

High School Mathematics Test 2014

Year
8

Pythagoras Theorem

Non Calculator
Section

Skills and Knowledge Assessed:

- Investigate Pythagoras' theorem and its application to solving simple problems involving right angled triangles (ACMMG222)
- Investigate the concept of irrational numbers, including π (ACMMG186)

Name _____

Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided.

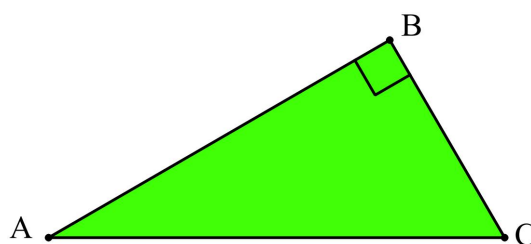
Show any working out on the test paper. Calculators are **not** allowed.

For any questions in this non-calculator section, you may refer to the table of squares provided below.

N	N^2	N	N^2	N	N^2	N	N^2	N	N^2	N	N^2
9	81	16	256	23	529	30	900	37	1369	44	1936
10	100	17	289	24	576	31	961	38	1444	45	2025
11	121	18	324	25	625	32	1024	39	1521	46	2116
12	144	19	361	26	676	33	1089	40	1600	47	2209
13	169	20	400	27	729	34	1156	41	1681	48	2304
14	196	21	441	28	784	35	1225	42	1764	49	2401
15	225	22	484	29	841	36	1296	43	1849	50	2500

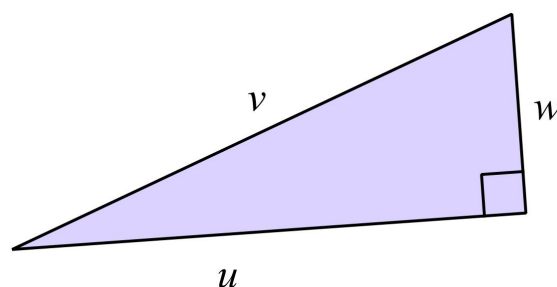
1. Which side is the hypotenuse of the right triangle ABC?

- ☐ AB
☐ AC
☐ BC
☐ BD

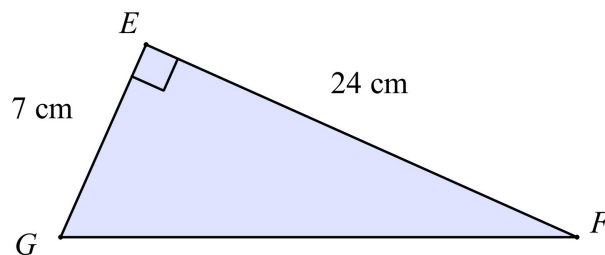


2. Which is a correct statement of Pythagoras Theorem for the triangle shown below.

- ☐ $u^2 = v^2 + w^2$
☐ $u^2 = w^2 + v^2$
☐ $v^2 = u^2 + w^2$
☐ $w^2 = v^2 + u^2$



3.

Find the length of FG .

4.

Which of these is an irrational number?

☐ $\sqrt{289}$

☐ $\sqrt{625}$

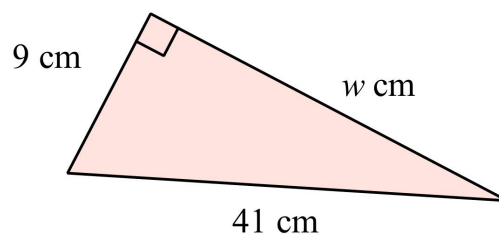
☐ $\sqrt{961}$

☐ $\sqrt{1098}$

5.

Find the value of w .

$w =$



6.

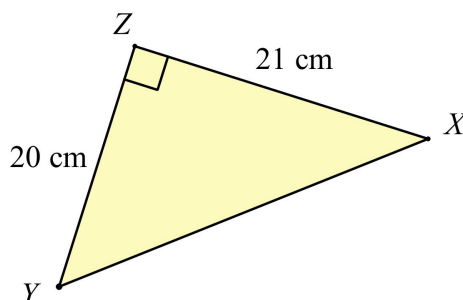
Find the length of XY

☐ 25

☐ 27

☐ 29

☐ 31



7.

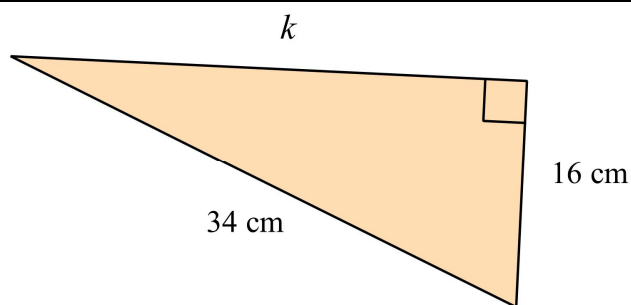
Find the value of k .

☐ $k = 28$

☐ $k = 30$

☐ $k = 31$

☐ $k = 33$



8.

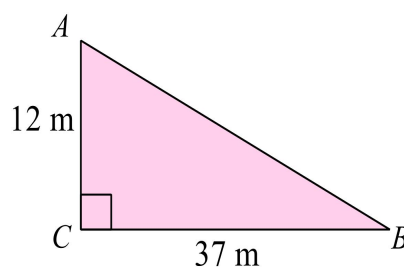
Which is the best estimate for the length of AB in the triangle?

☐ It lies between 32 m and 33 m.

☐ It lies between 38 m and 39 m.

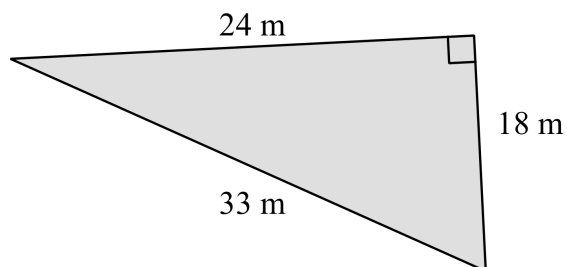
☐ It lies between 45 m and 46 m.

☐ It lies between 49 m and 50 m.



9. What is the third (larger) number which would form a Pythagorean Triad with 12 and 35?

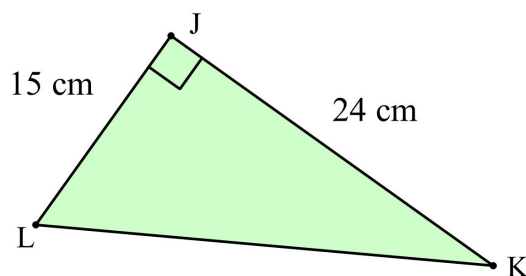
10. Is a triangle with the dimensions below, right angled?
Explain why.



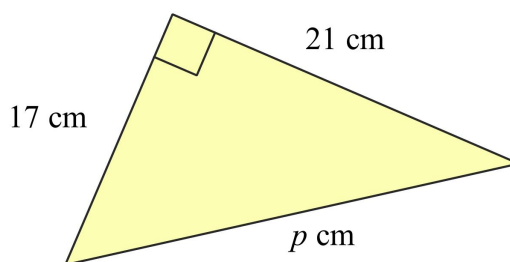
.....

.....

11. Find the length of KL (leave your answer as a surd).

 cm


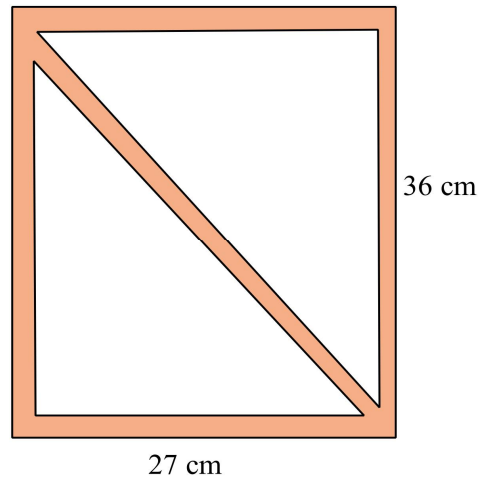
12. What is the value of p in the triangle shown?



- ☐ $p = 2$
☐ $p = \sqrt{38}$
- ☐ $p = \sqrt{152}$
☐ $p = \sqrt{730}$

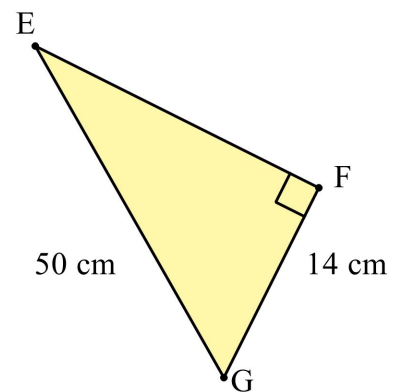
13. A rectangular pet gate measures 27 cm by 36 cm and has a diagonal brace through the centre. What is the total length of metal that is needed to make the gate?

- ☐ 45 cm.
☐ 81 cm.
☐ 108 cm.
☐ 171 cm.

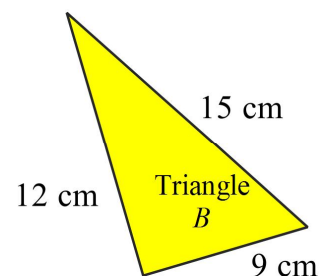
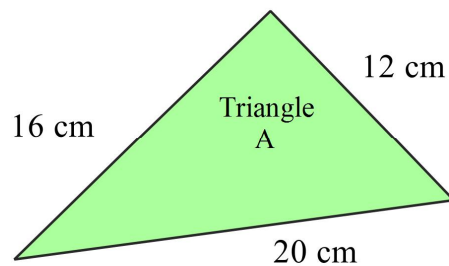


14. What is the area of the triangle EFG ?

Area = cm^2



15. Which of the triangles below are right angled?



- ☐ Both triangles are right angled.
☐ Neither triangle is right angled.
☐ Only triangle A is right angled.
☐ Only triangle B is right angled.

High School Mathematics Test 2014

Year
8

Pythagoras Theorem

Calculator Allowed
Short Answer
Section

Name _____

Answer all questions in the spaces provided on this test paper by:

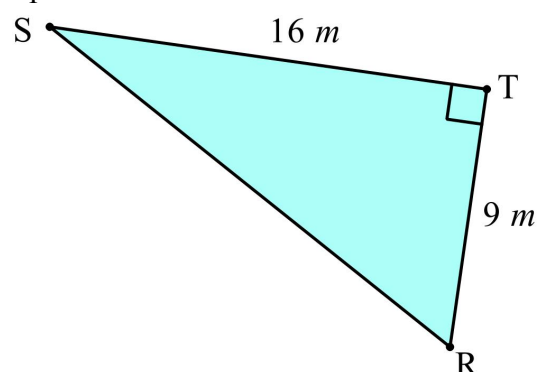
Writing the answer in the box provided.

or

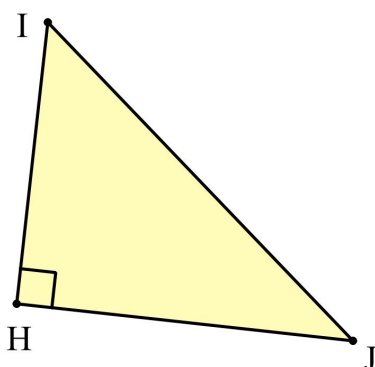
Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are allowed.

1. What is the length of RS , correct to 1 decimal place?

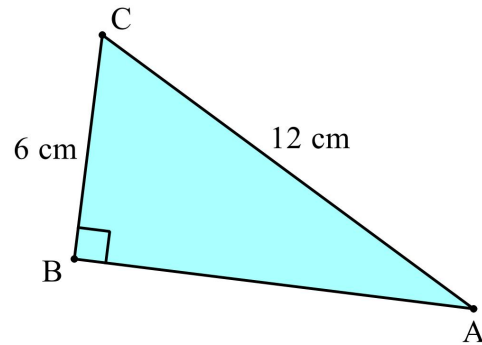
 cm

2. Write a statement of Pythagoras Theorem for triangle HIJ, shown.



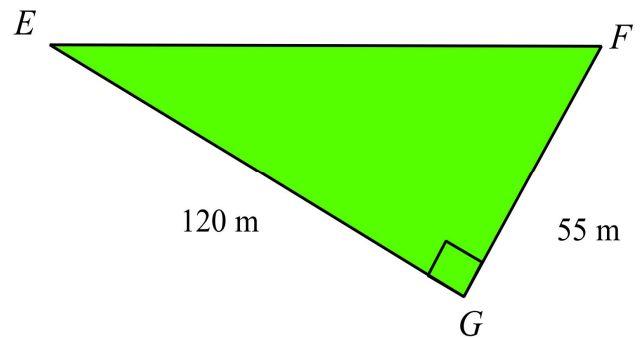
3. The length of AB in the triangle below is:

- ☐ 2.5 cm
☐ 3.5 cm
☐ 10.4 cm
☐ 13.4 cm



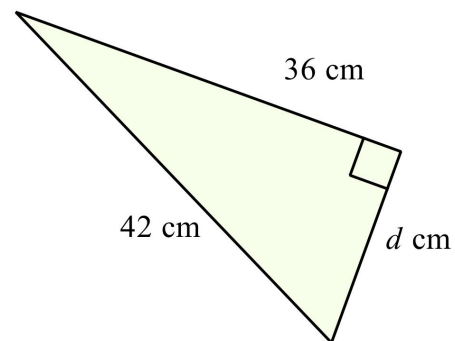
4. Find the distance EF to the nearest metre.

$EF =$ m.



5. Find the value of d in the triangle below.

- ☐ 2.5 cm
☐ 3.5 cm
☐ 13.4 cm
☐ 21.6 cm



6. Which of the following are Pythagorean triads?

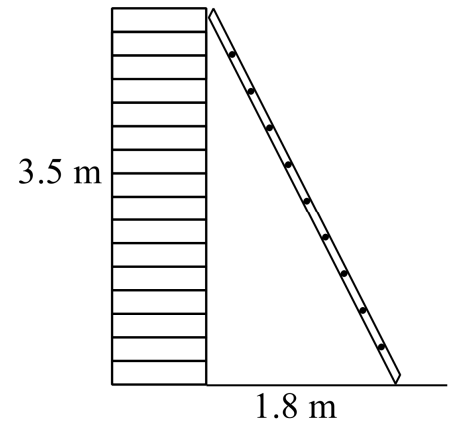
More than one could be a Pythagorean triad, so mark all that are.

- ☐ {15, 39, 45} ☐ {15, 36, 39} ☐ {16, 28, 34} ☐ {24, 70, 74}

7.

The ladder shown, leans against the top of the wall. What is the height of the wall, correct to the nearest 10^{th} of a metre?

Height is metres.

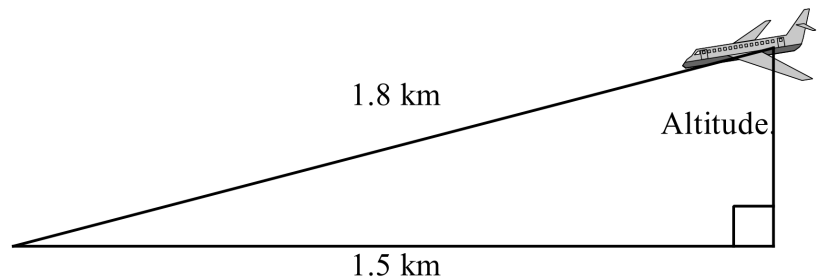


8.

A plane is shown coming in to land. It is 1.5 km horizontally from the point where it will touch down and 1.8 km in a straight line from the point.

What is its altitude to the nearest metre?

Altitude is metres.



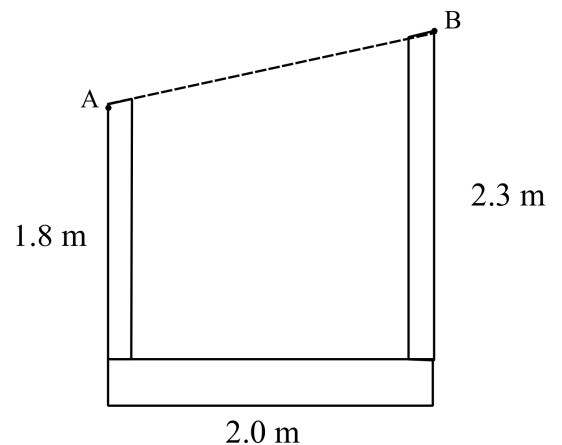
9.

Tarquin is building a shed.

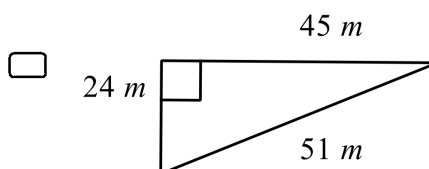
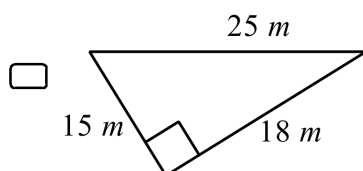
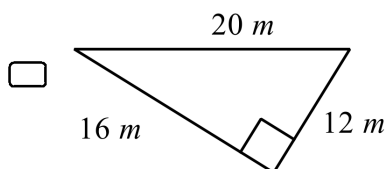
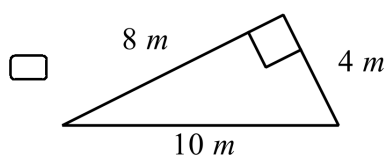
He needs a beam for the roof, to go from A to B on the diagram.

What is the length of the beam?

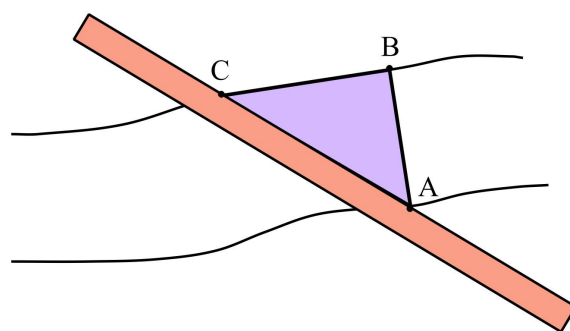
Length is metres.



10. Shade the bubbles of the two triangles which are right angled below.



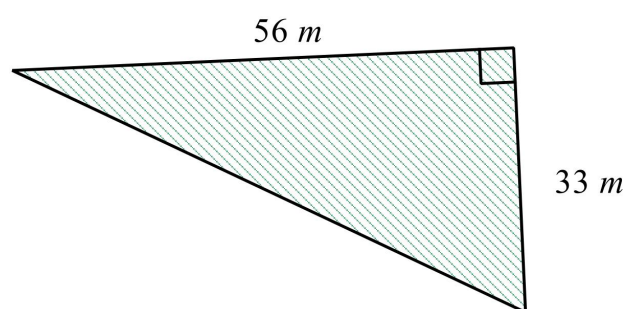
11. Measurements were taken to help calculate the width of the river.
The distance across the bridge $AC = 120$ m.
The distance along the bank $BC = 86$ m.
Calculate the width of the river (AB), to the nearest metre.



Width is

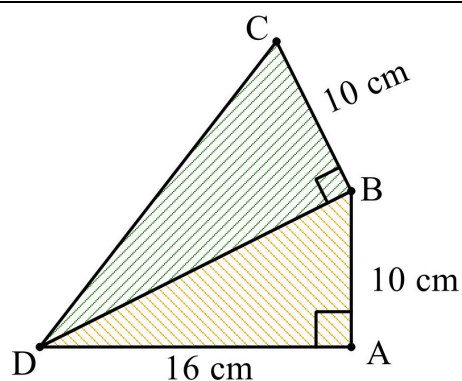
12. What is the perimeter of the triangle STU?

- ☐ 65 m
☐ 89 m
☐ 121 m
☐ 154 m

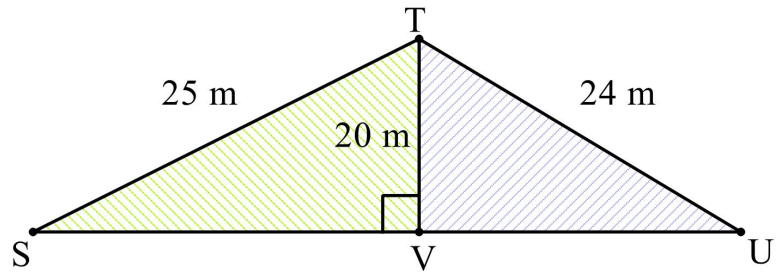


13. What is the length of CD ?

- ☐ 12.5 m
☐ 18.9 m
☐ 21.4 m
☐ 45.6 m

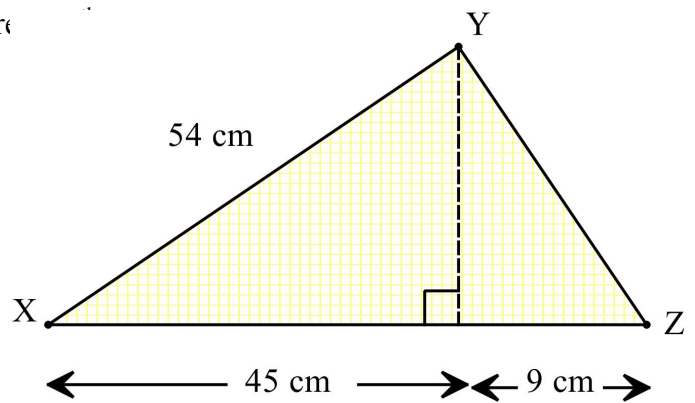


14. Calculate the distance SU.



SU = m.

15. Find the area of triangle XYZ, to the nearest



Area = cm^2

High School Mathematics Test 2014

Pythagoras Theorem ANSWERS

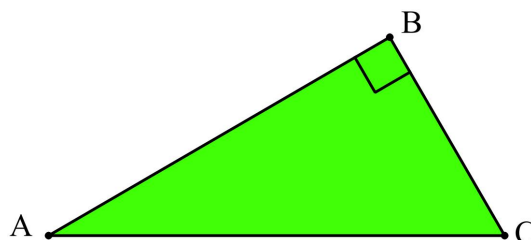
Non Calculator Section (1 mark each)

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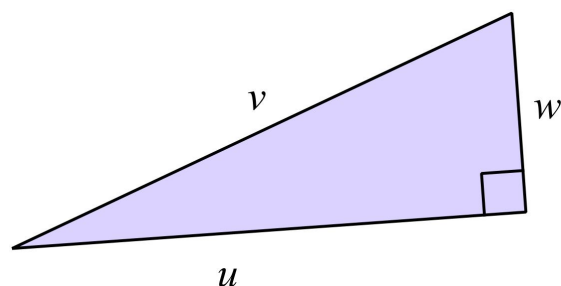
1. Which side is the hypotenuse of the right triangle ABC ?

- ☐ AB
☒ AC
☐ BC
☐ BD



2. Which is a correct statement of Pythagoras Theorem for the triangle shown below.

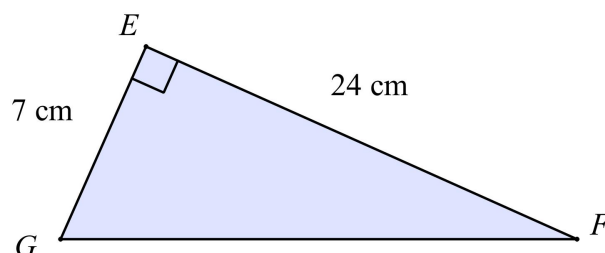
- ☐ $u^2 = v^2 + w^2$
☐ $u^2 = w^2 + v^2$
☒ $v^2 = u^2 + w^2$
☐ $w^2 = v^2 + u^2$

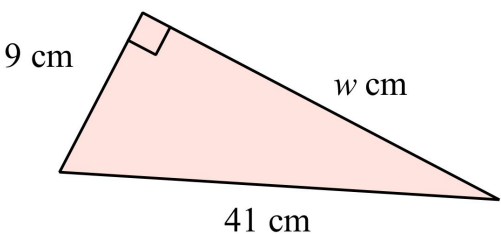
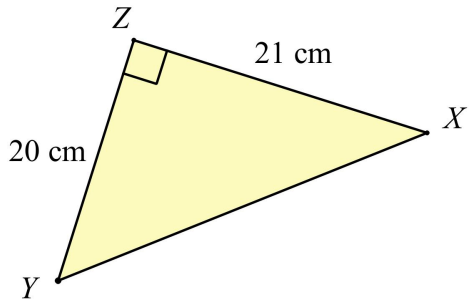
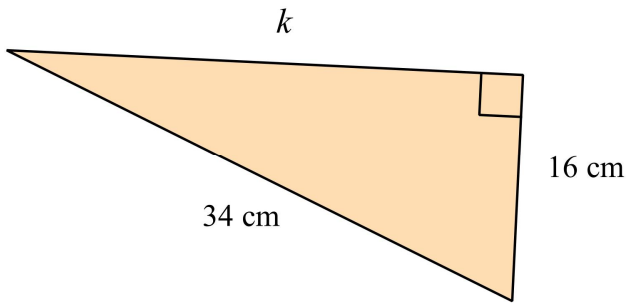
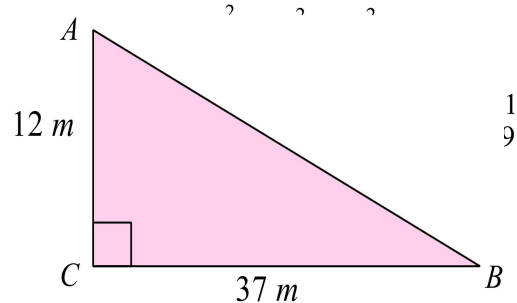


3. Find the length of FG .

$$\begin{aligned}
 FG^2 &= 7^2 + 24^2 \\
 &= 625 \\
 FG &= 25
 \end{aligned}$$

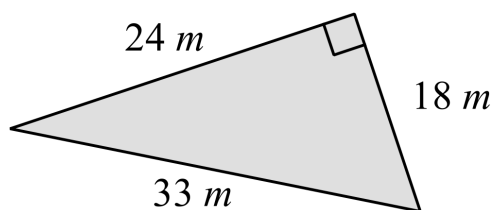
25 cm



4.	Which of these is an irrational number?	Not in the table of squares.
	<input type="checkbox"/> $\sqrt{289}$ <input type="checkbox"/> $\sqrt{625}$ <input type="checkbox"/> $\sqrt{961}$ <input checked="" type="checkbox"/> $\sqrt{1098}$	
5.	Find the value of w .	$w^2 = 41^2 - 9^2$ $= 1600$ $w = 40$
	$w = $ 40	
6.	Find the length of XY	
	<input type="checkbox"/> 25 <input type="checkbox"/> 27 <input checked="" type="checkbox"/> 29 <input type="checkbox"/> 31	$XY^2 = 20^2 + 21^2$ $= 841$ $w = 29$
		
7.	Find the value of k .	
	<input type="checkbox"/> $k = 28$ <input checked="" type="checkbox"/> $k = 30$ <input type="checkbox"/> $k = 31$ <input type="checkbox"/> $k = 33$	$k^2 = 34^2 - 16^2$ $= 900$ $k = 30$
		
8.	Which is the best estimate for the length of AB in the triangle?	
	<input type="checkbox"/> It lies between 32 m and 33 m. <input checked="" type="checkbox"/> It lies between 38 m and 39 m. <input type="checkbox"/> It lies between 45 m and 46 m. <input type="checkbox"/> It lies between 49 m and 50 m.	
9.	What is the third (larger) number which would form a Pythagorean Triad with 12 and 35?	
	37	$X^2 = 35^2 + 12^2$ $= 1369$ $X = 37$ <p>so third number is 37</p>

10.

Is a triangle with the dimensions below, right angled? Explain why?



$$24^2 + 18^2 = 900$$

$$33^2 \neq 900$$

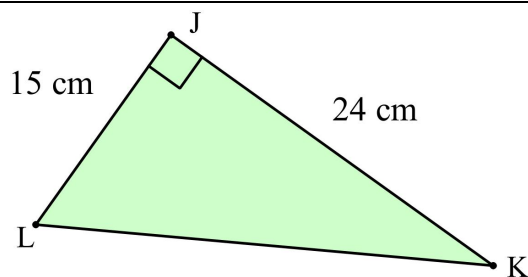
so the triangle is not right angle

11.

Find the length of KL (leave your answer as a surd).

$$\boxed{\sqrt{801}} \text{ cm}$$

$$\begin{aligned} KL^2 &= 15^2 + 24^2 \\ &= 801 \\ KL &= \sqrt{801} \end{aligned}$$



12.

What is the value of p in the triangle shown?

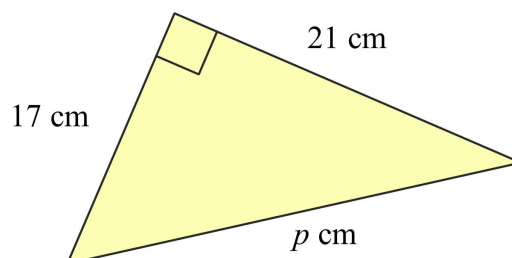
$$\begin{aligned} p^2 &= 21^2 + 17^2 \\ &= 730 \\ p &= \sqrt{730} \end{aligned}$$

☐ $p = 2$

☐ $p = \sqrt{38}$

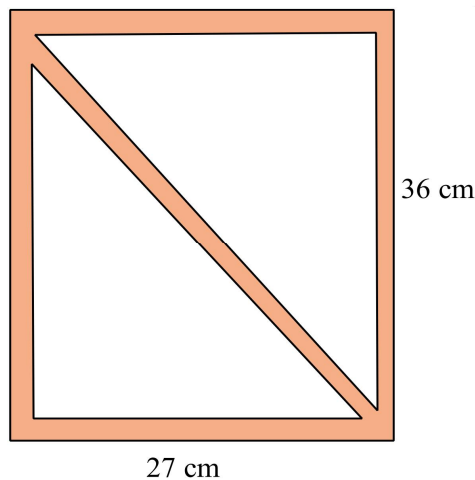
☐ $p = \sqrt{152}$

☒ $p = \sqrt{730}$



13. A rectangular pet gate measures 27 cm by 36 cm and has a diagonal brace through the centre. What length of metal is needed to make the gate?

- ☒ 45 cm.
☐ 81 cm.
☐ 108 cm.
☐ 171 cm.

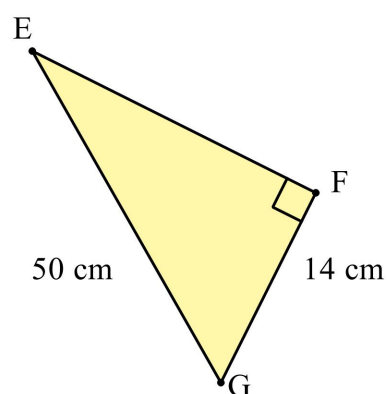


$$\begin{aligned} p^2 &= 36^2 + 27^2 \\ &= 2025 \\ p &= 45 \end{aligned}$$

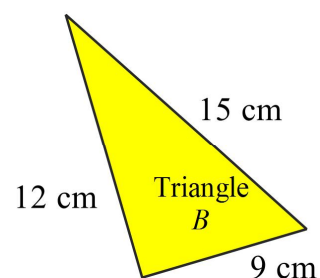
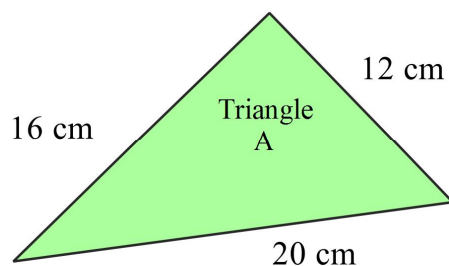
14. What is the area of the triangle EFG ?

$$\begin{aligned} EF^2 &= 50^2 - 14^2 \\ &= 2304 \\ EF &= 48 \\ \text{Area} &= \frac{1}{2} \times 14 \times 48 \end{aligned}$$

Area = 336 cm^2



15. Which of the triangles below are right angled?



- ☒ Both triangles are right angled.
☐ Neither triangle is right angled.
☐ Only triangle A is right angled.
☐ Only triangle B is right angled.

Triangle A

$$12^2 + 16^2 = 400$$

$$20^2 = 400$$

Triangle A is right angled.

Triangle B

$$12^2 + 9^2 = 225$$

$$15^2 = 225$$

Triangle B is right angled.

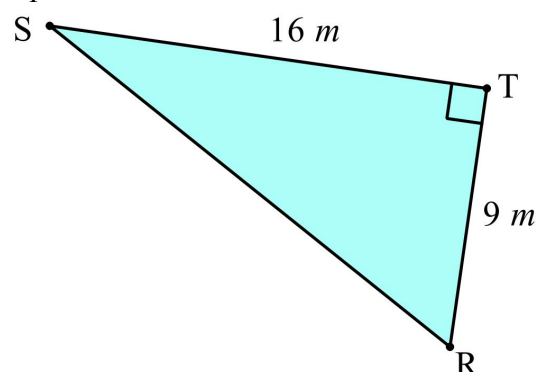
High School Mathematics Test 2014

Calculator Allowed Short Answer Section (1 mark each)

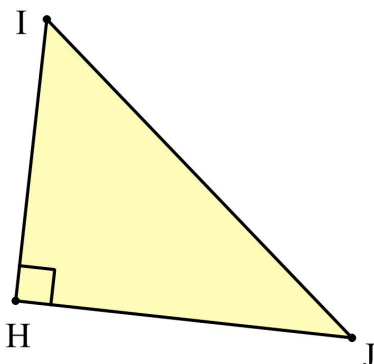
1. What is the length of RS , correct to 1 decimal place?

$$\begin{aligned} RS^2 &= 9^2 + 16^2 \\ &= 337 \\ RS &= 18.357. . \end{aligned}$$

18.4

 cm


2. Write a statement of Pythagoras Theorem for triangle HIJ, shown



$IJ^2 = HJ^2 + HI^2$

3. The length of AB in the triangle below is:

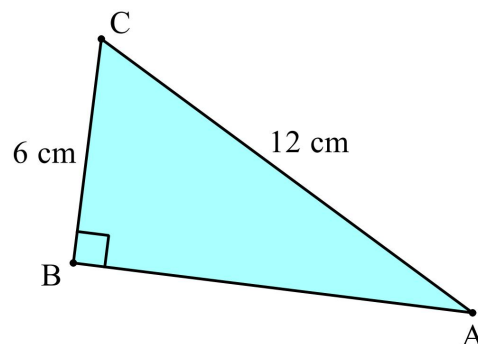
☐ 2.5 cm

☐ 3.5 cm

☒ 10.4 cm

☐ 13.4 cm

$$\begin{aligned} AB^2 &= 12^2 - 6^2 \\ &= 108 \\ KL &= 10.392. . \end{aligned}$$

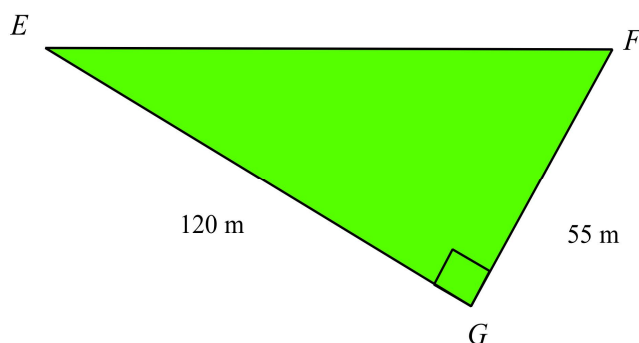


4.

Find the distance EF to the nearest metre..

$$\begin{aligned} EF^2 &= 120^2 + 55^2 \\ &= 17425 \\ EF &= 132.003 \end{aligned}$$

$$EF = \boxed{132} \text{ m.}$$



5.

Find the value of d in the triangle below.

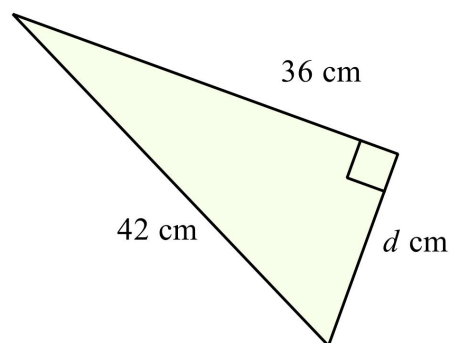
☐ 2.5 cm

☐ 3.5 cm

☐ 13.4 cm

☒ 21.6 cm

$$\begin{aligned} d^2 &= 42^2 - 36^2 \\ &= 468 \\ d &= 21.633 \dots \end{aligned}$$



6.

Which of the following are Pythagorean triads?

More than one could be a Pythagorean triad, so mark all that are.

$15^2 + 39^2 = 1746$

$15^2 + 36^2 = 1521$

$16^2 + 28^2 = 1040$

$24^2 + 70^2 = 5476$

$45^2 = 2025$

$39^2 = 1521$

$34^2 = 1156$

$74^2 = 5476$

Not Pythag Triad..

Is a Pythag Triad..

Not Pythag Triad..

Is a Pythag Triad.

☐ {15, 39, 45}

☒ {15, 36, 39}

☐ {16, 28, 34}

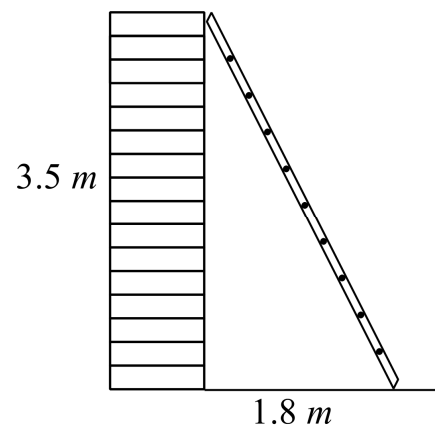
☒ {24, 70, 74}

7.

The ladder shown, leans against the top of the wall.
What is the height of the wall, correct to the nearest 10th of a metre?

Height is $\boxed{3.9}$ metres.

$$\begin{aligned} h^2 &= 3.5^2 + 1.8^2 \\ &= 15.49 \\ h &= 3.935 \dots \end{aligned}$$



8.

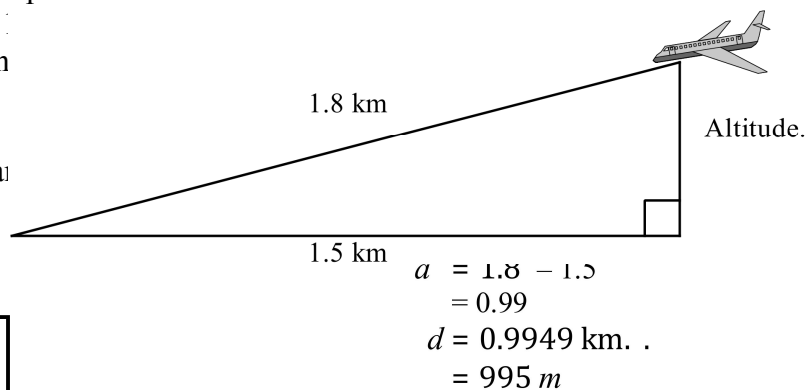
A plane is shown coming in to land. It is 1.5 km horizontally from the point where it will touch down and in a straight line from the point

What is its altitude to the nearest metre?

Altitude is

995

metres.



9.

Tarquin is building a shed.

He needs a beam for the roof, to go from A to B on the diagram.

What is the length of the beam to the nearest centimetre?

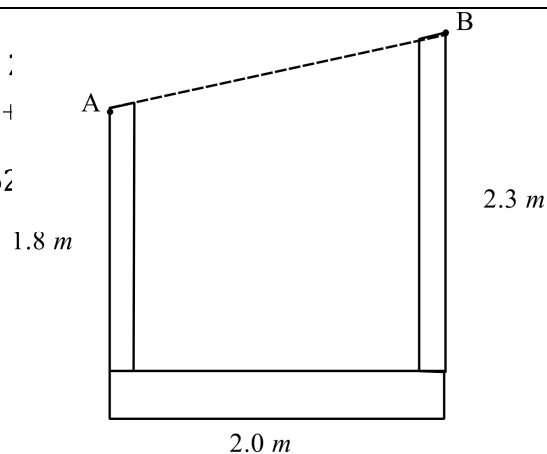
Length is

2.06

Diff in ht = :

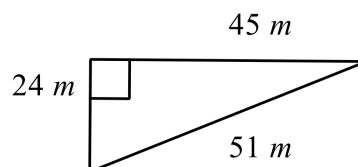
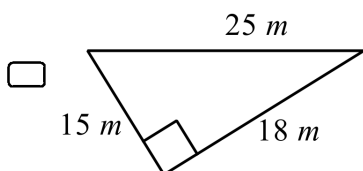
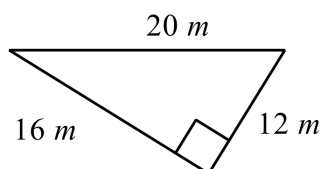
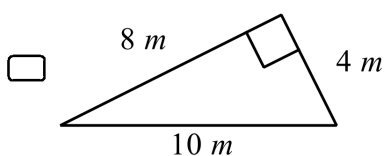
$$AB^2 = 0.5^2 + 4.25^2$$

$$AB = 2.062$$



10.

Shade the bubbles of the two triangles which are right angled below.



$$8^2 + 4^2 = 80$$

$$10^2 = 100$$

Not Right Δ .

$$12^2 + 16^2 = 400$$

$$20^2 = 400$$

Is Right Δ .

$$15^2 + 18^2 = 549$$

$$25^2 = 625$$

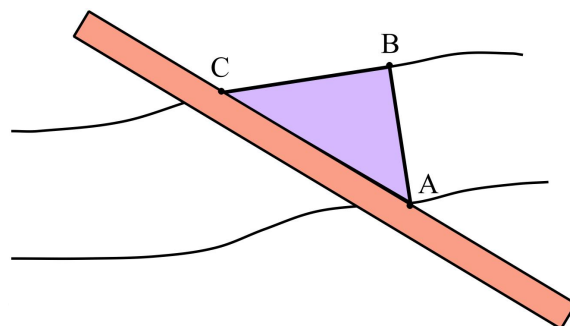
Not Right Δ .

$$24^2 + 45^2 = 2601$$

$$51^2 = 2601$$

Is Right Δ .

11. Measurements were taken to help calculate the width of the river.
The distance across the bridge $AC = 120$ m.
The distance along the bank $BC = 86$ m.
Calculate the width of the river (AB), to the nearest metre.



Width is

84

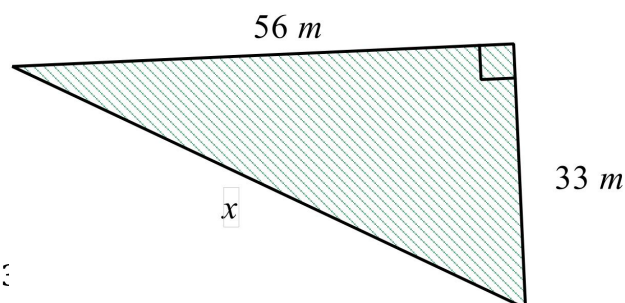
$$\begin{aligned} AB &= \sqrt{120^2 - 86^2} \\ &= \sqrt{7004} \\ d &= 83.689 \text{ m..} \end{aligned}$$

12. What is the perimeter of the triangle STU?

- ☐ 65 m
☐ 89 m
☐ 121 m
☒ 154 m

$$\begin{aligned} x^2 &= 56^2 + 33^2 \\ &= 4225 \\ x &= 65 \text{ m..} \end{aligned}$$

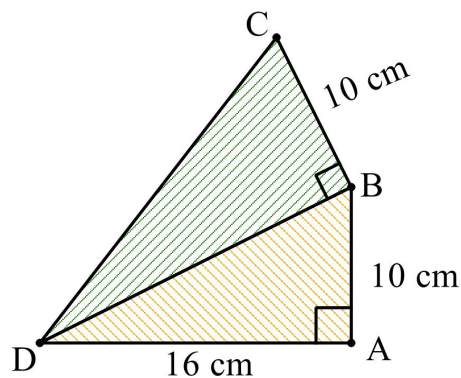
$$\text{Perimeter} = 56 + 33 + 65 = 154$$



13. What is the length of CD?

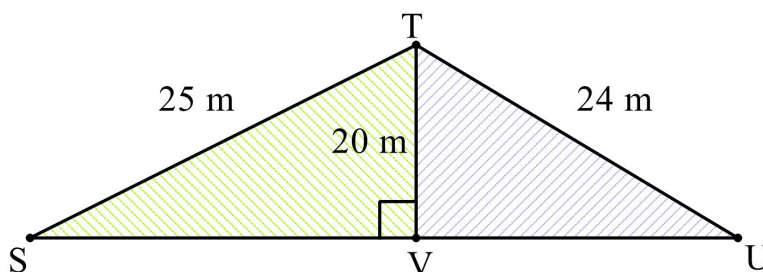
- ☐ 12.5 m
☐ 18.9 m
☒ 21.4 m
☐ 45.6 m

$$\begin{aligned} BD^2 &= 10^2 + 16^2 \\ &= 356 \\ BD &= 18.87 \text{ m.} \\ CD^2 &= 10^2 + 18.87^2 \end{aligned}$$



14. Calculate the distance SU.

$$\begin{aligned} SV^2 &= 25^2 - 20^2 \\ &= 225 \\ SV &= 15 \text{ m.} \\ VU^2 &= 24^2 - 20^2 \end{aligned}$$



$$SU = 23.8 \text{ m.}$$

15. Find the area of triangle XYZ, to the nearest 10th of a square centimetre.

$$\begin{aligned}YA^2 &= 54^2 - 45^2 \\ &= 891\end{aligned}$$

$$YA = 29.849 \text{ cm}$$

$$XZ = 45 + 9 = 54 \text{ cm}$$

$$\text{Area} = \boxed{805.9} \text{ cm}^2$$

