PYTHGORAS THEOREM

Pearson Edexcel - Tuesday 11 June 2019 - Paper 3 (Calculator) Higher Tier

1.

| 8 | (a) | Mistake described | C1 | for statement describing a mistake
Acceptable
eg should be $AC^2 - AB^2$
    she should do $8^2 - 6^2$
    she should be subtracting not adding the numbers
    she thought that BC was the hypoteneuse when it was actually AC
    should be $BC^2 + AB^2 = AC^2$
.....should be $8^2 = 6^2 + BC^2$
Not acceptable
eg she has not used Pythagoras correctly
    $6^2 + 8^2$ is 120
    the answer should be $\sqrt{28}$ or 5 or 5.3 or 5.2915
    $BC + AB = AC$ | |
| | (b) | Explanation | C1 | for explanation
Acceptable examples
the scale factor used is 2.5
$5 \div 2$ is not 1.5
$10 \div 4$ is more than 1.5
the scale factor is not 1.5
he has not used the correct scale factor
has enlarged it by too much
ZY should be 6
Not acceptable examples
the grid is not large enough | Note that a diagram alone is insufficient. |

Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

2.

5			70.5	P1	starts process of Pythagoras e.g. $5^2 + 12^2$
				P1	complete process for Pythagoras e.g. $\sqrt{5^2 + 12^2}$ or $\sqrt{25+144}$ or $\sqrt{169}$ (=13)
				P1	(dep P1 for Pythagoras) process of adding all the lengths e.g. $5 + 5 + 12 + 12 + $ "13" (=47)
				P1	(indep) process of multiplying at least 2 lengths by 1.5
				A1	cao SC: any evidence of working with Pythagoras award the P1 or P2

Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

3.

4			No with reasoning	M1	Derive AC=9 cm and identify as hypotenuse
				M1	$4^2 + 7^2$
				A1	for using eg $AC = \sqrt{4^2 + 7^2}$ or 65 and 81
				C1	for concluding explanation that ABC is not a right-angled triangle with evidence.

Pearson Edexcel - Friday 6 November 2015 - Paper 2 (Calculator) Higher Tier

4.

*7			No not enough	5	M1 for substituting into Pythagoras' theorem M1 for complete correct use of Pythagoras' theorem M1 for a complete method to find the perimeter of their trapezium A1 51.(20655..) C1 (dep on correct first 2 M marks) for correct conclusion dependent upon supporting calculations

Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

5.

15		80.1	3	M1 for $39^2 + 70^2$ M1 for $\sqrt{"1521"+"4900"}$ **or** $\sqrt{"6421"}$ A1 for 80.1 - 80.2

Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

6.

11		3.52	3	M1 for $1.35^2 + 3.25^2$ M1 (dep) for $\sqrt{(1.35^2 + 3.25^2)}$ $(=\sqrt{12.385})$ A1 for answer in the range 3.51 to 3.52

Pearson Edexcel - Monday 4 March 2013 - Paper 2 (Calculator) Higher Tier

7.

13	(a)	11.5	3	M1 for $13^2 - 6^2$ or $169 - 36$ or 133 M1 (dep on M1) for $\sqrt{"13^2 - 6^2"}$ **or** $\sqrt{133}$ A1 for answer in the range $11.5 - 11.6$
	(b)	47.2	3	M1 for cos $(RPQ)=\frac{17}{25}$ oe **OR** sin $PQR = \frac{17}{25}$ with PQR clearly identified M1 for $(RPQ =+)$ cos$^{-1}\frac{17}{25}$ oe **OR** $PQR = $ sin$^{-1}\frac{17}{25}$ with PQR clearly identified A1 for answer in the range $47.1 - 47.2$ SC : B2 for an answer of 0.823(033...) **or** 52.3(95...) **or** 52.4

Pearson Edexcel - Friday 2 March 2012 - Paper 3 (Non-Calculator) Higher Tier

8.

24	(a)	$(a+1)^2 = a^2 + 2a + 1 \neq a^2 + 1$ **OR** Pick any non-zero value of a and show that LHS $\neq$ RHS **OR** $(a+1)^2 = a^2 + 2a + 1$ Solves $a^2 + 2a + 1 = a^2 + 1$ to get $a = 0$ and indicates a contradiction	Correctly shown	2	M1 for $(a+1)^2 = a^2 + 2a + 1$ **or** $a^2 + a + a + 1$ (Expansion must be correct but may not be simplified) A1 for statement that $a^2 + 2a + 1 \neq a^2 + 1$ (eg. they are different) **OR** M1 for correct substitution of any integer into both expressions eg. $(2 + 1)^2$ **and** $2^2 + 1$ A1 for correct evaluation of both expressions and statement that they are not equal (eg. they are different) **OR** M1 $(a+1)^2 = a^2 + 2a + 1$ **or** $a^2 + a + a + 1$ A1 Solves $a^2 + 2a + 1 = a^2 + 1$ to get $a = 0$ and indicates a contradiction
	(b)	$a^2 + 2a + 1 + b^2 + 2b + 1 = c^2 + 2c + 1$ But $a^2 + b^2 = c^2$ So $2a + 2b + 1 = 2c$	AG	3	M1 use of Pythagoras in either triangle – **one** of $a^2 + b^2 = c^2$ **or** $(a+1)^2 + (b+1)^2 = (c+1)^2$ A1 $a^2 + 2a + 1 + b^2 + 2b + 1 = c^2 + 2c + 1$ **and** $a^2 + b^2 = c^2$ A1 $2a + 2b + 1 = 2c$
	(c)	LHS is odd, RHS is even	Explanation	1	B1 eg. LHS is odd, RHS is even **or** one side is odd and the other side is even oe

Pearson Edexcel - Wednesday 9 November 2011 - Paper 3 (Non-Calculator) Higher Tier

9.

| 21 | | $6^2 - (2\sqrt{3})^2 = 36 - 12 = 24$
 Area $= \dfrac{1}{2} \times 2\sqrt{3} \times \sqrt{24} = \sqrt{72}$
 $= \sqrt{36 \times 2} = 6\sqrt{2}$ | proof | 5 | M1 $6^2 - (2\sqrt{3})^2$ or $\sqrt{48}$ seen or $(2\sqrt{3})^2 + x^2 = 6^2$ oe
 A1 $\sqrt{24}$ oe
 M1(dep on M1) $\frac{1}{2} \times 2\sqrt{3} \times$ '$\sqrt{24}$'
 A1 $\sqrt{72}$ oe
 A1 $6\sqrt{2}$ or $(k) = 6$ |

Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

10.

| 22 | (a) | | Reason | 1 | B1 for angle between a **tangent** and a **radius** is a right angle (or 90°) |
| | (b) | $8^2 + 6^2$
 $\sqrt{100}$
 $10 - 6$ | 4 | 3 | M1 for $\sqrt{(8^2 + 6^2)}$
 A1 for 10
 A1 cao |

Pearson Edexcel - Monday 7 June 2010 - Paper 3 (Non-Calculator) Higher Tier

11.

25	(a)	$x^2 + (x+2)^2 = (x+4)^2$	Proof	3	M1 for $x^2 + (x + 2)^2 = (x + 4)^2$ oe
		$x^2 + x^2 + 4x + 4 = x^2 + 8x + 16$			A1 for $x^2 + x^2 + 4x + 4 = x^2 + 8x + 16$
		$x^2 + 4x - 8x + 4 - 16 = 0$			A1 for completing the proof
	b)(i)	$(x-6)(x+2) = 0$	6, -2	4	M1 for $(x \pm 6)(x \pm 2)$ (= 0)
		$x - 6 = 0$ or $x + 2 = 0$ or			
		$x = \dfrac{--4 \pm \sqrt{(-4)^2 - 4\times1\times-12}}{2\times1}$			OR $\dfrac{--4 \pm \sqrt{(-4)^2 - 4\times1\times-12}}{2\times1}$
		$x = \dfrac{4 \pm \sqrt{64}}{2}$			allow ±4 for b and ±12 for c
		$(x-2)^2 - 16 = 0$			OR $(x-2)^2 - 16 = 0$
		$x - 2 = \pm\sqrt{16}$			
		$x = 2 \pm\sqrt{16}$			A1 $x = 6$ cao
					A1 $x = -2$ cao
					[SC: B1 for 1 correct solution if M0 scored]
	(ii)		10		B1 ft from (b)(i), provided x is a positive value
					[Note: an answer of 10 and 2 gets B0]

Pearson Edexcel - Tuesday 10 November 2009 - Paper 4 (Calculator) Higher Tier

12.

16		$14^2 + 12^2$	18.4	3	M1 for $14^2 + 12^2$
		$= 196 + 144 = 340$			M1 (dep) for $\sqrt{14^2 + 12^2}$
		$\sqrt{340} = 18.4...$			A1 for 18.4 to 18.44

OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

13.

3			an acceptable response e.g. it is not a right-angled triangle	1	Accept any correct response e.g. they should use the sine rule or cosine rule	

AQA GSCE – Thursday 8 June 2020 – Paper 3 (Calculator) Higher Tier

14.

7	32^2 and 60^2 or 1024 and 3600 or 4624	M1	
	$\sqrt{32^2 + 60^2}$ or $\sqrt{1024 + 3600}$ or $\sqrt{4624}$	M1dep	
	68	A1	

Additional Guidance

Answer only 68	M1M1A1
$68 = 2\sqrt{17}$ incorrect further working	M1M1A0
68 from scale drawing	M0M0A0
68 from trigonometry	M0M0A0

AQA GSCE – Tuesday 12 June 2018 – Paper 3 (Calculator) Higher Tier

15.

20	$x^2 + (7x)^2 = (10y)^2$ or $x^2 + 49x^2 = 100y^2$	M1	oe
	$50x^2 = 100y^2$ or 1.41(...)	A1	oe equation with terms collected eg $\dfrac{x^2}{y^2} = \dfrac{100}{50}$ or $x^2 = 2y^2$ or $x = 1.41y$
	$\sqrt{2}$ or $\dfrac{2}{\sqrt{2}}$	A1	Do not accept further working

Additional Guidance

$x^2 + 7x^2 = 10y^2$	M0
$\sqrt{2} = 1.41$	M1A1A0
$x^2 + (7x)^2 = (10y)^2$ $x^2 + 14x^2 = 20y^2$	M1 A0

	Identifies error in working	B1	eg $2y^2$ should be $4y^2$ 2 should be 4 2 should be squared Should have worked out $(2y)^2$ but has only worked out y^2
	Additional Guidance		
	Answer may be seen next to Sami's method below the diagram		
	Adding brackets around $2y$ to Sami's working in line 2 (working lines may be blank)		B1
	Showing the error being corrected eg1 $(2y)^2 = 100$ and $2y = 10$ eg2 $4y^2 = 36 + 64$		B1 B1
15(a)	She hasn't squared the bracket		B1
	Has only squared y		B1
	The brackets have been left out		B1
	$(2y)^2$ is not equal to $2y^2$		B1
	Should have square rooted 100 before dividing by 2 because the $2y$ should not have been taken out of the bracket		B1
	Should have square rooted 100 before dividing by 2 (could be referring to working from line 3 to line 4)		B0
	Line 2 is wrong (has not identified which part of line 2 is wrong)		B0
	Answer should be $y = 5$ (has not shown what the error is)		B0
	Ignore non-contradictory work if correct response seen		

	No and valid reason	B1	eg No and the hypotenuse is 10 No and $2y$ is 10 No and if you double y it is more than 8

Additional Guidance	
Valid reason must be for Mel's argument	
Neither box ticked with valid reason can score B1 if decision in words eg $2y$ is 10 so Mel is wrong	B1
No and she didn't double it to 10	B1
No and she didn't double y	B0
No and she has to double 5 which makes it 10	B1
No and she has to double 5	B0
No and the hypotenuse is $2y$ so that's more than 8	B1
No and the hypotenuse is $2y$	B0
No and the hypotenuse is the longest side	B0
No and y is 5	B0
No and if you double y it is more than 6 and 8	B1
No and if you double y it is more than 6	B0
Yes and valid reason	B0

15(b)