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Geometry – Pythagoras' theorem – Finding lengths of sides

Recap

1. Define Pythagoras' theorem

2. Round the following numbers to one decimal place:

   a. 1.35 1.4
   b. 1.89 1.9
   c. 2.24 2.2
   d. 12.564 12.6
   e. 13.40 13.4
   f. 56.36 56.4
   g. 5.99 6.0
   h. 0.45 0.5

3. Round the following numbers to three significant figures:

   a. 12.65 12.7
   b. 1.879 1.88
   c. 0.2475 0.248
   d. 12.0564 12.1
   e. 13.04 13.0
   f. 19.96 20.0
   g. 5.999 6.00
   h. 0.040502 0.0405

4. Simplify the following:

   a. $(\sqrt{2})^2$ = 2
   b. $(\sqrt{3})^2$ = 3
   c. $(\sqrt{8})^2$ = 8
   d. $(\sqrt{x})^2$ = x

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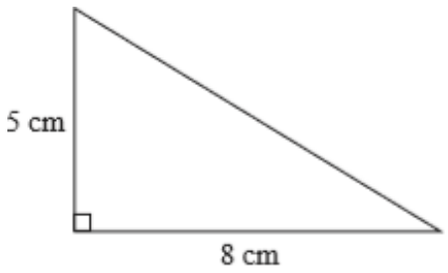
Core

1. Find the length of the hypotenuse in the triangles below. Give your answers to three significant figures.

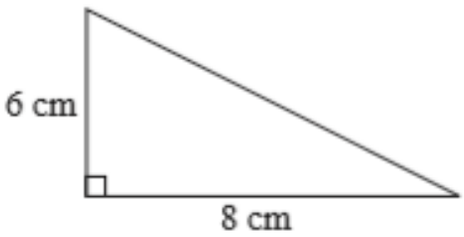
a.



9.43cm

b.

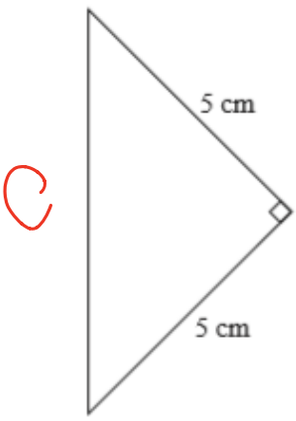
$a^2+b^2=c^2$
$6^2+8^2=c^2$
$100=c^2$



10cm

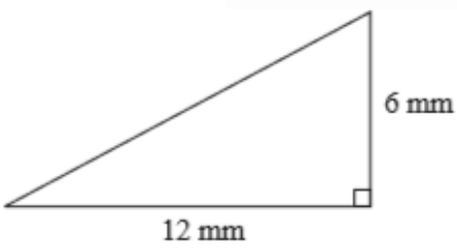
c.

$a^2+b^2=c^2$
$5^2+5^2=c^2$
$50=c^2$
$c=\sqrt{50}$



7.07cm

d.



13.4cm

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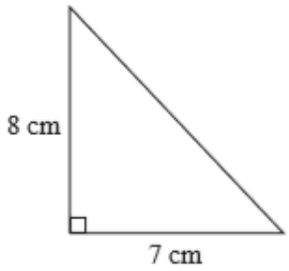
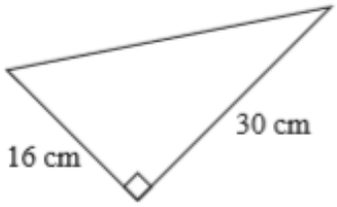
e.



$a^2+b^2=c^2$
$8^2+7^2=c^2$
$113=c^2$

10.6 cm

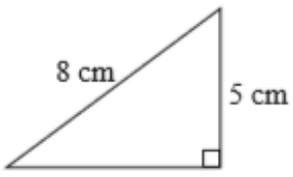
f.



34 cm

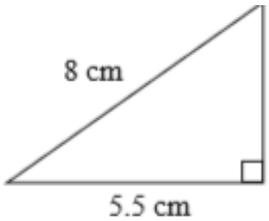
2. Find the length of the unknown side in the triangles below. Give your answers to three significant figures.

a.



6.24 cm

b.



$a^2+b^2=c^2$
$a^2+5.5^2=8^2$
$a^2+30.25=64$
$a^2=33.75$

5.81 cm

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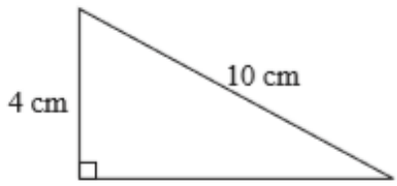
c.

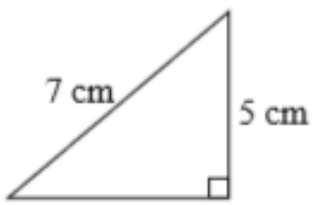
8.49cm

d.



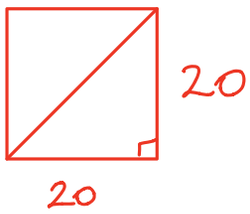
9.17cm

e.



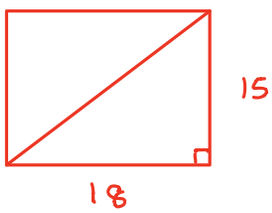
4.90cm

3. What is the length of the diagonal of a square with sides of length 20cm, giving your answer to three significant figures?



28.3cm

4. What is the length of the diagonal of a rectangle with sides 18cm and 15cm , giving your answer to three significant figures?



23.4cm

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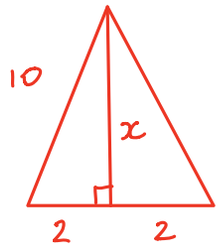
5. An isosceles triangle has two sides of length 10cm and one side of length 4cm. Calculate the perpendicular height of the triangle, giving your answer to one decimal place.

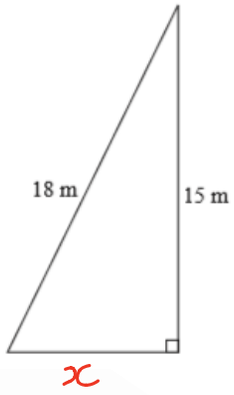


$x^2 + 2^2 = 10^2$

$x^2 = 96$

$x = 9.8$ cm (1.dp)

6. Calculate the perimeter of the triangle to the right, correct to one decimal place:



$x^2 + 15^2 = 18^2$

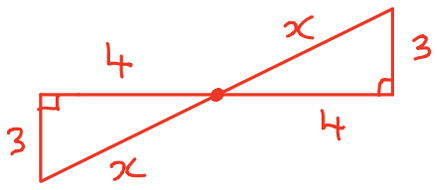
$x^2 = 9.9$

$\therefore$ Perimeter $= 9.9 + 18 + 15$

$= 42.9$m (1.d.p)

Extension

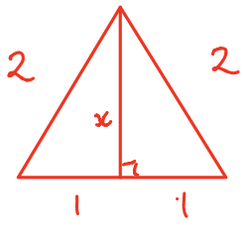
1. Two people, starting at the same point, walk along a straight line in opposite directions for four metres, then turn left through ninety degrees and walk for another three metres. What distance are they now apart?



$x = 5$m

$\therefore$ 10m

2. Sketch an equilateral triangle of side 2 cm. Draw one line of symmetry of the triangle. Use Pythagoras' theorem to calculate the height of the triangle and hence calculate the area of the triangle. Leave your answers as square roots.



$x^2 + 1^2 = 2^2$

$x^2 = 3$

$x = \sqrt{3}$

$\therefore$ Area $= \frac{1}{2} \times 2 \times \sqrt{3}$

$= \sqrt{3}$ cm

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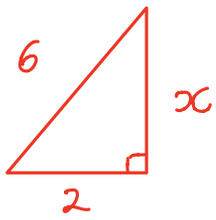
3. A ladder leaning against a vertical wall is 6m long. The bottom of the ladder is 2m from the base. How high is the ladder up the wall (correct to one decimal place)?

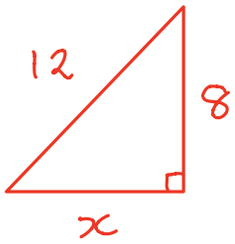


$x^2 + 2^2 = 6^2$

$x^2 = 32$

$x = 5.7\text{cm}$ (1dp)

4. A rope of length 12m is tied to the top of a flagpole and the height of the flagpole is 8m. How far will the end of the rope be from the base of the flagpole, if pulled tight (correct to one decimal place).

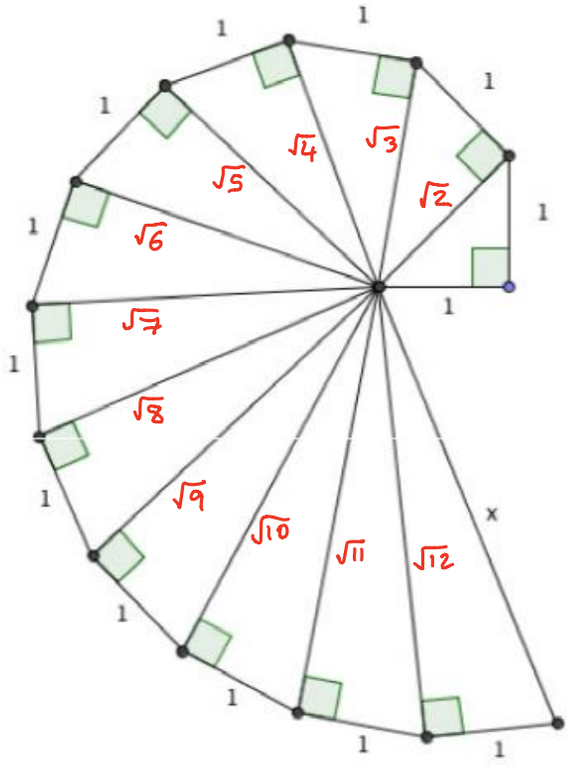


$x^2 + 8^2 = 12^2$

$x^2 = 80$

$x = 8.9\text{m}$ (1dp)

5. Find the value of x, giving your answer in the form $\sqrt{k}$, where k is a whole number.



$x = \sqrt{13}$