Year 11 Mathematics Advanced

Topic: Trigonometry and Measure of Angles (1 of 5)
Review Questions: Right-angled trigonometry, bearings and elevation
Term 3, 2026

How to use this review set

These are real past-paper questions, grouped by question pattern. The grey label on each question shows where it is from and its marks.

- The questions are grouped by the pattern that keeps coming up in exams, a few of each in a row, running from the plainer patterns into the harder ones near the end. Work through them and you will meet every type an exam can throw at you.
- This set **is your diagnostic**. Working through it shows you exactly which patterns are solid and which need work. Attempt every question properly in your own book, and go back to your notes to help you work through tough questions if needed.
- Every question you get wrong, need help with or struggle with goes in your **Mistakes Log**, which you should be working on daily to get you exam-ready.

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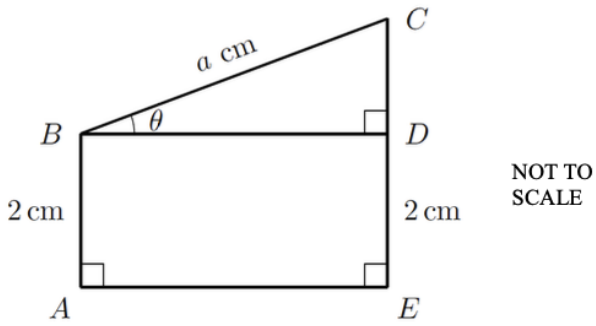
2. Angles of elevation and depression
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Right-angled trigonometry

1. Finding a side or angle in a right-angled triangle

Q1 Barker 2020 Trial Q19 · **2 marks**

The figure below represents a wire frame made up of 6 parts: AB, BC, CD, ED, AE and BD. Here $AB = ED = 2$ cm and $BC = a$ cm, where $a > 0$. The frame is arranged so that $ABDE$ is a rectangle (with right angles at A and E), and BCD is a triangle right-angled at D with $\angle CBD = \theta$, where $0 < \theta < \dfrac{\pi}{2}$.



(a) Find BD and CD in terms of a and θ.

(b) Find the total length L of wire in the frame in terms of a and θ.

Q2 Fort St 2022 Prelim Q4 · **1 mark**

A right-angled triangle has its right angle at the top vertex. The two sides meeting at the right angle have lengths $\sqrt{7}$ and 3. The angle α is at the base vertex adjacent to the side of length $\sqrt{7}$ (so that the side of length 3 is opposite α). Calculate the size of the angle α, correct to the nearest second.



(A) $48°35'25.36''$

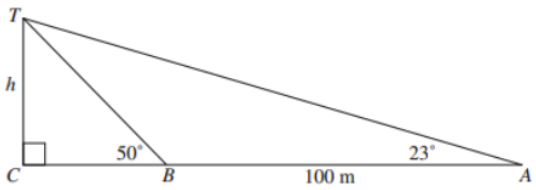
(B) $48°35'$

(C) $48°35'25''$

(D) $48°35'26''$

Q3 Riverview 2023 Trial Q11 · **4 marks**

A tower stands vertically with its top at T and its base A and a second point B on the same horizontal level as the foot of the tower. The angle of elevation of the top of the tower from point A is 23°. From point B, which is 100 metres closer to the tower and on the same horizontal level as A, the angle of elevation is 50°.



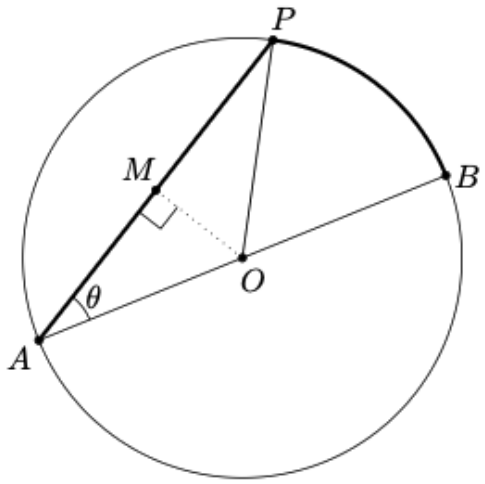
(a) Show that $\angle BTA = 27°$.

(b) Show that $BT = \dfrac{100 \sin 23°}{\sin 27°}$.

(c) Find the height h of the tower, correct to one decimal place.

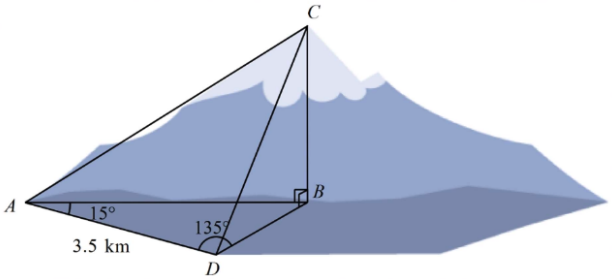
Q4 Sydney Grammar 2025 Trial Q34 · **1 mark**

A and B are the two endpoints of a diameter of a circle with centre O and radius R. A point P lies on the circumference of the circle, and $\angle PAB = \theta$, where $0 \leq \theta \leq \dfrac{\pi}{2}$. Let M be the midpoint of the chord AP, so that $\angle OMA = \dfrac{\pi}{2}$ (you do not need to show this). Find AM in terms of R and θ.



Q5 Killara 2021 Trial Q17 · **3 marks**

A novice hiker is deciding whether to begin her hike up a mountain from point A or from point D, which is 3.5 km away. The angle of inclination measured from point A to the peak of the mountain, C, is 36°. The points A, B and D lie on a level plane, where B is the point directly below the peak C. It is given that $\angle DAB = 15°$ and $\angle BDA = 135°$.

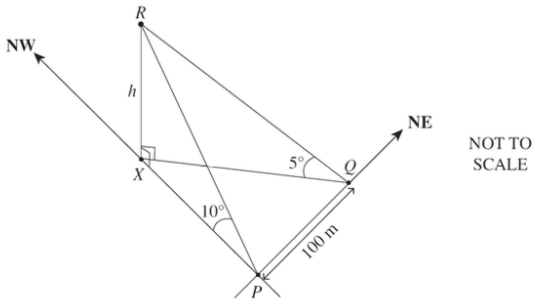


(a) Show that $AB = \dfrac{3.5 \sin 135°}{\sin 30°}$.

(b) Hence, or otherwise, find the angle of inclination from point D to the peak of the mountain. Give your answer to the nearest minute.

Q6 Danebank 2022 Trial Q24 · **5 marks**

A hiker starts from point P and walks 100 metres along a straight path to the north-east, arriving at point Q. A peak is located at point R, which is directly above the point X on the horizontal plane, so that $RX = h$ is the height of the peak. From point P, the angle of elevation to the peak R is 10°, and from point Q the angle of elevation to the peak is 5°. The horizontal triangle PQX has $\angle PXQ = 135°$.

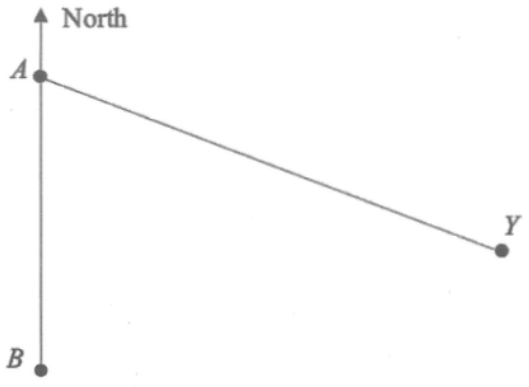


(a) Show that $XP = h \cot 10°$, and find a similar expression for XQ.

(b) Hence, find the value of h. Give your answer correct to the nearest metre.

Q7 Sydney Tech 2024 Trial Q28 · **6 marks**

A yacht leaves Port A on a bearing of 120° and sails for three hours at an average speed of 15 km/h to its destination Y, where it stops. At the same time, a speed boat also leaves Port A and travels due south to Island B, which is 30 km from the port.



(a) Calculate the distance of the yacht from Island B, to the nearest kilometre.

(b) Find the bearing of Island B from the yacht, to the nearest degree.

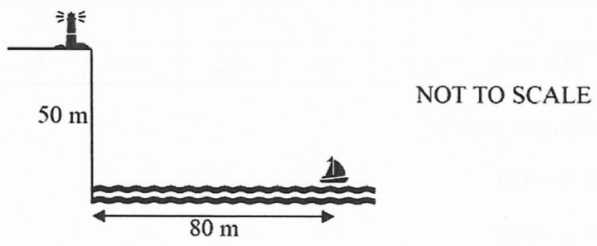
(c) After spending several hours at the island, the speed boat travels due north back towards Port A. How far south of the port will the speed boat be when it is directly west of the yacht?

Applications

2. Angles of elevation and depression

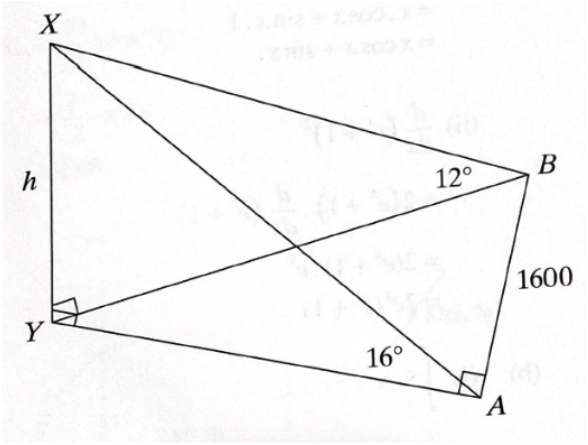
Q8 Kambala 2021 Prelim Q2 · **2 marks**

A lighthouse stands on top of a 50 metre high cliff. A yacht is 80 metres out to sea below the lighthouse. What is the angle of depression of the yacht from the base of the lighthouse, to the nearest degree?



Q9 Girraween 2020 Trial Q28 · **4 marks**

Declan walks 1600 metres due north along a straight road from point A to point B. The foot Y of a hill XY (where X is the top of the hill) lies on the same road, due south of A, and Y is on the same horizontal plane as the road. Let the height of the hill above Y be h metres. From point A the angle of elevation to the top of the hill is 16°, and from point B the angle of elevation to the top of the hill is 12°.

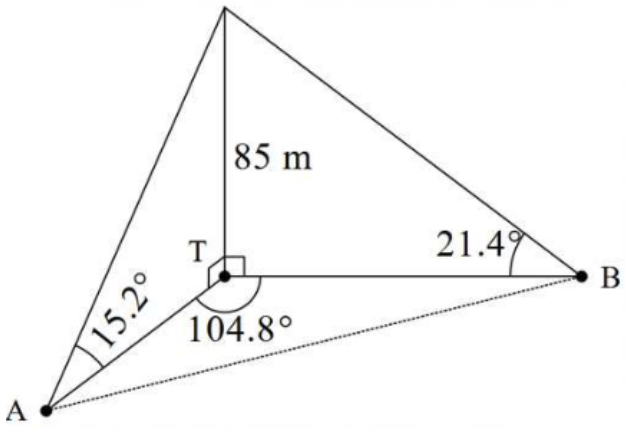


(a) Show that $BY = h\cot 12°$.

(b) Hence, find the value of h, to the nearest metre.

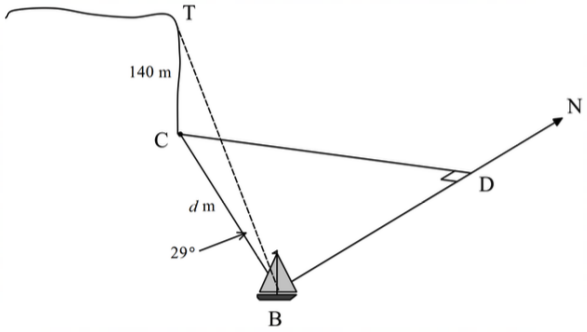
Q10 Loreto Kirribilli 2022 Prelim Q34 · **3 marks**

A radio tower with top T is 85 metres tall and stands perpendicular to level ground. Angela is at point A, where the angle of elevation to the top of the tower is 15.2°. Beth is at point B, where the angle of elevation to the top of the tower is 21.4°. The angle $\angle ATB = 104.8°$. The tower is due for repairs and a construction site will be fenced off in the shape of triangle ATB. Find the area of triangle ATB, to the nearest square metre.



Q11 Killara 2022 Prelim Q28 · **4 marks**

A travelling boat, at point B, spots a 140 metre vertical cliff on a true bearing of 312°. The angle of elevation from the boat to the top of the cliff is 29°. Let C be the base of the cliff.



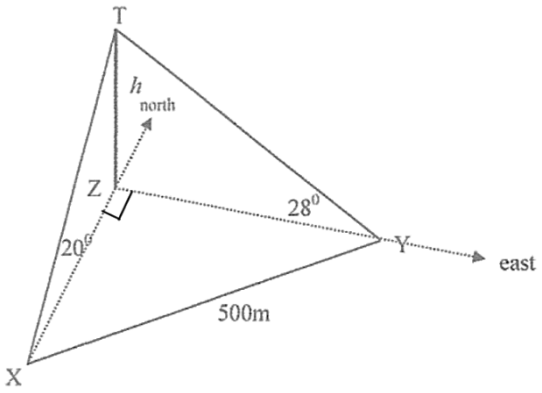
(a) Show that the distance d metres from the boat to the base of the cliff is given by

$$d = \frac{140}{\tan 29°}.$$

(b) The boat then travels due north to a point D, until it is directly east of the base of the cliff, so that $\angle BDC = 90°$. Find the new angle of elevation from the boat to the top of the cliff, to the nearest degree.

Q12 Girraween 2023 Prelim Q12(b) · **4 marks**

A conservationist observes the angle of elevation of the top of a tree, which is h metres tall, from two positions. From a point X, due south of the foot Z of the tree, the angle of elevation is 20°; and from a point Y, due east of Z, the angle of elevation is 28°. The distance XY is 500 metres.



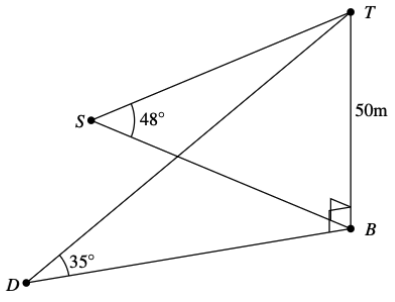
(i) Write expressions for XZ and YZ in terms of h.

(ii) Calculate the value of h, correct to one decimal place.

Q13 Knox 2024 Trial Q23 · **5 marks**

Darline and Saher visit Sydney Harbour to watch the fireworks at the top of the Sydney Harbour Bridge. Let B be the base of the bridge and T the top, where T is 50 metres above B. From Darline's position D, the base B is on a bearing of 078° and the angle of elevation to the top T is 35°. From Saher's position S, the base B is on a bearing of 140° and the angle of elevation to the top T is 48°. The points D, S and B are on the same horizontal plane.

NOT TO SCALE

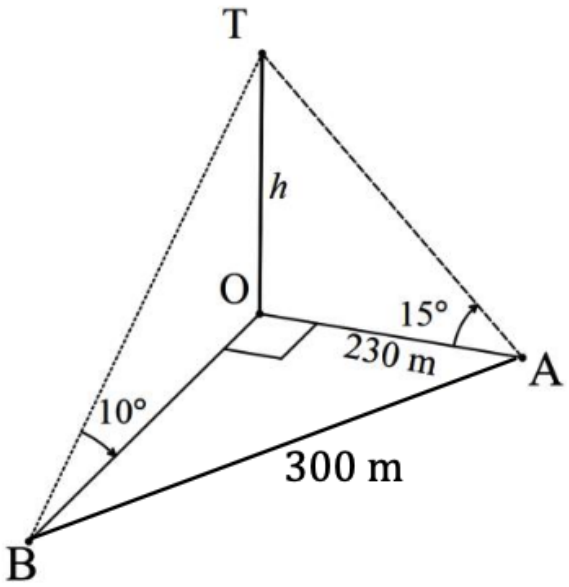


(a) Using appropriate diagrams and reasoning, show that $\angle SBD = 62°$.

(b) Find the distance between Saher and Darline, correct to two decimal places.

Q14 St George Girls 2023 Prelim Q21 · **6 marks**

Anthony stands at point A, 230 metres due east of the base O of a tower OT of height h metres. The angle of elevation of the top T from A is 15°. Brian, at point B, is due south of the tower OT; the angle of elevation of T from B is 10°.



(a) Show that $OA = h\tan 75°$.

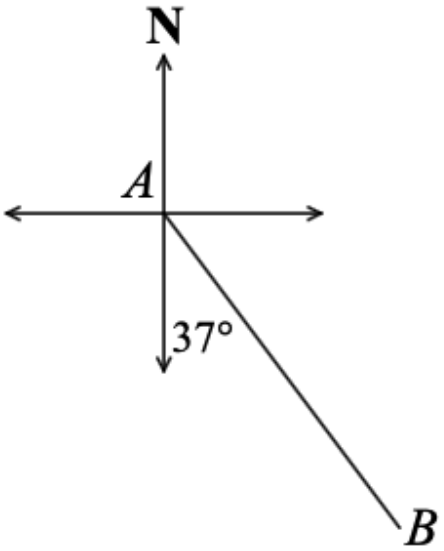
(b) By finding a similar expression for OB, find the height of the tower.

(c) What is the bearing of Brian from Anthony, to the nearest degree?

3. Bearings

Q15 Shore 2023 Trial Q4 · **1 mark**

In the diagram below, a compass cross is drawn at the point A, with north pointing up. The point B lies below and to the right of A, so that the line AB makes an angle of $37°$ with the southward direction at A. What is the true bearing of A from B?



(A) 037°

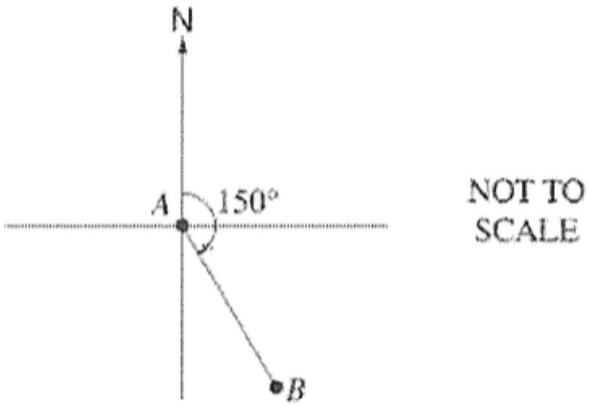
(B) 143°

(C) 307°

(D) 323°

Q16 Girraween 2022 Trial Q3 · **1 mark**

A plane flies on a bearing of 150° from A to B. What is the bearing of A from B?



(A) 030°

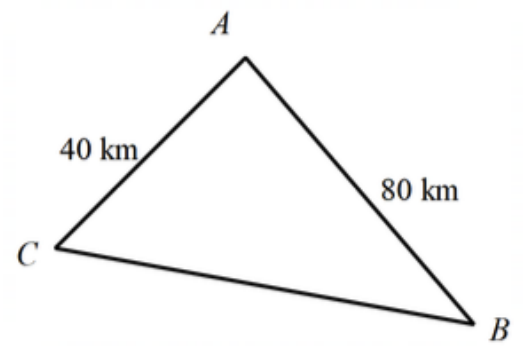
(B) 150°

(C) 210°

(D) 330°

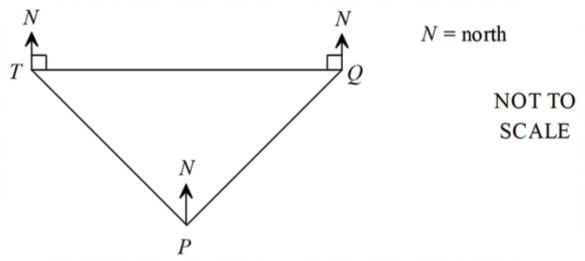
Q17 Cherrybrook Tech 2020 Trial Q13 · **3 marks**

Three towns A, B and C form a triangle. Town A is 80 km from Town B, and Town C is 40 km from Town A. The bearing of Town B from Town A is 130°, and the bearing of Town C from Town A is 240°. Find the distance between Town B and Town C, to the nearest kilometre.



Q18 Pymble 2022 Prelim Q17 · **3 marks**

The diagram below represents the flight path of a plane; the arrows marked N indicate the direction of north. The plane flies from a town T to a property P, which is 83 kilometres away on a bearing of 129°. The plane then flies to another property Q, which is 91 kilometres from P and which is due east of T.

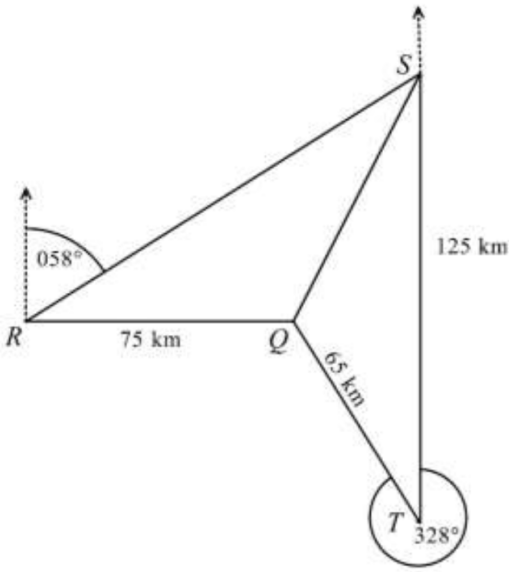


(a) Mark the diagram above with all the given information.

(b) What is the bearing of Q from P, correct to the nearest minute?

Q19 Moriah 2021 Prelim Q25 · **4 marks**

Four towns Q, R, S and T are positioned as follows. Q is due east of R with $RQ = 75$ km, and T is due south of S with $ST = 125$ km. The distance $QT = 65$ km. The bearing of S from R is 058°, and the bearing of Q from T is 328°.



(a) Calculate the distance SQ, correct to the nearest kilometre.

(b) Find the size of $\angle RSQ$ to the nearest degree, and hence give the bearing of Q from S.

Q20 Barker 2020 Trial Q11 · **5 marks**

A balloon drifts 100 km from point A to point B on a bearing of 028°. At point B the balloon changes direction and drifts 50 km to point C on a bearing of 114°.

(i) Draw a diagram showing the above information.

(ii) Show that the distance from point A to point C is 115 km to the nearest kilometre.

(iii) Find the bearing of point A from point C. Give your answer to the nearest degree.

Q21 Fort St 2021 Prelim Q3 · **6 marks**

Starting from point A, a hiker walks 800 metres on a bearing of 053°T, reaching point B. From point B the hiker walks a further 1.35 kilometres on a bearing of 165°T until point C.

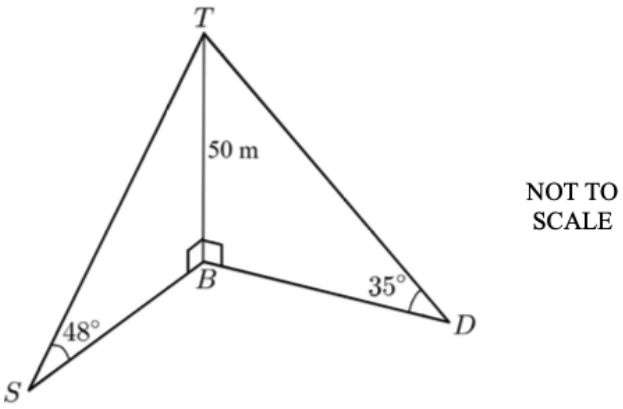
(i) Draw a one-third page diagram of the hiker's path.

(ii) What is the distance from A to C, correct to the nearest metre?

(iii) What bearing should the hiker take to get back to A from C?

Q22 Barker 2024 Trial Q24 · **3 marks**

A tall electricity tower BT is 50 metres in height, with its base at B and top at T. Two wire cables run from T down to positions S and D on the ground. From position S, which is due south of B, the angle of elevation to the top of the tower T is 48°. From position D, which is on a true bearing of 085° from B, the angle of elevation to the top of the tower T is 35°.

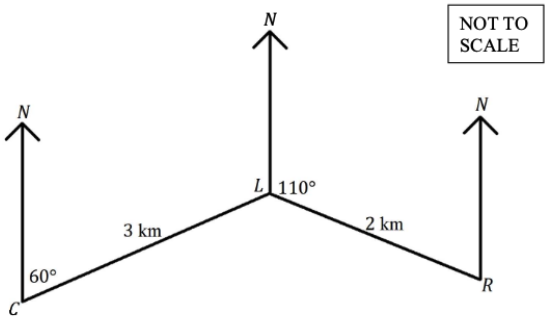


(i) Find the distance SB.

(ii) Find the distance SD, correct to the nearest metre.

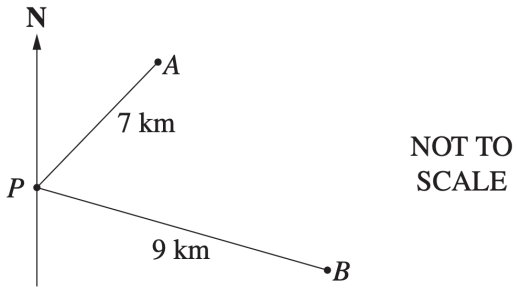
Q23 Penrith 2024 Trial Q18 · **4 marks**

Henry is going on a bushwalk. He walks 3 km on a bearing of 060°T from his car C, where he reaches a lookout L. He then walks 2 km on a bearing of 110°T to a rockpool R. Find the shortest distance that Henry needs to walk to return to his car, and the bearing on which he would be walking from the rockpool (to the nearest degree).



Q24 2020 HSC Q15 · **5 marks**

Mr Ali, Ms Brown and a group of students were camping at the site located at P. Mr Ali walked with some of the students on a bearing of 035° for 7 km to location A. Ms Brown, with the rest of the students, walked on a bearing of 100° for 9 km to location B.



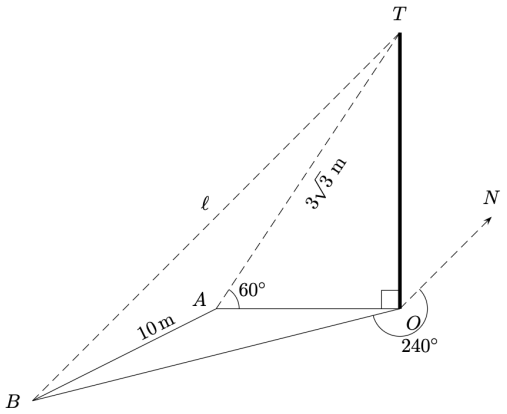
(a) Show that the angle APB is 65°.

(b) Find the distance AB.

(c) Find the bearing of Ms Brown's group from Mr Ali's group. Give your answer correct to the nearest degree.

Q25 Normanhurst Boys 2025 Trial Q24 · **6 marks**

A tall pole OT is held vertically in place by ropes anchored to two pegs in the ground at A and B, where O is the base of the pole and T is its top. The pegs are 10 metres apart, so $AB = 10$ m. Point A is due west of O, and B is on a true bearing of 240° from O. The rope connecting the top of the pole T to the peg at A is $3\sqrt{3}$ metres long and makes an angle of 60° with the ground.



(a) Show that $OB = \dfrac{9 + 11\sqrt{13}}{4}$ metres.

(b) Hence, or otherwise, find the length of the rope ℓ connecting T and B. Give your answer to the nearest metre.