High School Mathematics Test 2015

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)
- Investigate the concept of irrational numbers, including π (ACMMG186)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.
Diagrams are not drawn to scale unless otherwise stated.

1. State Pythagoras Theorem for the triangle shown below.

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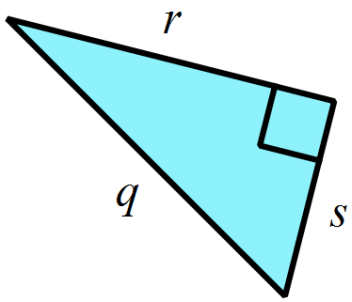
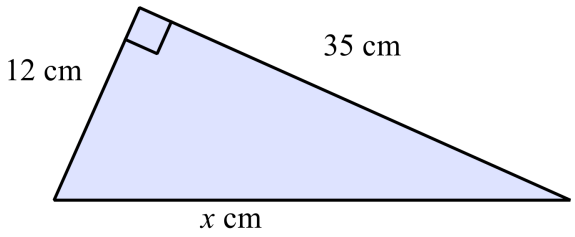


2. Find the value of x.



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3. Find the value of w.

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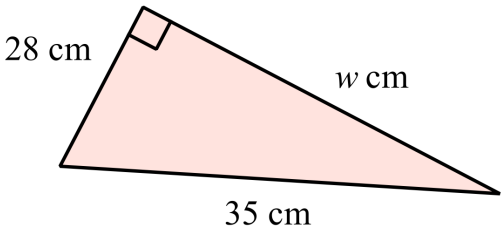
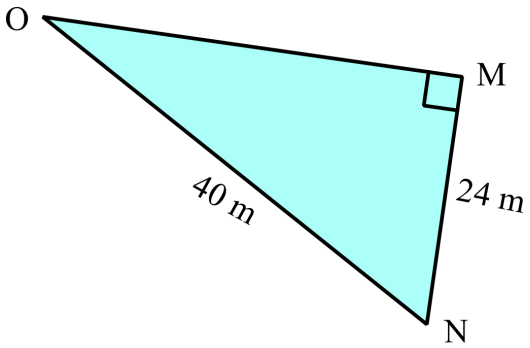


4. What is the length of *OM* ?



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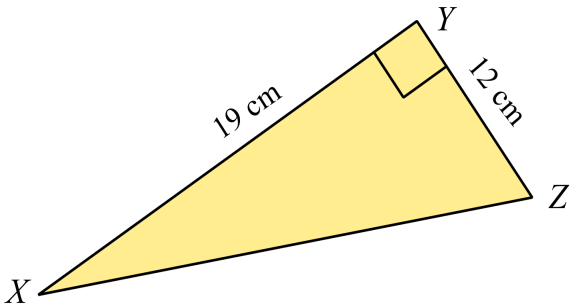
5. Find the distance *XZ* to the nearest centimetre.



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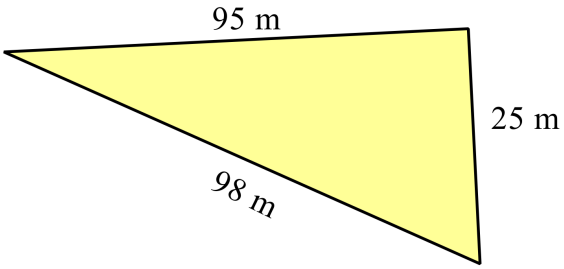
6. Is a triangle with the dimensions below, right angled? Explain why?



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

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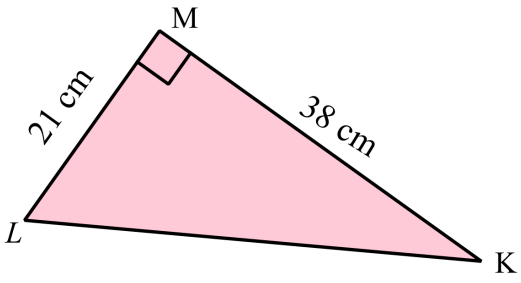
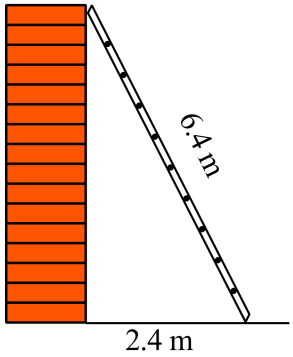


8. The ladder shown, leans against the top of the wall.
What is the height of the wall, correct to the nearest 10th of a metre?



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9. Are either of the following two sets of numbers, a Pythagorean triad (show your reasons)?

Set A (48, 64, 80) **Set B (50, 90, 105)**

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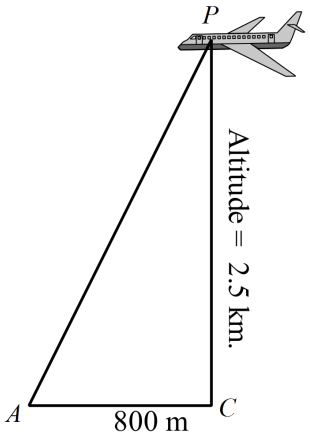
10. A plane *P* is known to be at an altitude of 2.5 km above point *C*.

It is viewed from point *A*, which is 800 m horizontally from C.

What is the distance *AP*?



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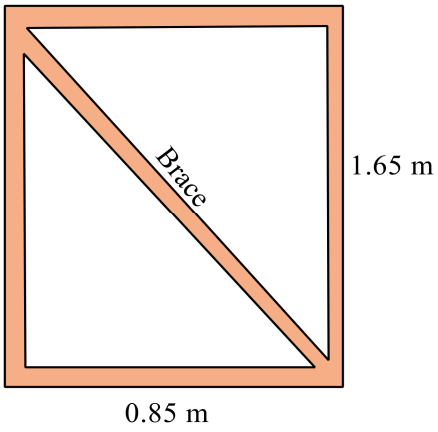
11. Gerald is building a gate to go in his fence.
He needs a diagonal brace to support the frame of the gate.
What is the length of the brace, correct to the nearest centimetre?



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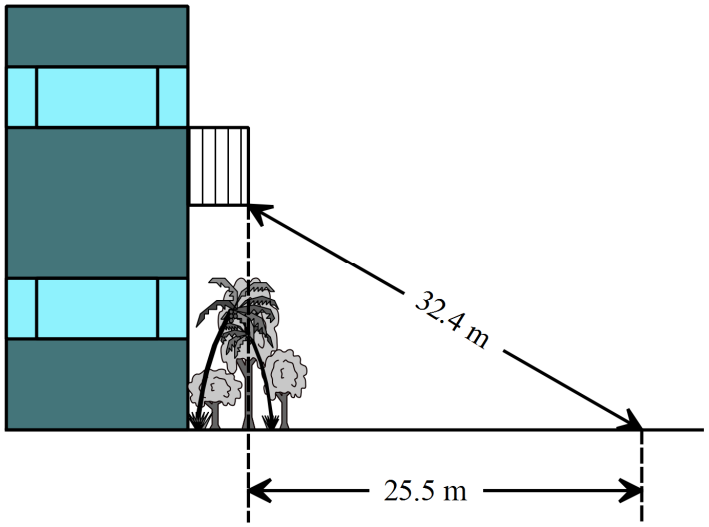
12. The height of the balcony could not be measured directly because of garden beds, so the measurements shown were taken.

Calculate the height of the balcony, to the nearest metre.



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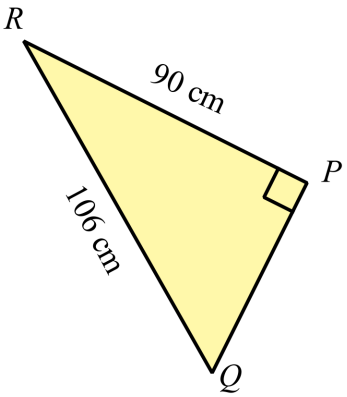
13. What is the perimeter of the triangle *PQR*?



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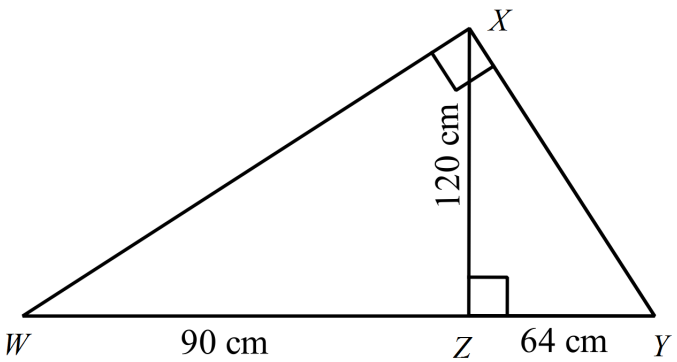
14. ΔWXY and ΔXYZ are both right angled as shown in the diagram.

Also $XZ = 120$ cm, $WZ = 90$ cm and $YZ = 64$ cm.

Find the perimeter of triangle WXY.



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15. $AC = 77$ m, $AB = 51$ m and $BD = 24$ m.
Calculate the distance BC.

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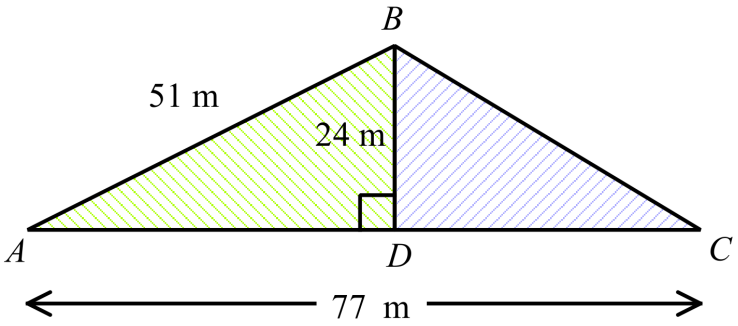


High School Mathematics Test 2015

Year 9 **Pythagoras Theorem**

Calculator Allowed

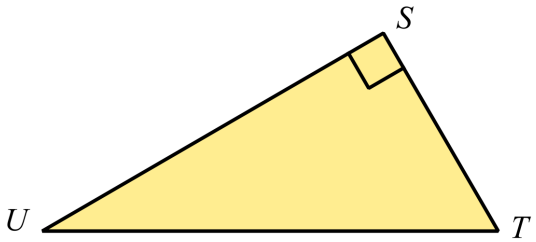
Name_____

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.

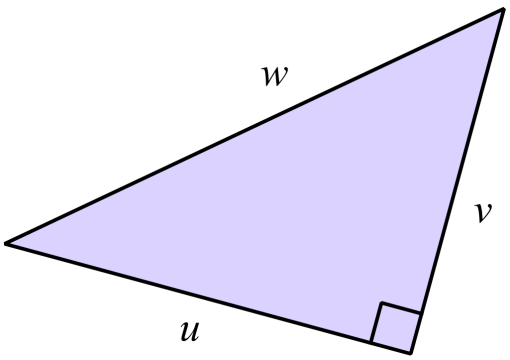
1. Which side is the hypotenuse of the right triangle *STU*?

A. *ST*
B. *SU*
C. *TU*
D. *US*



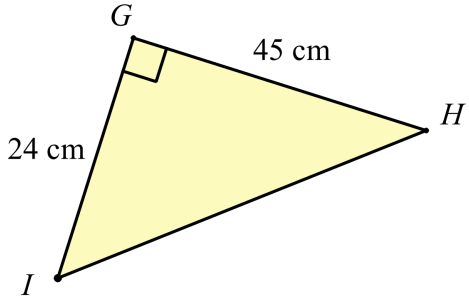
2. Which is a correct statement of Pythagoras Theorem for the triangle shown below.

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

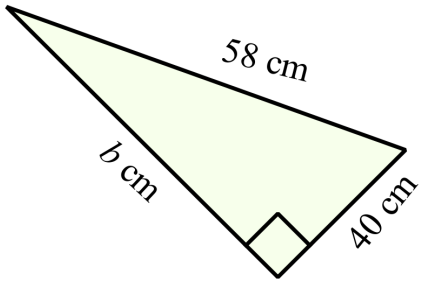


3. Find the length of *HI*

A. 21
B. 38
C. 51
D. 69

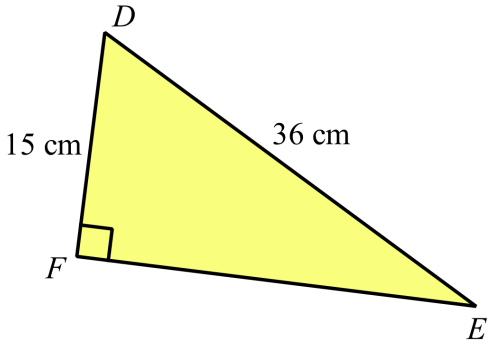


4. Find the value of b in the triangle below.



A. 18 cm
B. 42 cm
C. 84 cm
D. 98 cm

5. Calculate the length of EF, correct to one decimal place.

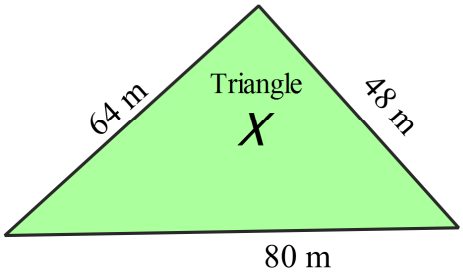


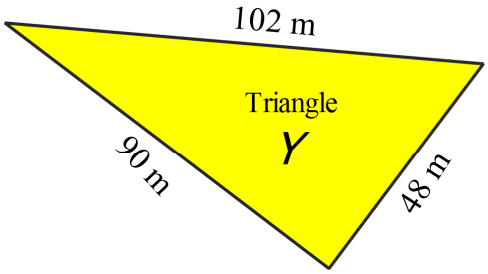
A. 21.0 cm
B. 32.7 cm
C. 39.0 cm
D. 51.0 cm

6. Which of the following is a Pythagorean triad?

A. {21, 22, 29} B. {21, 48, 52} C. {21, 99, 101} D. {21, 28, 35}

7. Which of the triangles below are right angled?



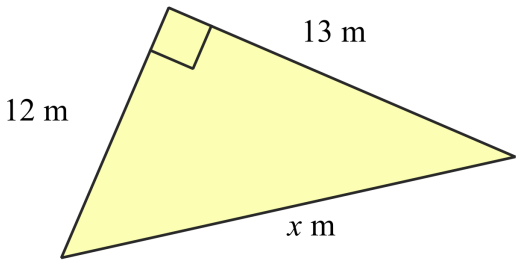


A. Both triangles are right angled.
B. Neither triangle is right angled.
C. Only triangle X is right angled.
D. Only triangle Y is right angled.

8. A rectangular LED/LCD television screen measures 98 cm by 126 cm.
The size is described by the length of the diagonal of the television.
How would it be described?

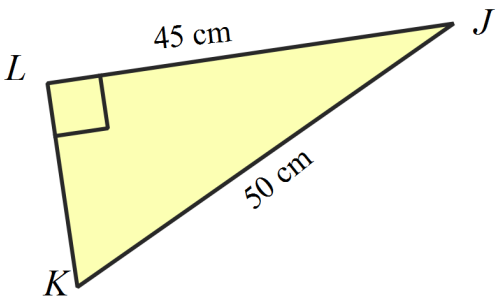
A. A 160 cm LED/LCD television.
B. A 204 cm LED/LCD television.
C. A 224 cm LED/LCD television.
D. A 240 cm LED/LCD television.

9. What is the value of x in the triangle shown?



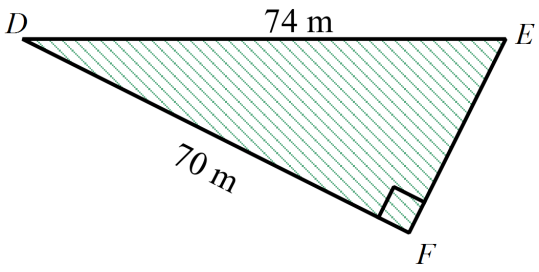
A. $x = 1$
B. $x = 5$
C. $x = \sqrt{313}$
D. $x = \sqrt{620}$

10. What is the length of KL in the triangle shown?



A. $\sqrt{95}$ cm
B. $\sqrt{475}$ cm
C. $\sqrt{2250}$ cm
D. $\sqrt{4525}$ cm

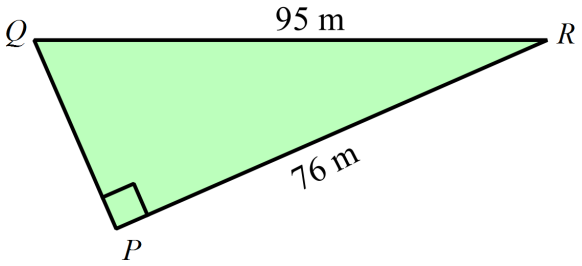
11. What is the perimeter of the triangle DEF?



A. 120 m
B. 144 m
C. 168 m
D. 188 m

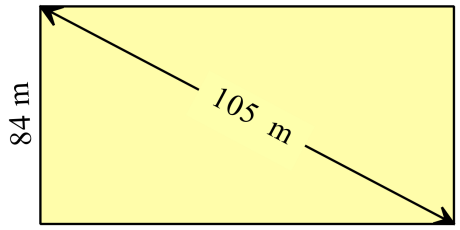
12. What is the area of the triangle PQR?

A. 171 m^2
B. 228 m^2
C. 2 166 m^2
D. 3 610 m^2



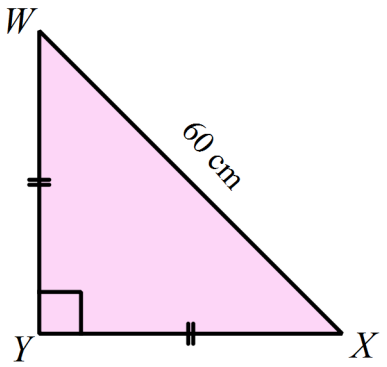
13. What is the area of the rectangle shown?

A. 5 292 m^2
B. 7 056 m^2
C. 8 820 m^2
D. 11 025 m^2



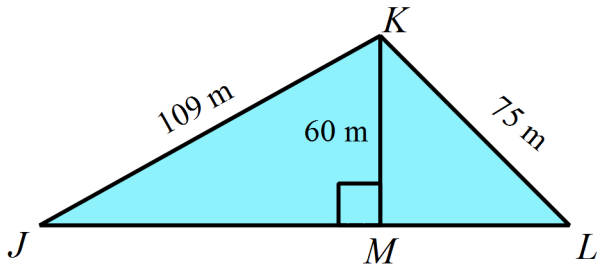
14. In ΔWXY, $WY = XY$.
What is the perimeter of the triangle?

A. 120 cm
B. 145 cm
C. 165 cm
D. 180 cm



15. What is the length of JL in the triangle shown?

A. 45 m
B. 91 m
C. 124 m
D. 136 m



High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Pythagoras Theorem

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 ⬭

Year 9 *Pythagoras Theorem* Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	q is the hypotenuse, so $q^2 = r^2 + s^2$	$q^2 = r^2 + s^2$
2.	$x^2 = 12^2 + 35^2$ $= 144 + 1225$ $= 1369$ $x = \sqrt{1369} = 37$	$x = 37$
3.	$w^2 = 35^2 - 28^2$ $= 1225 - 784$ $= 441$ $w = \sqrt{441} = 21$	$w = 21$
4.	$OM^2 = 40^2 - 24^2$ $= 1600 - 576$ $= 1024$ $OM = \sqrt{1024} = 32$	$OM = 32\ m$
5.	$XZ^2 = 19^2 + 12^2$ $= 361 + 144$ $= 505$ $XZ = \sqrt{505}$ $= 22.472 = 22\ m$ (nearest cm)	$OM = 22\ cm$ *(nearest cm)*
6.	$25^2 + 95^2 = 625 + 9025$ $= 9650$ $98^2 = 9604 \neq 9650$ So not a right triangle.	Not right, see working (required)
7.	$KL^2 = 21^2 + 38^2$ $= 441 + 1444$ $= 1885$ $KL = \sqrt{1885}$	$\sqrt{1885}$

8.	$h^2 = 6.4^2 - 2.4^2$ $= 35.2$ $h = \sqrt{35.2}$ $= 5.932 = 5.9$ m (nearest 10th)	5.9 m
9.	$48^2 + 64^2 = 2304 + 4096$ $= 6400$ $80^2 = 6400$ ∴ Pythagorean Triad $50^2 + 90^2 = 2500 + 8100$ $= 10\,600$ $105^2 = 11\,025 \neq 10\,600$ ∴ Not a Pythagorean Triad	Only Set A is a Pythagorean triad See working which is required.
10.	$AP^2 = 2.5^2 + 0.8^2$ $= 6.25 + 0.64$ $= 6.89$ $AP = \sqrt{6.89} = 2.6248... = 2.6$ km (nearest 100 m) $= 2\,600\ m$	2 600 m
11.	$b^2 = 1.65^2 + 0.85^2$ $= 3.445$ $w = \sqrt{3.445}$ $= 1.856071 = 1.86$ m (nearest cm)	1.86 m
12.	$h^2 = 32.4^2 - 25.5^2$ $= 399.51$ $w = \sqrt{399.51}$ $= 19.9877 = 20$ m (nearest metre)	20 m
13.	$PQ^2 = 106^2 - 90^2$ $= 3136$ $PQ = \sqrt{3136} = 56$ m Perimeter = 106+90+56 $= 252$ cm	252 cm

14.	$WX^2 = 90^2 + 120^2$ $= 22500$ $wx = \sqrt{22500} = 150$ cm $XY^2 = 120^2 + 64^2$ $= 18496$ $XY = \sqrt{18496} = 136$ cm Perimeter $= 90 + 64 + 136 + 150$ $= 440$ cm	440 cm
15.	$AD^2 = 51^2 - 24^2$ $= 2025$ $AD = \sqrt{2025} = 45$ $DC = 77 - 45 = 32$ $BC^2 = 24^2 + 32^2$ $= 1600$ $BC = \sqrt{1600} = 40$ cm	40 cm

Year 9 *Pythagoras Theorem*

Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	TU is the longest and opposite to the right angle.	C
2.	W is the hypotenuse so $w^2 = v^2 + u^2$	D
3.	$HI^2 = 24^2 + 45^2$ $= 576 + 2025$ $= 2601$ $HI = \sqrt{2601} = 51$	C
4.	$b^2 = 58^2 - 40^2$ $= 3364 - 1600$ $= 1764$ $b = \sqrt{1764} = 42$	B
5.	$EF^2 = 36^2 - 15^2$ $= 1296 - 225$ $= 1071$ $HI = \sqrt{1071} = 32.726.. = 32.7$ (one dec place)	B
6.	$21^2 + 28^2 = 35^2$	D
7.	$48^2 + 64^2 = 80^2$ $48^2 + 90^2 = 102^2$ Both are right angled.	A
8.	$d^2 = 98^2 + 126^2$ $= 9604 + 15876$ $= 25480$ $d = \sqrt{25480}$ $= 159.62 = 160$ cm	A
9.	$x^2 = 12^2 + 13^2$ $= 144 + 169$ $= 313$ $x = \sqrt{313}$	C

10.	$KL^2 = 50^2 - 45^2$ $= 2500 - 2025$ $= 475$ $EF = \sqrt{475}$	B
11.	$EF^2 = 74^2 - 70^2$ $= 5476 - 4900$ $= 576$ $EF = \sqrt{576} = 24$ Perimeter $= 24 + 70 + 74 = 168$ cm	C
12.	$QR^2 = 95^2 - 76^2$ $= 9025 - 5776$ $= 3249$ $QR = \sqrt{3249} = 57$ m $Area = \frac{1}{2} \times 76 \times 57 = 2\,166\ \text{m}^2$	C
13.	$l^2 = 105^2 - 84^2$ $= 11025 - 7056$ $= 3969$ $QR = \sqrt{3969} = 63\ m$ Area $= 63 \times 84 = 5\,292\ m^2$	A
14.	$WY^2 + XY^2 = 60^2$ $WY^2 + WY^2 = 60^2$ $2WY^2 = 3600$ $WY^2 = 1800$ $WY = 42.426$ (1 dec pl) Perimeter $= 42.426 \times 2 + 60$ $= 144.852 = 145$ cm (nearest cm)	B
15.	$JM^2 = 109^2 - 60^2$ $= 11881 - 3600$ $= 8281$ $JM = \sqrt{8281} = 91$ m $JL = 91 + 45 = 136$ m $LM^2 = 75^2 - 60^2$ $= 5625 - 3600$ $= 2025$ $LM = \sqrt{2025} = 45$ m	D

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Pythagoras Theorem

Name _____ANSWERS_____

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 ●