

GEOMETRY

Chapter 10: Pythagoras & Trigonometry

Part 1: Pythagoras' Theorem



[Starter](#)

[Video](#)

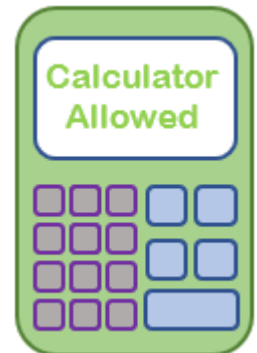
[Worksheet – I'm giving it a try!](#)

[Worksheet – I'm building my confidence!](#)

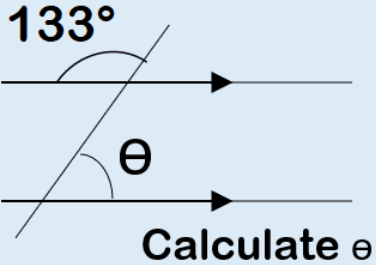
[Worksheet – I'm ready for anything!](#)

[Extension](#)

[Homework](#)



Answer 4 questions to make a straight line vertically, horizontally or diagonally.

Write 90 as a product of prime factors	If $a = 1$, $b = -1$ and $c = 3$, calculate $2a + bc$	A table that used to cost £180 has increased in price by 49%. How much does it cost now?	The ratio of red to blue sweets is 4 : 5 and blue to green sweets is 4 : 3. What is the ratio of red to green sweets?
 Calculate θ	Factorise $12a^2 - 15ab$	Find the nth term of the sequence 8, 12, 16, 20, 24	Calculate $\frac{1}{6} \times \frac{2}{9}$
Calculate $\frac{3}{6} + \frac{3}{9}$	Estimate 21.11×7.65	Share 120 in the ratio 6 : 4	Expand and simplify $(x - 8)(x + 1)$
Solve $7(4y - 2) = -42$	The mean of these 4 numbers is 3.75. Calculate the missing value. 6, 1, 6, ?	Does the co-ordinate (2, 4) lie on the graph $y = 2x - 3$?	Calculate the size of one exterior angle in a regular pentagon.

[Answers](#)

Answers

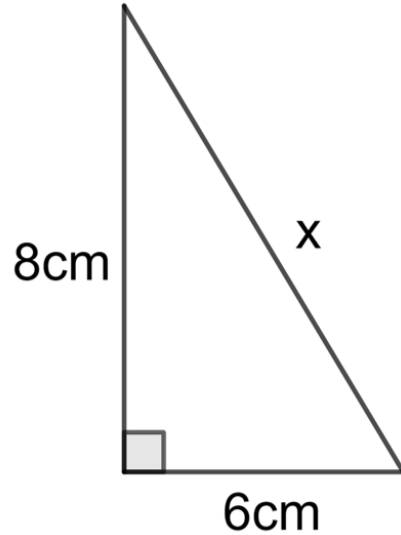
$2 \times 3^2 \times 5$	-1	£268.20	16 : 15
47°	$3a(4a-5b)$	$4n + 4$	$1/27$
$5/6$	160	$72 : 48$	$x^2 - 7x - 8$
$y = -1$	2	$4 = 2(2) - 3$ No	72°

[Back to the start!](#)

* Diagrams not drawn to scale

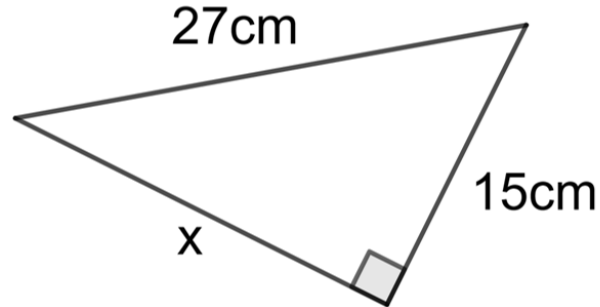
Pythagoras' Theorem

1. Calculate x .

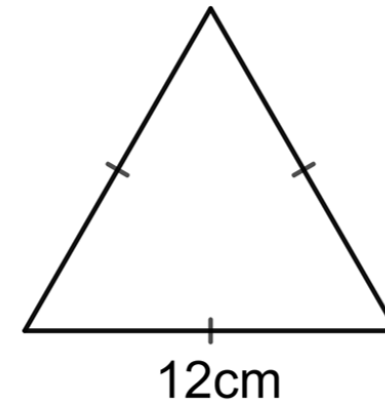


2. Calculate x .

Give your answer to 2 decimal places.



3. An equilateral triangle has sides of length 12cm. What is the perpendicular height of the triangle?



Watch this [video](#) to see how to do the examples.
Remember to pause the video when promoted to copy the notes.

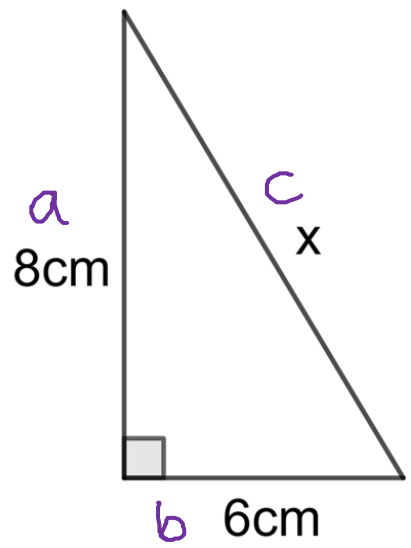
[Notes](#)

Pythagoras' Theorem

* Diagrams not drawn to scale

allows us to calculate the length of one side of a right-angled triangle, given the other 2 sides.

1. Calculate x.

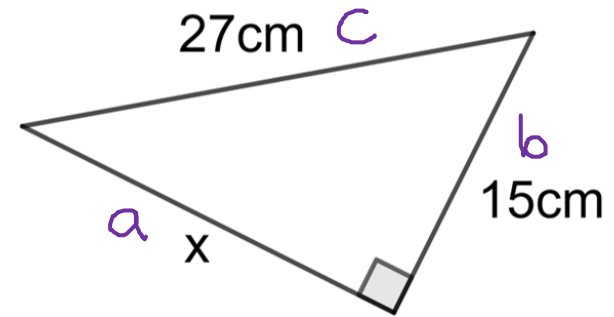


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 8^2 + 6^2 &= x^2 \\ 64 + 36 &= x^2 \\ 100 &= x^2 \\ x &= \sqrt{100} = 10\text{cm} \end{aligned}$$

(Pythagorean triple)

2. Calculate x.

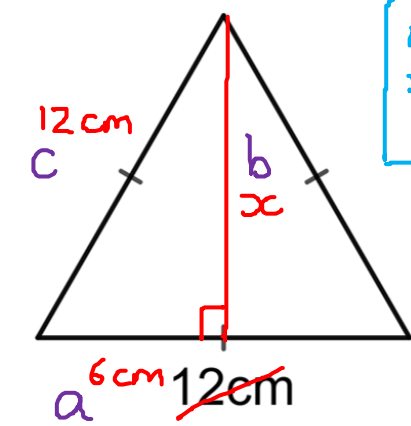
Give your answer to 2 decimal places.



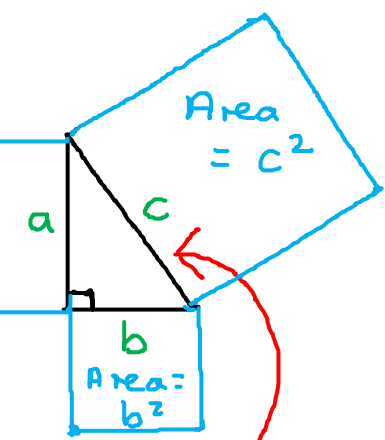
$$\begin{aligned} a^2 + b^2 &= c^2 \\ x^2 + 15^2 &= 27^2 \\ x^2 + 225 &= 729 \\ x^2 &= 729 - 225 \\ x^2 &= 504 \\ x &= \sqrt{504} = 22.45\text{cm} \end{aligned}$$

(2dp)

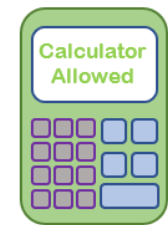
3. An equilateral triangle has sides of length 12cm. What is the perpendicular height of the triangle?



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 6^2 + x^2 &= 12^2 \\ 36 + x^2 &= 144 \\ x^2 &= 144 - 36 = 108 \\ x &= \sqrt{108} = 10.39\text{cm} \end{aligned}$$



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



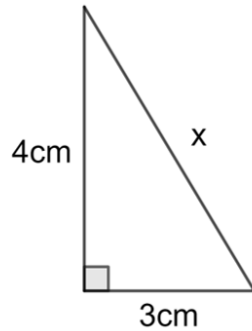
[Back to the start!](#)

* Diagrams not drawn to scale

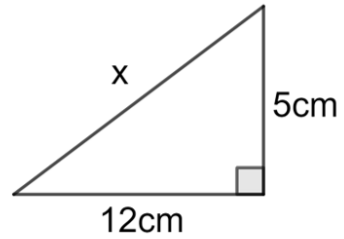
I'm giving it a try!

For each triangle below, calculate x . Give your answer to 2 decimal places where necessary:

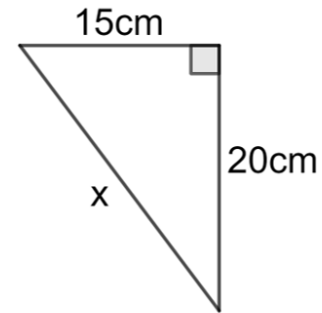
(a)



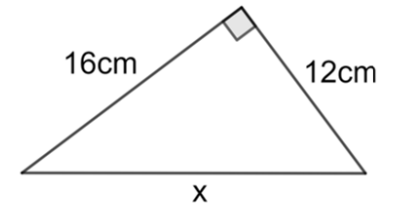
(b)



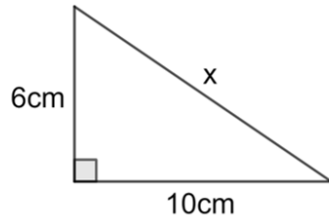
(c)



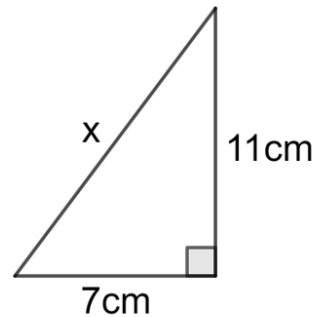
(d)



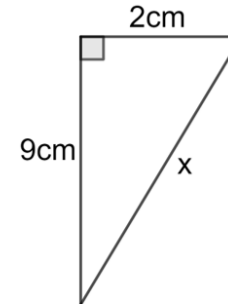
(e)



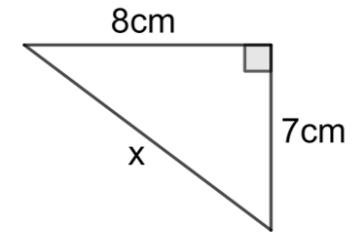
(f)



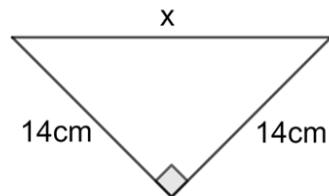
(g)



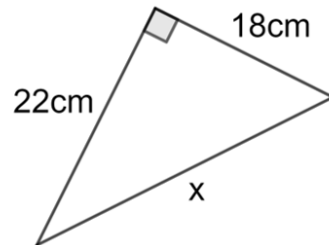
(h)



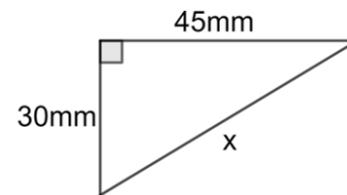
(i)



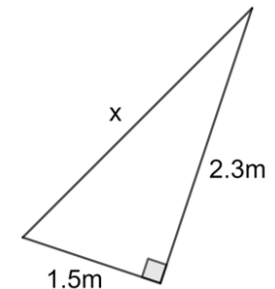
(j)



(k)



(l)



[Answers](#)

Answers

I'm giving it a try!

(a) 5cm

(b) 13cm

(c) 25cm

(d) 20cm

(e) 11.66cm

(f) 13.04cm

(g) 9.22cm

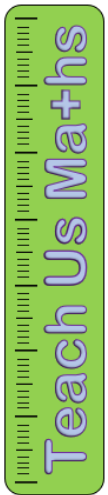
(h) 10.63cm

(i) 19.80cm

(j) 28.43cm

(k) 54.08mm

(l) 2.75m



Now that you have marked your work, take time to reflect on how confident you are feeling...

My Reflections...

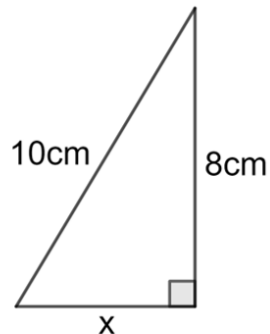


[Back to the start!](#)

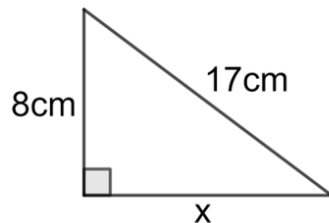
* Diagrams not drawn to scale **I'm building my confidence!**

For each triangle below, calculate x . Give your answer to 2 decimal places where necessary::

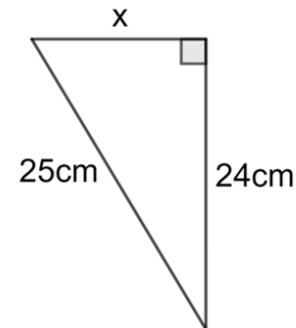
(a)



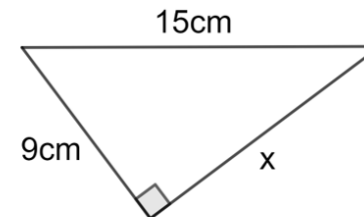
(b)



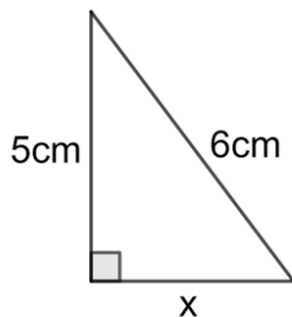
(c)



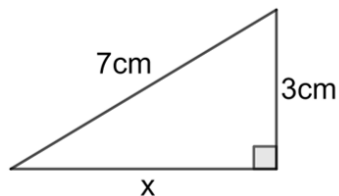
(d)



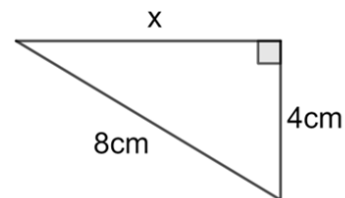
(e)



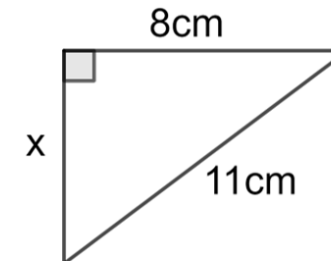
(f)



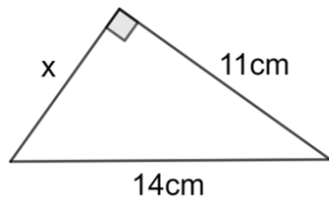
(g)



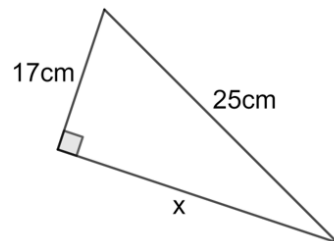
(h)



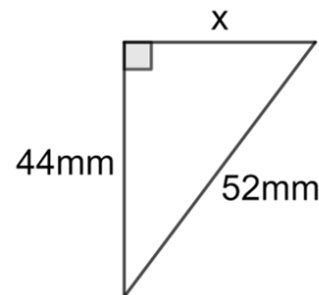
(i)



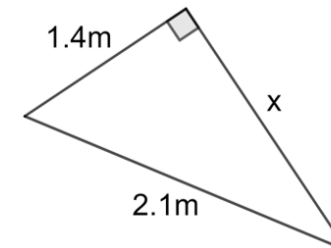
(j)



(k)



(l)



Answers

I'm building my confidence!

(a) 6cm

(b) 15cm

(c) 7cm

(d) 12cm

(e) 3.32cm

(f) 6.32cm

(g) 6.93cm

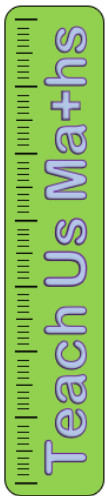
(h) 7.55cm

(i) 8.66cm

(j) 18.33cm

(k) 27.71mm

(l) 1.57m



Now that you have marked your work, take time to reflect on how confident you are feeling...

My Reflections...



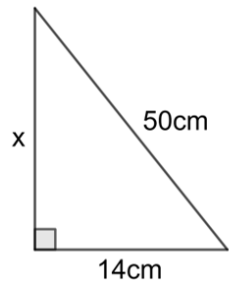
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I'm ready for anything!

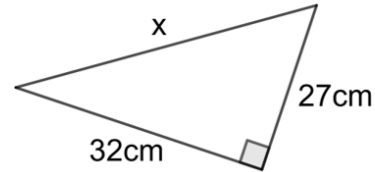
* Diagrams not drawn to scale

1. For each triangle below, calculate x . Give your answer to 2 decimal places where necessary:

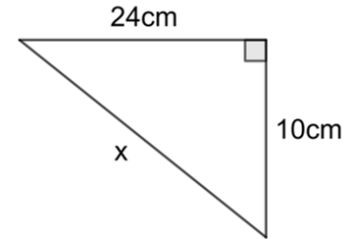
(a)



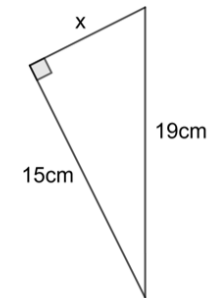
(b)



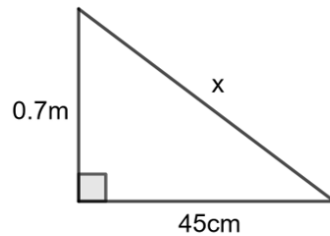
(c)



(d)



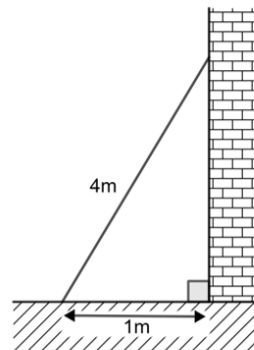
2.



Find x .

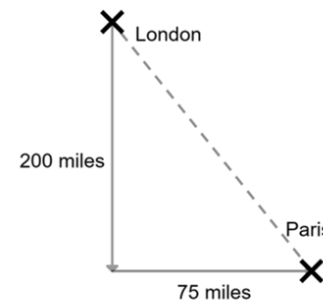
Give your answer to 2 decimal places and include suitable units.

3.



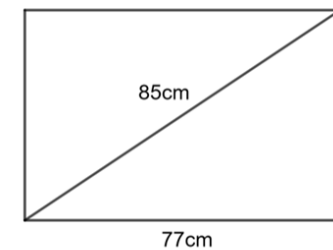
The base of a 4m long ladder is placed 1m away from the side of a house. How far up the wall will the ladder reach?

4.



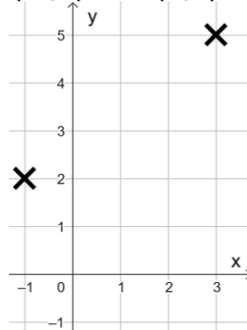
Paris is 200 miles due South and 75 miles due East of London. How far, directly, is Paris from London?

5.

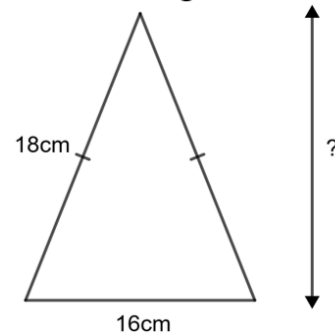


A TV screen is 77cm long and 85cm diagonally across. Find the area of the screen.

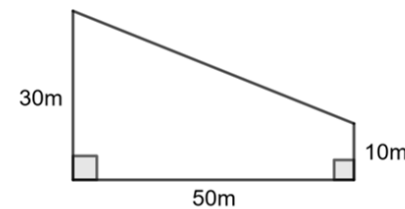
6. Find the distance between the co-ordinates $(-1, 2)$ and $(3, 5)$.



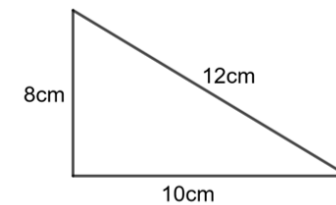
7. Find the perpendicular height of the isosceles triangle below.



8. A farmer wants to put a fence around his field. Fencing costs £40 per metre. How much will the farmer spend?



9. Is the triangle below a right-angled triangle?



Answers

I'm ready for anything!

1. (a) 48cm (b) 41.87cm (c) 26cm (d) 11.66cm

2. 0.83m or 83.22cm

3. 3.87m (2dp)

4. 213.60 miles (2dp)

5. Width = 36cm
Area = 2772cm²

6. $\sqrt{4^2 + 3^2} = 5$

7. $\sqrt{18^2 - 8^2} = 16.12cm$

8. $\sqrt{50^2 + 20^2} = 53.85 \dots m$

9. **No** $8^2 + 10^2 \neq 12^2$

Perimeter = 143.85...m

Cost = £5754.07

Now that you have marked your work, take time to reflect on how confident you are feeling...

My Reflections...



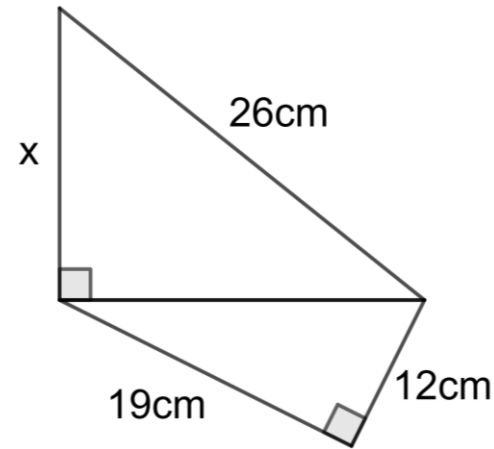
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Extension

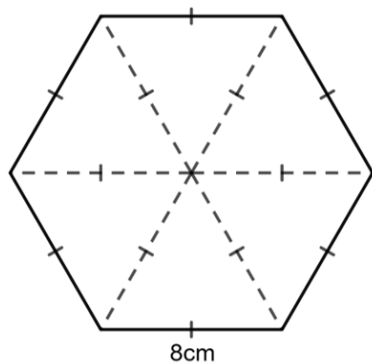
* Diagrams not drawn to scale

A right-angle triangle has got one side of length 15cm and another side of length 21cm.
Find the 2 possible lengths of the third side?

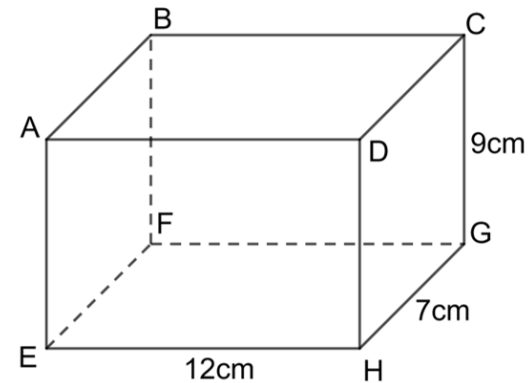
Find x.



A regular hexagon is made up of 6 equilateral triangles.
Calculate the area of a regular hexagon with length 8cm.
Give your answer in the form $a\sqrt{b}$.



Here is a cuboid. Calculate length CE.

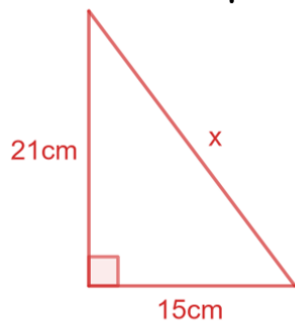


[Answers](#)

Answers

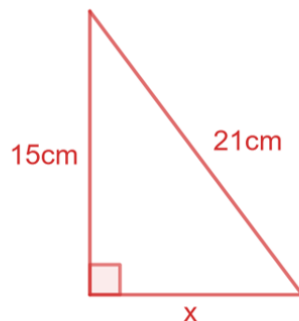
A right-angle triangle has got one side of length 15cm and another side of length 21cm.

Find the 2 possible lengths of the third side?



$$15^2 + 21^2 = c^2$$

$$c = \sqrt{15^2 + 21^2} = 25.8\text{cm (1dp)}$$

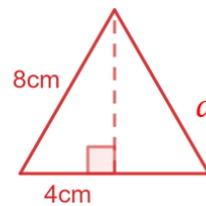
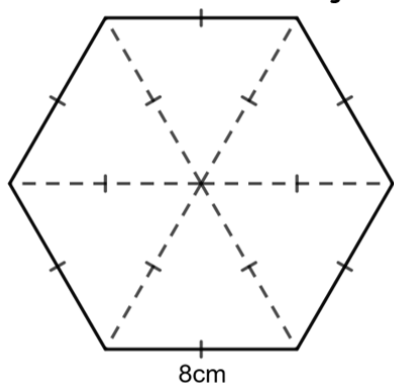


$$a^2 + 15^2 = 21^2$$

$$a = \sqrt{21^2 - 15^2} = 14.7\text{cm (1dp)}$$

A regular hexagon is made up of 6 equilateral triangles. Calculate the area of a regular hexagon with length 8cm.

Give your answer in the form $a\sqrt{b}$.



$$\text{height} = \sqrt{8^2 - 4^2} = \sqrt{48}$$

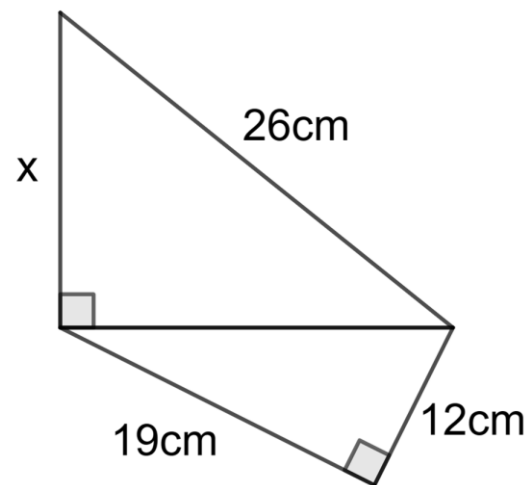
$$\text{area of equilateral triangle}$$

$$= \frac{1}{2} \times 8 \times \sqrt{48} = 4\sqrt{48}$$

$$\text{area of hexagon} = 6 \times 4\sqrt{48}$$

$$= 24\sqrt{48} = 96\sqrt{3}$$

Find x.



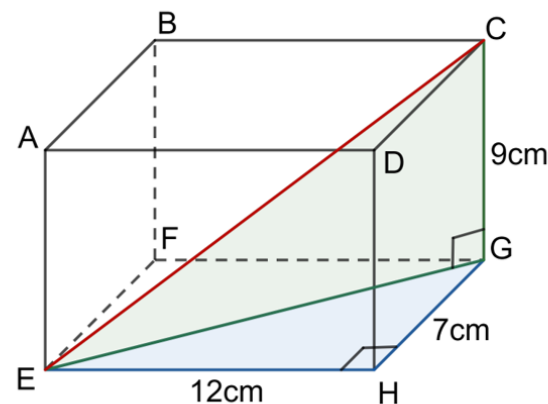
$$? = \sqrt{19^2 + 12^2} = \sqrt{505}$$

$$x = \sqrt{26^2 - (\sqrt{505})^2}$$

$$= \sqrt{26^2 - 505}$$

$$= \sqrt{171} = 13.1\text{cm (1dp)}$$

Here is a cuboid. Calculate length CE.



$$EG = \sqrt{12^2 + 7^2} = \sqrt{193}$$

$$CE = \sqrt{9^2 + (\sqrt{193})^2}$$

$$= \sqrt{81 + 193}$$

$$= \sqrt{274} = 16.6\text{cm (1dp)}$$

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Homework

* Diagrams not drawn to scale

Retrieval Homework

1) Calculate $\frac{3}{8} + \frac{2}{7}$

2) Share 63 in the ratio 1 : 8

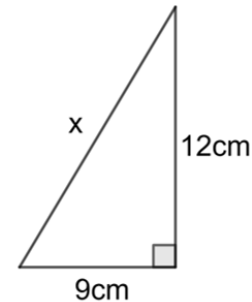
3) Expand $(x + 4)(x - 9)$

4) Increase £180 by 75%

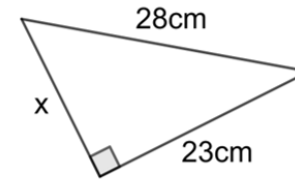
5) Solve $4(3y - 2) = 16$

Topic Homework

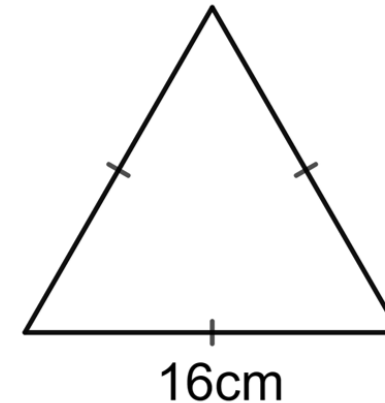
1. Calculate x.



2. Calculate x. Give your answer to 2 decimal places.



3. An equilateral triangle has sides of length 16cm. What is the perpendicular height of the triangle?



My Reflections...



[Answers](#)

Answers

Homework

Retrieval Homework

(1) $\frac{37}{56}$ (2) $7 : 56$ (3) $x^2 - 5x - 36$ (4) £315 (5) $y = 2$

Topic Homework

1. 15cm

2. 15.97cm

3. $\sqrt{16^2 - 8^2} = 13.86\text{cm}$ (2dp)

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