High School
Mathematics Test 2014

Year 9

Pythagoras Theorem

Calculator Allowed

Skills and Knowledge Assessed:

- Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Find the length of *FG*.

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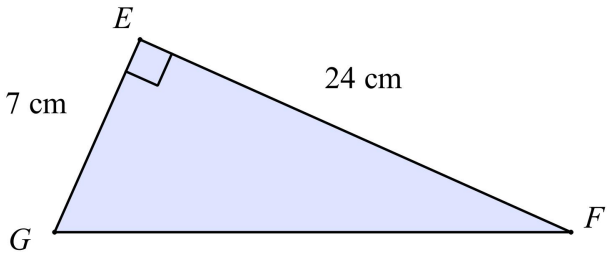

2. Find the value of *w*.

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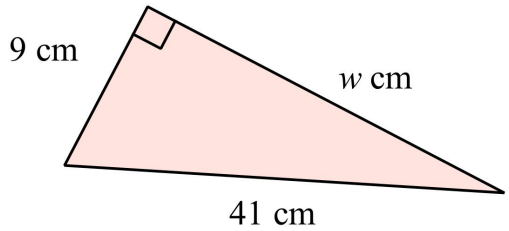

3. What is the length of *RS* ?

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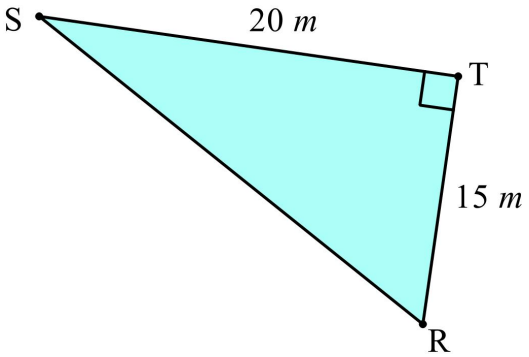
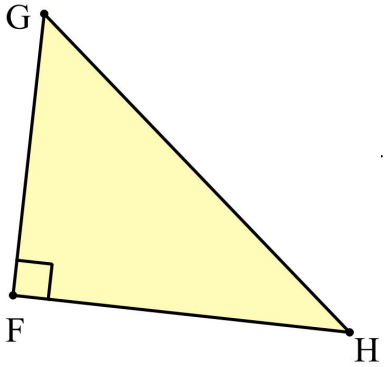


4. Write a statement of Pythagoras Theorem for triangle HIJ, shown.



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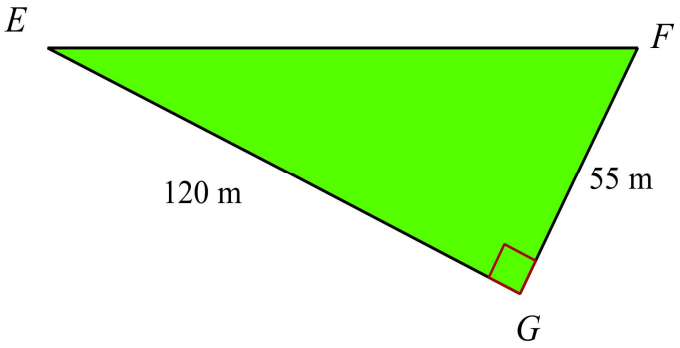
5. Find the distance EF to the nearest metre.



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6. Is there a whole number which will go with 12 and 35 to form a Pythagorean Triad, and if so what is it?

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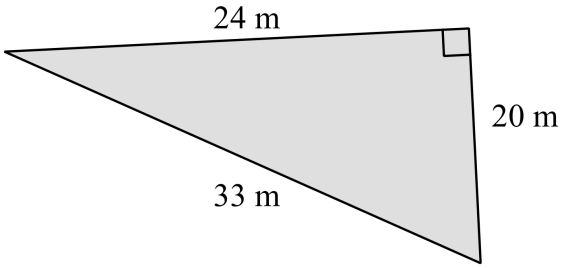
7. Is a triangle with the dimensions below, right angled? Explain why?



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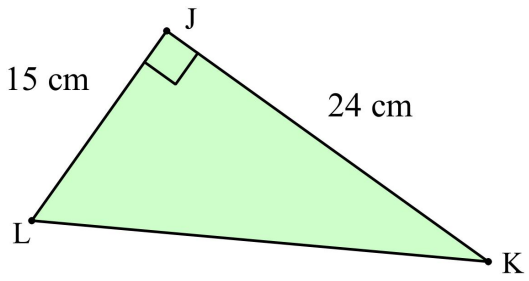
8. Find the length of *KL* (leave your answer as a surd).



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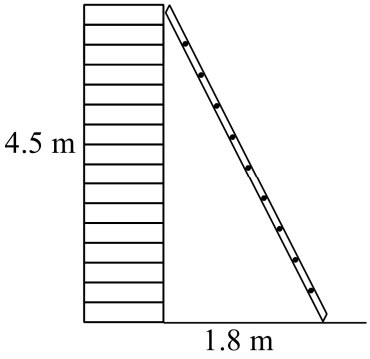
9. The ladder shown, leans against the top of the wall.
What is the height of the wall, correct to the nearest 10^{th} of a metre?



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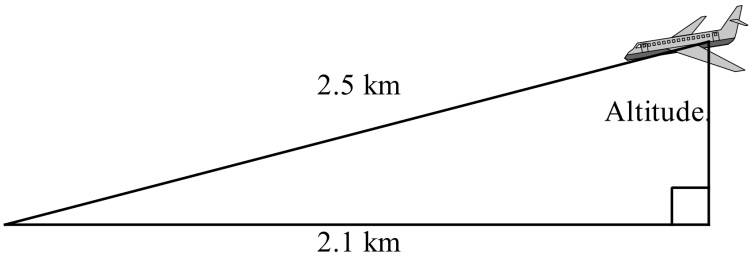
10. A plane is shown coming in to land. It is 2.1 km horizontally from the point where it will touch down and 2.5 km in a straight line from the point.



What is it's altitude to the nearest metre?

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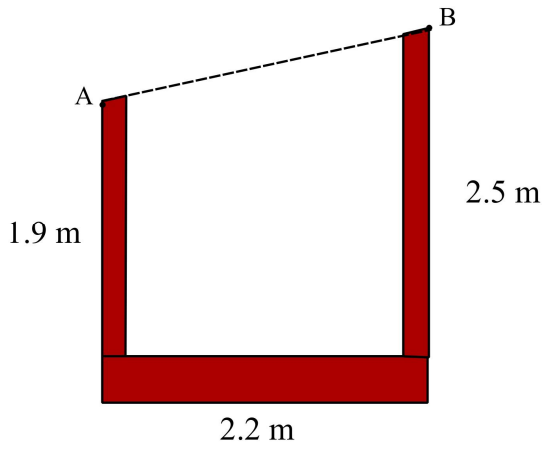
11. Tarquin is building a shed.

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

What is the length of the beam?



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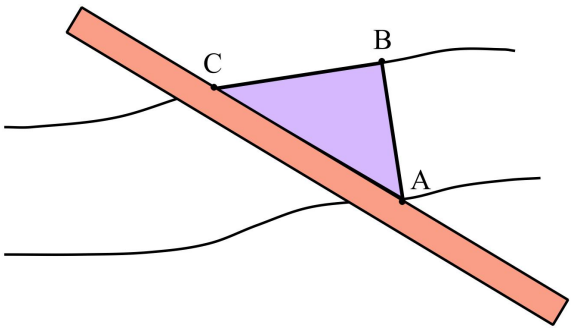
12. Measurements were taken to help calculate the width of the river.
The distance across the bridge AC = 120 m.
The distance along the bank BC =86 m.
Calculate the width of the river (AB), to the nearest metre.



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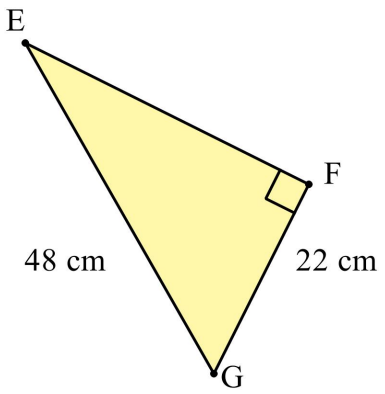
13. What is the area of the triangle *EFG*?



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14. Calculate the distance SU.

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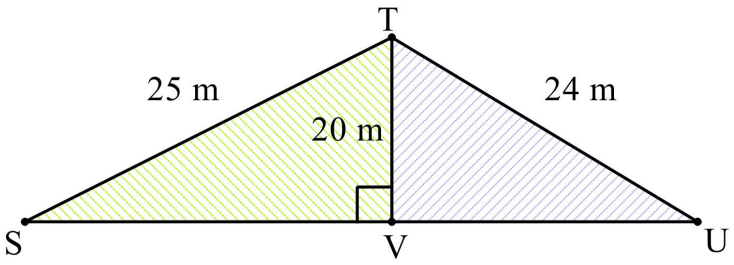

15. Find the area of triangle XYZ, to the nearest 10^{th} of a square centimetre.

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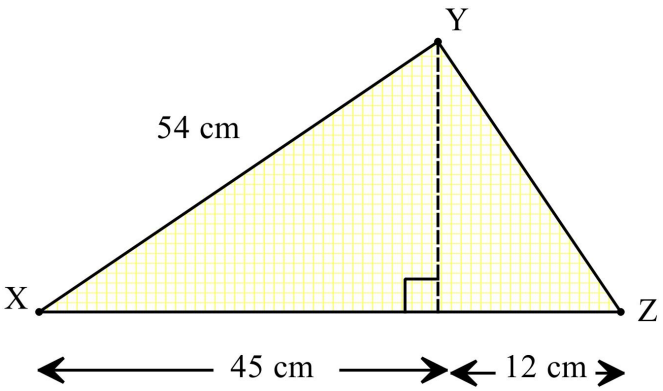


High School
Mathematics Test 2014

Year 9

Pythagoras Theorem

Calculator Allowed

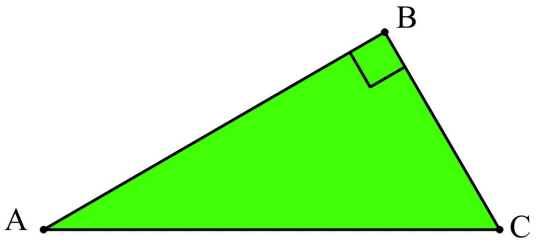
Name_____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

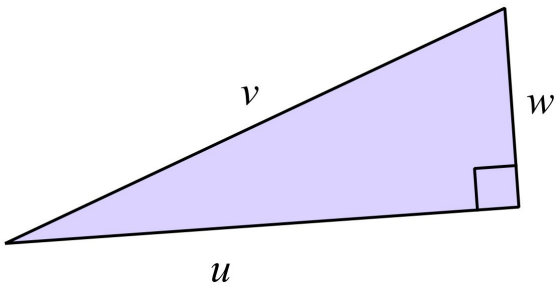
1. Which side is the hypotenuse of the right triangle ABC?

A. AB
B. AC
C. BC
D. BD



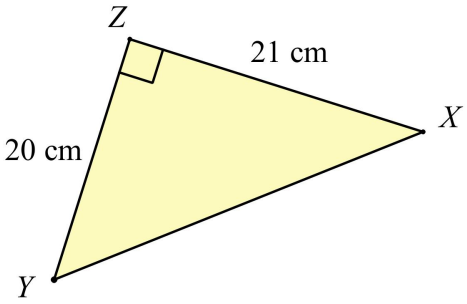
2. Which is a correct statement of Pythagoras Theorem for the triangle shown below.

A. $u^2 = v^2 + w^2$
B. $u^2 = w^2 + v^2$
C. $v^2 = u^2 + w^2$
D. $w^2 = v^2 + u^2$



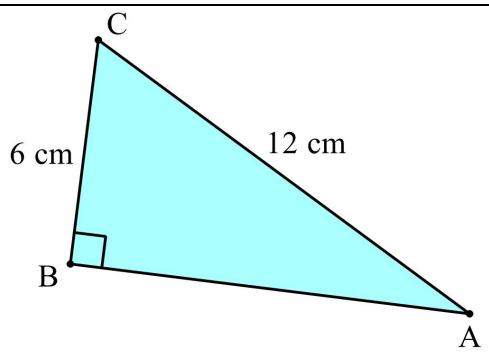
3. Find the length of XY

A. 25
B. 27
C. 29
D. 31



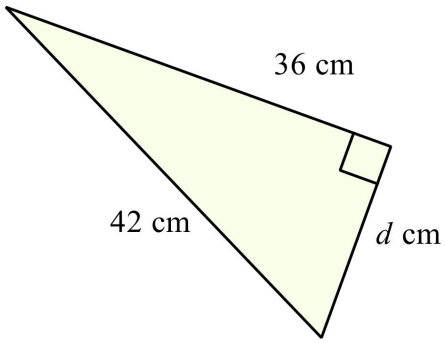
4. The length of AB in the triangle below is:

A. 2.5 cm
B. 3.5 cm
C. 10.4 cm
D. 13.4 cm



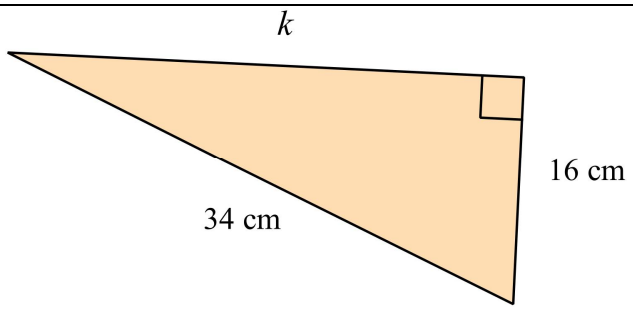
5. Find the value of d in the triangle below.

A. 2.5 cm
B. 3.5 cm
C. 13.4 cm
D. 21.6 cm



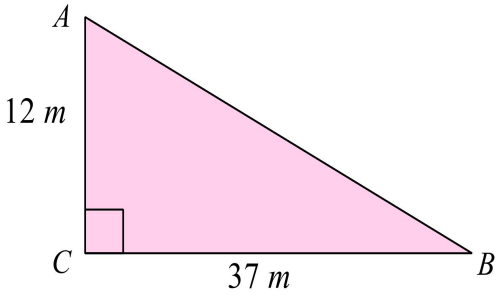
6. Find the value of k.

A. $k = 28$
B. $k = 30$
C. $k = 31$
D. $k = 33$



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

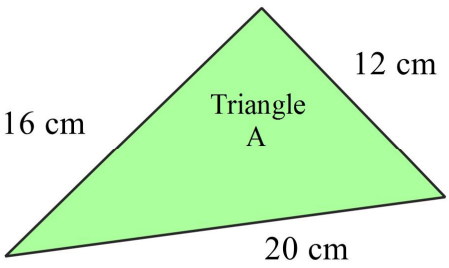
A. It lies between 32 m and 33 m.
B. It lies between 38 m and 39 m.
C. It lies between 45 m and 46 m.
D. It lies between 49 m and 50 m.

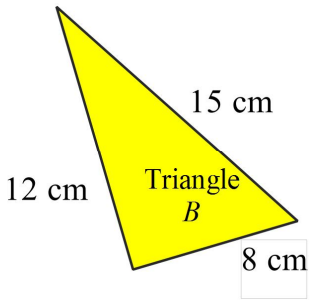


8. Which of the following is a Pythagorean triad?

A. {15, 39, 45} B. {15, 36, 38} C. {16, 28, 34} D. {24, 70, 74}

9. Which of the triangles below are right angled?





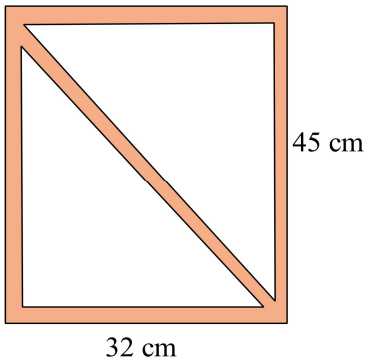
A. Both triangles are right angled.

B. Neither triangle is right angled.

C. Only triangle A is right angled.

D. Only triangle B is right angled.

10. A rectangular pet gate measures 32 cm by 45 cm and has a diagonal brace through the centre. What length of metal is needed to make the brace for the gate?



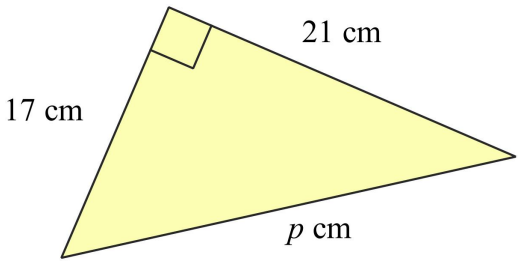
A. 31.6 cm.

B. 55.2 cm.

C. 62.3 cm.

D. 77.0 cm.

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



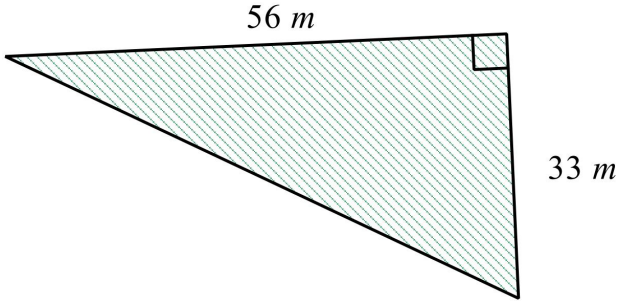
A. $p = 2$

B. $p = \sqrt{38}$

C. $p = \sqrt{152}$

D. $p = \sqrt{730}$

12. What is the perimeter of the triangle STU?



A. 65 m

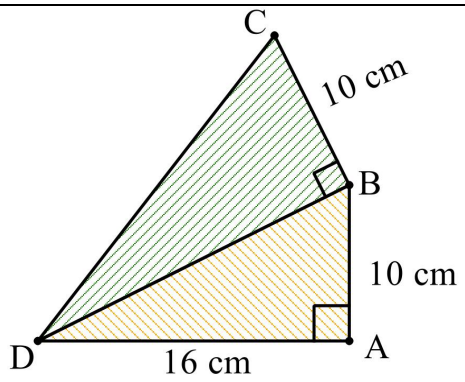
B. 89 m

C. 121 m

D. 154 m

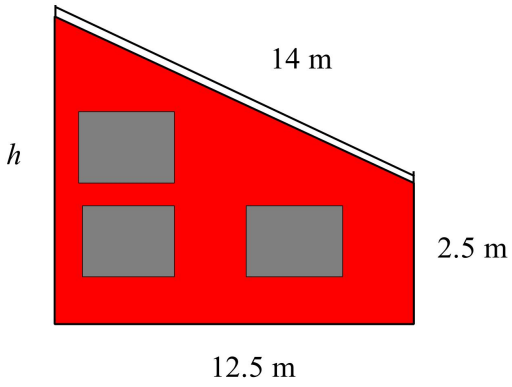
13. What is the length of CD?

A. 12.5 m
B. 18.9 m
C. 21.4 m
D. 45.6 m



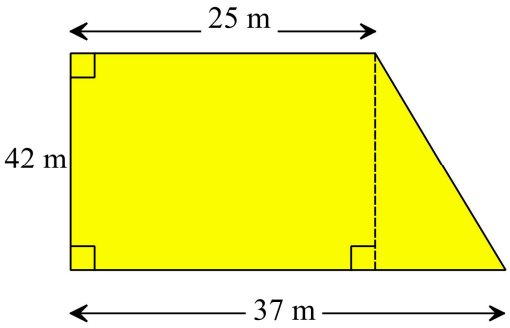
14. What is the height of the wall, marked *h*?

A. 6.3 m
B. 8.8 m
C. 9.2 m
D. 12.9 m



15. What is the perimeter of this shape?

A. 86 m
B. 111 m
C. 123 m
D. 148 m



High School
Mathematics Test 2014

Pythagoras Theorem

Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

High School
Mathematics Test 2014

Pythagoras Theorem

ANSWERS

Section 1 (1 mark each)	
	Working and Answers
1.	$FG^2 = 7^2 + 24^2$ $= 625$ $FG = 25$
2.	$w^2 = 41^2 - 9^2$ $= 1600$ $w = 40$
3.	$RS^2 = 15^2 + 20^2$ $= 625$ $RS = 25$
4.	$FG^2 + FH^2 = GH^2$ or $f^2 = g^2 + h^2$
5.	$EF^2 = 55^2 + 120^2$ $= 17425$ $EF = 132.003$ $= 132$ (nearest metre)
6.	$12^2 + 35^2 = 1369$ $= 37$ There is a number and it is 37.
7.	$24^2 + 20^2 = 976$ $33^2 = 1089 \neq 976$ so the triangle is not right angled as doesn't follow Pythagoras theorem.
8.	$KL^2 = 15^2 + 24^2$ $= 801$ $KL = \sqrt{801}$
9.	$h^2 = 4.5^2 + 1.8^2$ $= 23.49$ $h = 4.846. . . .$ $h = 4.8$ (nearest 10th)
10.	$a^2 = 2.5^2 - 2.1^2$ $= 1.84$ $d = 1.35646$ km. . $= 1\,356$ m
11.	Diff in ht = 2.5 – 1.9 = 0.6 $AB^2 = 0.6^2 + 2.2^2$ $= 5.2$ $AB = 2.2803. .$ $AB = 2.3$ m (1 dp)

12.	$AB^2 = AC^2 - BC^2$ $AB^2 = 120^2 - 86^2$ $= 7004$ $d = 83.689$ m. $d = 84$ (nearest m)
13.	$EF^2 = 48^2 - 22^2$ $= 1820$ $EF = 42.7$ $\text{Area} = \frac{1}{2} \times 22 \times 42.7$ $= 469.3 \text{ cm}^2$
14.	$SV^2 = 25^2 - 20^2$ $= 225$ $SV = 15$ m. $VU^2 = 24^2 - 20^2$ $= 176$ $VU = 13.26$ m. $SU = 13.3 + 15 = 28.3\ m$
15.	$YA^2 = 54^2 - 45^2$ $= 891$ $YA = 29.849..$ cm. $XZ = 45 + 12 = 57$ cm $\text{Area} = \frac{1}{2} \times 57 \times 29.8$ $= 850.712 \text{ cm}^2$ $= 850.7 \text{ cm}^2$ (nearest 10th sq centimetre)

Section 2 (1 mark each)		
	Working	Answers
1.	AC is hypotenuse (longest side – opposite right angle)	B
2.	$v^2 = u^2 + w^2$	C
3.	$XY^2 = 20^2 + 21^2$ $= 841$ $w = 29$	C
4.	$AB^2 = 12^2 - 6^2$ $= 108$ $AB = 10.392..$	C
5.	$d^2 = 42^2 - 36^2$ $= 468$ $d = 21.633..$	D
6.	$k^2 = 34^2 - 16^2$ $= 900$ $k = 30$	B
7.	$AB^2 = 37^2 + 12^2$ $= 1513$ $38^2 = 1444$ and $39^2 = 1521$ so AB is between 38 and 39	B
8.	$15^2 + 39^2 = 1746$ Not Pythag Triad.. $15^2 + 36^2 = 1521$ Is not a Pythag Triad.. $16^2 + 28^2 = 1040$ Not Pythag Triad.. $24^2 + 70^2 = 5476$ $45^2 = 2025$ $38^2 = 1444$ $34^2 = 1156$ $74^2 = 5476$ Is a Pythag Triad.	D
9.	Triangle A $12^2 + 16^2 = 400$ $20^2 = 400$ Triangle A is right angled. Triangle *B* $12^2 + 8^2 = 208$ $15^2 = 225$ Triangle *B* is not right angled.	C
10.	$d^2 = 45^2 + 32^2$ $= 3049$ $d = 55.2$ cm	B
11.	$p^2 = 21^2 + 17^2$ $= 730$ $p = \sqrt{730}$	D
12.	$x^2 = 56^2 + 33^2$ $= 4225$ $x = 65$ m.. Perimeter = 56 + 33 + 65 = 154 *m*	D
13.	$BD^2 = 10^2 + 16^2$ $= 356$ $BD = 18.87$ m. $CD^2 = 10^2 + 18.87^2$ $= 456$ $BD = 21.4$ m.	C

14.	Diff in Height 2 = $14^2 - 12.5^2$ = 39.75 = 6.3 m. h = 6.3 + 2.5 = 8.8 m.	B
15.	Diff in base and top = 37 – 25 = 12 $12^2 + 42^2$ = 1908 $\sqrt{1908}$ = 43.7 Perimeter = 43.7 + 37 + 42 + 25 = 147.7 m = 148 m (nearest metre)	D

High School
Mathematics Test 2014

Pythagoras Theorem

Multiple Choice Answer Sheet

Name ___Marking Sheet

Completely fill the response oval representing the most correct answer.

1.	A ○	B ●	C ○	D ○
2.	A ○	B ○	C ●	D ○
3.	A ○	B ○	C ●	D ○
4.	A ○	B ○	C ●	D ○
5.	A ○	B ○	C ○	D ●
6.	A ○	B ●	C ○	D ○
7.	A ○	B ●	C ○	D ○
8.	A ○	B ○	C ○	D ●
9.	A ○	B ○	C ●	D ○
10.	A ○	B ●	C ○	D ○
11.	A ○	B ○	C ○	D ●
12.	A ○	B ○	C ○	D ●
13.	A ○	B ○	C ●	D ○
14.	A ○	B ●	C ○	D ○
15.	A ○	B ○	C ○	D ●