that the bearing of B from A is 095. He wrote: 'Bearing of A from B = 095 - 180 = -85, so the bearing is 085.'

**(Total for Question 5 is 2 marks)**

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**6** From a lighthouse L, the bearing of boat A is 048, the bearing of boat B is 132, and the bearing of boat C is 210.

Diagram NOT accurately drawn




**(a)** Work out the size of angle ALB. **(2)**

.....

**(b)** Work out the size of angle BLC. **(2)**

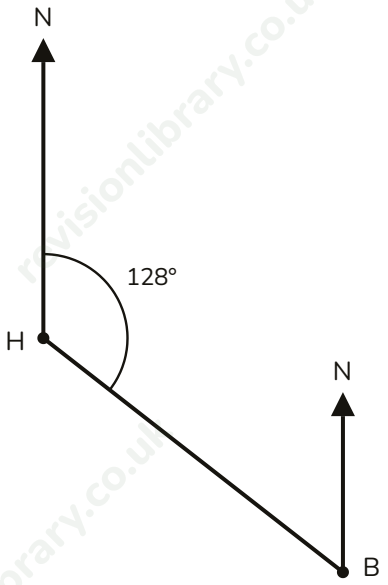
.....

**(Total for Question 6 is 4 marks)**


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**7** The bearing of boat B from harbour H is 128.
Show that the bearing of H from B is 308.

Diagram NOT accurately drawn

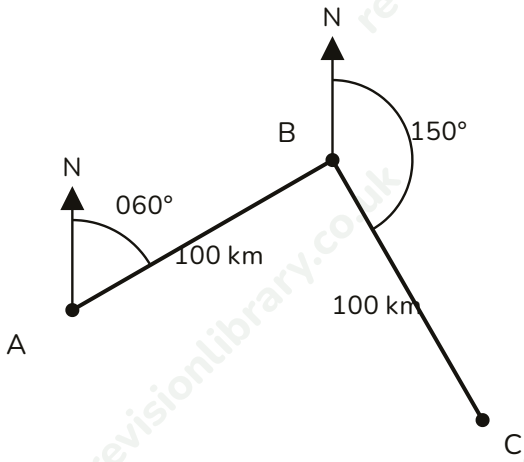



**(Total for Question 7 is 2 marks)**


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**8** A plane flies from airport A on a bearing of 060 for 100 km to reach point B. It then flies on a bearing of 150 for 100 km to reach point C.
Show that triangle ABC is right-angled at B.

Diagram NOT accurately drawn



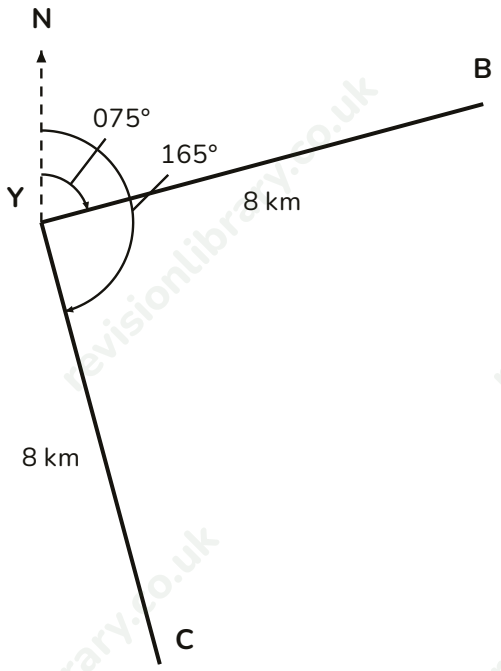

**(Total for Question 8 is 3 marks)**


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**9** Two yachts leave harbour Y at the same time. Yacht 1 sails to buoy B on a bearing of 075 degrees for 8 km. Yacht 2 sails to buoy C on a bearing of 165 degrees for 8 km (the same distance).

Work out the bearing of B from C. You must show all steps and explain how you used the information. Give your answer to the nearest degree.

Diagram NOT accurately drawn

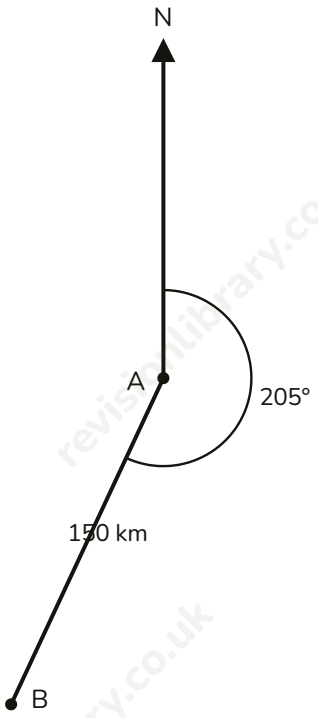



**(Total for Question 9 is 5 marks)**


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**10** A plane flies from airport A on a bearing of 205 to airport B, a distance of 150 km.

Diagram NOT accurately drawn




**(a)** Calculate how far south of A airport B is. Give your answer correct to 3 significant figures. **(2)**

.....

**(b)** Calculate how far west of A airport B is. Give your answer correct to 3 significant figures. **(2)**

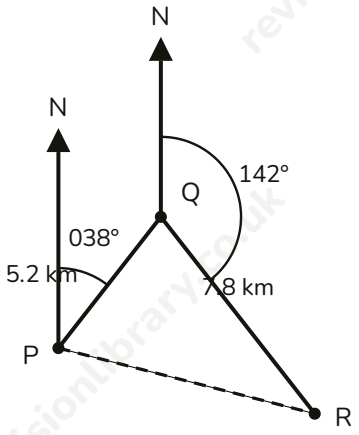
.....

**(Total for Question 10 is 4 marks)**


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**11** A yacht race course has three buoys, P, Q and R. The bearing of Q from P is 038, with PQ = 5.2 km. The bearing of R from Q is 142, with QR = 7.8 km.

Diagram NOT accurately drawn




**(a)** Calculate the distance PR, giving your answer correct to 3 significant figures. **(3)**

.....

**(b)** Calculate the bearing of R from P, giving your answer to the nearest degree. **(2)**

.....

**(Total for Question 11 is 5 marks)**


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**12** Generalisation problem. Points A and B are two fixed points. A point P moves so that the bearing of P from A is fixed at θ degrees and the bearing of P from B is fixed at φ degrees, where θ and φ are given acute angles such that a consistent position of P exists. Explain briefly what geometric locus P describes and give one condition on θ and φ (in words) that must hold for P to lie on a finite locus. (7 marks)

**(Total for Question 12 is 7 marks)**


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# Mark scheme · 4.16 Bearings: Test Pack

## Question 1

(a) 008 cao (must include both leading zeros) **B1**

**(a) Answer: 008**

(b) 075 cao (must include the leading zero) **B1**

**(b) Answer: 075**

(c) 009 cao (must include both leading zeros) **B1**

**(c) Answer: 009**

## Question 2

(a) True cao **B1**

**(a) Answer: True**

(b) False cao **B1**

**(b) Answer: False**

(c) True cao **B1**

**(c) Answer: True**

## Question 3

(a) 038 cao **B1**

**(a) Answer: 038**

(b) 007 cao (must include leading zeros) **B1**

**(b) Answer: 007**

## Question 4

130 / 20 oe **M1**

6.5 cm cao **A1**

**Answer: 6.5 cm**

## Question 5

identifies the error: since 095 is less than 180, 180 should be added, not subtracted (oe) **B1**

275 cao **B1**

**Answer: Error: 180 should be added, not subtracted, since 095 < 180; correct bearing = 275**

## Question 6

(a) 132 - 48 oe **M1**

(a) 84 degrees cao **A1**

**(a) Answer: 84 degrees**

(b) 210 - 132 oe **M1**

(b) 78 degrees cao **A1**

**(b) Answer: 78 degrees**

## Question 7

correct use of angle facts with the parallel North lines (e.g. states the alternate angle at B is equal to 128, oe) **B1**

308 cso, with 128 + 180 shown since 128 is less than 180 **B1**

**Answer: 308**

## Question 8

bearing of A from B = 060 + 180 = 240 oe **M1**

(dep) 240 - 150 oe **M1**

angle ABC = 90, so triangle ABC is right-angled at B, cso **A1**

**Answer: Angle ABC = 90 degrees, so triangle ABC is right-angled at B**

## Question 9

find angle BYC = 165 - 075 = 90 degrees (method) **M1**

recognise triangle YBC is isosceles (YB = YC = 8 km) so the base angles are equal: base angle = (180 - 90)/2 = 45 degrees **M1**

find the back bearing of Y from C: 165 + 180 = 345 degrees (method) **M1**

combine: bearing of B from C = bearing C->Y + base angle = 345 + 45 (method) **M1**

390 - 360 = 030 degrees cao; accept an equivalent complete coordinate or scale-drawing method for all 5 marks, with no second method required **A1**

**Answer: 030 degrees**

## Question 10

(a) 150 cos(25) oe, using the 25 degree angle past South (205-180) **M1**

(a) awrt 136 (km) **A1**

**(a) Answer: 136 km south**

(b) 150 sin(25) oe **M1**

(b) awrt 63.4 (km) **A1**

**(b) Answer: 63.4 km west**

## Question 11

(a) resolves at least one leg into north/south and east/west components correctly, e.g. north = 5.2cos(38), east = 5.2sin(38) **M1**

(a) combines both legs to find the total north-south and east-west displacement, e.g. north total = 5.2cos(38) - 7.8cos(38), east total = 5.2sin(38) + 7.8sin(38) **M1**

(a) awrt 8.26 (km) **A1**

**(a) Answer: 8.26 km**

(b) correct trig using their total components, e.g. angle from East = $\tan^{-1}(2.049/8.004)$, or equivalent sine/cosine rule method **M1**

(b) awrt 104 (degrees), ft their components **A1**

**(b) Answer: 104**


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## Question 12

| | |
|---|---|
| State that a fixed bearing from A is a ray from A at angle θ; similarly from B | **M1** |
| Recognise that intersection of two rays is either a single point or empty, so locus is typically a point if the rays meet | **M1** |
| Explain that if θ and φ vary to describe whole sets of bearings then locus could be an arc; here with fixed θ and φ the locus is the intersection point (or none) | **M1** |
| State a condition for a finite locus in words: the two rays from A and B must meet, i.e. not be parallel and must be directed so they cross | **M1** |
| Give an explicit condition example: θ and φ must not differ by 180 degrees and the directions must face towards each other so the rays intersect | **A1** |
| Provide a short diagrammatic or verbal justification | **A1** |
| Concise concluding sentence describing locus as either a single point (when rays meet) or empty, with condition stated | **B1** |

**Answer: The locus is the intersection of two rays so usually a single point; requirement: the two rays must meet (not be parallel or pointing away from each other).**


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