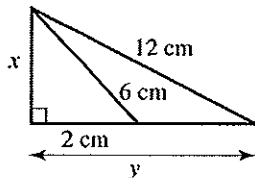


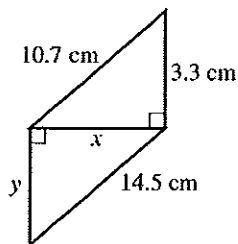
Pythagoras' theoremName: _____

1 Find the value of the pronumerals in these figures. Give answers correct to 2 decimal places.

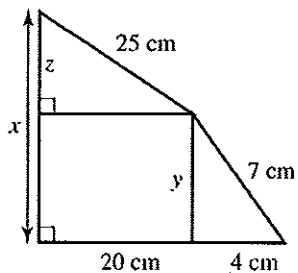
(a)



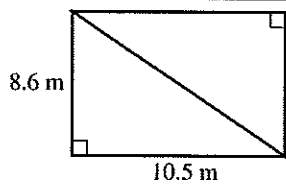
(b)



(c)



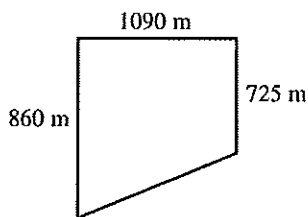
2



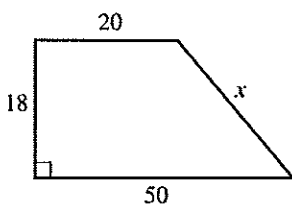
(a) Find the length of the diagonal of the rectangle in this figure.

(b) Find the area of the triangle in this figure.

- 3 Gemma goes bike riding and travels 725 m north, then 1090 m west and then 860 m south. She stops for a rest. How far is she from her starting point?

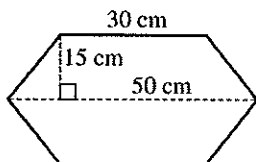


- 4 What is the value of x ?
Leave your answer in exact form.



- A $\sqrt{48}$
B $\sqrt{144}$
C $\sqrt{1224}$
D $\sqrt{2304}$

- 5 Peter is decorating a cake he made out of 2 trapeziums to form a hexagon. With parallel sides of 30 cm and 50 cm and height 15 cm, how much ribbon will he need to decorate the perimeter of the hexagon?



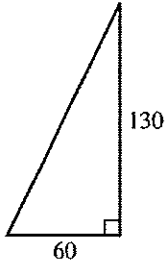
6 A roof is to have a peak of 2.8 m above the ceiling. If the roof is to span 9.6 m, what is the length of a sloping edge?

7 Use the triad 7, 24, 25 to create 3 other triads and check that they satisfy Pythagoras' theorem.

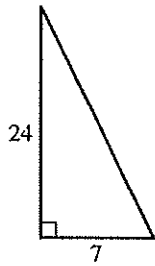
8 Is the following statement true or false?
If the smallest number of a Pythagorean triad is 8, the middle number is 15 and then the hypotenuse must be 17.

9 Calculate the length of the hypotenuse exactly if possible (if not, leave in exact or square root form).

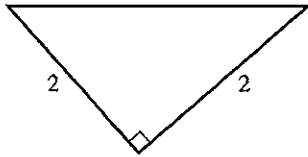
(a)



(b)



(c)



10 Using the values of x and y and with the appropriate method, find each triad.

(a) 8, 12

(b) 15, 5

(c) 4, 1

Pythagoras' theorem

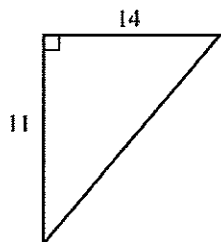
Name: _____

1 Are the following statements true or false?

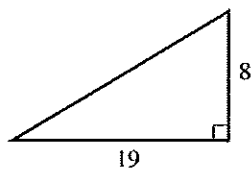
- (a) Pythagoras' theorem only applies to right-angled triangles.
- (b) If two sides of a right-angled triangle are 4 cm and 6 cm, then the length of the hypotenuse is 7.21 cm.
- (c) If the length of the hypotenuse is 22 mm and one side is 13 mm, then the length of the other side is 19 m.

2 Find the length of the hypotenuse, correct to 2 decimal places.

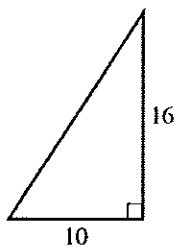
(a)



(b)

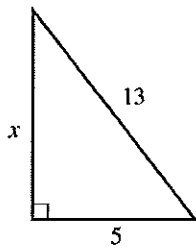


(c)

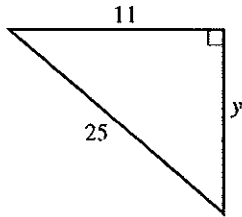


3 Find the value of the pronumeral. Leave your answer in exact form.

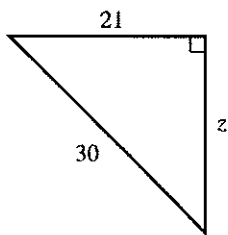
(a)



(b)



(c)



4 What is the length of a diagonal of a rectangle 9 m long and 5 m wide?

- A 4 m
- B 8.5 m
- C 10.3 m
- D 14 m

5 An isosceles triangle has sloping edges equal to 9 mm and a base equal to 6 mm. Calculate the height of the triangle to the nearest mm.

-
- 6 Find the length of the hypotenuse in triangles with:
- (a) sides 63 m and 2752 cm, hypotenuse in m

 - (b) sides 4.6 km and 8930 m, hypotenuse in km

 - (c) sides 250 mm and 580 mm, hypotenuse in cm.

-
- 7 Find the length of the third side (hypotenuse and one other side is given in order) of triangles with:
- (a) sides 0.45 km and 176 m, third side in m

 - (b) sides 20 cm and 15 cm, third side in mm

 - (c) sides 0.68 m and 38 cm, third side in mm.
-

8 An aeroplane flies 520 km north 45° west then 387 km east. It is then noted that the plane is due north of its starting point. How far is the plane from its starting point?

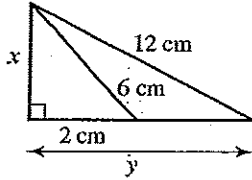
9 A ladder 12 m long leans against a wall. The foot of the ladder is 190 cm from the wall. How far up the wall does the ladder reach?

10 Vivian is making a window 700 mm wide and 900 mm high. She decides to add 2 diagonals which will cross each other, made of wood. How much wood will she need in metres?

Pythagoras' theorem Name: Nancy Le

1 Find the value of the pronumerals in these figures. Give answers correct to 2 decimal places.

(a)



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

$$36 = 4 + x^2$$

$$36 - 4$$

$$x^2 = 32$$

$$x = 5.656854249$$

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

$$5.70 \text{ cm } 5.66 \text{ (to 2 dp)}$$

Now $x^2 + y^2 = 12^2$

$$\therefore y^2 = 144 - x^2$$

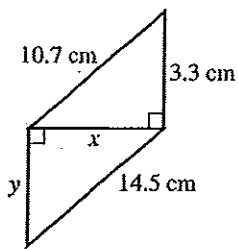
$$= 144 - 32$$

$$= 112$$

$$\therefore y = 10.58 \text{ cm (to 2 dp)}$$

Need to use 10.18^2

(b)



$$10.7^2 = 3.3^2 + x^2$$

$$114.49 = 10.89 + x^2$$

$$114.49 - 10.89$$

$$x^2 = 103.6$$

$$x = 10.17840852$$

$$x = 10.18 \text{ cm (to 2 d.p.)}$$

$$14.5^2 = 10.2^2 + y^2$$

$$210.25 = 104.04 + y^2$$

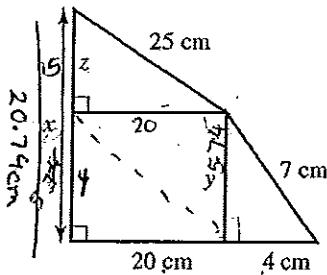
$$210.25 - 104.04$$

$$y^2 = 106.21$$

$$y = 10.3058236$$

$$y = 10.31 \text{ cm}$$

(c)



$$25^2 = 20^2 + z^2$$

$$625 = 400 + z^2$$

$$625 - 400$$

$$z^2 = 225$$

$$z = 15 \text{ cm}$$

$$7^2 = 4^2 + y^2$$

$$49 = 16 + y^2$$

$$49 - 16$$

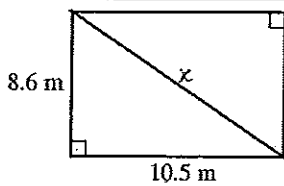
$$y^2 = 33$$

$$y = 5.744562647$$

$$y = 5.74 \text{ cm}$$

$$x = 20.74 \text{ cm}$$

2



$$x^2 = 8.6^2 + 10.5^2$$

$$x^2 = 73.96 + 110.25$$

$$x^2 = 184.21$$

$$x = 13.57239846$$

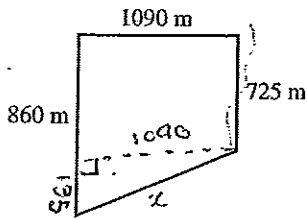
$$x = 13.6 \text{ m (to 1 d.p.)}$$

(a) Find the length of the diagonal of the rectangle in this figure.

(b) Find the area of the triangle in this figure. $\frac{90.3 \text{ m}^2}{2} = 45.15 \text{ m}^2$

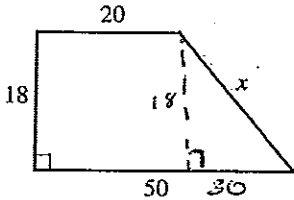
$\frac{1}{2} \times b \times h$

- 3 Gemma goes bike riding and travels 725 m north, then 1090 m west and then 860 m south. She stops for a rest. How far is she from her starting point?



$$\begin{aligned} x^2 &= 1090^2 + 135^2 \\ x^2 &= 1188100 + 18225 \\ x^2 &= 1206325 \\ x &= 1098.328275 \\ x &= 1098.33 \text{ m (2 dec)} \end{aligned}$$

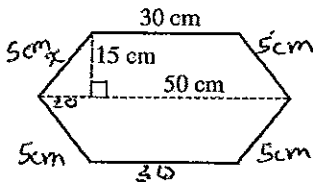
- 4 What is the value of x ?
Leave your answer in exact form.



$$\begin{aligned} x^2 &= 18^2 + 30^2 \\ x^2 &= 324 + 900 \\ x^2 &= 1224 \\ x &= \sqrt{1224} \\ x &= 34.98571137 \\ x &= 35 \text{ (1 dec)} \end{aligned}$$

- A $\sqrt{48}$
B $\sqrt{144}$
C $\sqrt{1224}$ ✓
D $\sqrt{2304}$

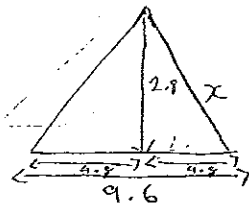
- 5 Peter is decorating a cake he made out of 2 trapeziums to form a hexagon. With parallel sides of 30 cm and 50 cm and height 15 cm, how much ribbon will he need to decorate the perimeter of the hexagon?



$$\begin{aligned} x^2 &= 15^2 + 20^2 \\ x^2 &= 225 + 400 \\ x^2 &= 625 \\ x &= 25 \\ x &= 5 \text{ cm} \end{aligned}$$

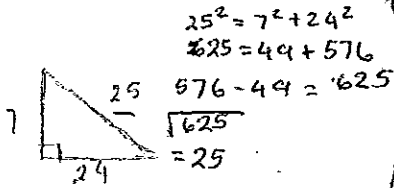
Ans: 80cm of a ribbon

- 6 A roof is to have a peak of 2.8 m above the ceiling. If the roof is to span 9.6 m, what is the length of a sloping edge?



$$\begin{aligned} x^2 &= 2.8^2 + 4.8^2 \\ x^2 &= 7.84 + 23.04 \\ x^2 &= 30.88 \\ x &= 5.55697596 \\ x &= 5.6 \text{ m (1 d.p.)} \end{aligned}$$

- 7 Use the triad 7, 24, 25 to create 3 other triads and check that they satisfy Pythagoras' theorem.



$$\begin{aligned} 25^2 &= 17^2 + 24^2 \\ 5^2 &= 4^2 + 3^2 \\ 25 &= 16 + 9 \\ &= 25 \\ &= \sqrt{25} \\ &= 5 \text{ cm} \end{aligned}$$

2)

$$\begin{aligned} 25^2 &= 20^2 + 15^2 \\ 625 &= 400 + 225 \\ &= 400 + 225 \\ &= 625 \\ &= \sqrt{625} \\ &= 25 \end{aligned}$$

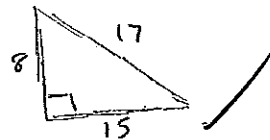
3)

$$\begin{aligned} 30^2 &= 24^2 + 18^2 \\ 900 &= 576 + 324 \\ &= 576 + 324 \\ &= 900 \\ &= \sqrt{900} \\ &= 30 \end{aligned}$$

- 8 Is the following statement true or false?

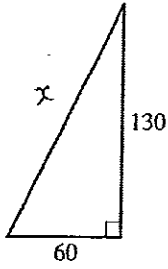
If the smallest number of a Pythagorean triad is 8, the middle number is 15 and then the hypotenuse must be 17.

~~True~~
True ✓



9 Calculate the length of the hypotenuse exactly if possible (if not, leave in exact or square root form).

(a)



$$x^2 = 130^2 + 60^2$$

$$x^2 = 16900 + 3600$$

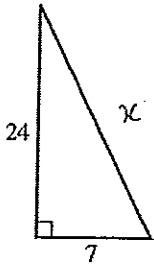
$$x^2 = \sqrt{20500}$$

$$~~x = 143.1782106~~$$

$$~~x = 143 \text{ (1 dec)}~~$$

$$x = \sqrt{20500}$$

(b)



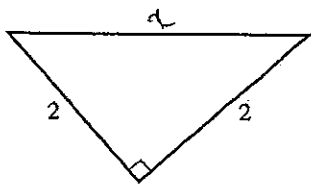
$$x^2 = 24^2 + 7^2$$

$$x^2 = 576 + 49$$

$$x^2 = \sqrt{625}$$

$$x = 25$$

(c)



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

$$x^2 = 4 + 4$$

$$x^2 = \sqrt{8}$$

$$~~x = 2.828427125~~$$

$$~~x = 2 \text{ (1 dec)}~~$$

10 Using the values of x and y and with the appropriate method, find each triad.

(a) 8, 12

a) 8, 6, 10

(b) 15, 5

b) 5, 13, 12

(c) 4, 1

c) 4, 3, 5.

Pythagoras' theorem

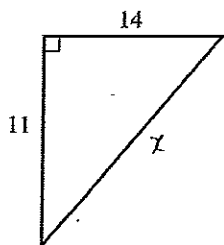
Name: Nancy Le

1 Are the following statements true or false?

- (a) Pythagoras' theorem only applies to right-angled triangles. True ✓
- (b) If two sides of a right-angled triangle are 4 cm and 6 cm, then the length of the hypotenuse is 7.21 cm. True ✓
- (c) If the length of the hypotenuse is 22 mm and one side is 13 mm, then the length of the other side is 19 m. False ✓

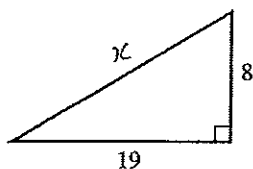
2 Find the length of the hypotenuse, correct to 2 decimal places.

(a)



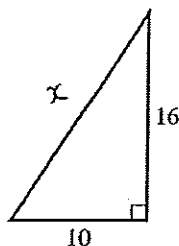
$$\begin{aligned} x^2 &= 14^2 + 11^2 \\ x^2 &= 196 + 121 \\ x^2 &= 317 \\ x &= 17.80 \text{ (to 2 dp)} \end{aligned}$$

(b)



$$\begin{aligned} x^2 &= 8^2 + 19^2 \\ x^2 &= 64 + 361 \\ x^2 &= 425 \\ x &= 20.62 \end{aligned}$$

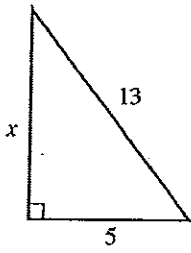
(c)



$$\begin{aligned} x^2 &= 16^2 + 10^2 \\ x^2 &= 256 + 100 \\ x^2 &= 356 & \longrightarrow & x = 18.867\dots \\ x &= 19.1 & & = 18.87 \text{ (to 2 dp)} \end{aligned}$$

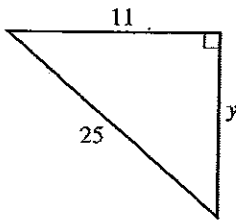
3 Find the value of the pronumeral. Leave your answer in exact form.

(a)



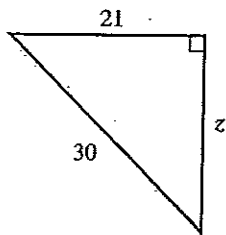
$$\begin{aligned} 13^2 &= 5^2 + x^2 \\ 169 &= 25 + x^2 \\ 169 - 25 & \\ x^2 &= 144 \\ x &= 12 \end{aligned}$$

(b)



$$\begin{aligned} 25^2 &= 11^2 + y^2 \\ 625 &= 121 + y^2 \\ 625 - 121 & \\ y^2 &= 504 \\ y &= 22.44994432 \\ y &= 22.4 \text{ (1 dec)} \end{aligned}$$

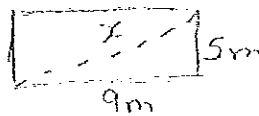
(c)



$$\begin{aligned} 30^2 &= 21^2 + z^2 \\ 900 &= 441 + z^2 \\ 900 - 441 & \\ z^2 &= 459 \\ z &= 21.42428529 \\ z &= 21.4 \text{ (1 dec)} \end{aligned}$$

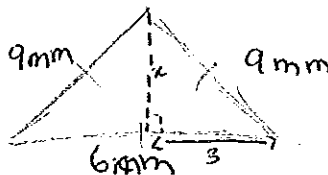
4 What is the length of a diagonal of a rectangle 9 m long and 5 m wide?

- A 4 m
- B 8.5 m
- C 10.3 m
- D 14 m



$$\begin{aligned} x^2 &= 5^2 + 9^2 \\ x^2 &= 25 + 81 \\ x^2 &= 106 \\ x &= 10.29563014 \\ x &= 10.3 \text{ m} \end{aligned}$$

5 An isosceles triangle has sloping edges equal to 9 mm and a base equal to 6 mm. Calculate the height of the triangle to the nearest mm.

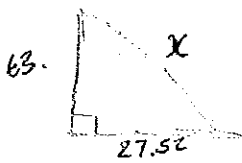


$$\begin{aligned} 9^2 &= 3^2 + x^2 \\ 81 &= 9 + x^2 \\ 81 - 9 & \\ x^2 &= 72 \\ x &= 8.48528137 \\ x &= 8 \text{ mm} \end{aligned}$$

(to nearest mm)

6 Find the length of the hypotenuse in triangles with:

(a) sides 63 m and 2752 cm, hypotenuse in m



$$\begin{aligned} x^2 &= 63^2 + 27.52^2 \checkmark \\ x^2 &= 3969 + 757.3504 \\ x^2 &= 4726.3504 \checkmark \\ x &= 68.74845744 \\ x &= 68.7 \text{ m (1 dec)} \checkmark \end{aligned}$$

(b) sides 4.6 km and 8930 m, hypotenuse in km

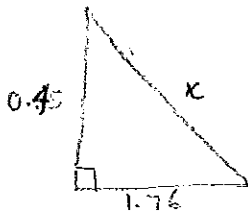
$$\begin{aligned} x^2 &= 4.6^2 + 8.9^2 \\ x^2 &= 21.16 + 79.21 \checkmark \\ x^2 &= 100.37 \\ x &= 10.01848292 \checkmark \\ x &= 10 \text{ km (1 dec)} \checkmark \end{aligned}$$

(c) sides 250 mm and 580 mm, hypotenuse in cm.

$$\begin{aligned} x^2 &= 25^2 + 58^2 \\ x^2 &= 625 + 3364 \\ x^2 &= 3989 \checkmark \\ x &= 63.1585307 \\ x &= 63.2 \text{ cm (1 dec)} \end{aligned}$$

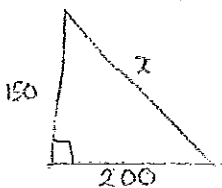
7 Find the length of the third side (hypotenuse and one other side is given in order) of triangles with:

(a) sides 0.45 km and 176 m, third side in m



$$\begin{aligned} x^2 &= 0.45 + 1.76 \leftarrow \text{Try again.} \\ x^2 &= 0.0625 + 3.0976 \\ x^2 &= 3.1601 \\ x &= 1.77766701 \\ x &= 1.8 \text{ km (1 dec)} \end{aligned}$$

(b) sides 20 cm and 15 cm, third side in mm



$$\begin{aligned} x^2 &= 150^2 + 200^2 \checkmark \\ x^2 &= 22500 + 40000 \\ x &= 62500 \checkmark \\ x &= 250 \text{ mm} \checkmark \end{aligned}$$

(c) sides 0.68 m and 38 cm, third side in mm.

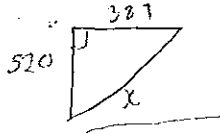


$$\begin{aligned} x^2 &= 3.8^2 + 0.068^2 \\ x^2 &= 14.44 + 0.004624 \\ x^2 &= 14.444624 \\ x &= 3.8 \text{ m} \\ x &= 3800 \text{ mm} \end{aligned}$$

change $0.68 \text{ m} = 0.68 \times 1000 \text{ mm}$
 $= 680 \text{ mm}$
 $38 \text{ cm} = 380 \text{ mm} \dots \text{Try again}$

$$x = 84.4 \text{ mm (1 dec)}$$

- 8 An aeroplane flies 520 km north 45° west then 387 km east. It is then noted that the plane is due north of its starting point. How far is the plane from its starting point?



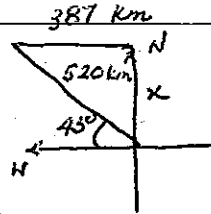
$$x^2 = 387^2 + 520^2$$

$$x^2 = 149,769 + 270,400$$

$$x^2 = 420,169$$

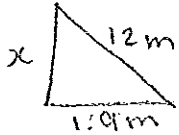
$$x = 648.2044431$$

$$x = 648.2 \text{ km (1 dec)}$$



Find x , try again.

- 9 A ladder 12 m long leans against a wall. The foot of the ladder is 190 cm from the wall. How far up the wall does the ladder reach?



$$12^2 = 1.9^2 + x^2$$

$$144 = 3.61 + x^2$$

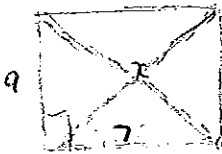
$$144 - 3.61$$

$$x^2 = 140.39$$

$$x = 11.84862861 \text{ m}$$

~~$x = 12 \text{ m}$~~
 $x = 11.85 \text{ m (to 2 dp)}$

- 10 Vivian is making a window 700 mm wide and 900 mm high. She decides to add 2 diagonals which will cross each other, made of wood. How much wood will she need in metres?



$$x^2 = 9^2 + 7^2$$

$$x^2 = 81 + 49$$

$$x^2 = 130$$

$$x^2 = 11.40175425$$

$$x = 11.4 \text{ m (1 dec)}$$

Total length of wood needed
 $= 2x = 22.8 \text{ m}$