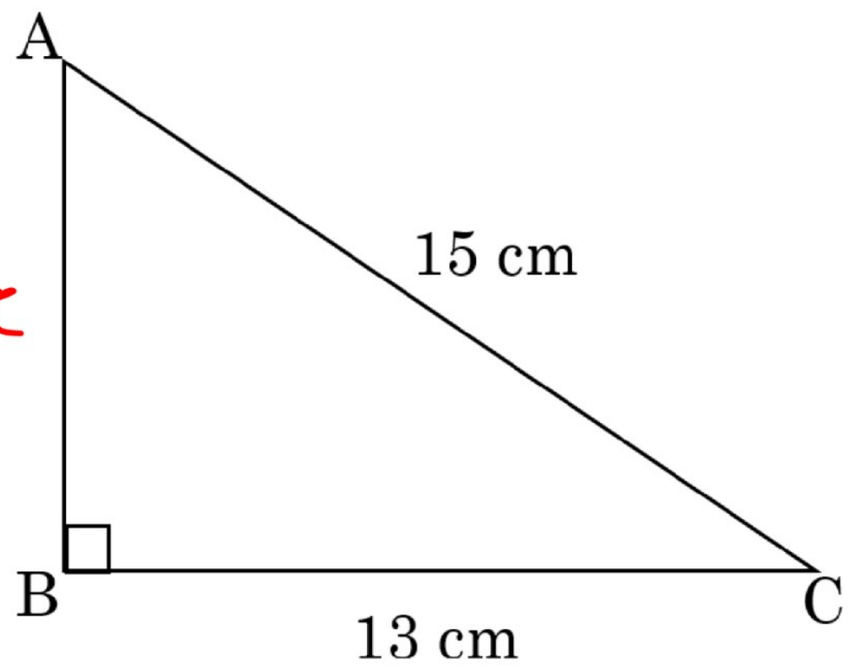
Pythagoras' Theorem Exam Practice

Q1. Find the length of side AB correct to 1 decimal place.



$x^2 = 15^2 - 13^2$

$x^2 = 225 - 169$

$x^2 = 56$

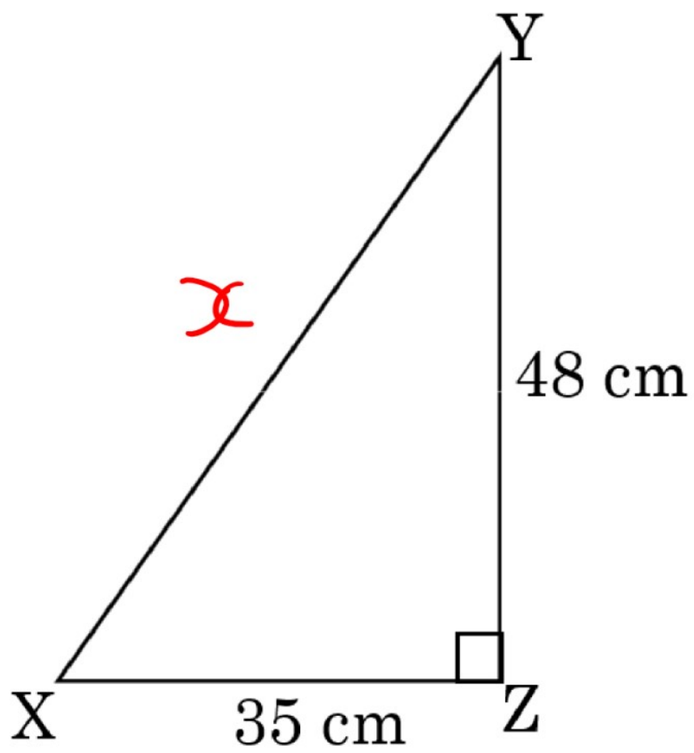
$x = \sqrt{56}$

$x = 7.48\ldots$

Answer: 7.5 cm

(3 marks)

Q2. Find the length of side XY correct to 1 decimal place.



$x^2 = 35^2 + 48^2$

$x^2 = 3529$

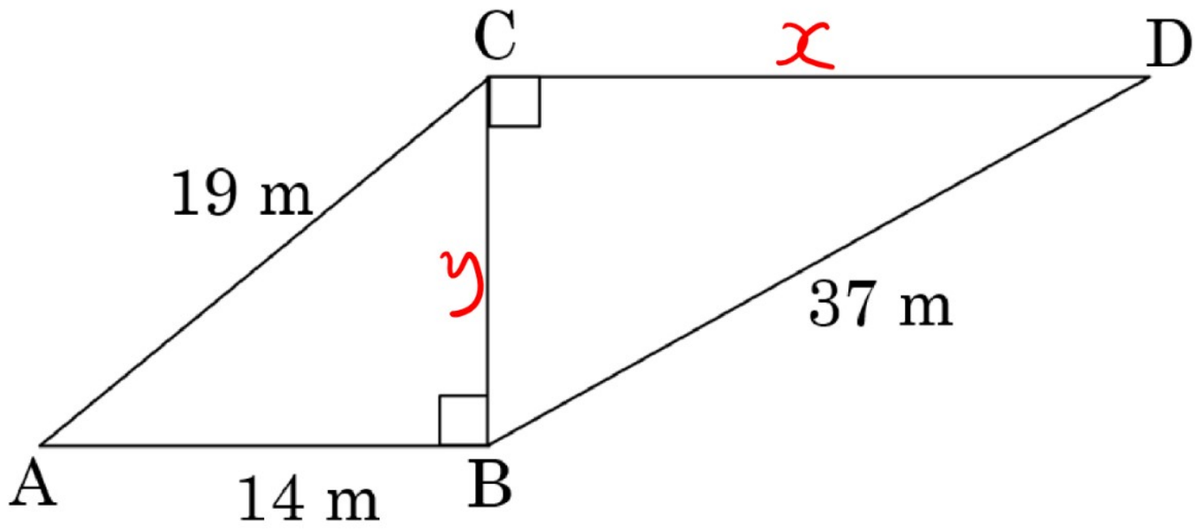
$x = \sqrt{3529}$

$x = 54.405\ldots$

Answer: 54.4 cm

(3 marks)

Q3. Find the length of side CD correct to 1 decimal place.



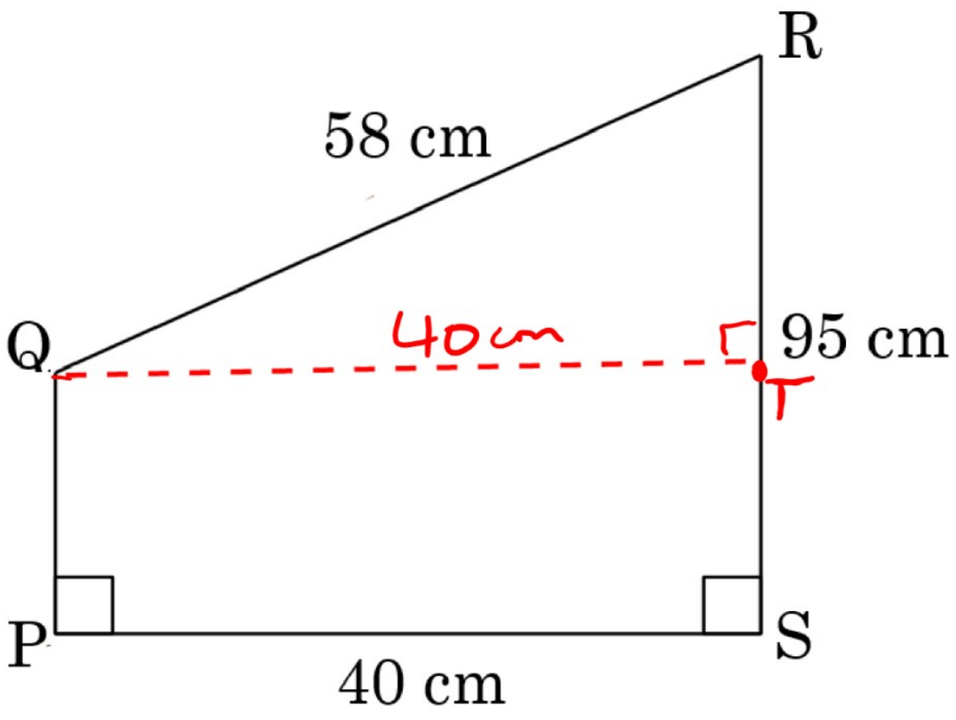
- $y^2 = 19^2 - 14^2$
- $y^2 = 361 - 196$
- $y^2 = 165$
- $y = \sqrt{165}$

- $x^2 = 37^2 - (\sqrt{165})^2$
- $x^2 = 1369 - 165$
- $x = \sqrt{1204}$
- $x = 34.69..$

Answer: 34.7 m

(4 marks)

Q4. Find the length of side PQ.



- $(RT)^2 = 58^2 - 40^2$
- $= 1764$
- $RT = \sqrt{1764}$
- $= 42$

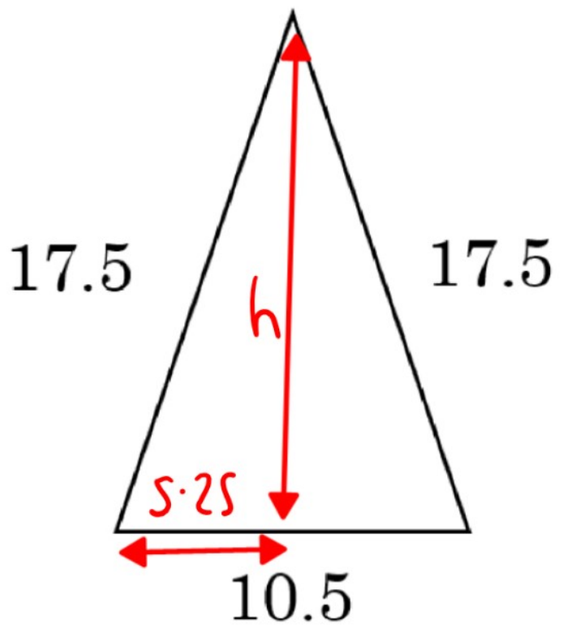
$PQ = 95 - 42$

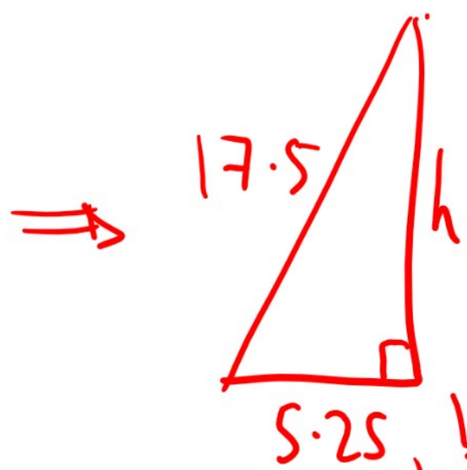
$= 53$

Answer: 53 cm

(4 marks)

Q5. Find the area of the triangle shown, giving your answer to 3 significant figures.





5·25, because the original triangle is isosceles

- $h^2 = 17.5^2 - 5.25^2$

$h^2 = 278.6875$

$h = \sqrt{278.6875}$

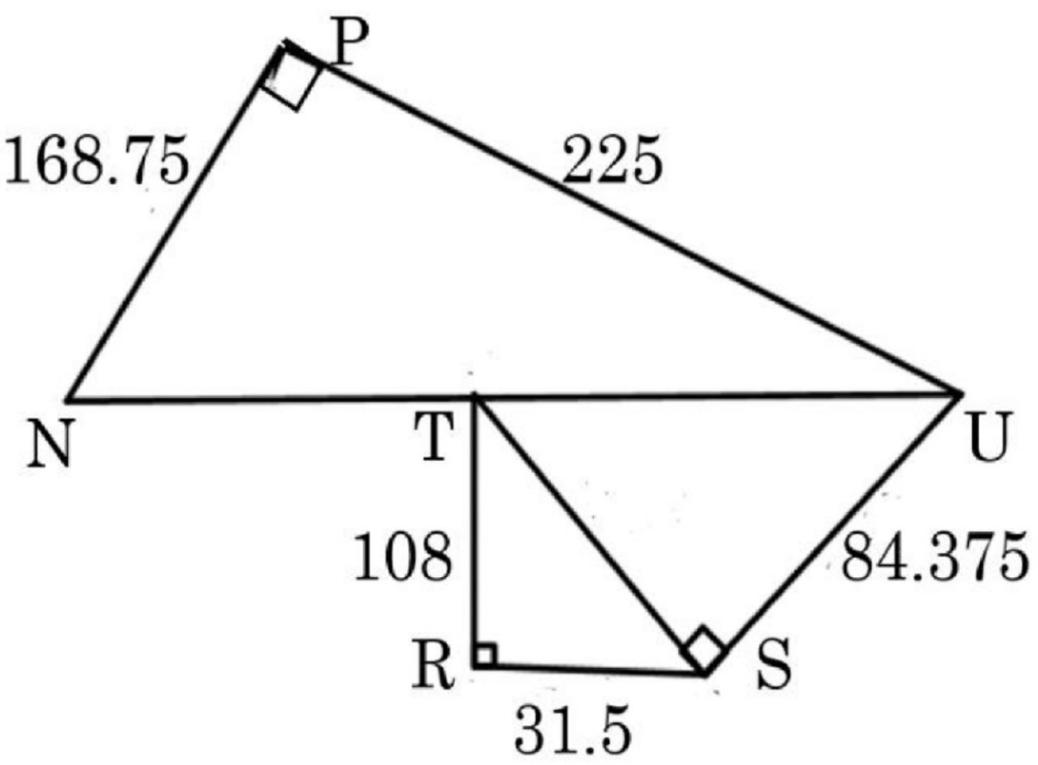
- Area $= \frac{1}{2} \times 10.5 \times \sqrt{278.6875}$ (using Area $= \frac{1}{2} \times b \times h$)

$= 87.64\ldots$

Answer: 87.6 units^2

(4 marks)

Q6. Given that T is the mid-point of side NU, show that the triangle NPU is right-angled.



- $(TS)^2 = 108^2 + 31.5^2 \Rightarrow TS = 112.5$

  $(TU)^2 = 112.5^2 + 84.375^2 \Rightarrow TU = 140.625$

- $NU = 2 \times TU, \Rightarrow NU = 281.25$

- We now show ~~that~~ $(NU)^2 = (PN)^2 + (PU)^2$, which proves ~~that~~ NPU is right-angled.

$$\left.\begin{aligned} 168.75^2 + 225^2 &= 79101.5625 \\ \text{and} \quad 281.25^2 &= 79101.5625 \end{aligned}\right\} \text{Same}$$

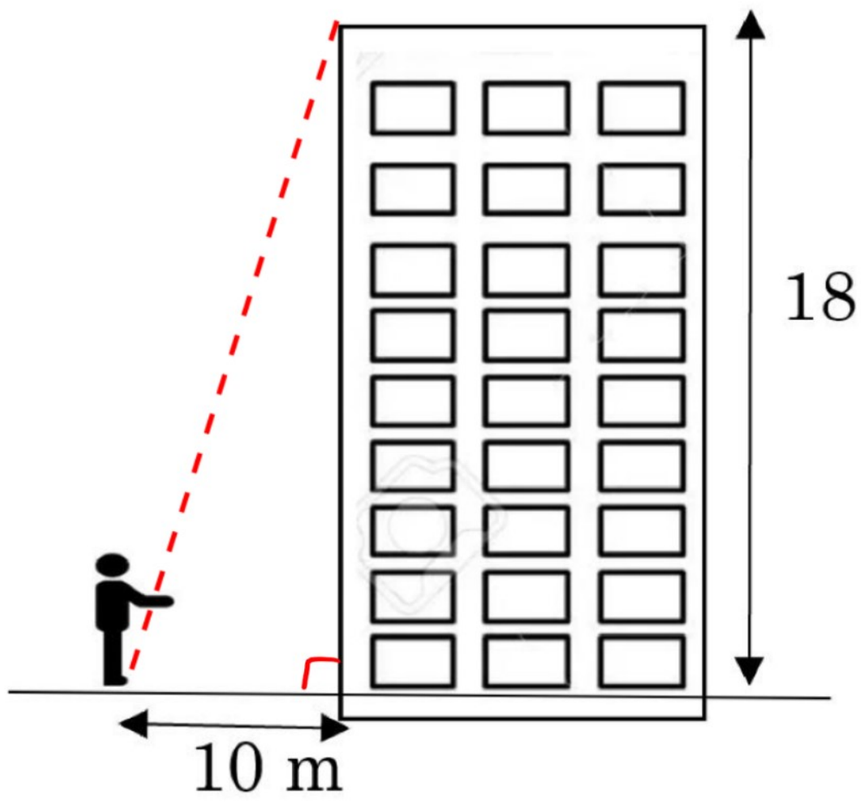
$\therefore$ NPU is right-angled.

Answer: _____

(5 marks)

Problem Questions:

Q7. A boy throws a ball so that it lands on top of the building shown below:



a) Work out an estimate for the distance the ball has travelled from the boy's arm to the roof.

let d = the distance

$d \approx \sqrt{10^2 + 18^2}$

$= \sqrt{424}$

$= 20.59\ldots$

Answer: 20.6

(3 marks)

b) Is your answer to (a) an under or over-estimate?
Explain your choice.

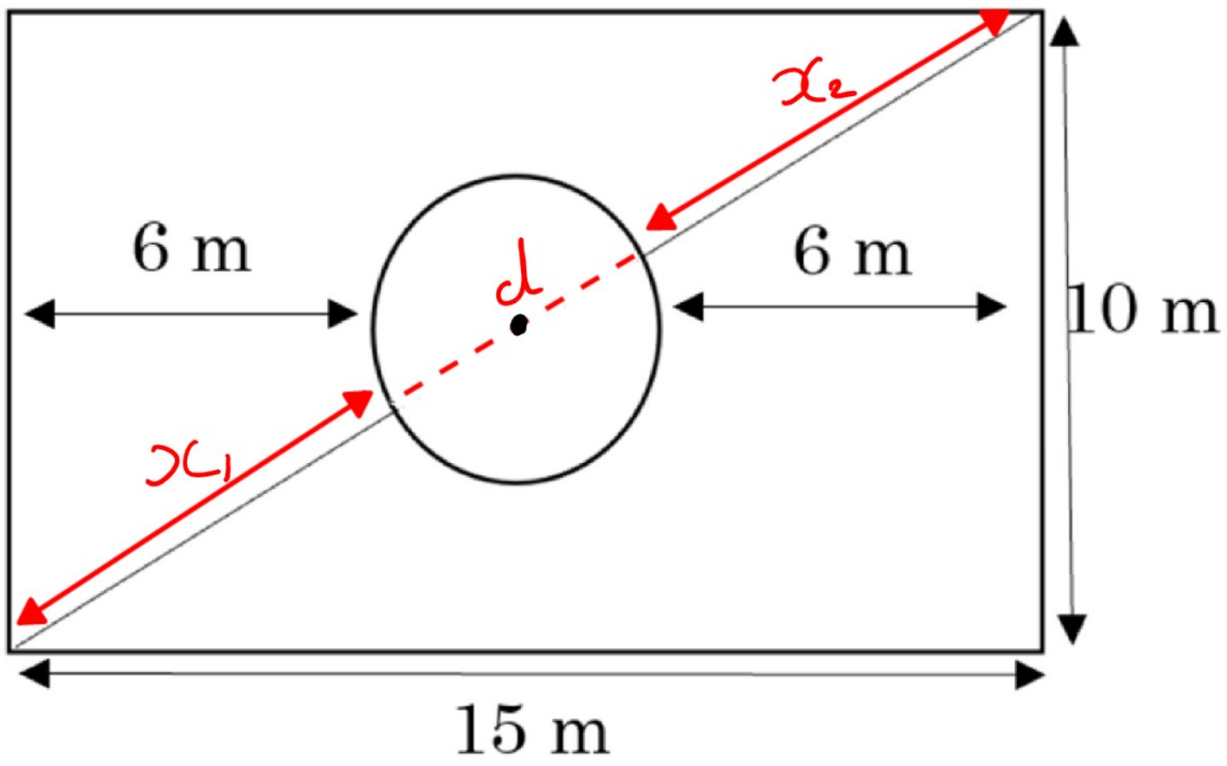
eg. • Over: the height of the boys arm from the ground has not been taken into account.

• Under: the path of the ball would be a curve rather than a straight line so longer in practice.

Answer: _____

(1 mark)

Q8. Here is a plan of an ornamental garden with a circular pond in the middle. The centre of the pond is marked on.



A path is to be created along the outside border, diagonally to the pond from the corners, and around the pond, using square paving slabs. If each 0.5 m² slab costs £11.50, work out the total cost of paving the garden.

- $d = 15 - 6 - 6$

$\Rightarrow d = 3$

- Circular path $= \pi d$
  $= 3\pi$ metres
- Border : $15 + 15 + 10 + 10 = 50$ m
- Diagonal distance from corner of border to far border is:

$$\sqrt{15^2 + 10^2}$$

$$= 5\sqrt{13}$$

$\Rightarrow x_1 + x_2 =$ diagonal distance − diameter of pond

$\Rightarrow x_1 + x_2 = 5\sqrt{13} - 3$

$\therefore$ total path length $= 3 + 50 + 5\sqrt{13} - 3$
$= 50 + 5\sqrt{13}$
$= 68.0277\ldots$ m

$\therefore$ total cost $= (68.0277 \div 0.5) \times £11.50$

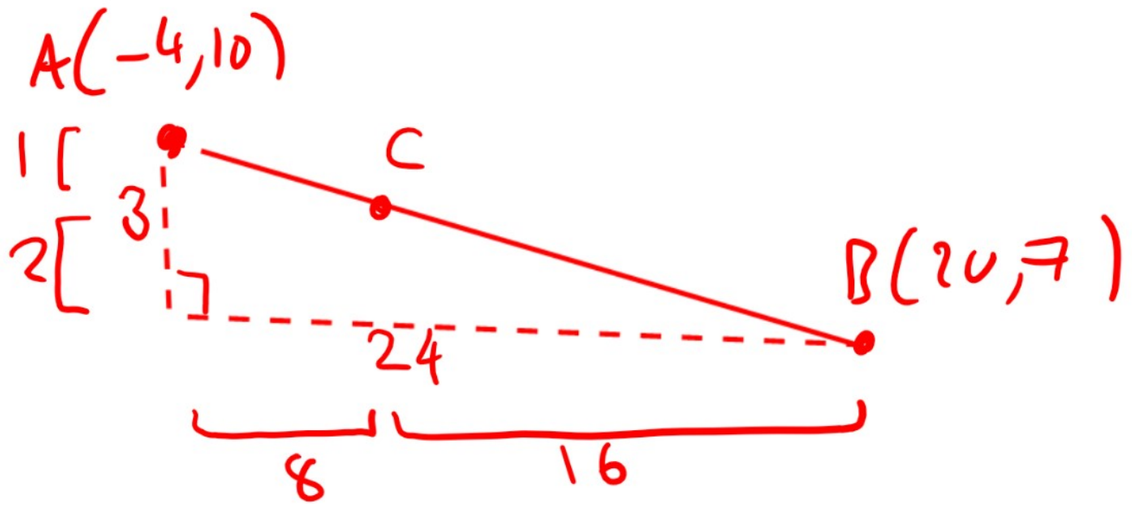
Answer: £1564.64

$\Rightarrow £1564.638\ldots$

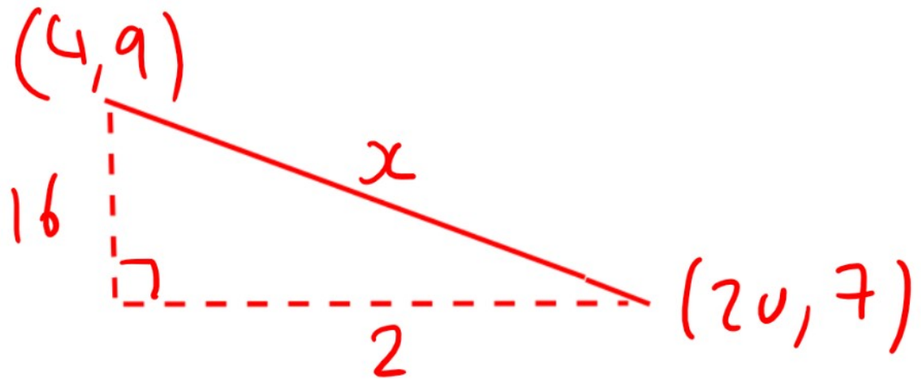
(6 marks)

Q9. AB is a line segment, where A is (-4,10) and B is (20, 7). The point C divides AB in the ratio 1 : 2.

Find the distance CB to 1 decimal place.



$\Rightarrow C=(4,9)$



$x^2 = 16^2 + 2^2$

$x^2 = 260$

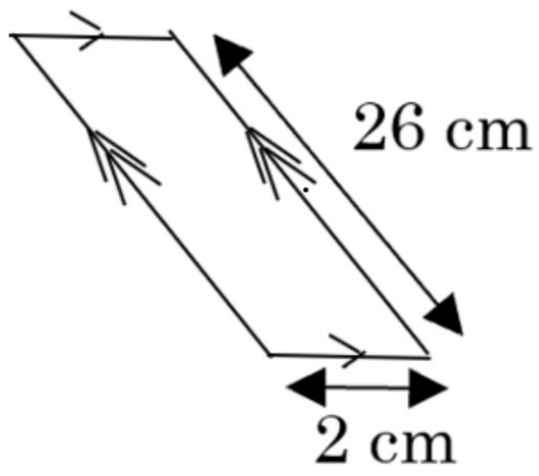
$x = \sqrt{260}$

$x = 16.12\ldots$

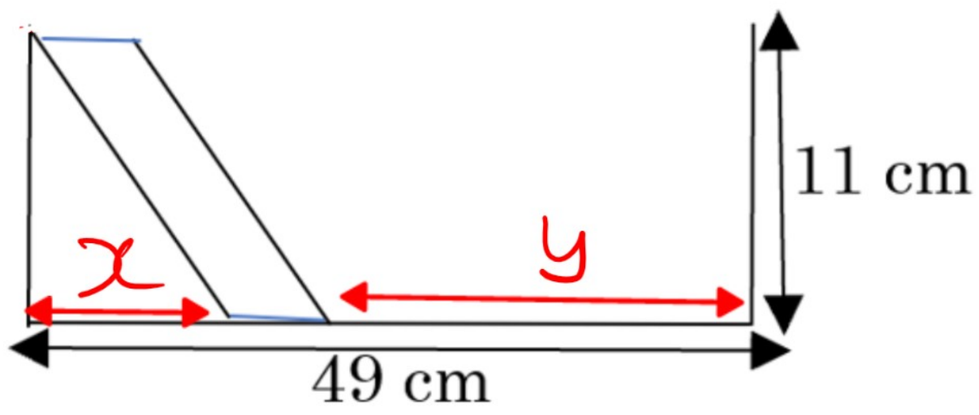
Answer: 16.1

(5 marks)

Q10. Identical models in the following shape are to be packed into a box:



The first is fixed in place as shown:



More models are then placed on the right of the one already in the box.
Work out how many models can be placed in the box in this model.

- $x^2 + 11^2 = 26^2$

  $x = \sqrt{555}$

  $y = 49 - 2 - \sqrt{555}$

  $y = 23.44$

- No. additional models which can go into the box is $23.44 \div 2 = 11.72\ldots$

  $\Rightarrow$ 11 models

- Total no. of models = 12

Answer: 12

(6 marks)