BEARINGS

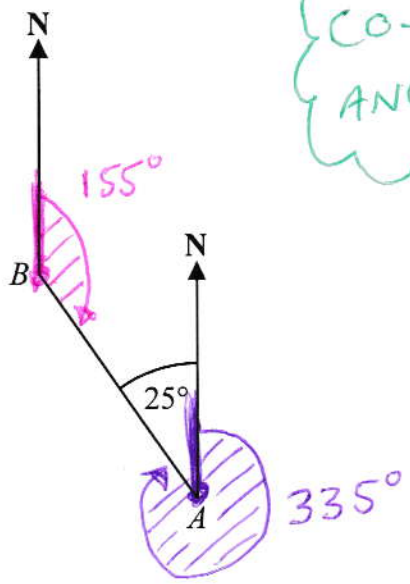
DATE OF SOLUTIONS: 11/11/2019
MAXIMUM MARK: 74

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, Specimen Set 2] Bearings **[3 marks]**

The diagram shows the positions of two churches, A and B



CO-INTERIOR ANGLES ADD TO 180°

Amber says,

"The bearing of church B from church A is 025°"

(a) Amber is wrong.
Explain why.

BECAUSE BEARINGS ARE ALWAYS MEASURED CLOCKWISE, FROM THE NORTH

B1

(1)

(b) Calculate the correct bearing of church B from church A

360 − 25

335° A1

(1)

(c) Calculate the bearing of church A from church B

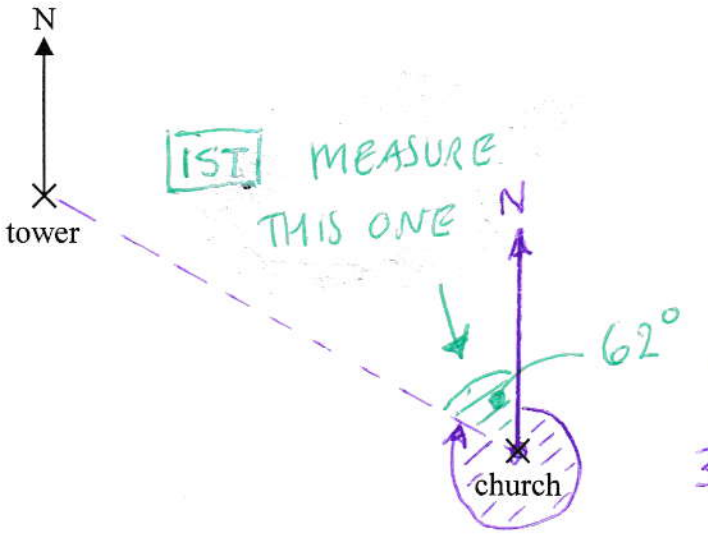
180 − 25

155° A1

(1)

2. [Edexcel, 2014] Bearings **[1 mark]**

The diagram shows part of a map.

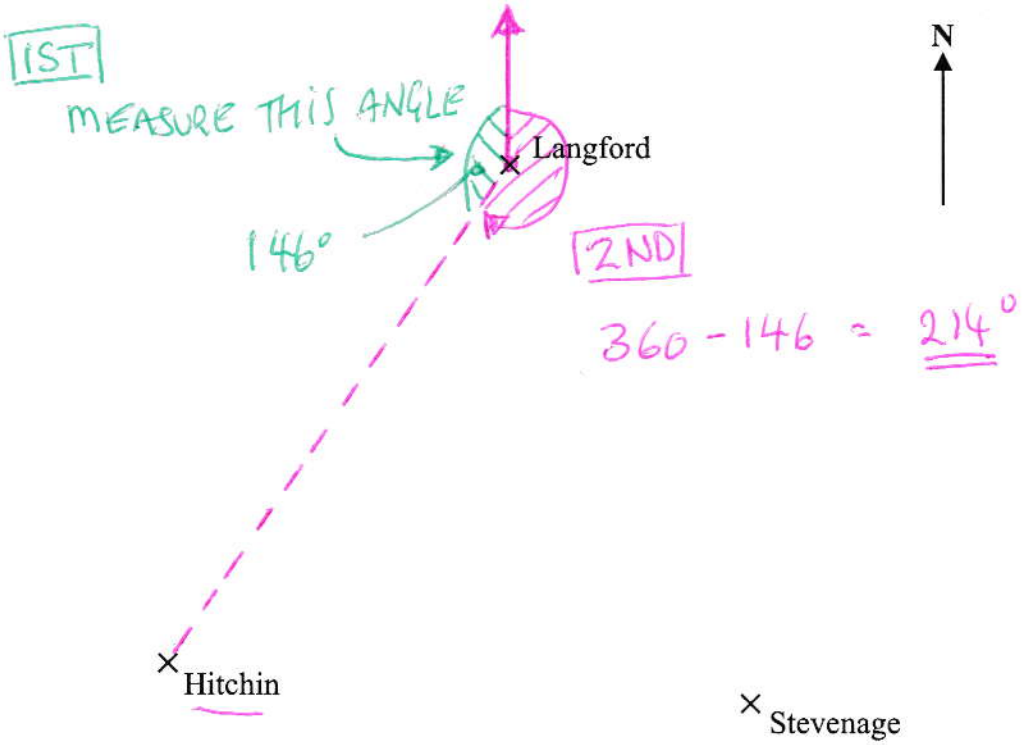


Find, by measuring, the bearing of the tower from the church.

298° (A1)

3. [Edexcel, 2013] Bearings **[1 mark]**

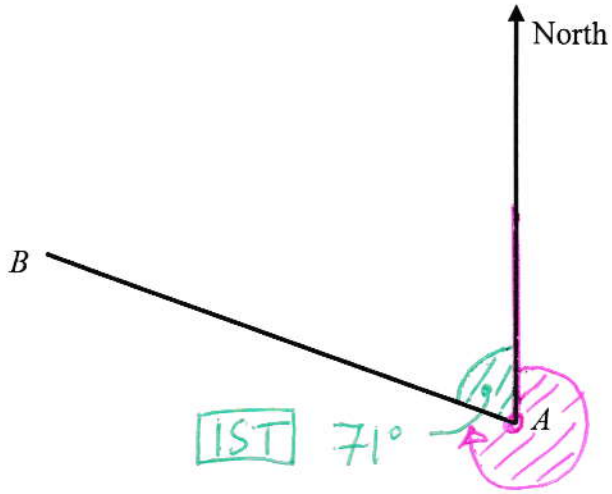
Here is a map showing three towns.



Measure the bearing of Hitchin from Langford.

214° A1

4. [Edexcel, 2006] Bearings **[4 marks]**



1ST 71°

2ND

360 - 71 = 289

B1

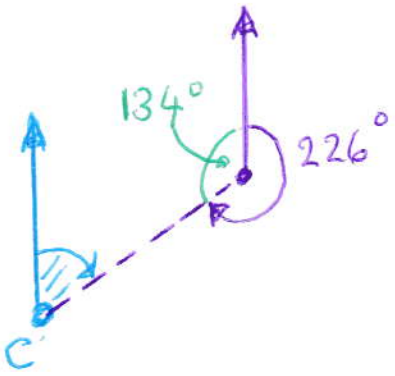
(a) By measurement, find the bearing of B from A.

289° A1

(2)

(b) The bearing of another point, C, from A is 226°.
Work out the bearing of A from C.

1ST 360 - 226 = 134°



2ND 180 - 134 = 46°

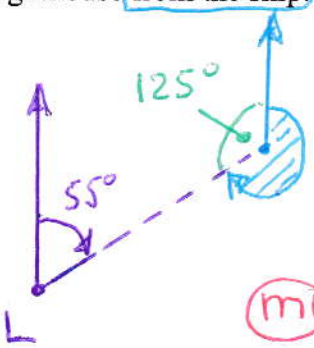
M1 [ANY CORRECT WORKING]

046° A1

(2)

5. Bearings **[2 marks]**

The bearing of a ship from a lighthouse is 055°
Work out the bearing of the lighthouse from the ship.



1ST

180 − 55 = 125°

2ND

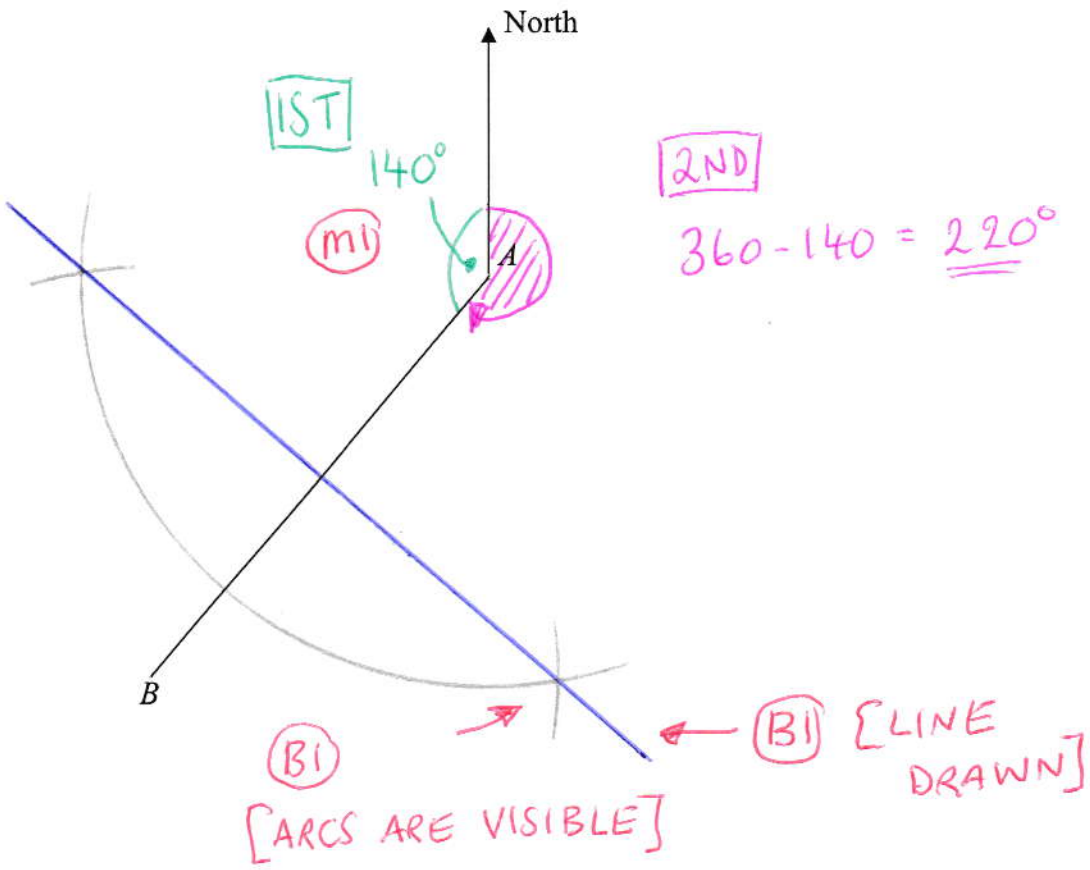
360 − 125 = 235°

M1 [ANY CORRECT WORKING]

235° A1

6. [Edexcel, 2005] Bearings **[5 marks]**

The diagram shows two towns, A and B.



(a) Measure the bearing of B from A.

A1

220 °

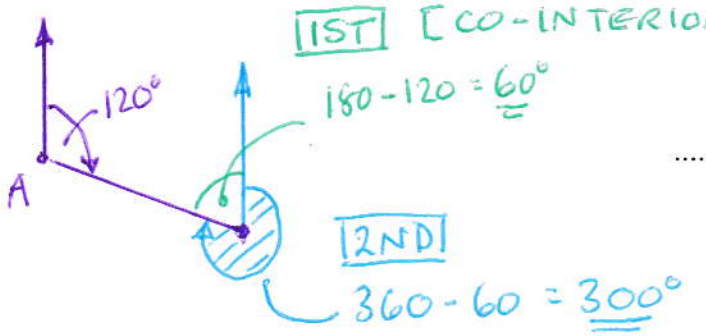
(2)

(b) A plane flies along the perpendicular bisector of the line AB.
Use ruler and compasses to construct the perpendicular bisector of AB.
Show all your construction lines.

[SEE DIAGRAM]

(2)

(c) The bearing of another town, C, from A is 120°.
Work out the bearing of A from C.



A1

300 °

(1)

7. [Edexcel, 2015] Bearings **[2 marks]**

The diagram shows two points S and T.
The bearing of T from S is 043°

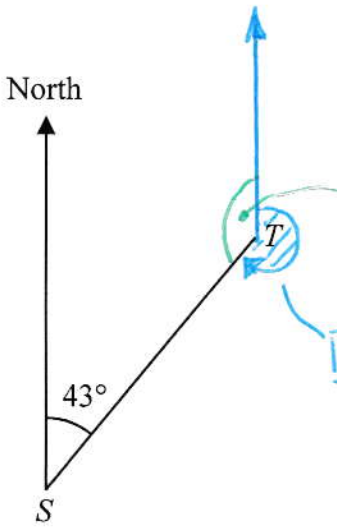


Diagram **NOT** accurately drawn

1ST [CO-INTERIOR]
180 - 43 = 137° M1

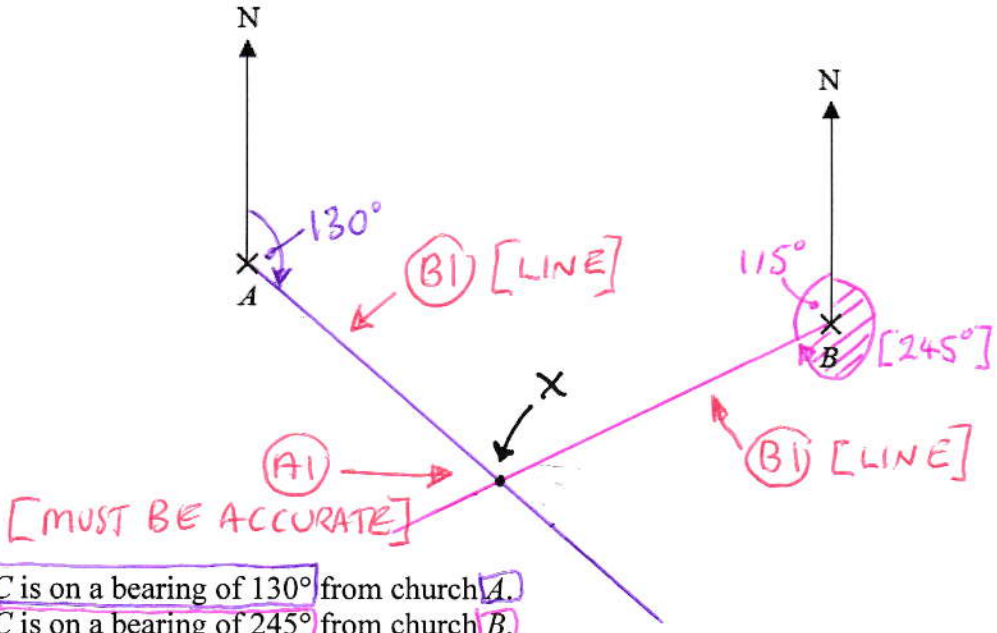
2ND
360 - 137 = 223°

Work out the bearing of S from T.

223° A1

8. [Edexcel, 2017] Bearings **[3 marks]**

The diagram shows the position of two churches, A and B



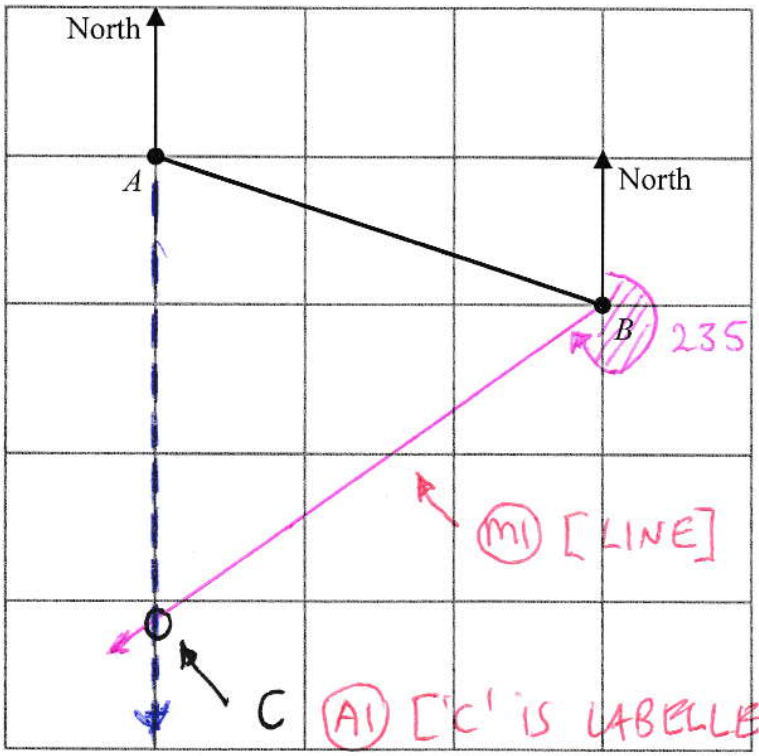
Church C is on a bearing of 130° from church A.
Church C is on a bearing of 245° from church B.

In the space above, draw an accurate diagram to show the position of church C.

Mark the position of church C with a cross (×).

Label it C.

9. [Edexcel, 2017] Bearings **[4 marks]**



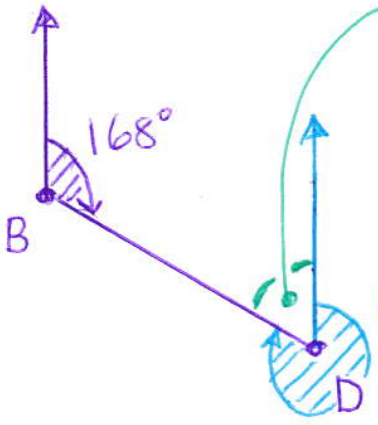
M1 [LINE]

A1 ['C' IS LABELLED AND IS ACCURATE!]

The diagram shows point A and point B on a map.
The point C is due south of A
The bearing of C from B is 235°
(a) Mark the point C on the map.

(2)

The bearing of a point D from B is 168°
(b) Find the bearing of B from D



1ST $180 - 168 = 12°$ [USE CO-INTERIOR ANGLES]

2ND $360 - 12 = 348°$ [USE ANGLES AROUND A POINT]

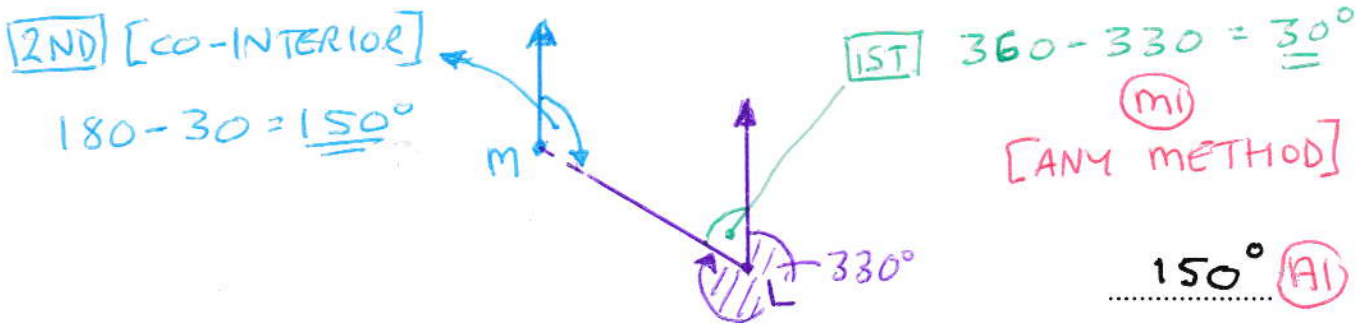
M1 [ANY RELEVANT METHOD]

348° A1

10. [Edexcel, 2015] Bearings **[2 marks]**

Manchester airport is on a bearing of 330° from a London airport.

Find the bearing of the London airport from Manchester airport.



11. [Edexcel, 2014] Bearings **[5 marks]**

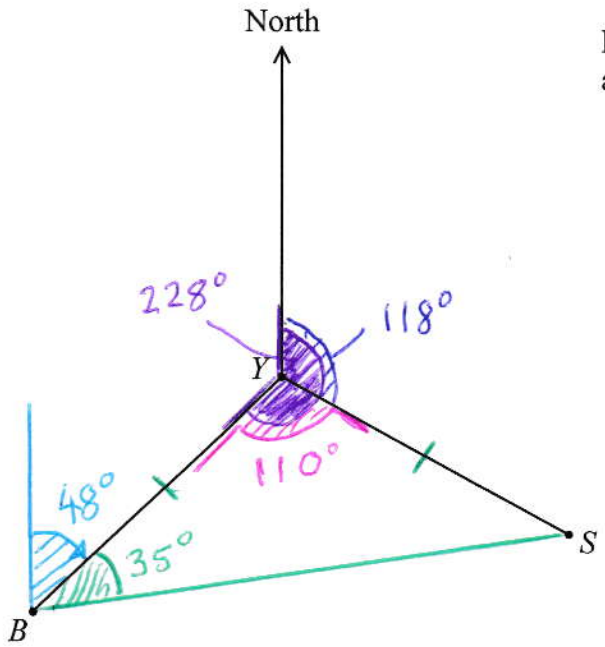


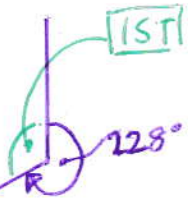
Diagram **NOT** accurately drawn

The diagram shows the positions of a yacht Y, a ship S and a beacon B.
The bearing of B from Y is 228°

(a) Find the bearing of Y from B.

1ST $360 - 228 = 132°$ M1
[ANY METHOD]

2ND $180 - 132 = 48°$



048° A1

REMEMBER '0'

(2)

The bearing of S from Y is 118°

(b) Find the size of the angle BYS.

$228° - 118°$

110° A1

(1)

(c) Given also that $BY = SY$, find the bearing of S from B.

ANGLE YBS $= \frac{180-110}{2}$

$= 35°$ M1

BEARING OF S FROM B

$= 48 + 35$

$= 83°$

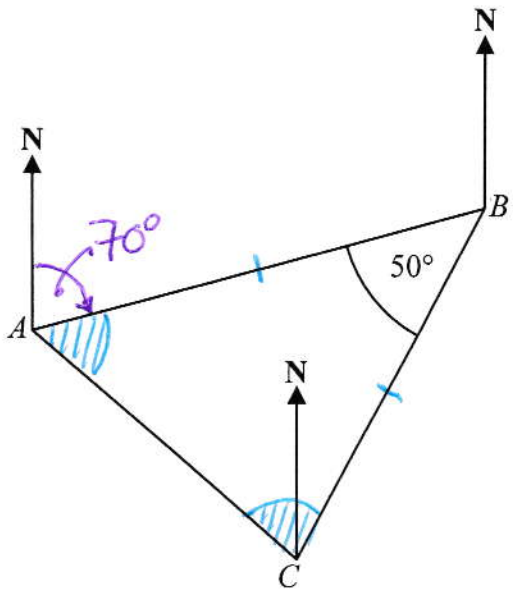
REMEMBER '0'

083° A1

(2)

12. [Edexcel, 2017] Bearings **[3 marks]**

The diagram shows the positions of three points, A, B and C, on a map.



The bearing of B from A is 070°

Angle ABC is 50°

$AB = CB$

Work out the bearing of C from A.

BECAUSE ABC IS AN ISOSCELES TRIANGLE (AB = CB)

THEN ANGLE BAC = $\frac{180 - 50}{2}$

$= 65°$ (M1)

$\therefore$ BEARING OF C FROM A $= 70 + 65$ (M1)

$= 135°$ (A1)

13. [Edexcel, 2014] Bearings **[7 marks]**

The diagram shows the positions of three turbines A, B and C.

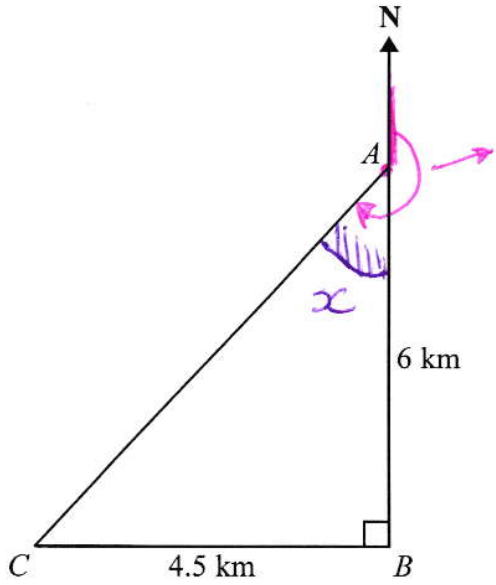


Diagram **NOT** accurately drawn

A is 6 km due north of turbine B.
C is 4.5 km due west of turbine B.

(a) Calculate the distance AC.

$AC^2 = 4.5^2 + 6^2$ (m1) [ADDING SQUARES]

$= 56.25$

$AC = \sqrt{56.25}$ (m1) [SQUARE ROOTING]

7.5 km

(3) (A1)

(b) Calculate the bearing of C from A.
Give your answer correct to the nearest degree.

[1ST]

$\tan x = \frac{OPP}{ADJ}$

$\tan x = \frac{4.5}{6}$

$\Rightarrow x = \tan^{-1}\left(\frac{4.5}{6}\right)$ (m1) [EITHER]

$= 36.869\ldots$ (m1)

$= 37°$

[2ND]

BEARING $= 180 + 37$ (m1)

$= 217°$

(A1)

217°

(4)

14. [Edexcel, 2009] Bearings **[4 marks]**

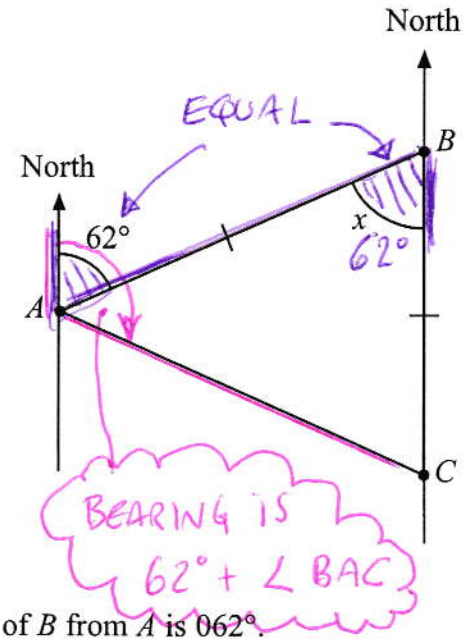


Diagram **NOT** accurately drawn

The bearing of B from A is 062°.
C is due south of B.
$AB = CB$.

(a) (i) Find the size of angle x.

62° (A1)

(ii) Give a reason for your answer.

'x' AND '62°' ARE ALTERNATE ANGLES (A1)

(2)

(b) Work out the bearing of C from A.

SINCE ABC IS AN ISOSCELES TRIANGLE

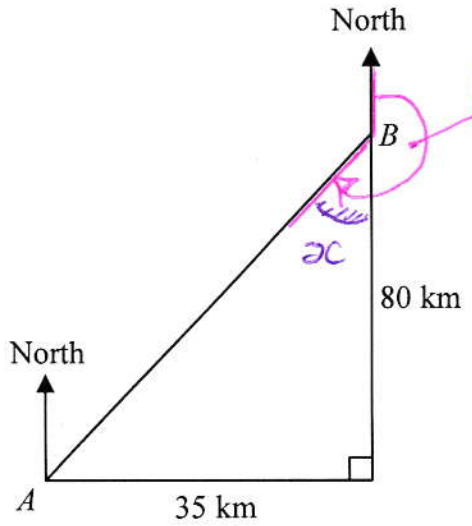
ANGLE BAC = $\frac{180 - 62}{2}$

= 59° (M1)

∴ BEARING OF C FROM A = 62 + 59

= 121° (A1)

15. [Edexcel, 2015] Trigonometry (SOH CAH TOA) **[4 marks]**



BEARING = $180° + x$

Town B is 35 km east and 80 km north of town A.

Work out the bearing of A from B.
Give your answer correct to the nearest degree.

1ST $\quad \tan x = \frac{\text{OPP}}{\text{ADJ}}$

$\tan x = \frac{35}{80}$

$\Rightarrow \quad x = \tan^{-1}\left(\frac{35}{80}\right)$ } M1 [EITHER]

$= 24°$

2ND

A FROM B $= 180 + 24$

$= 204°$

$204°$

16. Bearings **[2 marks]**

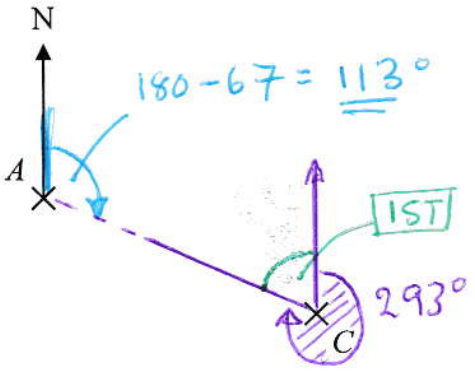


Diagram **NOT** accurately drawn

M1

[ANY CORRECT METHOD TO FIND A RELEVANT ANGLE]

A, *B* and *C* are three points on a map.
The bearing of *A* from *C* is 293°
Find the bearing of *C* from *A*.

113° A1

17. [Edexcel, 2014] Bearings **[7 marks]**

The diagram shows the positions of a tower and a tree.

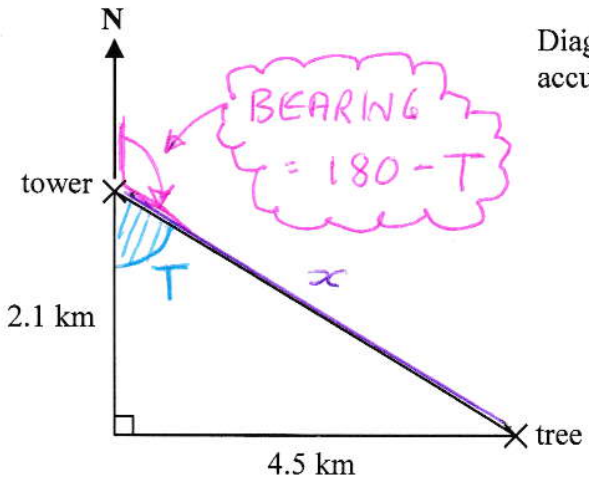


Diagram **NOT** accurately drawn

The tree is 2.1 km South of the tower and 4.5 km East of the tower.

(a) Work out the distance between the tower and the tree.
Give your answer correct to one decimal place.

$x^2 = 4.5^2 + 2.1^2$ (M1) [ADDING SQUARES]

$= 24.66$

$x = \sqrt{24.66}$ (M1) [SQUARE ROOT]

$= 4.96588...$

5.0 (A1) ..... km

(3)

(b) Work out the bearing of the tree from the tower.
Give your answer correct to the nearest degree.

FIRST

$\tan T = \frac{OPP}{ADJ}$

$\tan T = \frac{4.5}{2.1}$

$\Rightarrow T = \tan^{-1}\left(\frac{4.5}{2.1}\right)$ (M1) [EITHER]

$= 64.98...$

$= 65°$ (A1)

SECOND

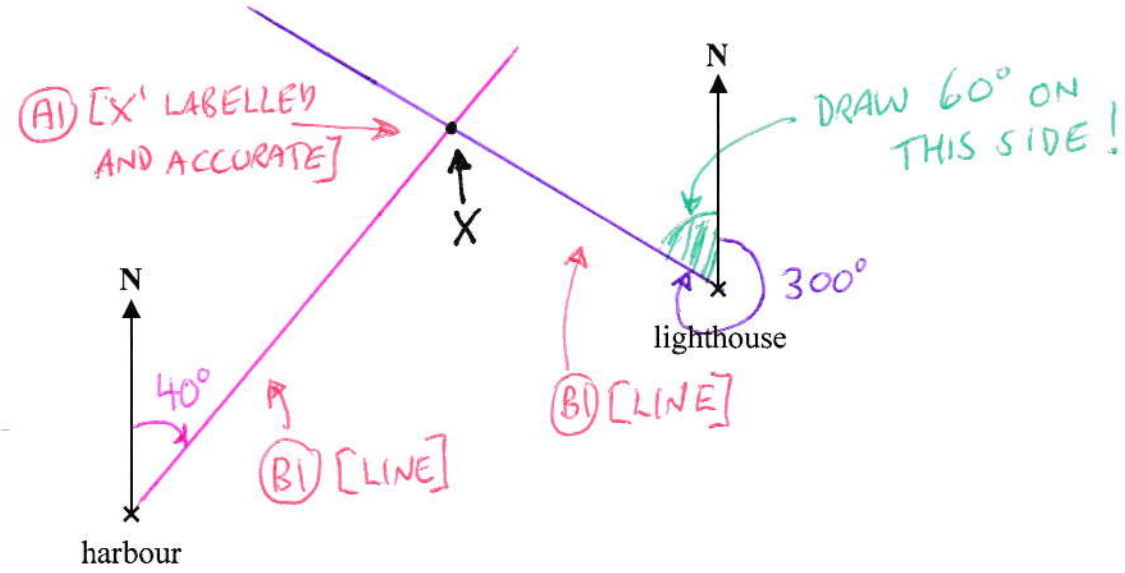
TREE FROM TOWER

$= 180 - 65$ (M1)

$= 115°$ (A1)

18. [Edexcel, 2015] Bearings **[3 marks]**

The diagram shows the positions of a lighthouse and a harbour on a map.



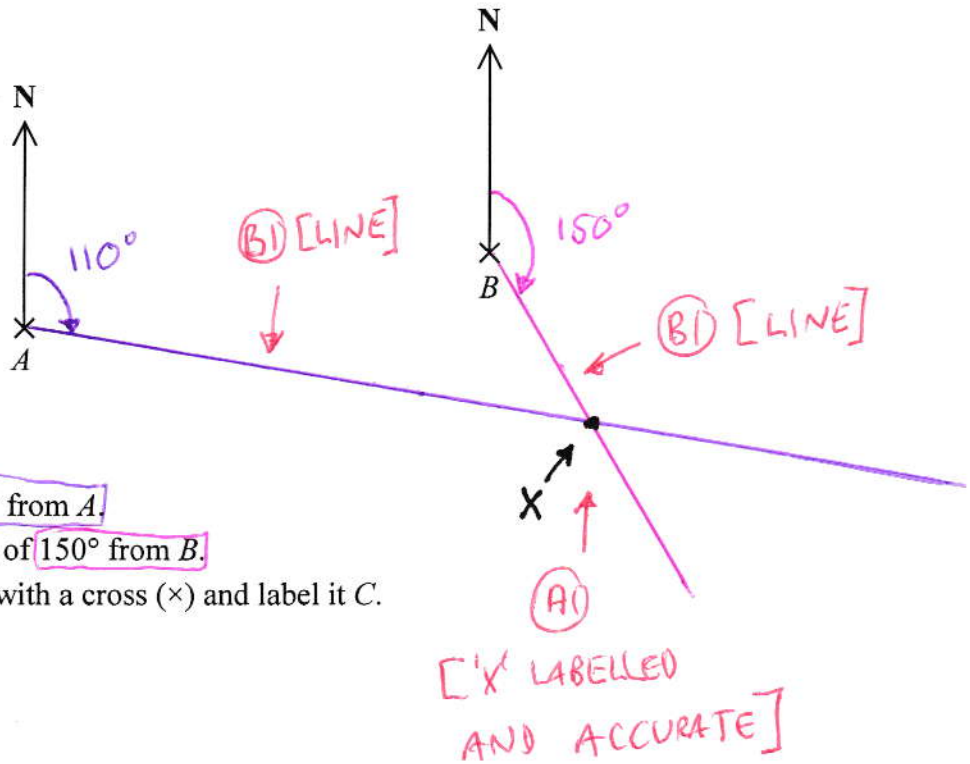
A boat is on a bearing of:

300° from the lighthouse
040° from the harbour.

On the diagram, mark with a cross (×) the position of the boat.
Label the boat *B*.

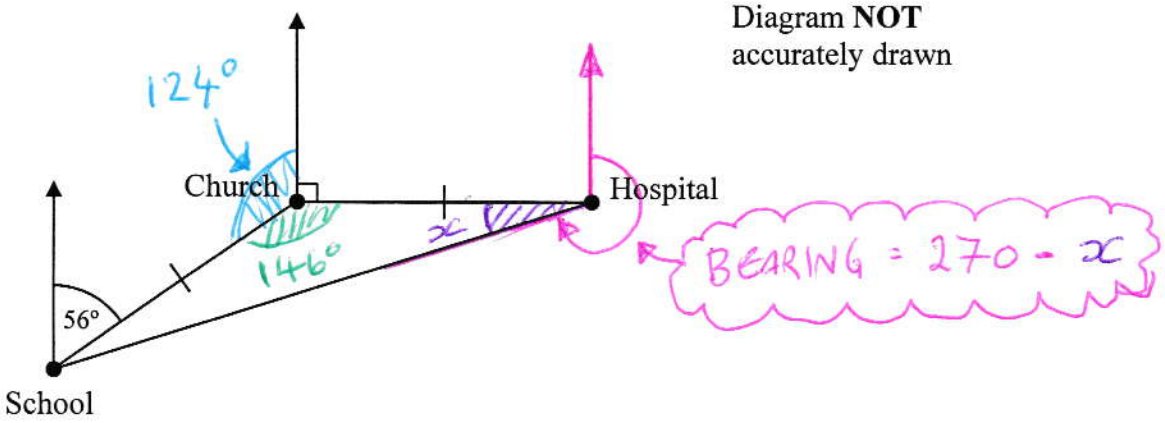
19. [Edexcel, 2016] Bearings **[3 marks]**

The diagram shows the positions of two lighthouses, A and B, on a map.



A ship is on a bearing of 110° from A.
The same ship is on a bearing of 150° from B.
Mark the position of the ship with a cross (×) and label it C.

20. Bearings **[4 marks]**



The diagram shows the position of three buildings in a town.
The bearing of the Church from the School is 056°.
The Hospital is due East of the Church.
The distance from the Church to School is equal to the distance from the Church to the Hospital.

Work out the bearing of the School from the Hospital.

1ST

= 180 - 56

= 124° B1

2ND

= 360 - (124 + 90) M1

= 146°

3RD

$x = \frac{180 - 146}{2}$ M1

= 17°

4TH

BEARING = 270 - 17

= 253° A1

21. [Edexcel, 2015] Bearings **[5 marks]**

There is a coastguard station at point A and at point B.
B is due East of A.
The distance from A to B is 12 km.

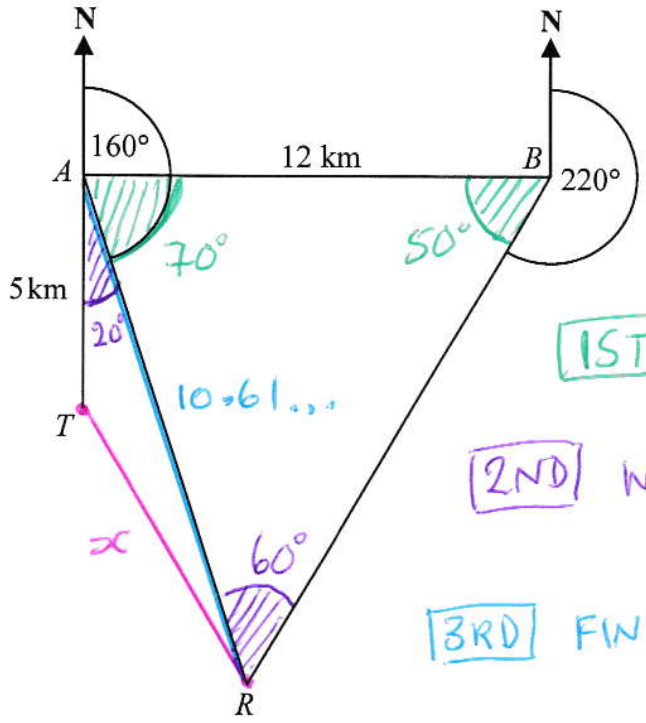


Diagram **NOT** accurately drawn

There is a rowing boat at point R.
R is on a bearing of 160° from A.
R is on a bearing of 220° from B.

There is a speedboat at point T.
T is 5 km due South of A.

Work out the shortest distance from T to R. (x)
Give your answer correct to 1 decimal place.
You must show all your working.

B1 [EITHER]

1ST WORK OUT 70° AND 50°

2ND WORK OUT 20° AND 60°

B1 [EITHER]

3RD FIND AR USING SINE RULE

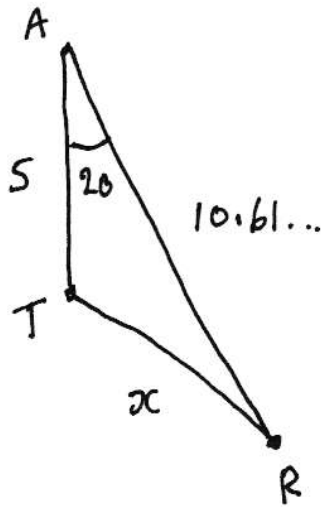
$$\frac{AR}{\sin 50} = \frac{12}{\sin 60} \Rightarrow AR = \frac{12}{\sin 60} \times \sin 50$$

M1

A1

$= 10.6146...$

4TH FIND TR USING COSINE RULE



M1

$x^2 = 5^2 + 10.61^2... - 2 \times 5 \times 10.61... \times \cos 20$

$= 37.925...$

$x = \sqrt{37.925}$

$= 6.15833...$

A1

6.2 km

Disclaimer

While reasonable endeavours have been used to verify the accuracy of these solutions, these solutions are provided on an "as is" basis and no warranties are made of any kind, whether express or implied, in relation to these solutions.

There is no warranty that these solutions will meet Your requirements or provide the results which You want, or that they are complete, or that they are error-free. If You find anything confusing within these solutions then it is Your responsibility to seek clarification from Your teacher, tutor or mentor.

Please report any errors or omissions that You find*. These solutions will be updated to correct errors that are discovered. It is recommended that You always check that You have the most up-to-date version of these solutions.

The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or 'best' method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

* The best way to inform of errors or omissions is a direct Twitter message to @Maths4Everyone