Advanced Trigonometry - Lesson 7

Trigonometry with Bearings

LI

- Solve problems involving bearings.

SC

- Basic angle properties.
- Sine and Cosine Rules.

Jan 10-12:11

Bearings

- Measured from a North line.
- Measured clockwise.
- Always written with 3 numbers.

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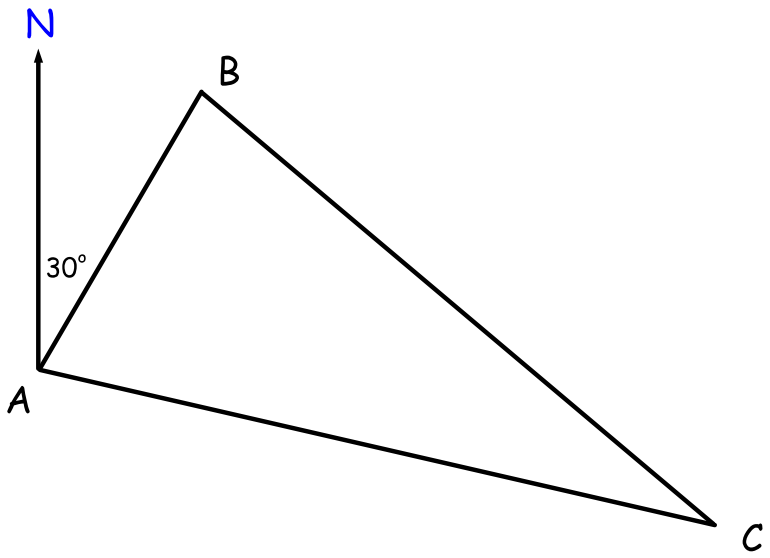
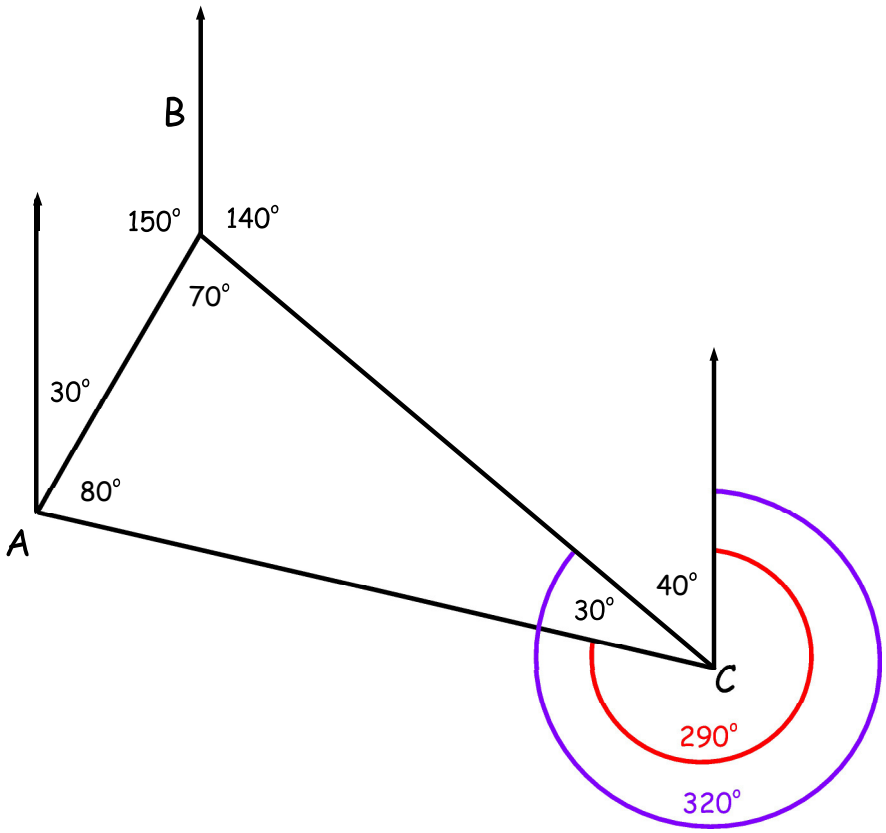
Example 1

Point B is on a bearing of 320° from C; point A is on a bearing of 290° from C.



Calculate the sizes of all 3 missing angles inside the triangle.



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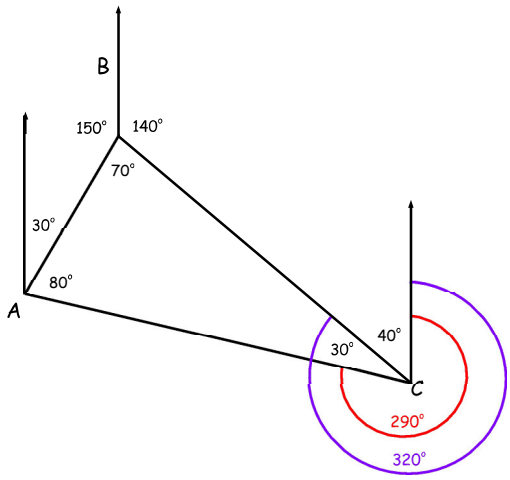
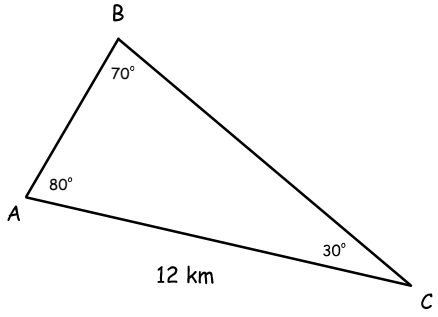
Example 2

In Example 1, given that side AC = 12 km, calculate the length of AB (to 3 s.f.).





Sine Rule for length

$$\frac{a}{\sin A^\circ} = \frac{b}{\sin B^\circ} = \frac{c}{\sin C^\circ}$$

$A^\circ = 80^\circ$, $a =$

$B^\circ = 70^\circ$, $b = 12$

$C^\circ = 30^\circ$, $c =$

$$\frac{c}{\sin C^\circ} = \frac{b}{\sin B^\circ}$$

$$\frac{c}{\sin 30^\circ} = \frac{12}{\sin 70^\circ}$$

$$c = \frac{(12 \times \sin 30^\circ)}{\sin 70^\circ}$$

$$c = 6.39 \text{ km}$$

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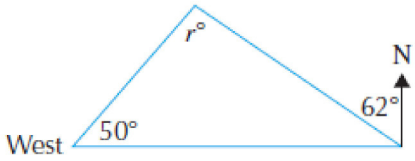
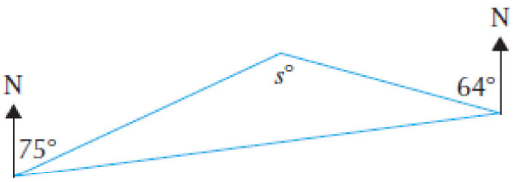
Questions

1 In each triangle shown find the missing angles labelled.

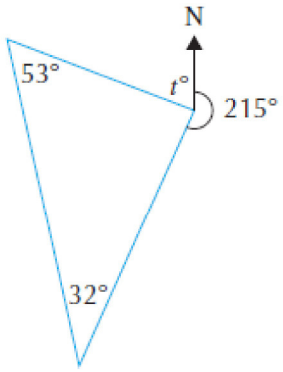
a



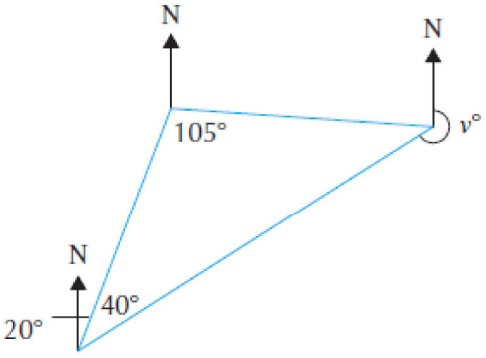
b



c

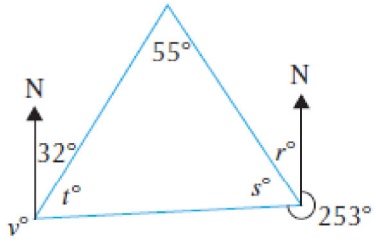


d

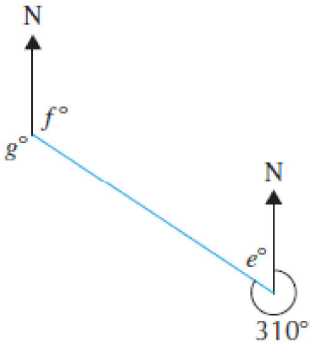


2 Calculate the missing angle shown in each diagram.

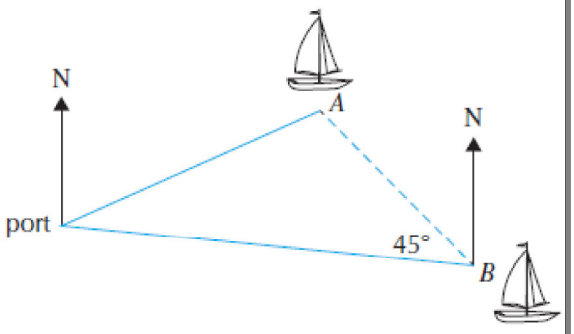
a



b



3 Boat A is on a bearing of 076° from port, boat B is on a bearing of 099°.
Calculate the bearing of boat A from boat B.



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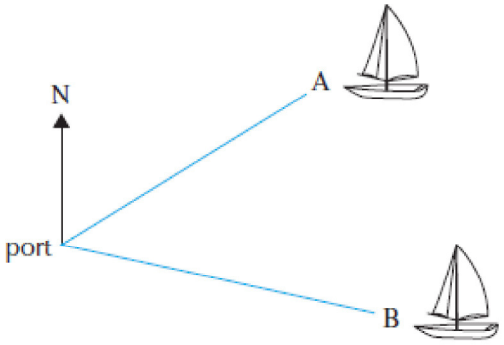
Questions

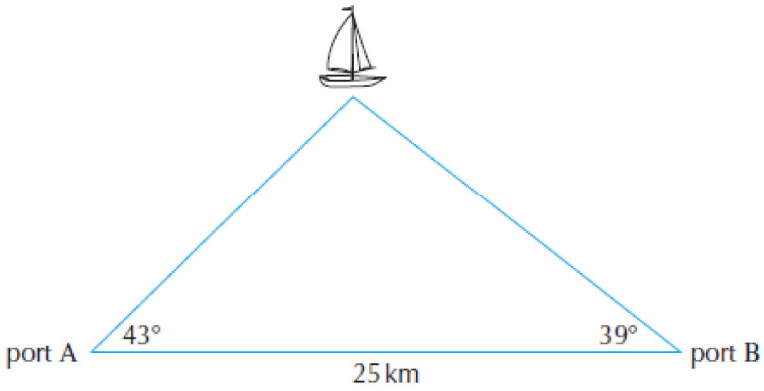
For each question, give your answer to 2 decimal places.

2 A ship sails east for 14.5 km then on a bearing of 130° for 11 km. Calculate the distance the boat has sailed.

3 Two yachts set off from the same port as shown in the diagram. Yacht A sails 10.7 km on a bearing of 053°, while yacht B sails 11.2 km on a bearing of 112°. Calculate the distance between the two yachts.



4 Port B is 25 km east of port A.



a Calculate the distance of the ship to the nearer port.

b Find the bearing the ship must sail to reach this port.

5 An airplane flies 170 miles from point X at a bearing of 125°, and then turns and flies at a bearing of 230° for 90 miles. How far is the plane from point X?

6 A ship is being followed by two submarines, A and B, 3.8 km apart, with A due east of B. If A is on a bearing of 165° from the ship and B is on the bearing of 205° from the ship, find the distance from the ship to both submarines.

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Answers

1 **a** 102°
b 139°
c 50°
d 240°

2 **a** **r** 23°, **s** 84°, **t** 41°, **v** 287°
b **e** 50°, **f** 130°, **g** 230°

3 324°

2 23.99 km

3 10.79 km

4 **a** 15.89 km
b 227°

5 170.53 miles

6 5.36 km, 5.71 km

Dec 18-14:20