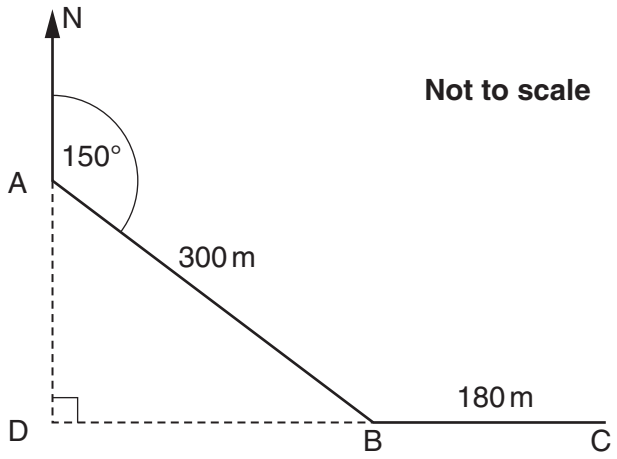
1 Haroon is orienteering in open, level countryside.

His instructions tell him:

- from the start, A, walk 300 m on a bearing of 150° to B
- then walk 180 m due east from B to C.



(a) AD is the distance that B is south of A.

Show by calculation that AD is 260 m, correct to the nearest metre. **[2]**

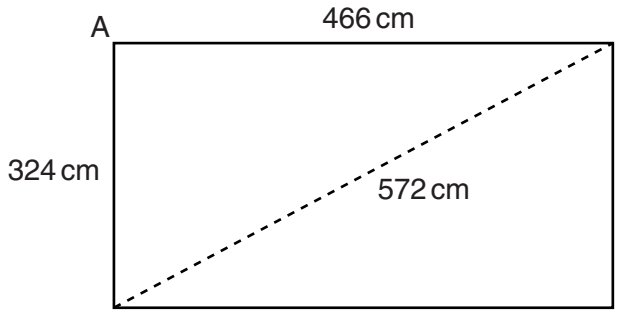
(b) Calculate the distance DC that C is east of A.

(b) ..... m **[3]**

(c) Calculate the bearing from C on which Haroon should walk to get back to the start, A.

(c) ..... ° **[4]**

2 Catherine is designing a new kitchen.
She wants to find out whether the walls meet at an angle of 90°.
She measures two walls and a diagonal across the kitchen floor.
This diagram of the floor shows her measurements.



Not to scale

(a) Use the wall measurements to calculate what the length of the diagonal should be if angle A = 90°.

(a) _____ cm **[3]**

(b) Use your result for the length of the diagonal to decide whether angle A is equal to 90°, less than 90° or more than 90°. Show how you decide.

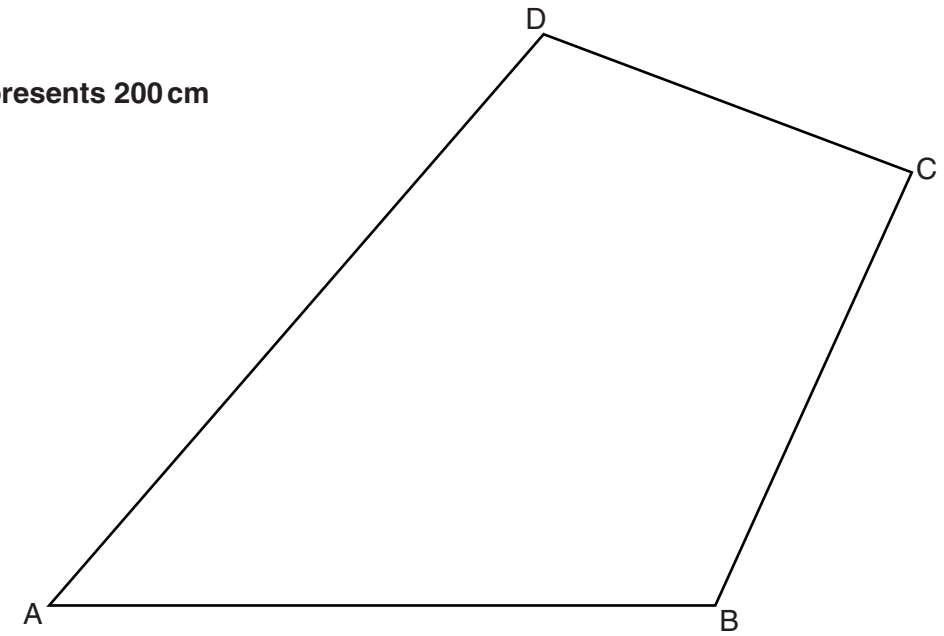
Angle A is _____ 90° because _____

_____ **[1]**

3 *In this question, use a ruler and a pair of compasses.*
Leave in your construction lines.

The scale drawing ABCD shows Neil's garden.
AB is the wall of Neil's house.

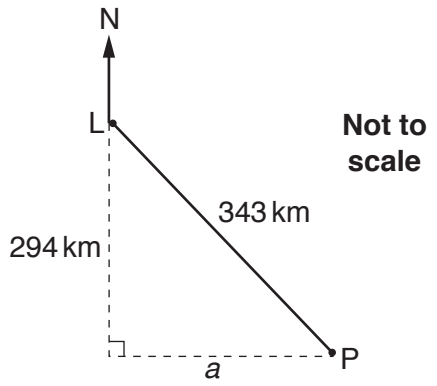
Scale: 1 cm represents 200 cm



Construct the perpendicular from D to AB.
Hence find the shortest actual distance, in metres, from corner D of the garden to the house.

_____ m **[4]**

4 Paris, P, is 343 km from London, L.
It is 294 km south of London.



(a) Calculate *a*, the distance that Paris is east of London.

(a) .....km **[3]**

(b) Calculate the bearing of Paris from London.

(b) .....° **[4]**

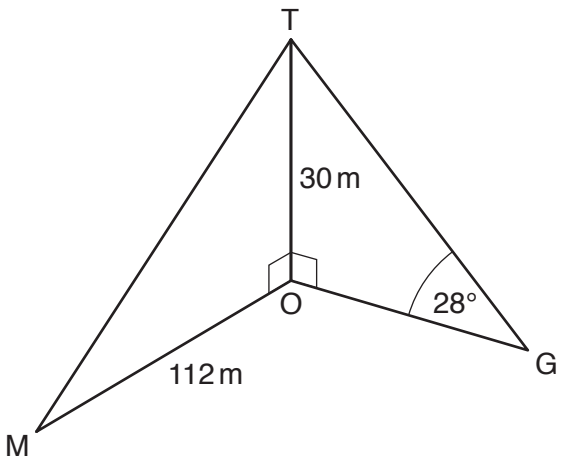
5 A vertical mobile phone mast, OT, is 30 m tall.

The diagram shows two of the straight wires, MT and GT, that support the mast.

M, G and O are all on horizontal ground.

The angle of elevation of the top of the mast, T, from G is 28°.

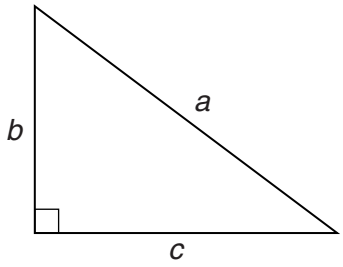
M is 112 m from O.



What **total** length of wire has been used for MT and GT?

..... m **[6]**

6 Here is a right-angled triangle.



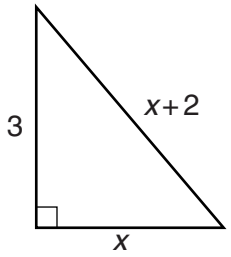
For this triangle

$$a^2 = b^2 + c^2.$$

Calculate the value of c when $a = 2.1 \times 10^5$ cm and $b = 7.6 \times 10^4$ cm.
Give your answer in standard form to an appropriate degree of accuracy.

..... cm **[4]**

7 In the triangle, all lengths are in centimetres.

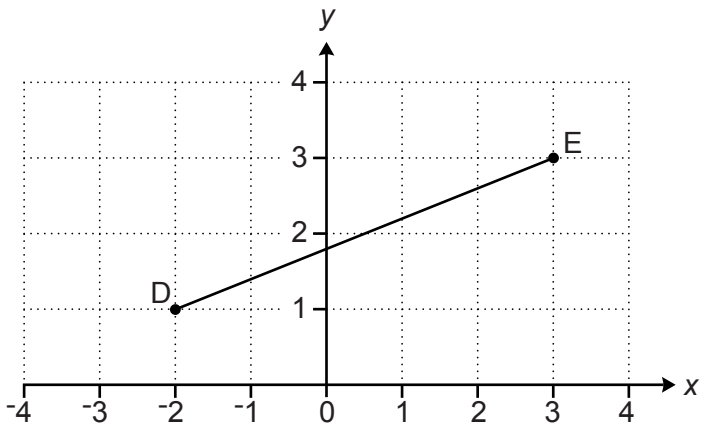


Not to scale

Use Pythagoras' theorem to find x.

_____ **[5]**

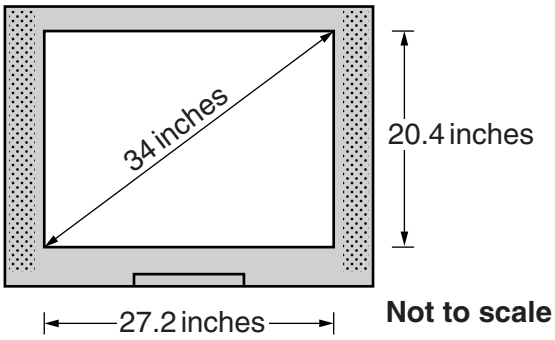
8 This is a grid of centimetre squares.



Calculate the length DE, giving your answer correct to 2 decimal places.

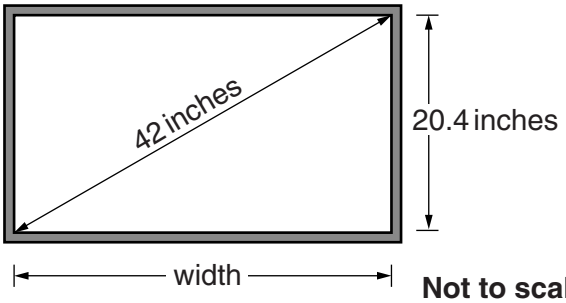
_____ cm **[5]**

9 The Jones family decides to buy a new TV.
This sketch shows their old TV.
The screen size of a TV is given as the length of its diagonal.



Not to scale

They decide to buy a new widescreen TV with the same screen height as their old one.
The diagonal of the new TV is 42 inches, as shown in this sketch.



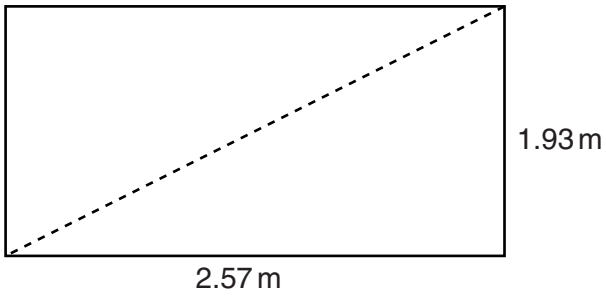
Not to scale

The screens of these TVs are rectangular.

Calculate how much wider, in inches, the screen on their new TV is than the screen on their old TV.

_____ inches **[4]**

10 Dave is building a greenhouse.
The base measures 2.57 m by 1.93 m.



Not to scale

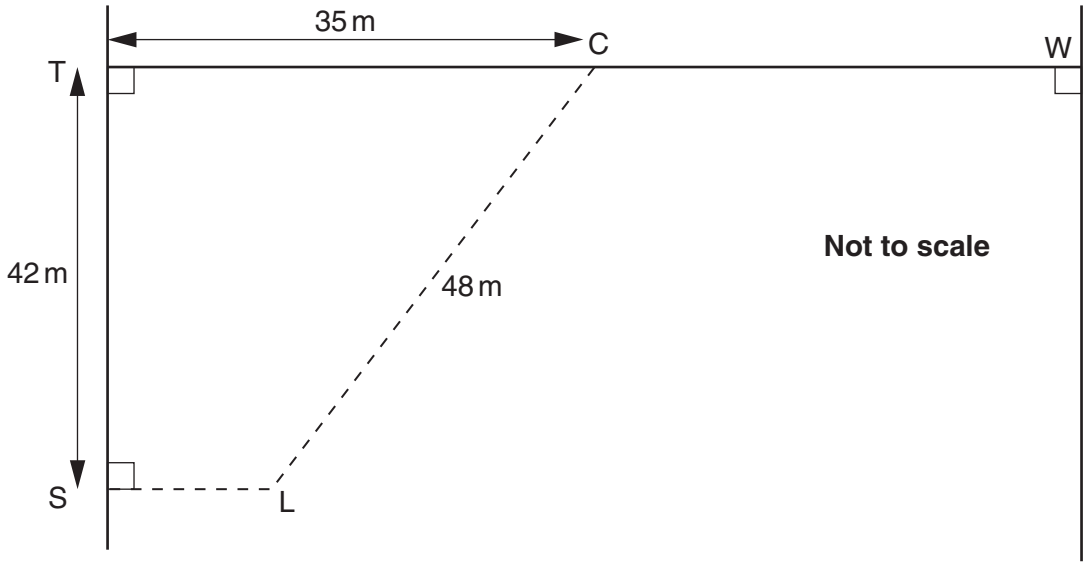
Dave checks that the base is a rectangle by measuring the diagonals.

Calculate the length that a diagonal should be.

_____ m **[3]**

11 Leigh plays rugby and is about to kick the ball towards goal.

(a) He is standing at L.
L is 48 m from the centre C of the goal, and 42 m from the line TW.
The distance TC is 35 m.



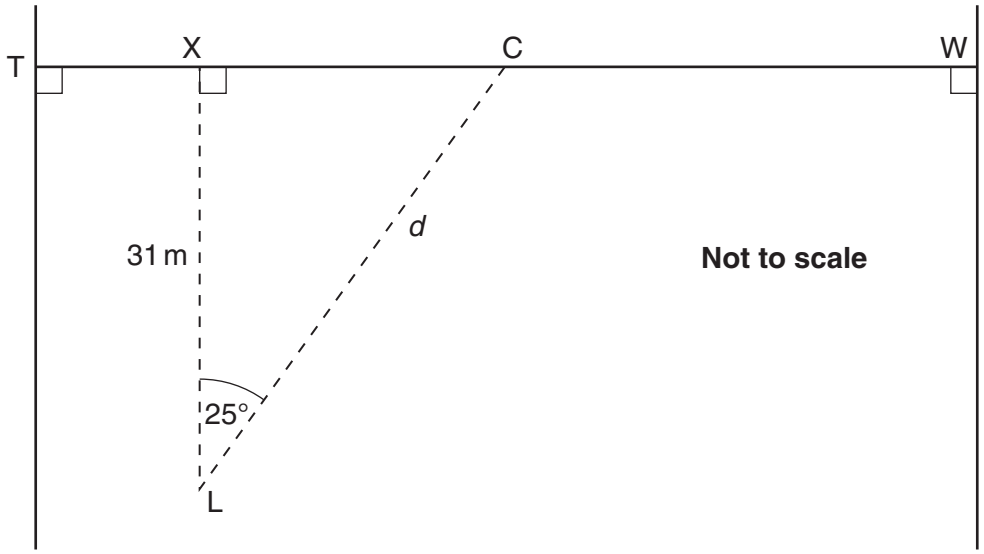
(i) Calculate LS, the shortest distance from Leigh to the line ST.

(a)(i) ..... m **[4]**

(ii) Calculate angle TCL.

(ii) .....° **[3]**

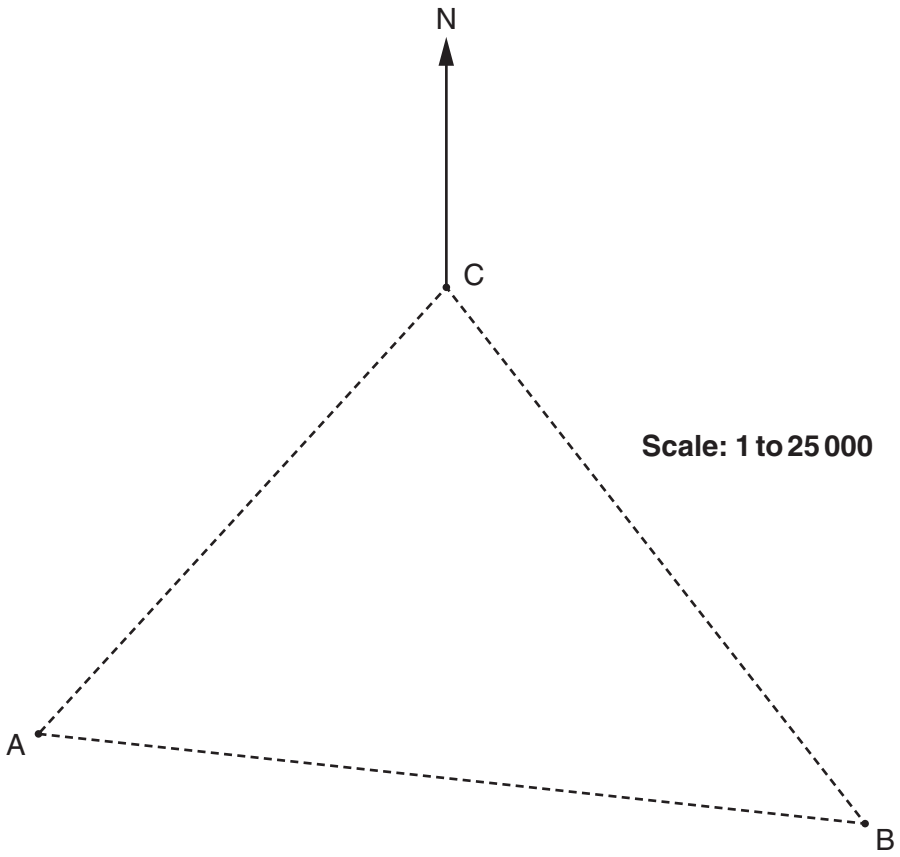
(b) Later in the game, Leigh has another kick towards goal.
This time, he is standing 31 m from the line TW and the angle XLC is 25°.



Calculate the distance, *d*, between Leigh and the centre of the goal.

(b) ..... m **[3]**

12 (a This map shows three places A, B and C in some flat countryside.
They are joined by paths.



(i) By measuring, find the bearing of A from C.

(a)(i) _____ ° **[1]**

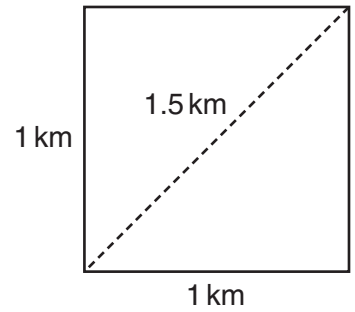
(ii) Ruth and Joy are planning a walk.
They want to start at A, walk to B, then to C and then to A along the paths shown.
Joy cannot walk more than 8 km.

Can Joy complete this walk?
Show how you decide.

(ii) _____ **[4]**

(b) A different map has a squared grid printed on it.
The distance between the gridlines represents 1 km.
A magazine for walkers gives this information to help estimate distances:

The distance across a diagonal of a square represents 1.5 km.



Use Pythagoras' theorem to calculate the length of a diagonal of a square and comment on the accuracy of the magazine's information.

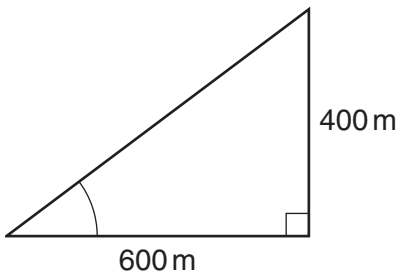
_____

_____ **[3]**

(c) Mike is walking up a path in hilly countryside.
The path increases in height by 400 m over a horizontal distance of 600 m, as shown on the diagram.

At the bottom of the path, Mike says:

It looks as if it goes up at 40° to the horizontal.



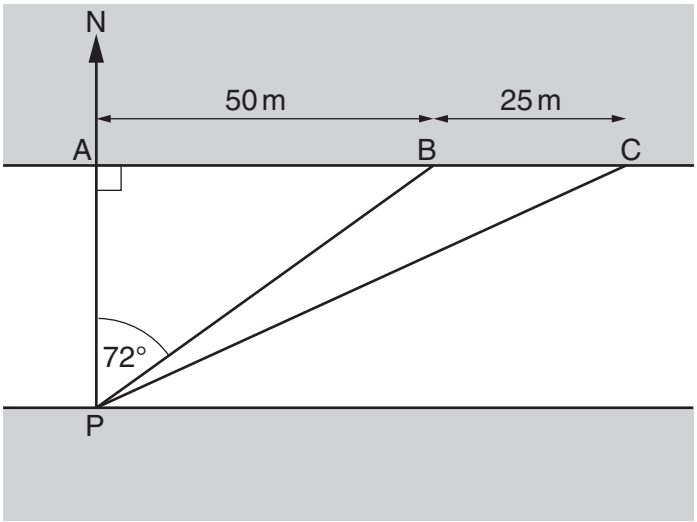
Not to scale

Calculate whether Mike's estimate is a good one.

_____

_____ **[3]**

13 Paul stands on one bank of a river at point P.
Aleysha stands on the other bank due North of Paul, at point A.
She then walks 50 m due East to point B.
At B her bearing from Paul is 072°.



Not to scale

(a) Calculate AP, the width of the river.

(a) _____ m **[3]**

(b) Aleysha walks 25 m further East to point C.

Calculate the bearing of C from P.

(b) _____ ° **[3]**