School Name
Mathematics Test 2017

Year 9 **Pythagoras Theorem** Calculator Allowed

Skills and Knowledge Assessed:

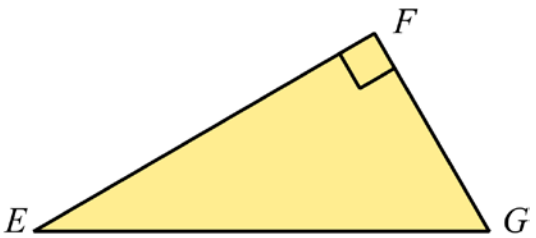
- Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222)
- Investigate the concept of irrational numbers, including π (ACMMG186)

Name_____

Section 1 Short Answer Section

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

1. Name the hypotenuse of the right triangle *EFG*?



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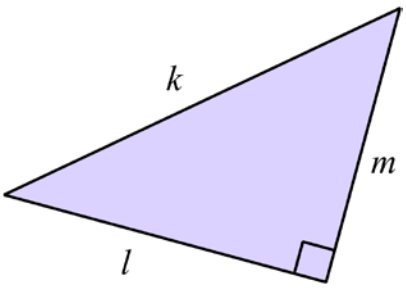
2. Write a statement of Pythagoras Theorem for the triangle shown below.



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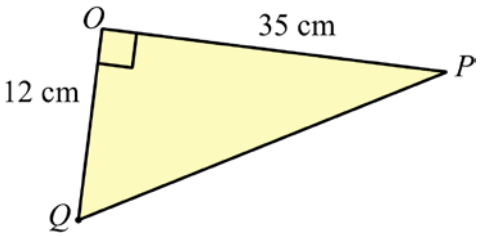
3. Find the length of *PQ*.



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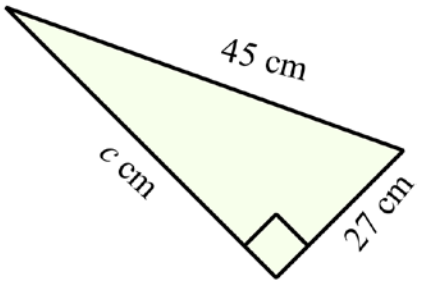
4. Find the value of c in the triangle below.



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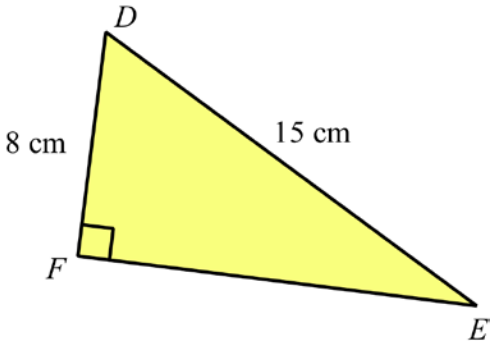
5. Calculate the length of EF, correct to one decimal place.



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6. Which of the following sets could be described as a Pythagorean triad? (Show why.)

Set A {21, 72, 75} Set B {42, 60, 75}.

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7. A rectangle is 64 cm long and has a diagonal which is 80 cm long.

Calculate the width of the rectangle.

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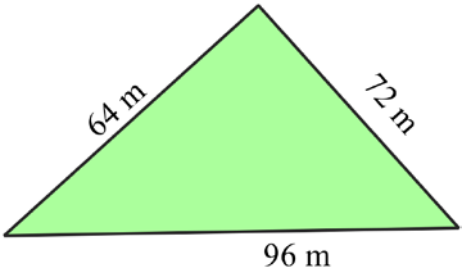
8. Determine if the triangle below is right angled?
Use calculations to support your decision.



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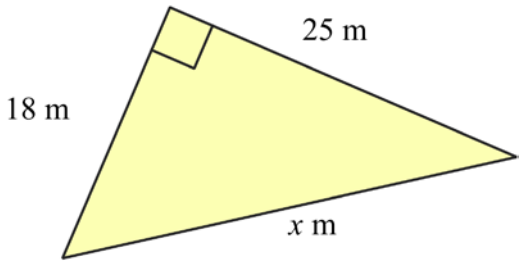
9. Calculate the exact value of x.



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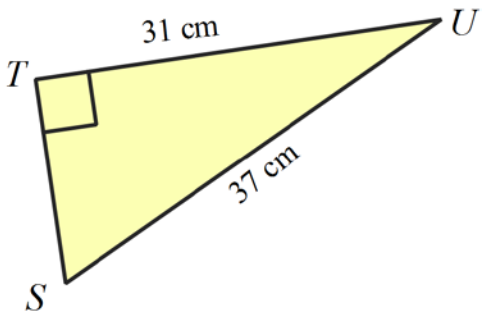
10. What is the length of ST, correct to 1 decimal place?



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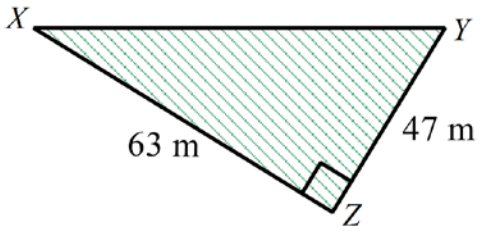
11. What is the perimeter of the triangle XYZ?
(Answer correct to the nearest 10^{th} of a square metre.)



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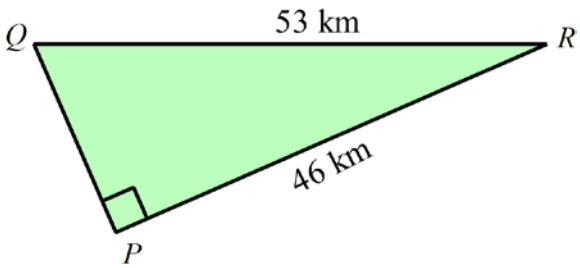
12. What is the area of the triangle PQR?
(Answer correct to 1 decimal place.)



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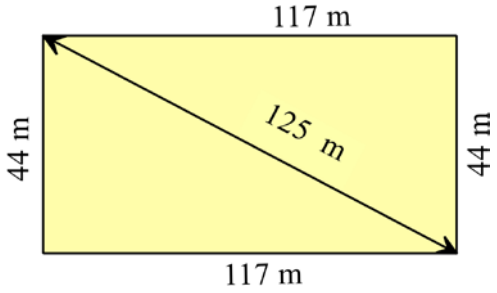
13. Determine if the quadrilateral shown is a rectangle.



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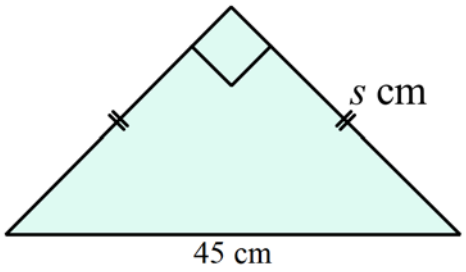
14. A right isosceles triangle is shown.

What is the value of s, correct to 1 decimal place?



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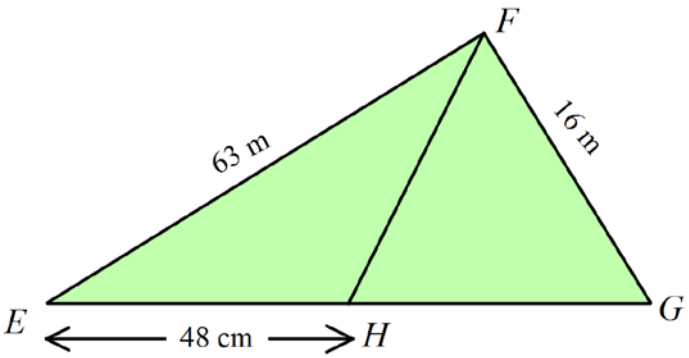
15. ΔEFG is right angled at F.
H is a point on EG such that $EH = 48$ m.

Find the length of HG.



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School Name
Mathematics Test 2017

Calculator Allowed

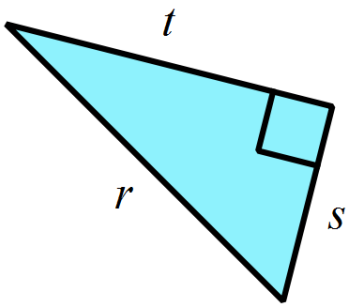
Year 9 **Pythagoras Theorem**

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



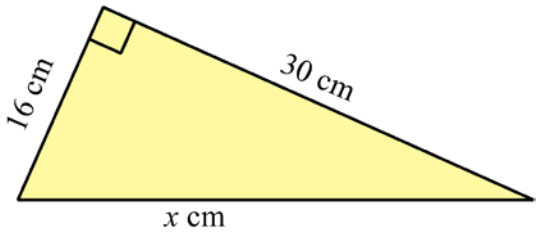
A. $r^2 = s^2 - t^2$

B. $s^2 = r^2 + t^3$

C. $t^2 = s^2 - r^2$

D. $r^2 = s^2 + t^2$

2. Find the value of x.



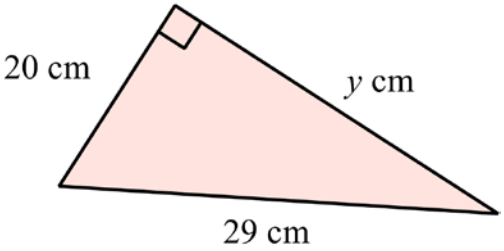
A. $x = 25$

B. $x = 31$

C. $x = 34$

D. $x = 46$

3. Find the value of y.



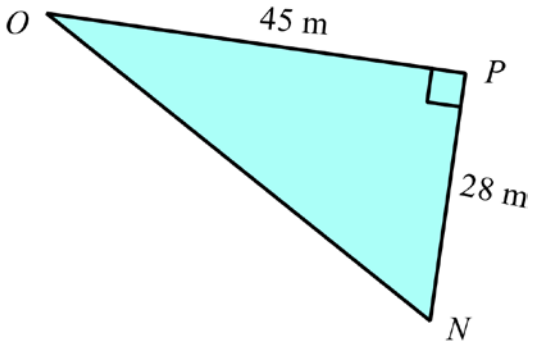
A. $y = 9$

B. $y = 21$

C. $y = 25$

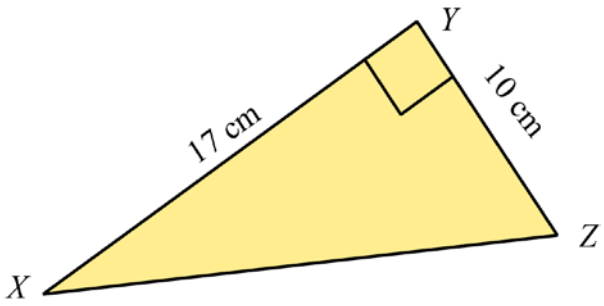
D. $y = 35$

4. What is the length of *ON* ?



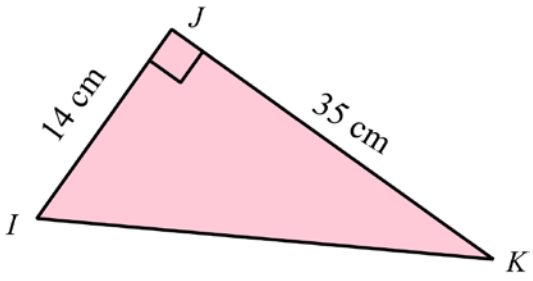
A. 48 m
B. 53 m
C. 61 m
D. 73 m

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



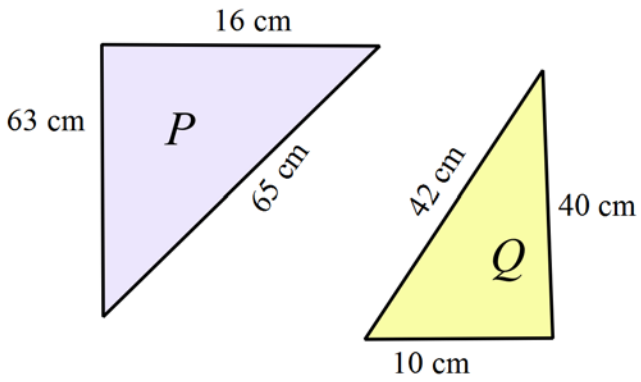
A. 19.7 cm
B. 20.3 cm
C. 23.5 cm
D. 27.0 cm

6. Find the length of *KI* (leave your answer as a surd).



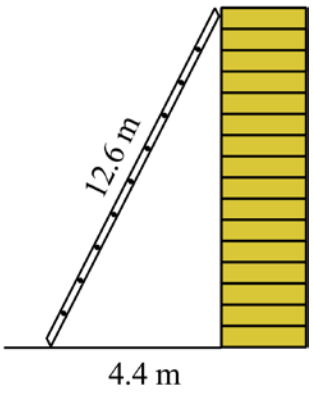
A. $\sqrt{1124}$
B. $\sqrt{1241}$
C. $\sqrt{1421}$
D. $\sqrt{2401}$

7. Determine if either of the triangles shown are right angled.



A. Both triangles are right angled.
B. Neither triangle is right angled.
C. Only triangle P is right angled.
D. Only triangle Q is right angled.

8. 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?

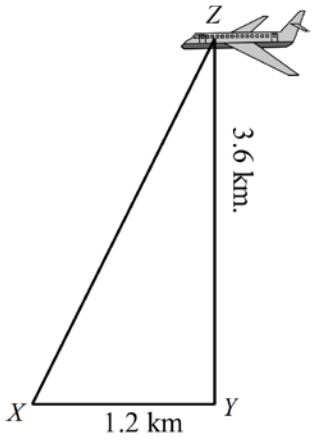


A. 11.8 m
B. 12.1 m
C. 12.4 m
D. 13.3 m

9. A plane (*Z*) is 3.6 km directly above a point *Y*.

It is viewed from point *X*, which is 1.2 km horizontally from Y.

What is the distance *XZ* (to the nearest 10 m)?



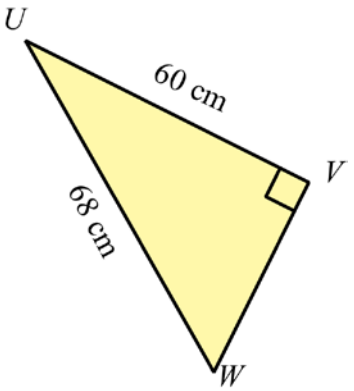
A. 3.69 km
B. 3.79 km
C. 3.95 km
D. 4.65 km

10. Are either or both of the following two sets of numbers, Pythagorean triads?

Set A (48, 55, 73)
Set B (11, 60, 61)

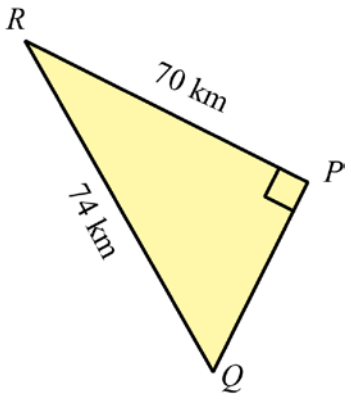
A. Both sets are Pythagorean triads.
B. Neither set is a Pythagorean triads.
C. Only Set A is a Pythagorean triad.
D. Only Set B is a Pythagorean triad.

11. Find the area of ΔUVW.



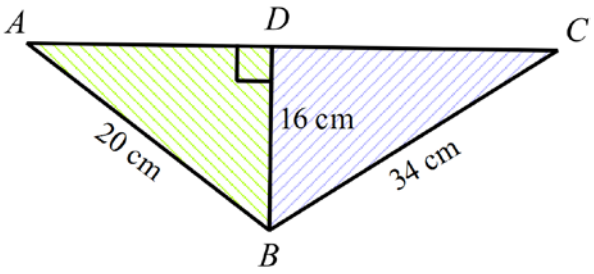
A. 510 cm^2
B. 680 cm^2
C. 720 cm^2
D. 960 cm^2

12. What is the perimeter of the triangle PQR?



A. 144 cm
B. 152 cm
C. 158 cm
D. 168 cm

13. BC = 34 cm, AB = 20 cm and BD = 16 cm.
Calculate the distance AC.

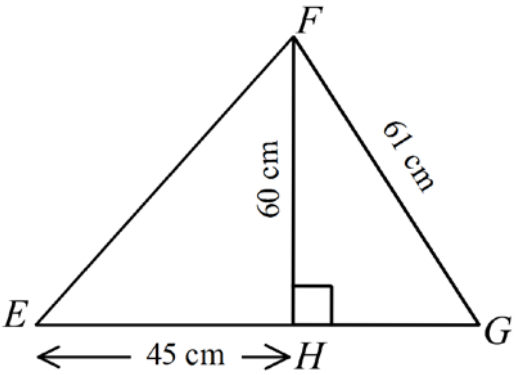


A. 27 cm
B. 30 cm
C. 42 cm
D. 54 cm

14. ΔFGH is right angled at H, as shown in the diagram.

Also EH = 45 cm, FH = 60 cm and FG = 61 cm.

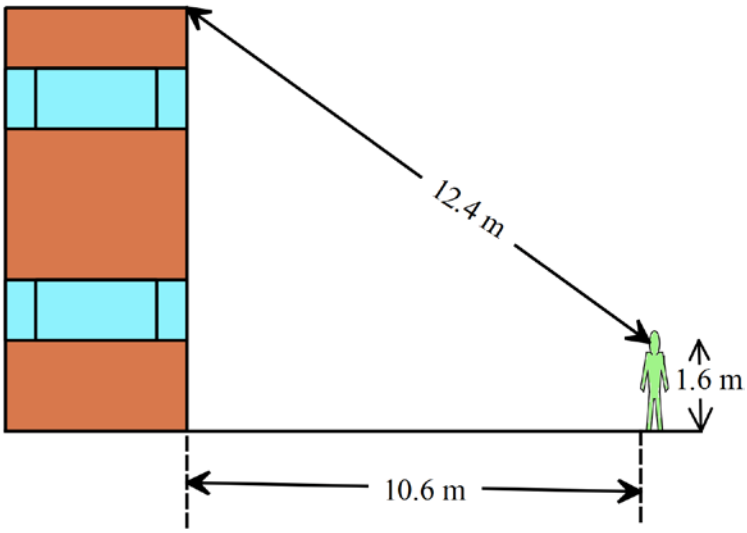
Find the perimeter of ΔFGH.



A. 166 cm
B. 192 cm
C. 198 cm
D. 206 cm

15. From 10.6 metres away from the base of a building, Karen sites the direct distance to the top of the building to be 12.4 m.

If her eye level is 1.6 m above ground, calculate the height of the building, to the nearest 10^{th} of a metre.



A. 3.4 m

B. 6.4 m

C. 7.4 m

D. 8.0 m

School Name

Mathematics 2017

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 ⬭

School Name
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Year 9 — *Pythagoras Theorem* — Non Calculator Section

ANSWERS

Question	Working and Answer
1.	*EG* is the longest side and opposite to the right angle, so ***EG* is the hypotenuse.**
2.	*k* is the hypotenuse so $\boldsymbol{k^2 = l^2 + m^2}$
3.	$PQ^2 = 12^2 + 35^2$ $= 144 + 1225$ $= 1369$ $PQ = \sqrt{1369}$ **$= 37$ cm**
4.	$c^2 = 45^2 - 27^2$ $= 2025 - 729$ $= 1296$ $c = \sqrt{1296}$ **$c = 36$**
5.	$EF^2 = 15^2 - 8^2$ $= 225 - 64$ $= 161$ $EF = \sqrt{161}$ $= 12.68857754$ **$= 12.7$ cm (1 dec pl)**
6.	$21^2 + 72^2 = 75^2$ $42^2 + 60^2 \neq 75^2$ **So set A is the Pythagorean Triad**

Question	Working and Answer
7.	Let w be the width. $w^2 = 80^2 - 64^2$ $= 6400 - 4096$ $= 2304$ $w = \sqrt{2304}$ $=$ **48 cm**
8.	$64^2 + 72^2 = 4096 + 5184$ $= 9280$ $96^2 = 9216$ $64^2 + 72^2 \neq 96^2$ **So the triangle is not right angled.**
9.	$x^2 = 25^2 + 18^2$ $= 625 + 324$ $= 949$ $\boldsymbol{x = \sqrt{949}}$
10.	$ST^2 = 37^2 - 31^2$ $= 1369 - 961$ $= 408$ $ST = \sqrt{408}$ $= 20.19900$ $=$ **20.2 cm (1 dec place)**
11.	$XY^2 = 47^2 + 63^2$ $= 3969 + 2209$ $= 6178$ $XY = \sqrt{6178}$ $= 78.6003$ $= 78.6\ m$ (1 dec place) Perimeter $= 78.6 + 47 + 63$ $=$ **188.6 m**
12.	$PQ^2 = 53^2 - 46^2$ $= 2809 - 2116$ $= 693$ $PQ = \sqrt{693}$ $= 26.32489...$ $= 26.3$ km (to 1 dec place) Area $= \frac{1}{2} \times 26.3 \times 46$ $= 605.47254$ $=$ **605.5 km^2 (604.9 km^2 if used rounded value)**

Question	Working and Answer
13.	The opposite sides are equal so the quadrilateral is a parallelogram, so if the two triangles formed are right triangles, the figure is a rectangle. Test with Pythagoras Theorem. $117^2 + 44^2 = 13689 + 1936$ $= 15625$ $125^2 = 15625$ **As the triangles are right, the figure is a rectangle.**
14.	Since it is isosceles, both the shorter sides are equal to s. As it is a right triangle, $s^2 + s^2 = 45^2$ $2s^2 = 2025$ $s^2 = 1012.5$ $s = \sqrt{1012.5}$ $= 31.8198...$ $\boldsymbol{s = 31.8}$ **cm (1 dec pl)**
15.	$EG^2 = 63^2 + 16^2$ $= 3969 + 256$ $= 4225$ $EG = \sqrt{4225}$ $= 65$ m $HG = 65 - 48$ $\boldsymbol{HG = 17}$ **m**

School Name
Mathematics Test 2017

Year 9

Pythagoras Theorem

Calculator Allowed
Multiple Choice
Section

ANSWERS

Question	Working	M C Answer
1.	r is the hypotenuse, so $r^2 = s^2 + t^2$	**D**
2.	$x^2 = 16^2 + 30^2$ $= 256 + 900$ $= 1156$ $x = \sqrt{1156} = 34$	**C**
3.	$y^2 = 29^2 - 20^2$ $= 841 - 400$ $= 441$ $y = \sqrt{441} = 21$	**B**
4.	$ON^2 = 28^2 + 45^2$ $= 784 + 2025$ $= 2809$ $ON = \sqrt{2809}$ $= 53$ m	**B**
5.	$XZ^2 = 17^2 + 10^2$ $= 289 + 100$ $= 389$ $XZ = \sqrt{389}$ $= 19.7230829...$ $= 19.7$ cm (nearest mm)	**A**
6.	$KI^2 = 14^2 + 35^2$ $= 196 + 1225$ $= 1421$ $KI = \sqrt{1421}$	**C**

7.	Triangle P $16^2 + 63^2 = 256 + 3969$ $= 4225$ $65^2 = 4225$ So P is a right triangle. Triangle Q $10^2 + 40^2 = 100 + 1600$ $= 1700$ $42^2 = 1764 \neq 1700$ So Q is not a right triangle.	**C**
8.	$h^2 = 12.6^2 - 4.4^2$ $= 158.76 - 19.36$ $= 139.4$ $h = \sqrt{139.4}$ $= 11.80677 = 11.8$ m (nearest 10th)	**A**
9.	$XZ^2 = 3.6^2 + 1.2^2$ $= 12.96 + 1.44$ $= 14.4$ $XZ = \sqrt{14.4} = 3.794733... = 3.79$ km (nearest 10 m)	**B**
10.	Set A $48^2 + 55^2 = 2304 + 3025$ $= 5329$ $73^2 = 5329$ Set A is Pythagorean Triad Set B $11^2 + 60^2 = 121 + 3600$ $= 3721$ $61^2 = 3721$ Set B is Pythagorean Triad	**A**
11.	$VW^2 = 68^2 - 60^2$ $= 4624 - 3600$ $= 1024$ $= 32$ cm Area $= \frac{1}{2} \times 60 \times 32$ $= 960$ cm^2	**D**

12.	$PQ^2 = 74^2 - 70^2$ $= 5476 - 4900$ $= 576$ $PQ = \sqrt{576} = 24$ Perimeter $= 24 + 70 + 74$ $= 168$ km	**D**
13.	$AD^2 = 20^2 - 16^2$ $= 400 - 256$ $= 144$ $AD = \sqrt{144} = 12$ $DC^2 = 34^2 - 16^2$ $= 1156 - 256$ $= 900$ $DC = \sqrt{900} = 30$ $AC = 12 + 30 = 42$ cm	**C**
14.	$EF^2 = 45^2 + 60^2$ $= 2025 + 3600$ $= 5625$ $EF = \sqrt{5625}$ $= 75$ cm $HG^2 = 61^2 - 60^2$ $= 3721 - 3600$ $= 121$ $HG = \sqrt{121} = 11$ cm Perimeter $= 45 + 11 + 61 + 75$ $= 192$ cm	**B**
15.	Let h be the height above his eye level $h^2 = 12.4^2 - 10.6^2$ $= 153.76 - 112.36$ $= 41.4$ $h = \sqrt{41.4} = 6.434283...$ Height of building $= 6.4 + 1.6 = 8.0\ m$	**D**

School Name

Mathematics 2017

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 ●