Student Name

Mathematics Stage 5 Core

TRIGONOMETRY B

Book 2 Solve right-angled triangle problems involving bearings

Version: 260207

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https://MrDingMaths.com

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OVERVIEW

SYLLABUS CONTENT

MA5-TRG-C-02 applies trigonometry to solve problems, including bearings and angles of elevation and depression

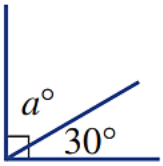
Solve right-angled triangle problems involving bearings

- Identify and interpret true bearings and compass bearings
- Explain the difference between true bearings and compass bearings and convert between them
- Solve practical problems involving bearings

REVIEW OF PRIOR KNOWLEDGE

1 Use angle relationships to find the unknown angle.

a



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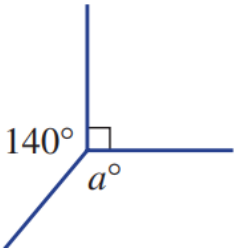

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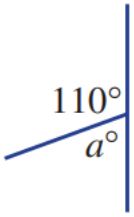

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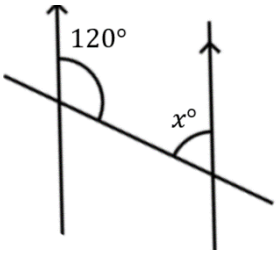

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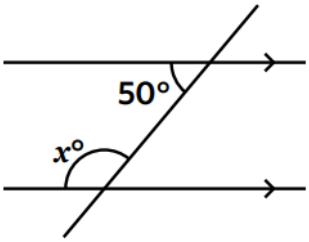

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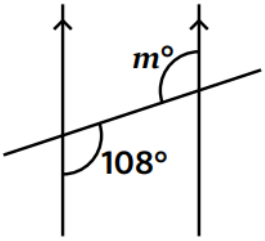
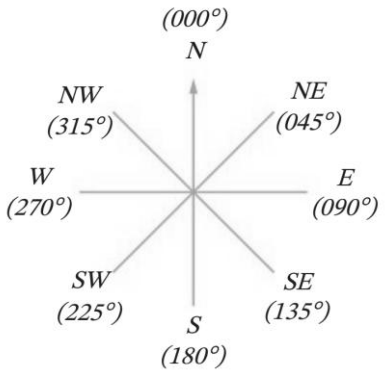


TRUE BEARINGS

Bearings: https://www.geogebra.org/m/er3jqacn

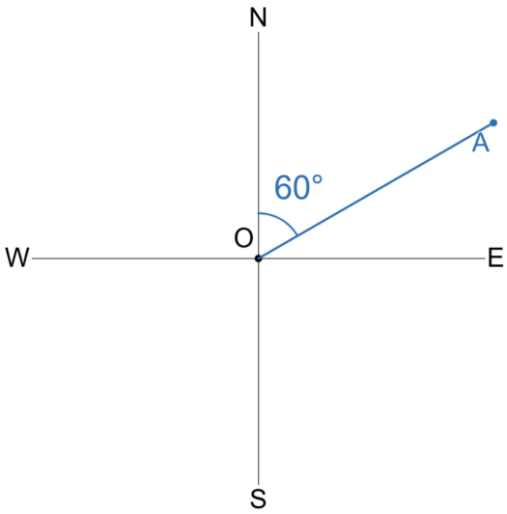
- **Bearings** give a travel direction from one point to another.
- With bearings, we are always taking a **top-down view**.



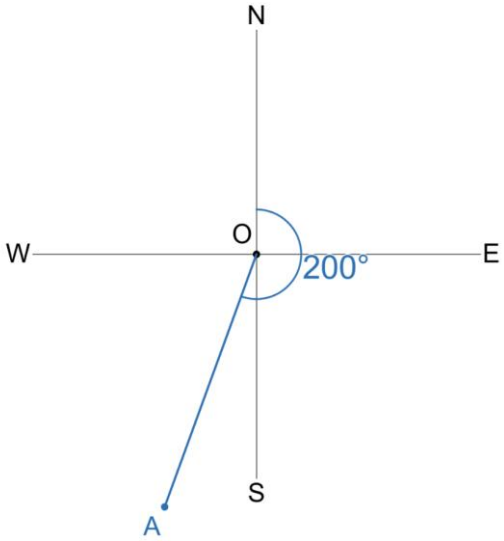
- **True bearing** measures the angle to turn clockwise from north.
- True bearings **always use three digits**.
  If a navigator only hears two digits, then they know they need it to be repeated.

Example Sketch true bearings.

The bearing of A from O is 060°

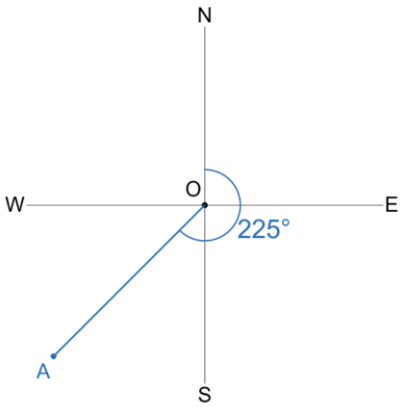


The bearing of A from O is 200°

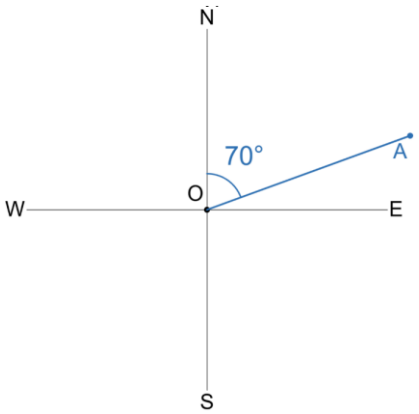


Sketch these true bearings of A from O.

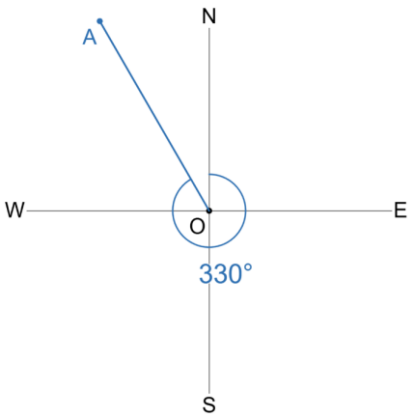
a 225°



b 070°

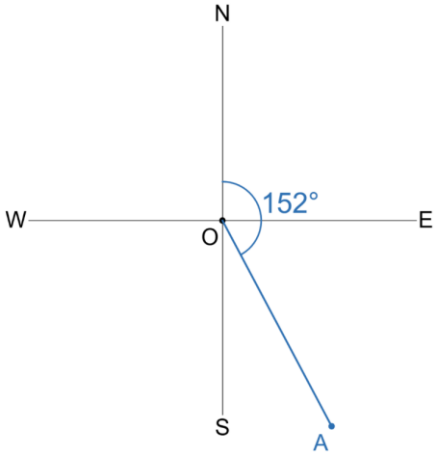


c 330°



Example Interpret true bearings.

Write the true bearing of A from O

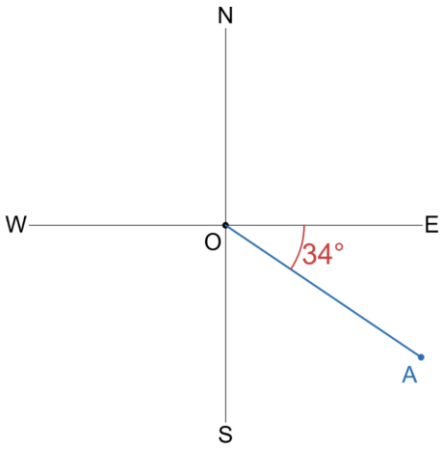


$152°$

Describe what a true bearing is.

A true bearing describes a direction by telling you how much to turn ……. from ……

Write the true bearing of A from O



$90° + 34°$

$= 124°$

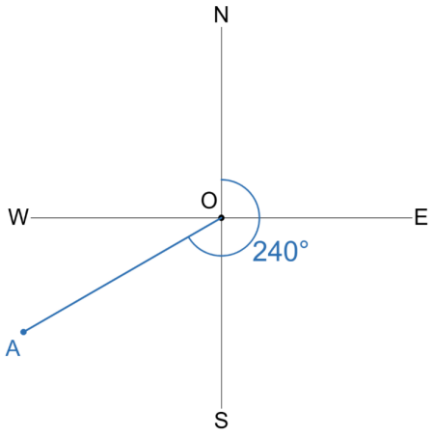
Draw an arc to show the true bearing on the diagram.

Why did we add 90 to 34?

The true bearing is how much to turn ……. from ……., so we need to find ∠……., which is made up of two angles: 90 and 34.

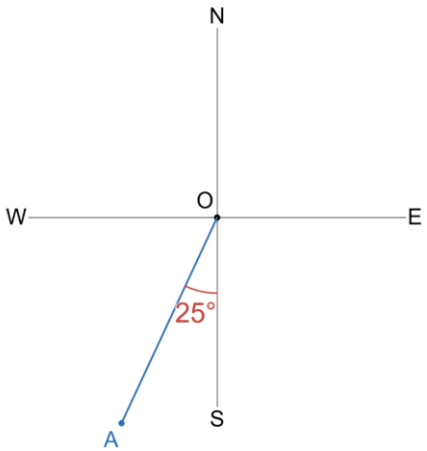
Write the true bearing of A from O

a



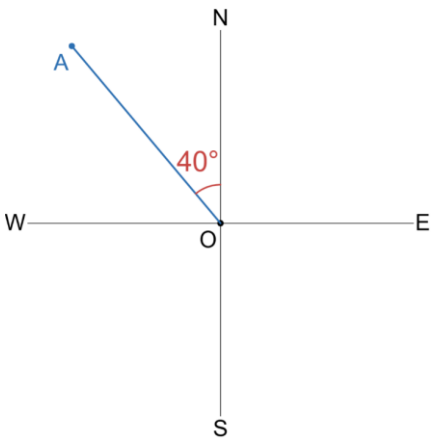
$240°$

b



$205°$

c



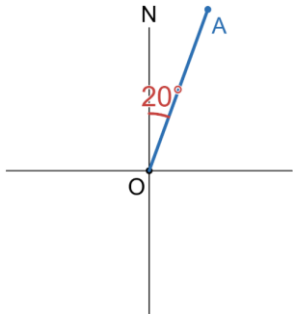
$320°$

Key ideas

1. A bearing indicates a direction. A true bearing states the angle to …… clockwise, starting from ……
2. A true bearing is always written with …… digits.

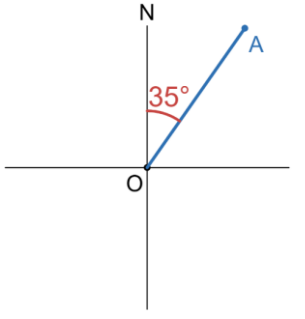
1 Express the bearing of A from O as a true bearing.

a



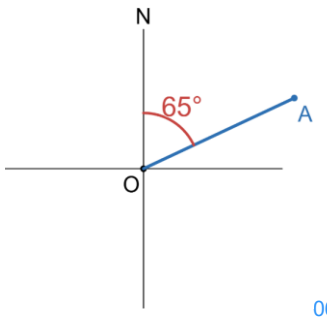
020°

b



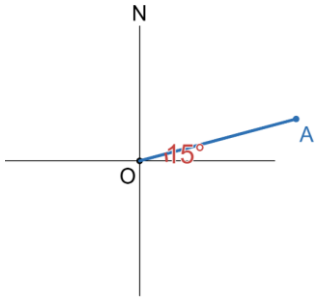
035°

c



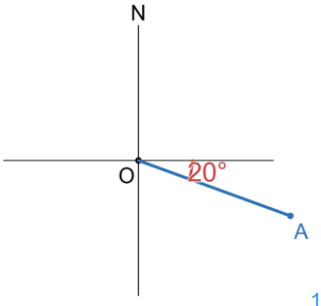
065°

d



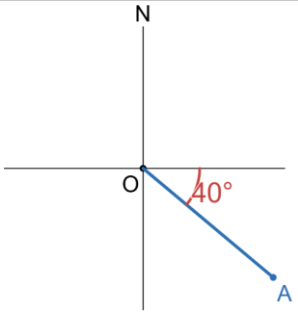
075°

e



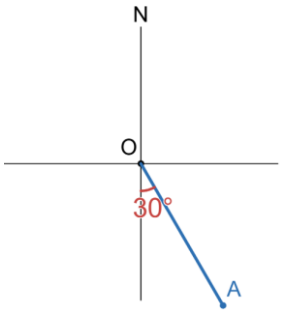
110°

f



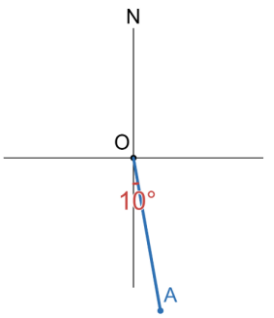
130°

g



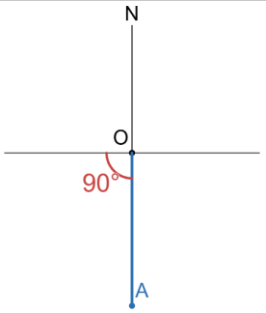
150°

h



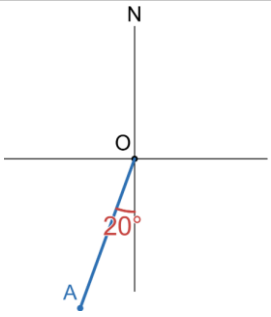
170°

i



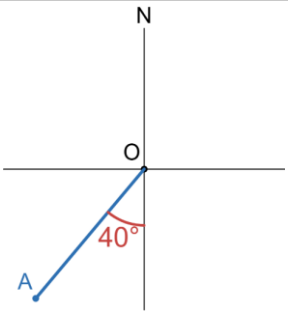
180°

j



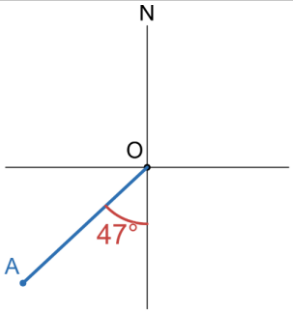
200°

k



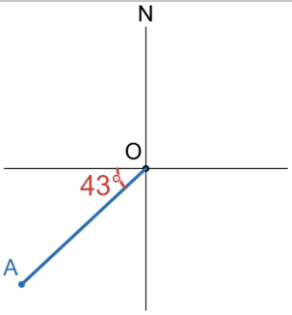
220°

l



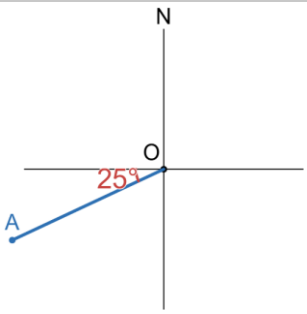
227°

m



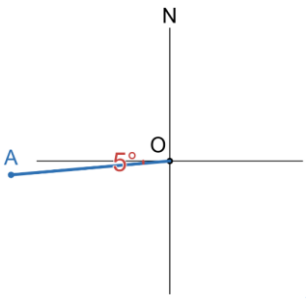
227°

n



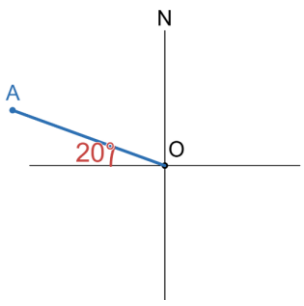
245°

o



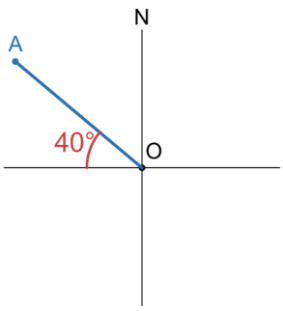
265°

p



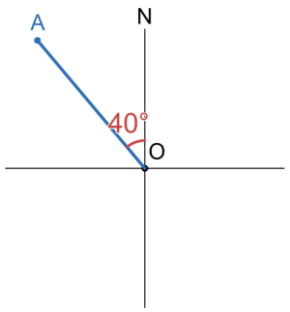
290°

q



310°

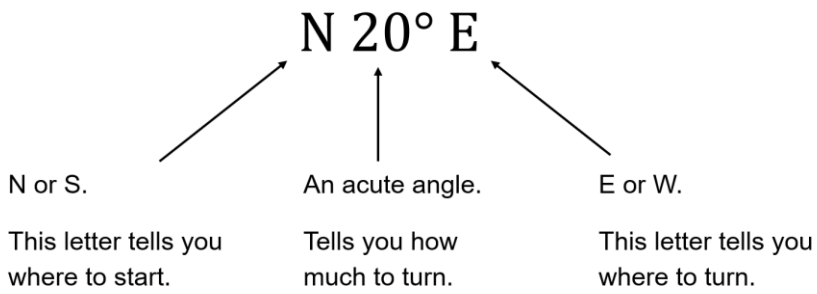
r



320°

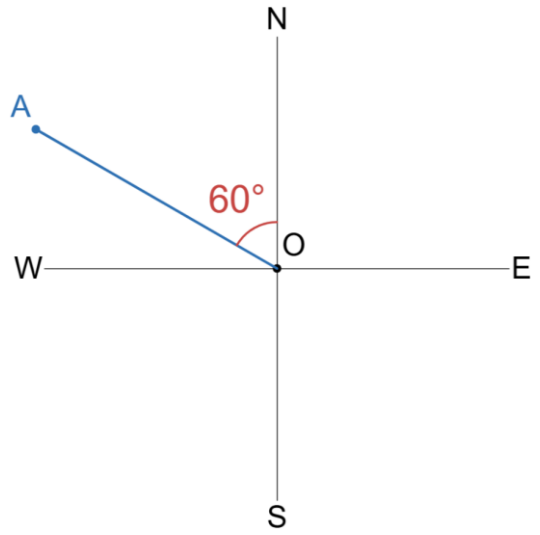
COMPASS BEARINGS

- **Compass bearings** tell you an **acute** angle to turn, starting from **North** or **South**.

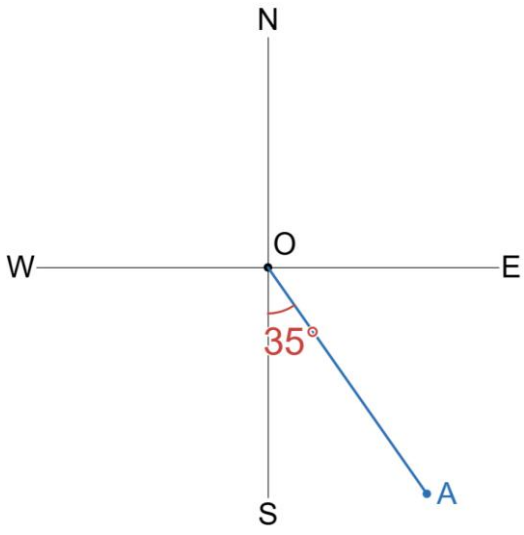


Example Sketch compass bearing.

The bearing of A from O is N60°W

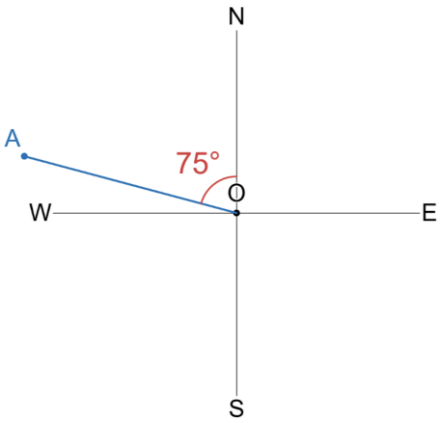


The bearing of A from O is S35°E

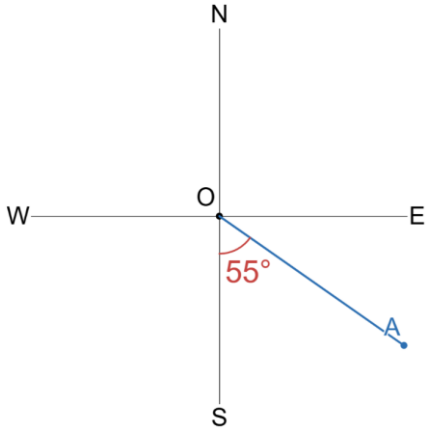


Sketch these compass bearings of A from O.

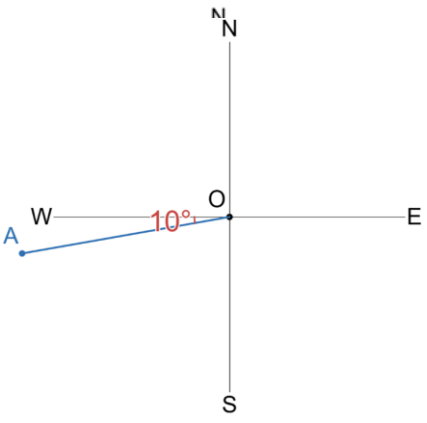
a N75°W



b S55°E



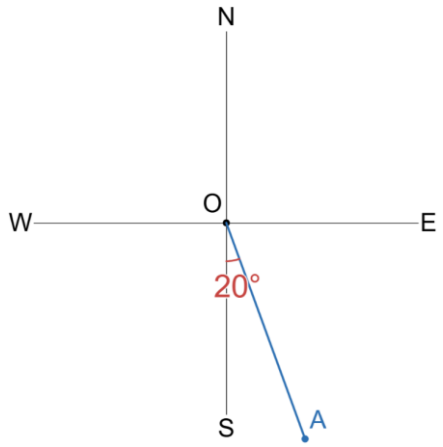
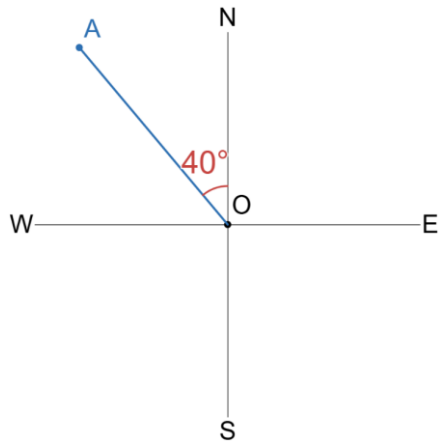
c S80°W



Key ideas

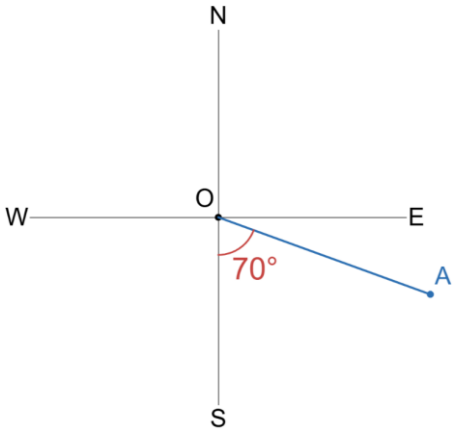
1. A compass bearing states the …… angle to turn …… or ……, starting from North or South.

Example Convert from compass to true bearing.

$\mathrm{S}20°\mathrm{E} = 180° - 20° = 160°$ 	What does $\mathrm{S}\ 20°\ \mathrm{E}$ mean? *Starting from ……., turn ……° ……* Why did we do $180° - 20°$ to get the true bearing? *The true bearing and $20°$ lie on a ……. line, so the two angles sum to ……°*
$\mathrm{N}40°\mathrm{W} = 360° - 40° = 320°$ 	What does $\mathrm{N}\ 40°\ \mathrm{W}$ mean? *Starting from ……., turn ……° ……* Why did we do $360° - 40°$ to get the true bearing? *The true bearing and $40°$ make a full revolution, so add up to ……°*

State the compass bearing of A from O and convert to true bearing.

a



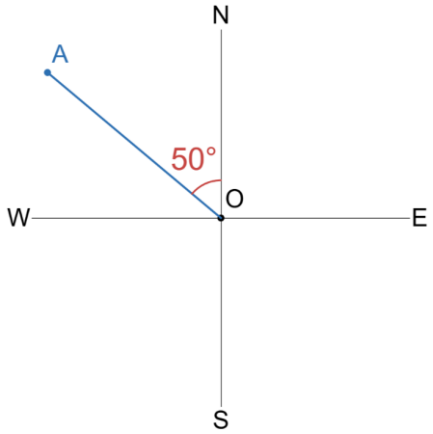
Compass:

S70°E

True:

110°

b



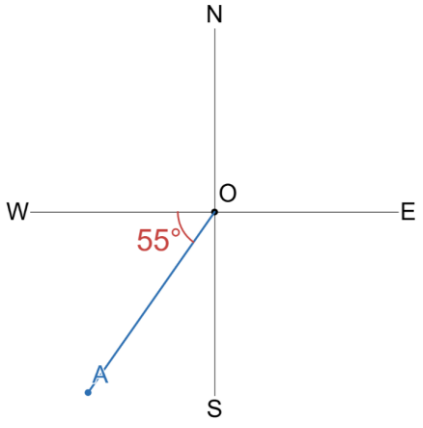
Compass:

N50°W

True:

310°

c



Compass:

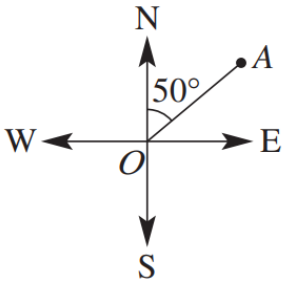
S35°W

True:

215°

1 Express these bearings in both compass and true bearing.

a



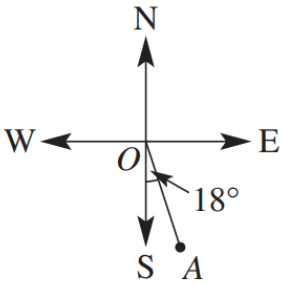
Compass: .....

N50°E

True: .....

050°

b



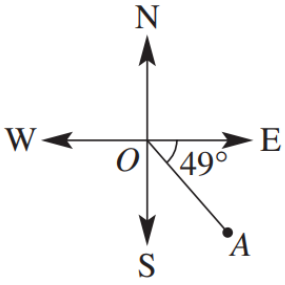
Compass: .....

S18°E

True: .....

162°

c



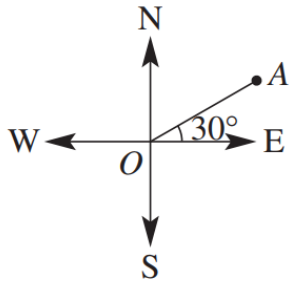
Compass: .....

S41°E

True: .....

139°

d



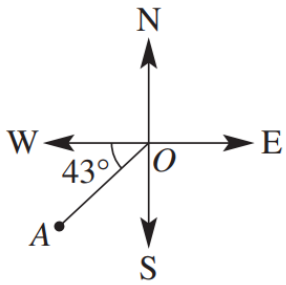
Compass: .....

N60°E

True: .....

060°

e



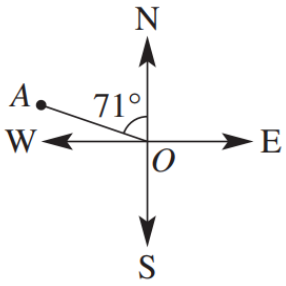
Compass: .....

S47°W

True: .....

227°

f



Compass: .....

N71°W

True: .....

289°

2 Explain why $E40°N$ is not a valid compass bearing.

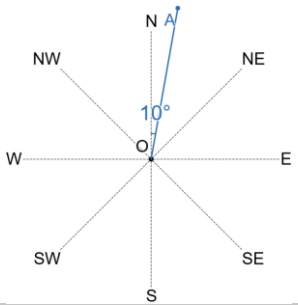
A compass bearing always starts from N or S.

3 Explain why $40°$ is not a valid true bearing.

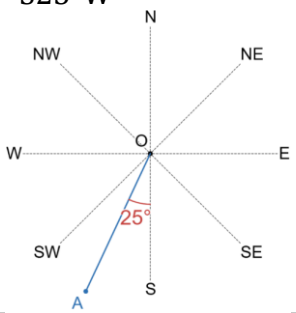
A true bearing is always 3 digits.

4 Sketch these bearings.

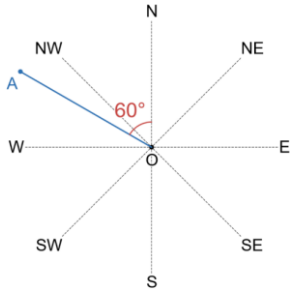
a N10°E



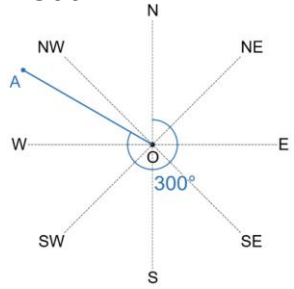
b S25°W



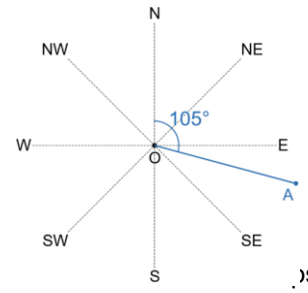
c N60°W



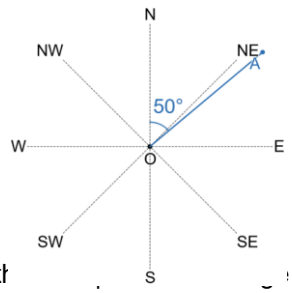
d 300°T



e 105°T

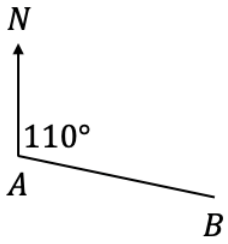


f 050°T



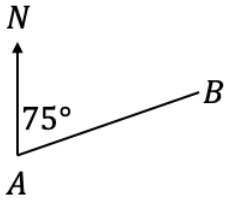
5 State the true bearing of:

a B from A



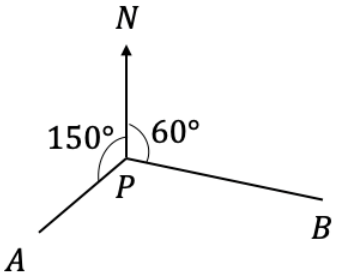
110°

b B from A



075°

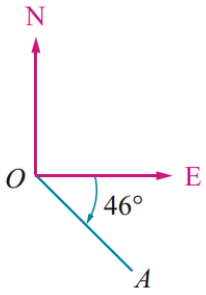
c A from P



210°

6 Write the bearing of A from O as compass bearings and true bearings.

a



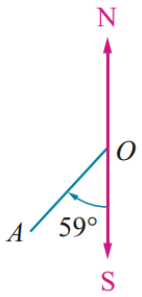
Compass: .....

S44°E

True: .....

136°

b



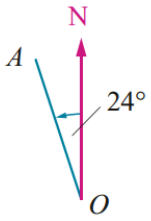
Compass: .....

S59°W

True: .....

239°

c



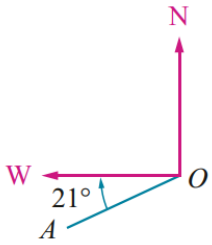
Compass: .....

N24°W

True: .....

336°

d



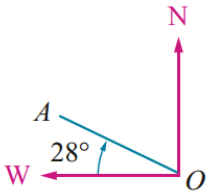
Compass: .....

S69°W

True: .....

249°

e



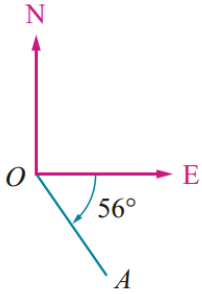
Compass: .....

N62°W

True: .....

298°

f



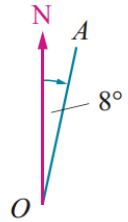
Compass: .....

S34°E

True: .....

236°

g



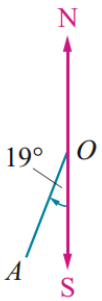
Compass: .....

N8°E

True: .....

008°

h



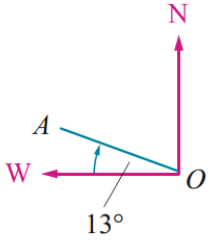
Compass: .....

S19°W

True: .....

199°

i



Compass: .....

N77°W

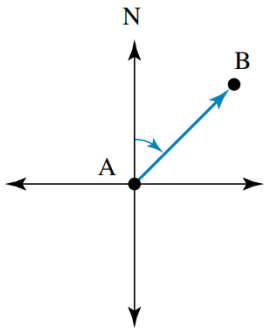
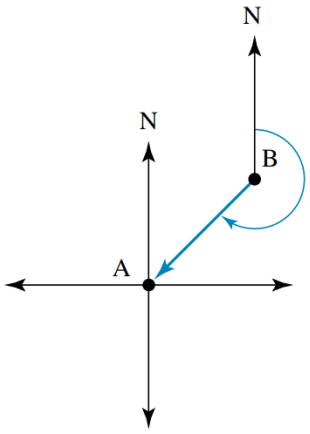
True: .....

283°

CALCULATING BEARING BETWEEN TWO LOCATIONS

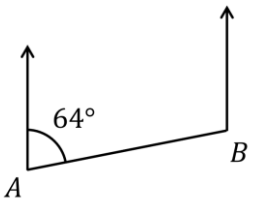
- "**From**" shows where you start a bearing.
- Bearing of "B from A" means: stand at A, find direction to B.
- In navigation, we use true bearing; compass bearings are rare.

Bearings: https://www.geogebra.org/m/rpvgcshx

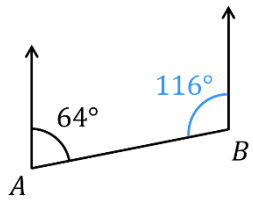
B from A	A from B
	

Example Determine the bearing between two locations.

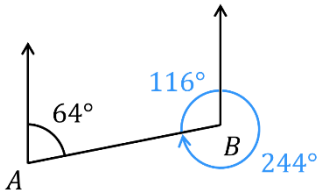
What is the bearing of A from B?



Step 1:



Step 2:



The bearing of A from B is 244°

What does the bearing of A from B mean?

Standing at … , how much to turn ……., starting from ……., to look at …

In step 1, how did we find 116°?

…… angles on parallel lines.

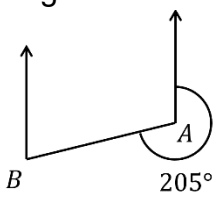
In step 2, how did we find 244°?

Angles at a point sum to ……

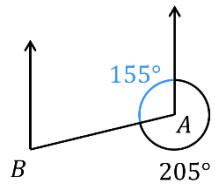
Why is 244° the bearing of A from B, rather than 116°?

True bearing is how much to turn ……., starting from north.

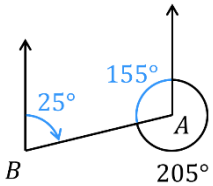
What is the bearing of A from B?



Step 1:



Step 2:



The bearing of A from B is 025°

In step 1, how did we find 155°?

Angles at a …… sum to ……°

In step 2, how did we find 025°?

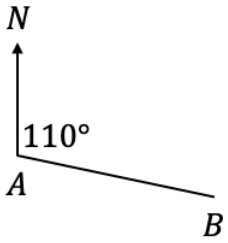
…… angles on …… lines.

Why is 025° the bearing of A from B, rather than 25°?

True bearing is always written with …… digits.

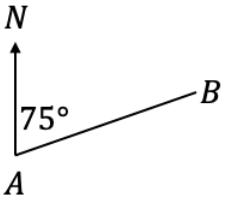
Determine the true bearing of

a A from B



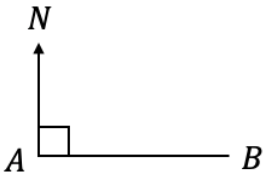
290°

b A from B



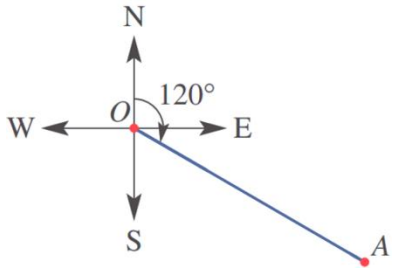
255°

c A from B



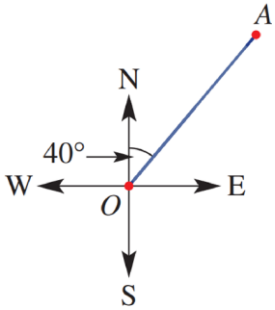
270°

d O from A



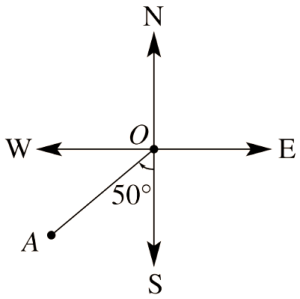
300°

e O from A



220°

f O from A



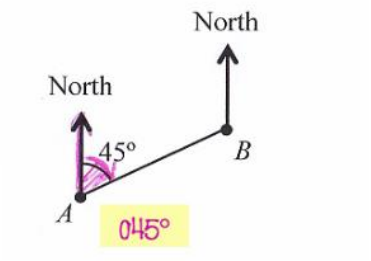
050°

Key ideas

1. Bearing of "B from A:"
   a. Start off standing at ……, facing north.
   b. Measure the angle you turn clockwise starting from north until you face ……

1

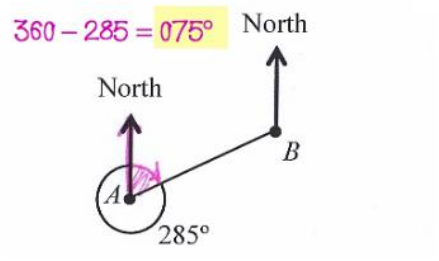
a Find the bearing of B from A



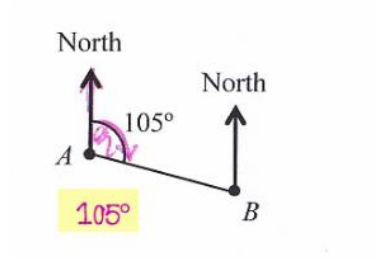
045°

Find the bearing of B from A

360 – 285 = 075°



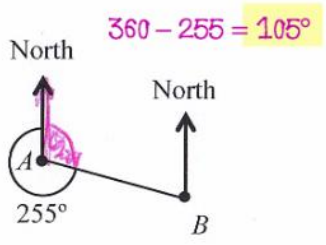
Find the bearing of B from A



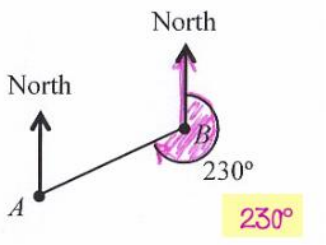
105°

c Find the bearing of B from A

360 – 255 = 105°

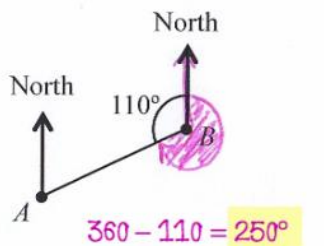


Find the bearing of A from B



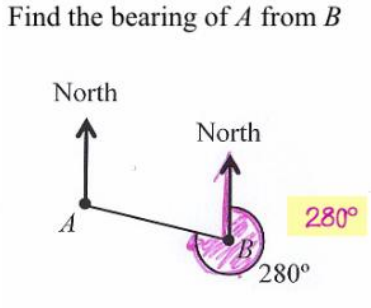
230°

Find the bearing of A from B



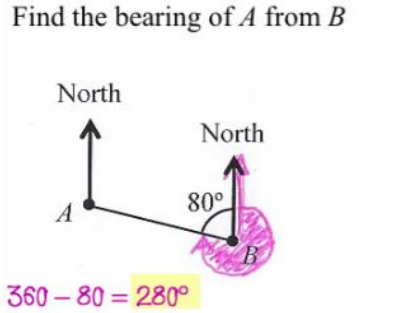
360 – 110 = 250°

e Find the bearing of A from B



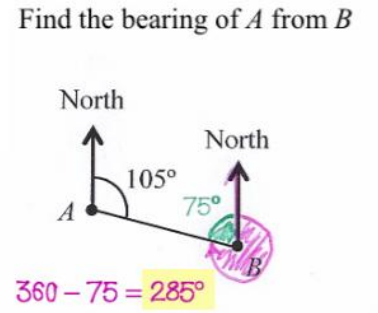
280°

Find the bearing of A from B



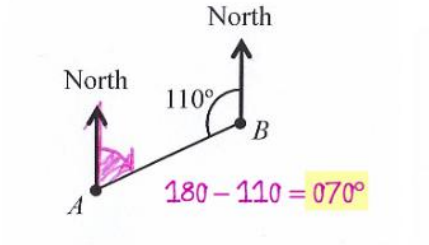
360 – 80 = 280°

Find the bearing of A from B



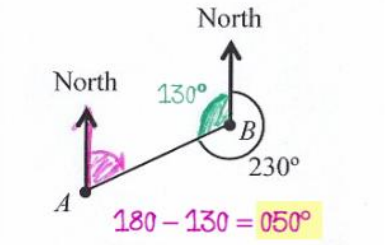
360 – 75 = 285°

g Find the bearing of B from A



180 – 110 = 070°

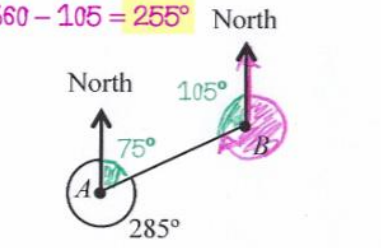
Find the bearing of B from A



180 – 130 = 050°

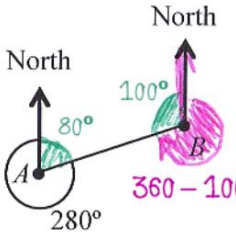
Find the bearing of A from B

360 – 105 = 255°



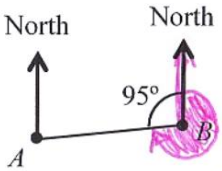
2

a Find the bearing of A from B



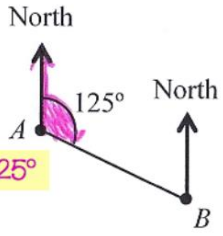
360 – 100 = 260°

Find the bearing of A from B



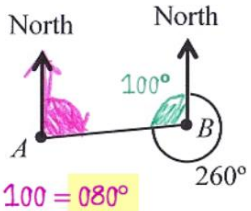
360 – 95 = 265°

Find the bearing of B from A



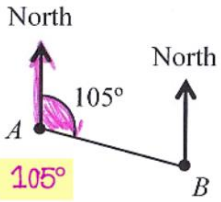
125°

Find the bearing of B from A



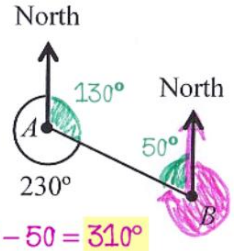
180 – 100 = 080°

Find the bearing of B from A



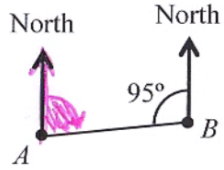
105°

Find the bearing of A from B



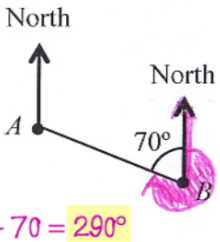
360 – 50 = 310°

Find the bearing of B from A



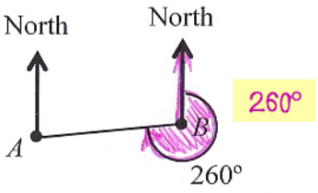
180 – 95 = 085°

Find the bearing of A from B



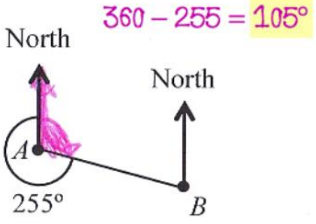
360 – 70 = 290°

Find the bearing of A from B

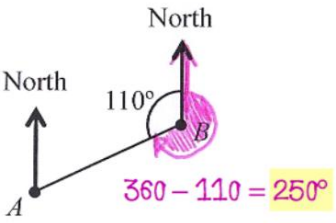


j Find the bearing of B from A

360 – 255 = 105°

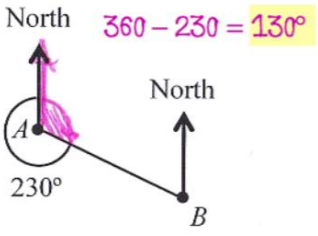


Find the bearing of A from B



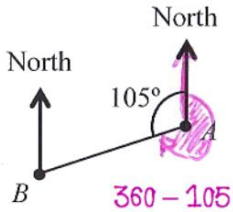
360 – 110 = 250°

Find the bearing of B from A



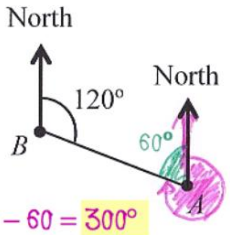
3

a Find the bearing of B from A



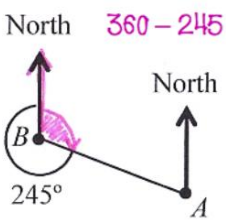
$360 - 105 = 255°$

Find the bearing of B from A

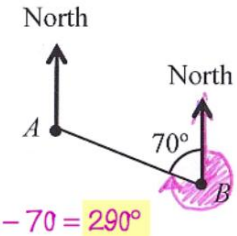


$360 - 60 = 300°$

Find the bearing of A from B

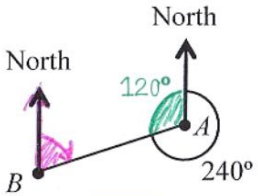


c Find the bearing of A from B



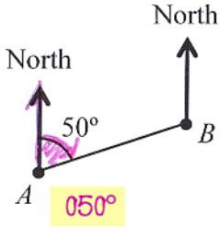
$360 - 70 = 290°$

Find the bearing of A from B



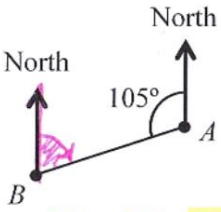
$180 - 120 = 060°$

Find the bearing of B from A



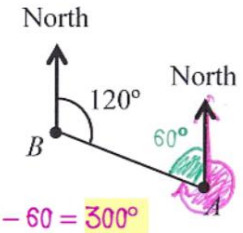
$050°$

g Find the bearing of A from B



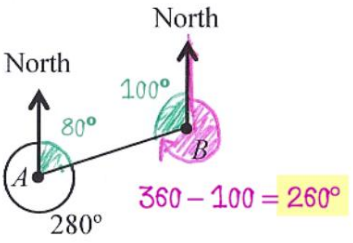
$180 - 105 = 075°$

Find the bearing of B from A



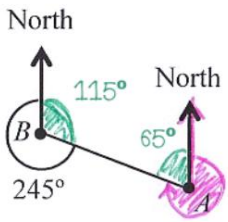
$360 - 60 = 300°$

Find the bearing of A from B



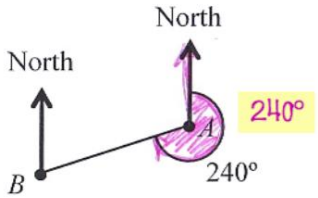
$360 - 100 = 260°$

j Find the bearing of B from A

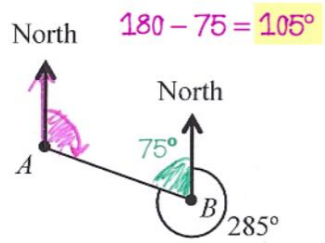


$360 - 65 = 295°$

Find the bearing of B from A

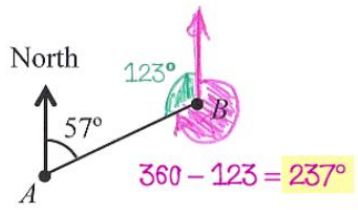


Find the bearing of B from A



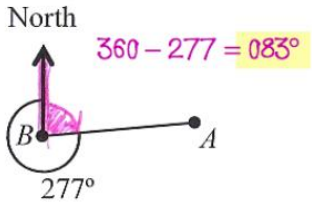
4

a Find the bearing of A from B



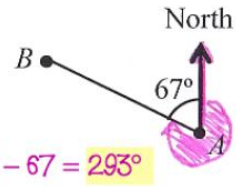
360 – 123 = 237°

Find the bearing of A from B



360 – 277 = 083°

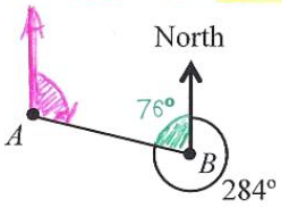
Find the bearing of B from A



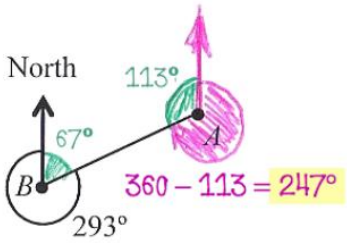
360 – 67 = 293°

d Find the bearing of B from A

180 – 76 = 104°

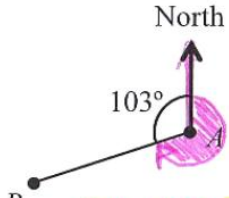


Find the bearing of B from A



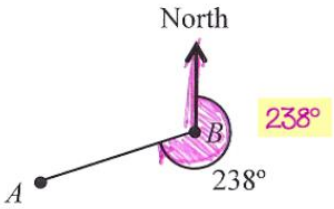
360 – 113 = 247°

Find the bearing of B from A



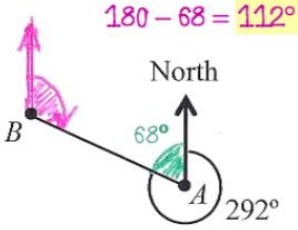
360 – 103 = 257°

g Find the bearing of A from B

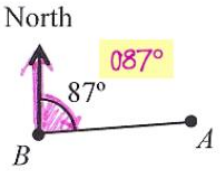


Find the bearing of A from B

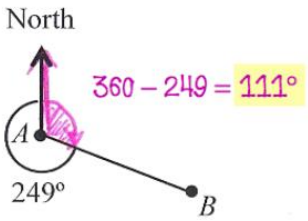
180 – 68 = 112°



Find the bearing of A from B

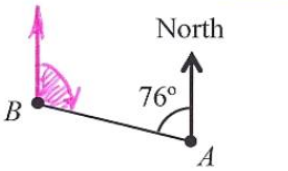


j Find the bearing of B from A

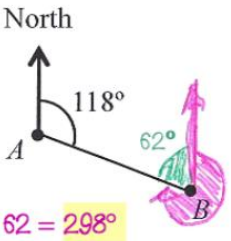


Find the bearing of A from B

180 – 76 = 104°



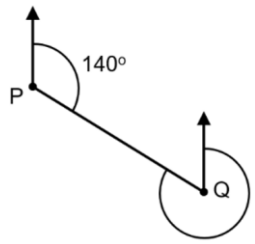
Find the be bearing of A from B



360 – 62 = 298°

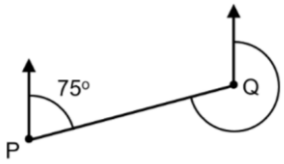
5 Determine the bearing of P from Q.

a



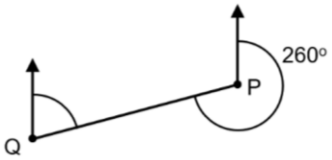
320°

b



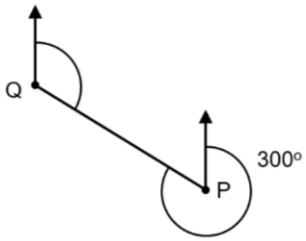
255°

c



080°

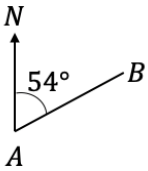
d



120°

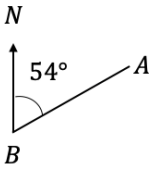
6 Determine the bearing of B from A

a



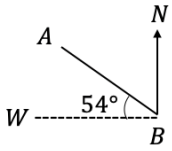
054°

b



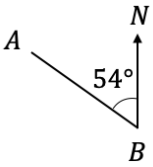
234°

c



144°

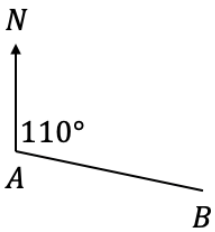
d



126°

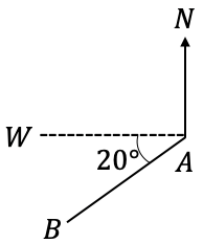
7 Determine the true bearing of A from B.

a



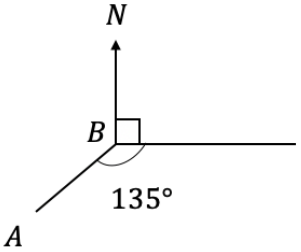
290°

b



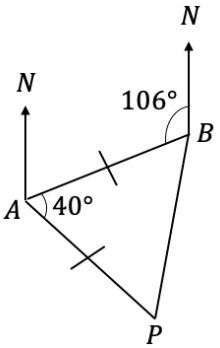
070°

c



225°

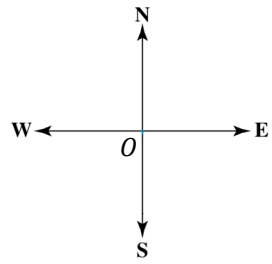
d



254°

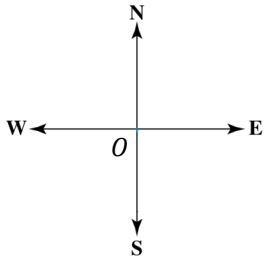
8 Given these bearings of A from O, find the bearing of O from A

a $123°$



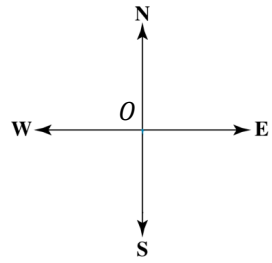
303°

b $047°$



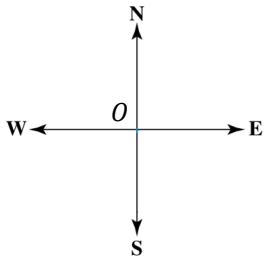
227°

c $231°$



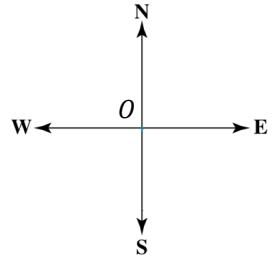
051°

d $195°$



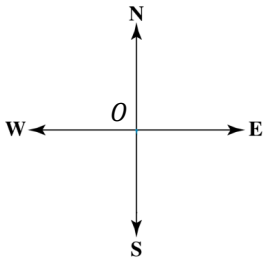
015

e $155°$



335°

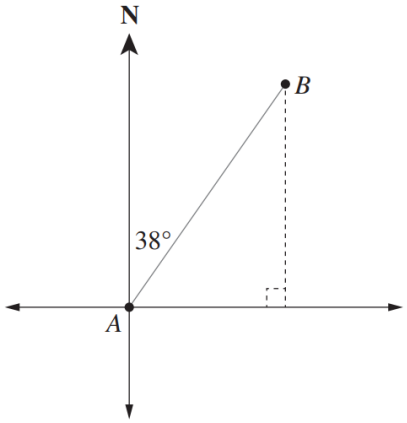
f $343°$



163°

9 **2021 HSC Standard 1**

The compass bearing of B from A is N38°E. What is the true bearing of A from B?

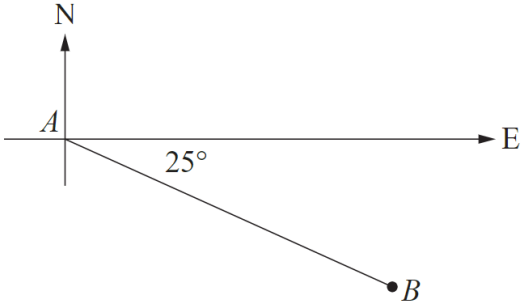


NOT TO SCALE

218°

10 **2021 HSC Standard 2 Band 5**

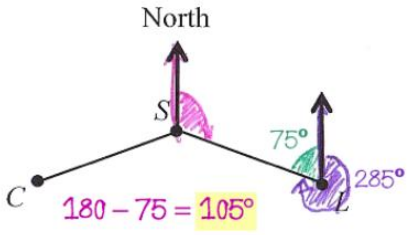
What is the true bearing of A from B?



295°

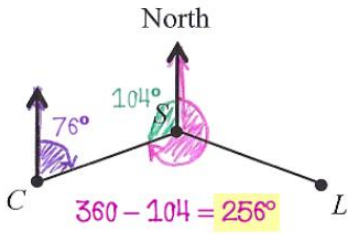
11

a The bearing of S from L is 285°. Find the bearing of L from S



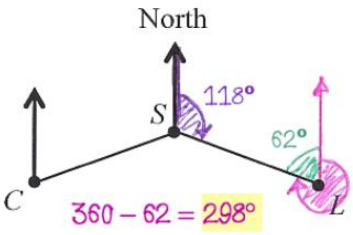
$180 - 75 = 105°$

The bearing of S from C is 76°. Find the bearing of C from S



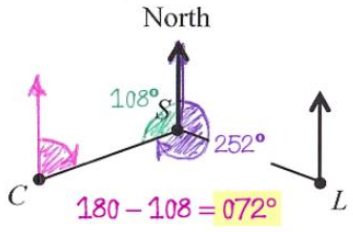
$360 - 104 = 256°$

The bearing of L from S is 118°. Find the bearing of S from L



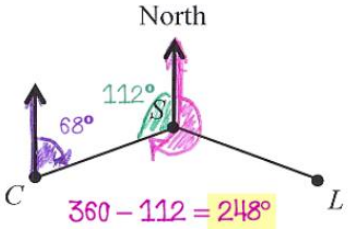
$360 - 62 = 298°$

d The bearing of C from S is 252°. Find the bearing of S from C



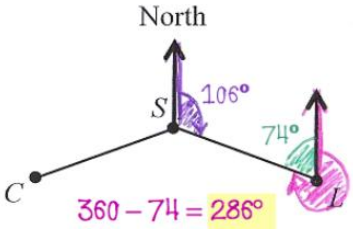
$180 - 108 = 072°$

The bearing of S from C is 68°. Find the bearing of C from S



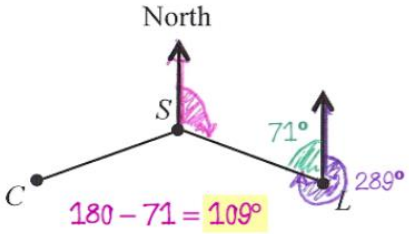
$360 - 112 = 248°$

The bearing of L from S is 106°. Find the bearing of S from L



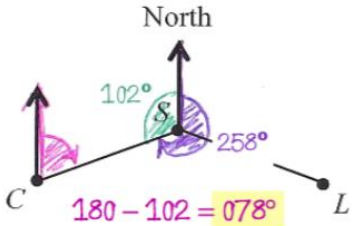
$360 - 74 = 286°$

g The bearing of S from L is 289°. Find the bearing of L from S



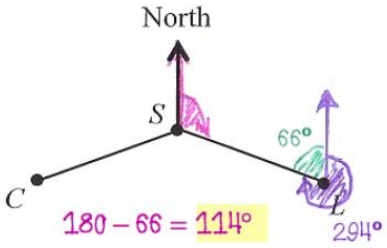
$180 - 71 = 109°$

The bearing of C from S is 258°. Find the bearing of S from C



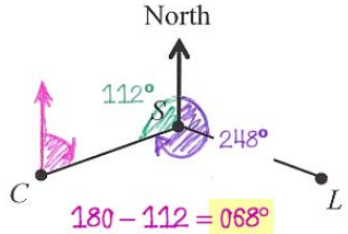
$180 - 102 = 078°$

The bearing of S from L is 294°. Find the bearing of L from S



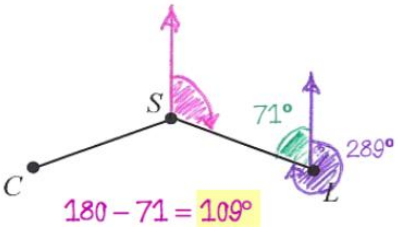
$180 - 66 = 114°$

j The bearing of C from S is 248°. Find the bearing of S from C



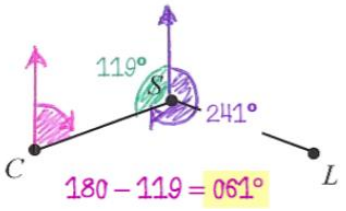
$180 - 112 = 068°$

The bearing of S from L is 289°. Find the bearing of L from S



$180 - 71 = 109°$

The bearing of C from S is 241°. Find the bearing of S from C



$180 - 119 = 061°$

12 **2022 HSC Standard 1**

Which true bearing is the same as S48°W?

A. 132°

B. 222°

C. 228°

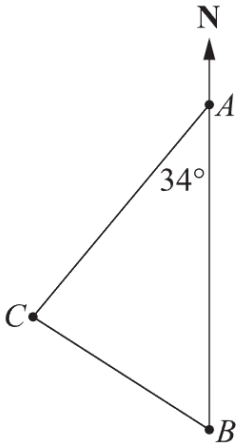
D. 312°

C

13 **2018 HSC Standard 2 Band 4**

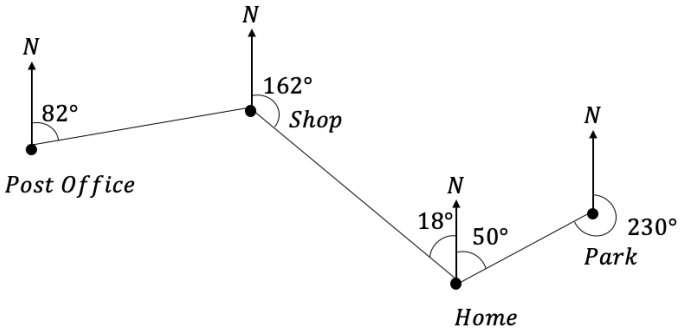
The diagram shows the positions of towns A, B and C

What is the true bearing of Town C from Town A?



214°

14 What is the bearing of:



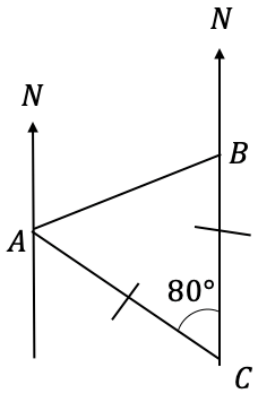
a The shop from home?

342°

b The post office from the shop?

262°

15 What is the bearing of:



a B from A?

050°

b C from A?

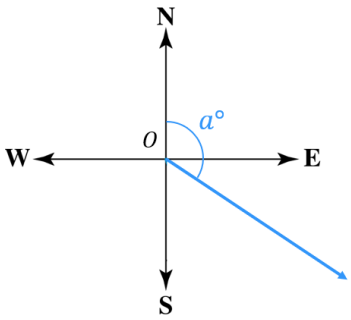
100°

c A from B?

230°

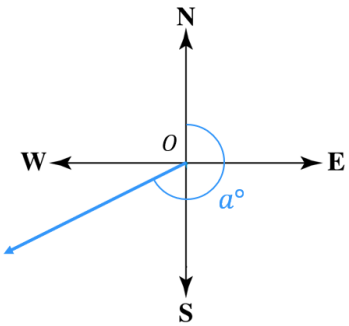
16 A true bearing is $a°$. Write an expression for the true bearing of the opposite direction of $a°$ if:

a a is between 0° and 180°



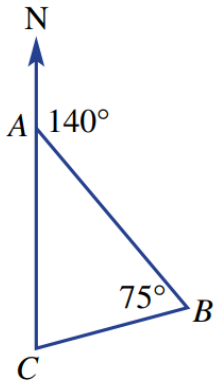
$a + 180$

b a is between 180° and 360°



$a - 180$

17 A hiker walks on a triangular pathway starting at point A, walking to point B then C, then A again.



a Find the bearing **from B to A**.

320°

b Find the bearing from B to C.

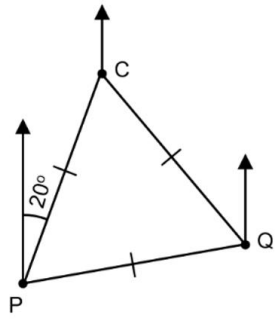
245°

c Find the bearing from C to B .

065°

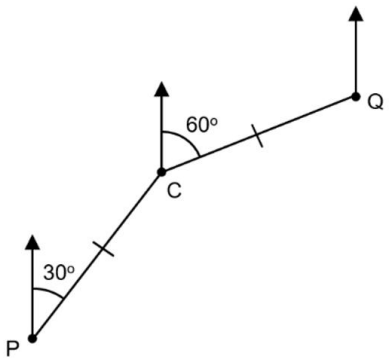
18 Find the bearing of Q from P.

a



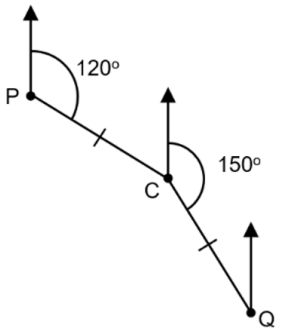
080°

b



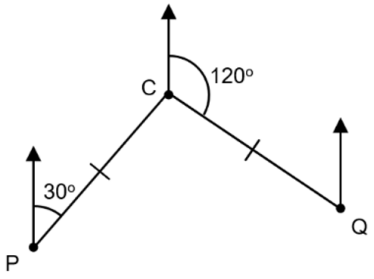
045°

c



135°

d



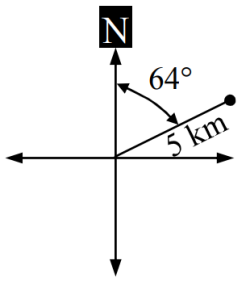
075°

INTERPRETING BEARING SCENARIOS

FOUNDATION

1 Identify what bearing is shown in the diagram.

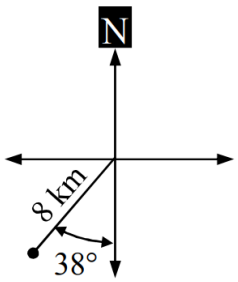
a



(A) 5 km at N 64° W
(B) 5 km at S 64° E
(C) 5 km at N 64° S
(D) 5 km at N 64° E

D

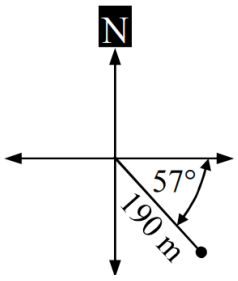
b



(A) 8 km at 038°T
(B) 8 km at 218°T
(C) 8 km at 232°T
(D) 8 km at 142°T

B

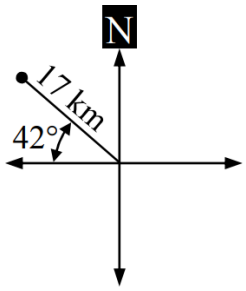
c



(A) 190 m at 147°T
(B) 190 m at E 57° S
(C) 190 m at 057°T
(D) 190 m at S 57° E

A

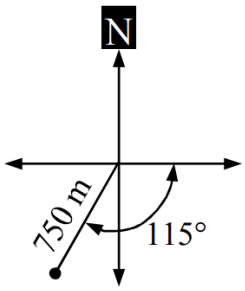
d



(A) 17 km at N 48° W
(B) 17 km at 318°T
(C) 17 km at 222°T
(D) 17 km at N 42° W

A

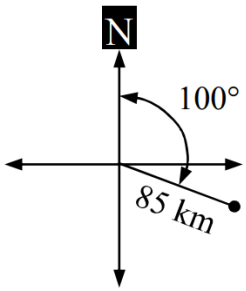
e



(A) 750 m at 195°T
(B) 750 m at 115°T
(C) 750 m at 205°T
(D) 750 m at S 15° W

C

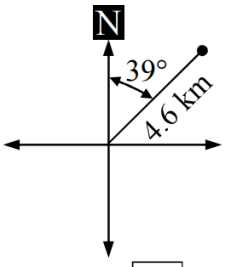
f



(A) 85 km at 010°T
(B) 85 km at N 100° E
(C) 85 km at 080°T
(D) 85 km at S 80° E

D

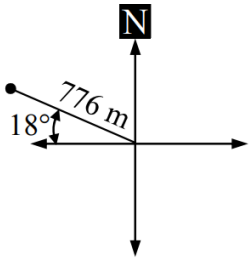
g



4.6 km at ☐ 39° E

N

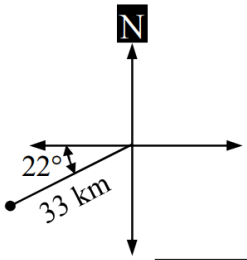
h



☐ m at ☐ °T

776, 288

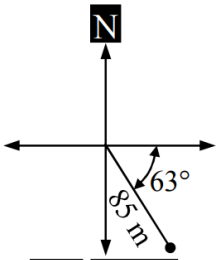
i



33 km at ☐ °T

248

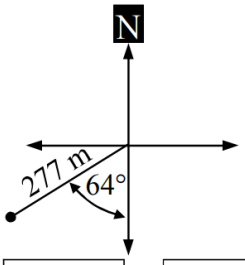
j



85 m at ☐ ☐ °E

S, 27

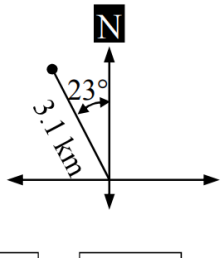
k



☐ at ☐ ° T

277 m, 244

l

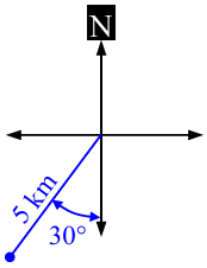


☐ at ☐ °T

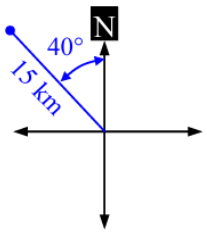
3.1 km, 337

2 Sketch the bearing and then label the distance and show the angle made with North or South.

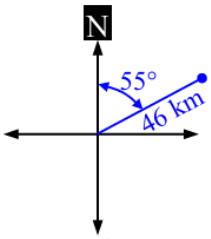
a Toni walked 5 km at a bearing of 210ºT.



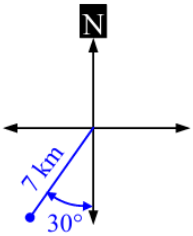
b Ben rode 15 km at a bearing of 320ºT



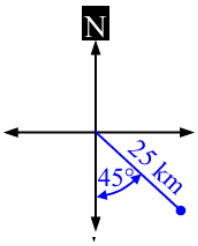
c Roy drove 46 km at a bearing of 055ºT



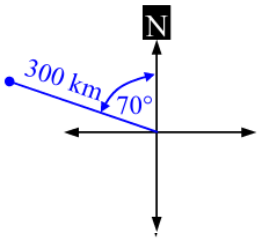
d Keira hiked 7 km at a bearing of S30ºW



e Mike sailed 25 km at a bearing of S45ºE

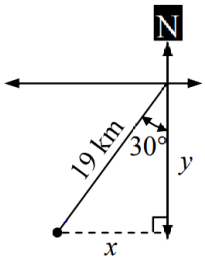


f Duncan flew for 300 km at a bearing of N70ºW

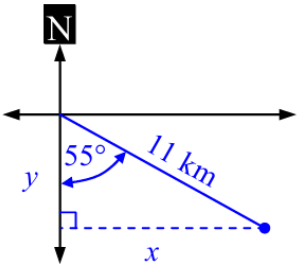


3 Sketch the bearing, label the distance, show the angle made with North or South.
Then label the vertical (y) and horizontal (x) distance travelled.
The first question has been done for you.

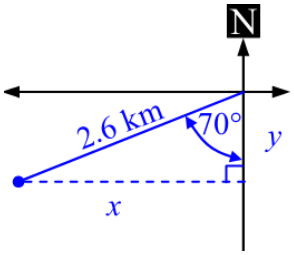
a Jade trekked 19 km at a bearing of 210ºT.



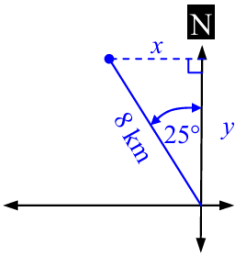
b Ike walked 11 km at a bearing of 125ºT



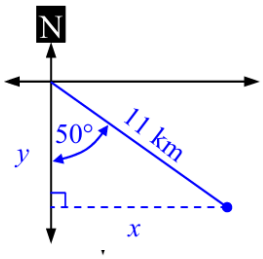
c Nidal swam for 2.6 km at a bearing of 250ºT



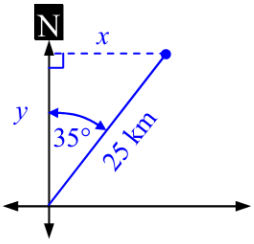
d Jiao trekked for 8 km at a bearing of N 25ºW.



e Blake rode for 11 km at a bearing of S 50º E.



f Allie sailed for 25 km at a bearing of N 35º E.



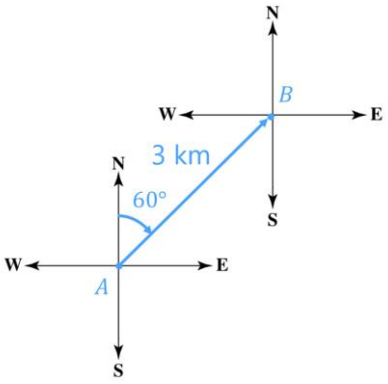
PROBLEMS INVOLVING BEARINGS AND TRIGONOMETRY

1. Draw a diagram and a compass rose at each point.
   Label all known information (known angles, distances, what you are trying to find).
2. Draw an appropriate right-angled triangle.
3. Find the unknown using trigonometry

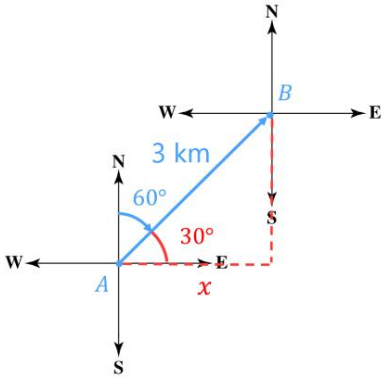
Example Solve problems involving bearings and trigonometry.

A bushwalker walks 3 km on a bearing of 060° from point A to point B.
Find how far east (correct to 1 decimal place) point B is from point A.

Step 1: Diagram



Step 2: Triangle



Step 3: Solve

$$\cos(30°) = \frac{x}{3}$$

$$3\cos(30°) = x$$

$$2.6 \text{ km} = x$$

The bushwalker is 3 km east of where they started.

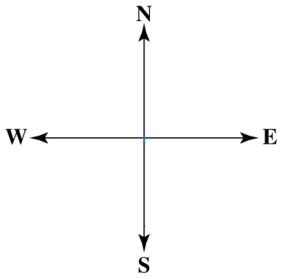
How are we able to use a trigonometric ratio?

……

How did we know the angle inside the triangle is $30°$?

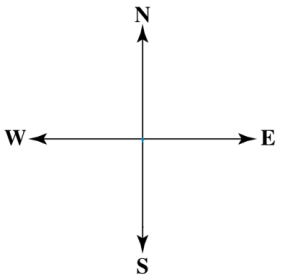
……

A fishing boat starts from point O and sails 75 km on a bearing of 160° to point B.
How far east of its starting point is the boat, to the nearest kilometre?



26 km

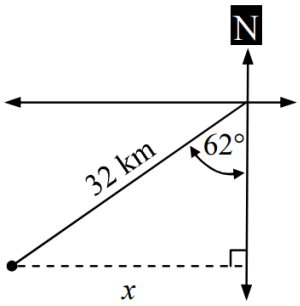
An athlete runs 10 km on a bearing of 200° from the start to the finish line.
How far south does the triathlete run? Answer to the nearest kilometre.



9 km

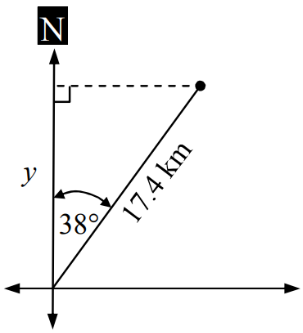
1 Label the sides O, A or H and calculate the unknown length to 1 decimal place.

a A ferry travels 32 km at a bearing of 242ºT.
Calculate how far West of its departure point (x) the ferry has travelled.



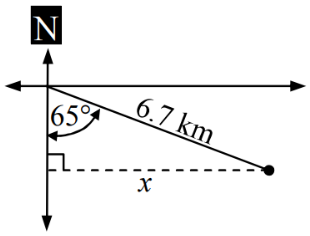
28.3 km

b Murali is trekking for 17.4 km at a bearing of N 38º E.
Calculate how far North of his starting point, (y), he has travelled.



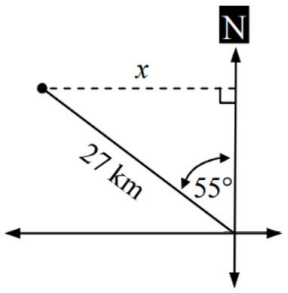
13.7 km

c Briony is competing in a 6.7 km cross country run at a bearing of 115ºT.
Calculate how far East (x) of her starting point she is when she finishes the run.



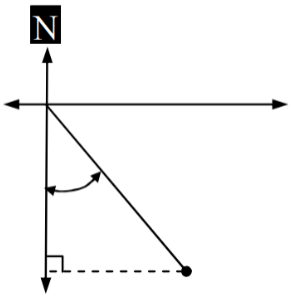
6.1 km

d Josh hiked for 27 km at a bearing of N 55º W.
Calculate how far West of his original position he is at the end of the hike.



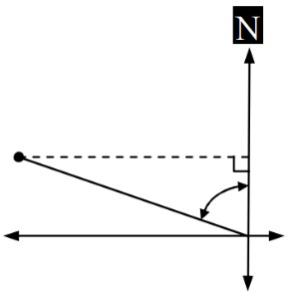
22.1 km

e Lucy sailed 33 km at a bearing of 142º T.
Calculate how far South of her original position Lucy is.



26 km

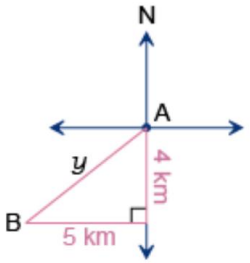
f Darius walked for 4.2 km at a bearing of 285ºT to a campsite.
How far North of his starting point is the campsite?



1.1 km

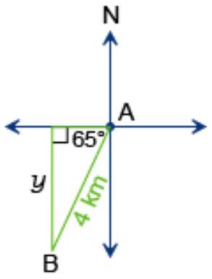
2 Match the question to the diagram. **Do not answer the questions**.

a An orienteering course starts at A and ends 4 km away at B on a bearing of 155º. Find how far south B is from A.



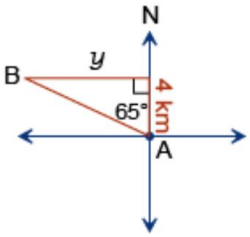
b

b A cyclist travelled south 4 km and then west for 5 km. Find the how far the cyclist was from her starting point.



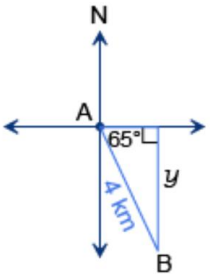
d

c A fishing boat left harbour on a bearing 295º. It anchored opposite a light house, 4 km north of the harbour. Calculate the distance from the ship to the lighthouse.



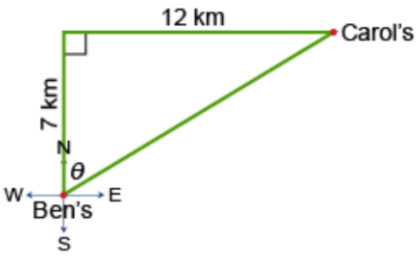
c

d A bushwalker set out on a bearing of 205º for 4 km. Find the distance she travelled south during her walk.



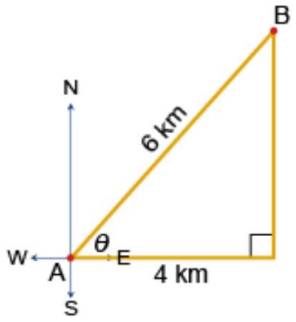
a

3 Anne travelled 7 km due north from Ben's house and then 12 km due east to Carol's house. What is the true bearing from Ben's house to Carol's house? Answer to the nearest degree.



060°

4 A rider travelled 4 km due east from A before changing direction and riding due north to B.
B is 6 km from A. Calculate the true bearing from A to B $(90 - \theta)$. Answer to the nearest minute.

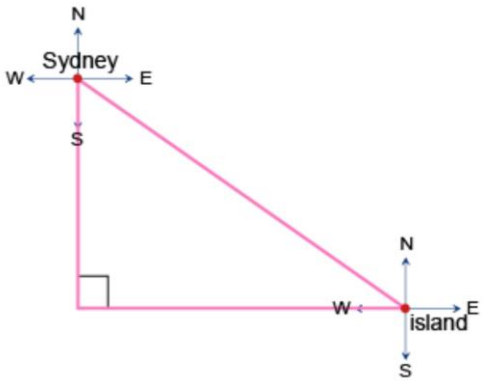


041°49′

5 A pigeon was released from A and flew 5.3 km due south before it turned west and continued to fly for another 17 km to reach B. Calculate the true bearing $(180 + \theta)$ of the pigeon at B from A.

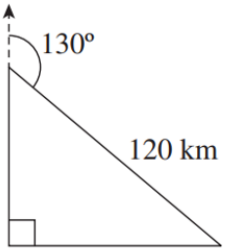
252°41′

6 A plane departed Sydney and flew due south for 350 km.
It then turned and flew due east for 500 km before landing on an island.
Calculate the bearing from the island to Sydney to nearest degree.



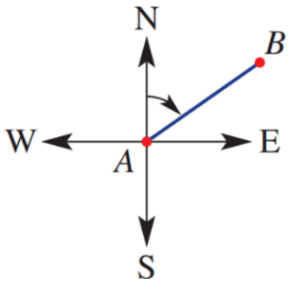
305°

7 Eleni drives 120 km on a bearing of $130°$.
She then drives due west until she is directly south of her starting point.
How far is she from her starting point, correct to the nearest kilometre?



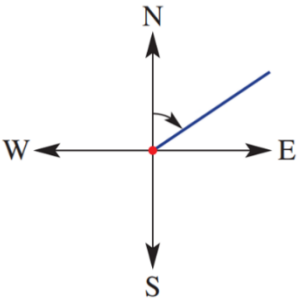
77 km

8 A bushwalker walks 4 km on a bearing of 055° from point A to point B.
Find how far east point B is from point A, correct to 2 decimal places.



3.28 km

9 A speed boat travels 80 km on a bearing of 048°.
Find how far east of its starting point the speed boat is, correct to 2 decimal places.

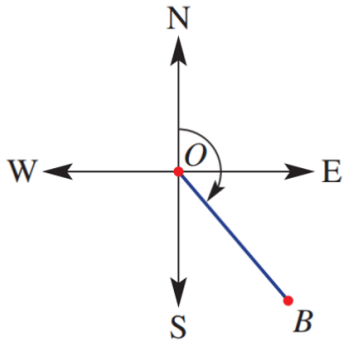


59.45 km

10 A fishing boat starts from point O and sails 60 km on a bearing of 140° to point B.

a How far east of its starting point is the boat, to the nearest kilometre?

b What is the bearing of O from B?

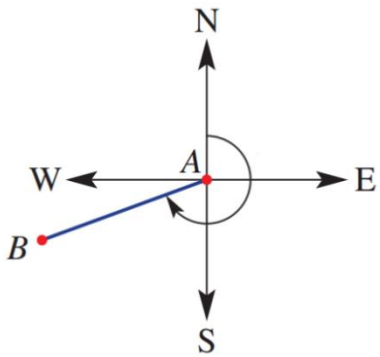


39 km, 320° T

11 Two towns, A and B, are 12 km apart. The bearing of B from A is 250°

a How far west of A is B, correct to 1 decimal place?

b Find the bearing of A from B

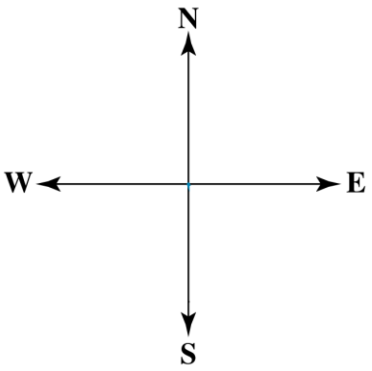


11.3 km, 070° T

12 Two points, A and B, positioned 15 cm apart, are such that B is 100° from A.

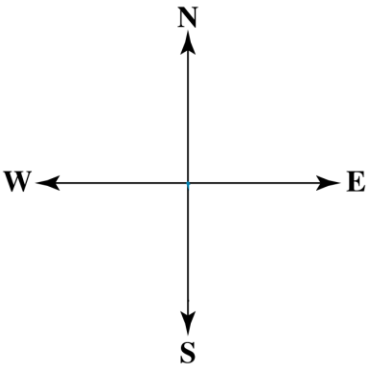
a Find how far east point B is from A, correct to 2 decimal places.

b Find how far south point B is from A, correct to the nearest millimetre.



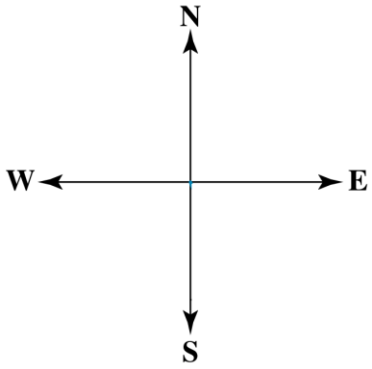
14.77 cm, 2.6 cm

13 A helicopter flies on a bearing of 140° for 210 km then flies due east for 175 km.
How far east (to the nearest kilometre) has the helicopter travelled from its starting point?



310 km

14 A tank moves 13.5 km from point A on a bearing of 042° to point B.
From point B, how far due south must the tank travel to be at a point due east of point A?
Give the answer correct to the nearest metre.

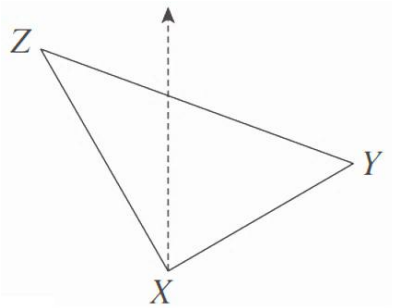


10.032 km

15 The bearings of towns Y and Z from town X are 060°T and 330°T respectively.

a Show that $\angle ZXY = 90°$.

b Given that town Z is 80 km from town X and that $\angle XYZ = 50°$,
find correct to the nearest kilometre, the distance between town Y and town X.

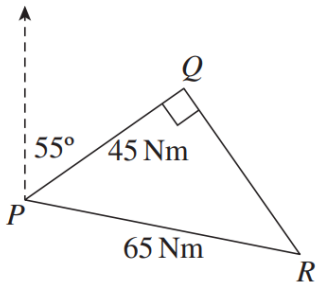


67 km

16 Port Q is 45 nautical miles from port P on a bearing of 055°T.
Port R is 65 nautical miles from port P, and ∠PQR = 90°.

a Find $\angle QPR$ to the nearest degree.

b Hence find the bearing of R from P to the nearest degree.



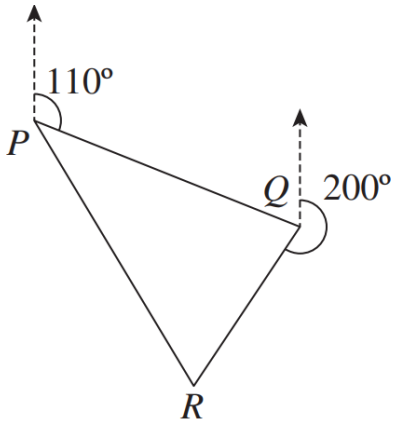
$\angle PQR = 46°$

101°

17 A ship leaves port P and travels 150 nautical miles to port Q on a bearing of 110°T.
It then travels 120 nautical miles to port R on a bearing of 200°T.

a Explain why $\angle PQR = 90°$

b Find the bearing of R from P to the nearest degree.

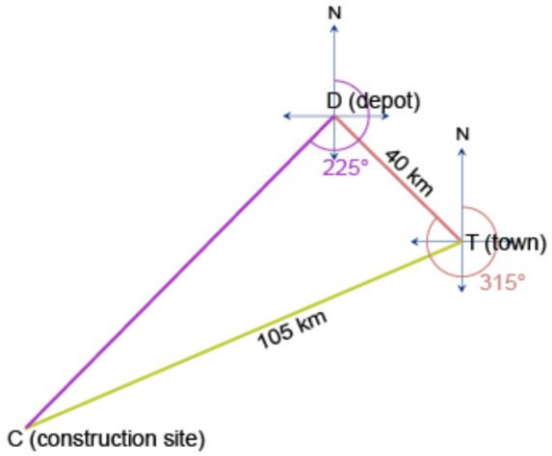


∠PQR = 360° − (200° + 70°) = 90°

(using co-interior angles on parallel lines and the fact that a revolution is 360°)

110° + 39° = 149°

18 A helicopter flew from a town on a bearing of 315º and travelled for 40 km to pick up its cargo from a depot. The helicopter then carried the cargo to a construction site on a bearing of 225º. The construction site is 105 km from the town.



a Show that ΔTDC is a right-angled triangle.

Bearing of D from T is 315, so the bearing of T from D is 135°

$225° - 135° = 90°$

$\therefore \angle CDT = 90°$ so ΔTDC is right-angled.

b Calculate the bearing of the construction site from the town, to the nearest minute.

$\cos \angle DTC = \frac{40}{105}$,

$\therefore \angle DTC = 36°36'$

$\therefore$ bearing = $315 - 36°36' = 247°24'$

19 2 ships leave from the same port. One ship travels on a bearing of $157°$ at 20 knots.
The second ship travels on a bearing of $247°$ at 35 knots.
(A knot is a speed of 1 nautical mile per hour).

a How far apart at the ships after 8 hours? Answer in nautical miles to 2 d.p.

b Calculate the bearing of the second ship from the first, to the nearest minute.

322.49 nautical miles, 276° 45'

20 A plane flies 1200 km on a NE compass bearing and then changes direction to a bearing of NW and flies for 450 km.

a How far, correct to the nearest km, is the plane from its starting point?

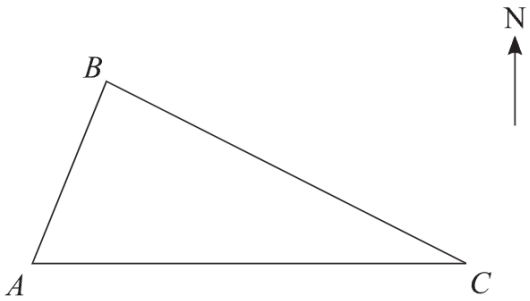
b What is the bearing of the plane from its starting point, to the nearest metre?

1282 km, 024° 27'

21 HSC Standard 2 Sample Question Band 4

Checkpoint *C* is due east of Checkpoint *A*.
The bearing of Checkpoint *B* from Checkpoint *A* is N22°E
and the bearing of Checkpoint *C* from Checkpoint *B* is S68°E.
The distance between Checkpoint *A* and Checkpoint *B* is 42 kilometres.

a Label the diagram and explain why $\angle ABC = 90°$



b Find the distance, to the nearest kilometre, between Checkpoint *A* and Checkpoint *C*

112 km

c If a runner is travelling 12.6 km/h, how long does it take her to travel between Checkpoint *A* and Checkpoint *B*, in hours and minutes?

3 h 20 m

22 A rally driver heads in a direction of 145° at a speed of 120 km/ h for 3 hours.
The rally driver then turns and drives north until he is due east of the starting point.
How long will this take at 120 km/ h? Answer to the nearest minute.

The rally driver travels 360 km at a bearing of 145°

This is $360 \cos 35°$ km south of his starting position.

$360 \cos 35° \text{ km} \div 120 \text{ km/h} = 2.4574 \ldots$ hours

2 hours 27 minutes