

PERIMETER

Pearson Edexcel - Monday 12 November 2018 - Paper 3 (Calculator) Higher Tier

1.

16	39.9	P1	for finding the length of the minor or major arc eg $\frac{220}{360}\pi \times 12 (= 23(.03834..))$	Allow appropriate rounding if calculation seen in parts
		P1	for substituting into the sine or cosine rule to find <i>OD</i> eg $14 \div \sin 140 = OD \div \sin 24$ or $(OD^2 =) 6^2 + 14^2 - 2 \times 6 \times 14 \times \cos 24 (= 78.5...)$	Must involve <i>OD</i> in the relationship but may be implied
		P1	for a complete process to find the length <i>OD</i> eg $14 \div \sin 140 \times \sin 24 (= 8.8(58778..))$	
		P1	for a complete process to find the perimeter eg $"23(.03834..)" + 14 + "8.8(58778..)" - 6$	May be seen in multiple calculations
		A1	for an answer in the range 39.8 to 40	If an answer in the range is seen in working and then incorrectly rounded award full marks.

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

2.

19		8.63 to 8.65	P1 for a start of process, eg. $0.5x(x - 2) = 2.5$ P1 for rearranging to give a quadratic equation, eg $x^2 - 2x - 5 (= 0)$ oe. P1 (dep on P1) for a process to solve their 3-term quadratic equation, condoning one sign error in use of formula ($x = 3.449...$ and $x = -1.449...$) P1 for selecting the positive value of x and applying Pythagoras to find the hypotenuse, eg $\sqrt{"3.449^2" + "1.449^2"} (= 3.74...)$ P1 (dep on previous P1) for complete process to find perimeter A1 for answer in the range 8.63 to 8.65	
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3.

3		9.25	3	M2 for $x + x + 4 + x + x + 4 = 45$ oe or $x + x + 4 = 22.5$ oe (M1 for $x + x + 4 + x + x + 4$ oe) A1 for 9.25 or $\frac{37}{4}$ oe OR M1 for $45 - 8 (= 37)$ or $22.5 - 4 (= 18.5)$ M1 for $(45 - 8) \div 4$ or $(22.5 - 4) \div 2$ A1 for 9.25 or $\frac{37}{4}$ oe
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Pearson Edexcel - Thursday 9 June 2016 - Paper 2 (Calculator) Higher Tier

4.

22		28.9	3	M2 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe + $\frac{75}{360} \times 2 \times \pi \times 10$ oe (= 7.85... + 13.08... = 20.94..) (M1 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe or $\frac{75}{360} \times 2 \times \pi \times 10$ oe) A1 for 28.9 to 28.95
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Pearson Edexcel - Thursday 4 June 2015 - Paper 1 (Non-Calculator) Higher Tier

5.

13			48	5	M1 for $8 - 2 (= 6)$ M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$) M1 (dep on previous M1) fo $\sqrt{n \cdot x^2 + 8^2}$ or $\sqrt{n \cdot 100}$ M1 (dep on M2) for $4 \times 2 + 4 \times "10"$ A1 cao
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Pearson Edexcel - Friday 13 June 2014 - Paper 2 (Calculator) Higher Tier

6.

9			$5\frac{2}{3}$	4	M1 for $AB = 2x$ or $DC = 2x + 4$ or for $38 - 4$ M1(dep) for $x + "x" + "2x" + "2x + 4"$ or for $"38 - 4" \div 6$ M1 for $"6x + 4" = 38$ A1 for $5\frac{2}{3}$ oe NB: Accept answers in the range 5.6 to 5.7 if M3 scored. SC if M0 then B2 for answer in range 5.6 - 5.7
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Pearson Edexcel - Wednesday 6 November 2013 - Paper 1 (Non-Calculator) Higher Tier

7.

8			38	5	M1 $3x - 5 = 19 - x$ M1 for a correct operation to collect the x terms or the number terms on one side of an equation of the form $ax + b = cx + d$ A1 for $x = 6$ M1 for substituting their value of x in the three expressions and adding or substituting their value of x after adding the three expressions A1 cao
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Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

8.

10			1.5	4	M1 for correct expression for perimeter eg. $4 + 3x + x + 6 + 4 + 3x + x + 6$ oe M1 for forming a correct equation eg. $4 + 3x + x + 6 + 4 + 3x + x + 6 = 32$ oe M1 for $8x = 12$ or $12 \div 8$ A1 for 1.5 oe OR M1 for correct expression for semi-perimeter eg. $4 + 3x + x + 6$ oe M1 for forming a correct equation eg. $4 + 3x + x + 6 = 16$ oe M1 for $4x = 6$ or $6 \div 4$ A1 for 1.5 oe
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Pearson Edexcel - Monday 5 March 2012 - Paper 4 (Calculator) Higher Tier

9.

20		$c^2 = 60^2 + 90^2 -$ $2 \times 60 \times 90 \times \cos 130^\circ$ $c^2 = 3600 + 8100 - 10\ 800 \times -$ 0.6427876 $c^2 = 11\ 700 + 6942.106$ $c^2 = 18642.106$ $c = \sqrt{18642.106} = 136.536$ Perimeter = $60 + 90 + 136.536$	286.5	4	M1 for substituting values correctly into cosine rule formula e.g. $60^2 + 90^2 - 2 \times 60 \times 90 \times \cos 130^\circ$ M1 for correct order of evaluation A1 for finding value of missing side in range 136 to 137 A1 for answer in range 286 to 287
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Pearson Edexcel - Tuesday 10 November 2009 - Paper 4 (Calculator) Higher Tier

10.

12	(a)	$2x + 9 + 2x - 3 + 4x + 5$	$8x + 11$	2	M1 for attempting to add $2x + 9$, $2x - 3$ and $4x + 5$ or for $8x + c$, $c \neq 0$ A1 for $8x + 11$
	(b)	$8x + 11 = 39$ $8x = 28$	3.5	2	M1 for " $ax + c$ " = 39 or $(39 - 'c') \div 'a'$ A1 f.t. for 3.5 oe provided ' c ' $\neq 0$ in (a)

OCR GSCE – Monday 11 November 2019 – Paper 6 (Calculator) Higher Tier

11.

4		80 nfw	5	<p>B3 for height [of B =] 10</p> <p>OR</p> <p>M2 for $3x^2 = \text{their } (12 \times 25)$ or better</p> <p>or</p> <p>M1 for $3x \times x$ oe or 300 seen A1 for $x = 10$</p> <p>AND</p> <p>M1 for $(2 \times \text{their } 10) + (2 \times 3 \times \text{their } 10)$ oe or for $2a + 2b$ where $ab = 300$ but not with 25 and 12</p>	<p>May be seen on diagram</p> <p>May be implied by arithmetic processing e.g. $\sqrt{\frac{\text{their } (12 \times 25)}{3}}$ or at least two trials of $3 \times \text{number} \times \text{number}$ intending 300</p> <p>Allow <i>their</i> 10 if clearly intended as height e.g. "$h =$" or marked on diagram e.g. M1M1 for $2 \times 36 + 2 \times 8.3[3\dots]$ after 300 seen</p>
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OCR GSCE – Tuesday 21 May 2019 – Paper 4 (Calculator) Higher Tier

12.

7		109 or 108.8 to 108.9	6	<p><i>figures and working may be on diagram</i></p> <p>B1 for [radius of circle =] 9 B1 for [AB or ED =] 32 soi by $41 - \text{their } 9$ M1 for $\frac{1}{4} \times 2 \times \pi \times \text{their } 9$ soi by $\frac{9\pi}{2}$, 14.1 or 14.13 to 14.14 M2 for $\sqrt{(\text{their } 9)^2 + (\text{their } 9)^2}$ soi by $9\sqrt{2}$, 12.7[2\dots] or 12.73 or M1 for $(\text{their } 9)^2 + (\text{their } 9)^2$ soi by 162 M1 for <i>their</i> 12.72... + <i>their</i> 14.1 + $2 \times \text{their } 32 + 18$ seen to a maximum of 5 marks</p>
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OCR GSCE – Thursday 25 May 2017 – Paper 4 (Calculator) Higher Tier

13.

6		214	5	<p>B4 for 214.2 or 214.24 to 214.26</p> <p>OR</p> <p>B1 for 60 marked or used as width of the rectangle or distance from B to the corner</p> <p>AND</p> <p>M2 for $\frac{1}{4} \times \pi \times 120$ soi by 30π, 94.2 or 94.24 to 94.26</p> <p>or</p> <p>M1 for $\pi \times 120$ soi by 376.8 to 377.1 or $\frac{1}{2}\pi \times 120$ soi by 188.4 to 188.56</p> <p>AND</p> <p>M1 for $2 \times \text{their } 60 + \text{their } 30\pi$</p> <p>AND</p> <p>B1 for their final answer written to more than 3 figs correctly rounded to 3 s.f.</p> <p><u>to a max. of 4 marks</u></p>	<p>Accept $120 + 30\pi$ for B4</p> <p>Allow eg $r = 60$ for B1</p>
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AQA GCSE – Thursday 8 June 2020 – Paper 3 (Calculator) Higher Tier

14.

Q	Answer	Mark	Comments
14	Alternative method 1		
	$60 \times (1 - 0.15)$ or 60×0.85 or 51 or $40 \times (1 - 0.1)$ or 40×0.9 or 36	M1	oe 60×0.15 or 9 or 40×0.1 or 4
	$2 \times \text{their } 51 + 2 \times \text{their } 36$ or 174	M1dep	oe $2 \times \text{their } 9 + 2 \times \text{their } 4$ or 26 their 51, their 36, their 9 and their 4 must come from a correct method
	$(2 \times 60 + 2 \times 40) \times 0.75$ or 200×0.75 or 150 or $(2 \times 60 + 2 \times 40) \times 0.25$ or 200×0.25 or 50	M1	oe
	174 and 150 and No or 224 and 200 and No or 26 and 50 and No	A1	SC3 176 and 150 and No or 226 and 200 and No or 24 and 50 and No

Mark scheme and Additional Guidance continue on the next page

14 cont	Alternative method 2		
	60 × (1 – 0.15) or 60 × 0.85 or 51 or 40 × (1 – 0.1) or 40 × 0.9 or 36	M1	oe 60 × 0.15 or 9 or 40 × 0.1 or 4
	2 × their 51 + 2 × their 36 or 174	M1dep	oe 2 × their 9 + 2 × their 4 or 26 their 51, their 36, their 9 and their 4 must come from a correct method
	$\frac{(2 \times 60 + 2 \times 40) - \text{their } 174}{2 \times 60 + 2 \times 40} \times 100$ or $\frac{200 - \text{their } 174}{200} \times 100$ or 13(%) or $\frac{174}{200} \times 100$ and 100 – 25 or 87(%) and 75(%)	M1dep	oe $\frac{2 \times \text{their } 9 + 2 \times \text{their } 4}{200} \times 100$ or $\frac{26}{200} \times 100$ or 13(%) or $\frac{200 - (2 \times \text{their } 9 + 2 \times \text{their } 4)}{200} \times 100$ and 100(%) – 25(%) or 87(%) and 75(%)
	13% and No or 87% and 75% and No	A1	oe SC3 12% and No or 88% and 75% and No
Additional Guidance			
Ignore incorrect statements or calculations with full mark response			
Consistently working with half of a perimeter can score up to 4 marks			
SC3 must come from transposing length and width values			
Accept length and width values transposed for up to 3 marks eg 60 × 0.9 with 40 × 0.85 and 2 × 54 + 2 × 34 eg 60 × 0.9 with 40 × 0.9 and 2 × 54 + 2 × 36 (not transposed) eg 60 × 0.1 or 40 × 0.15 or 6		M1M1 M1M0 M1	

AQA GCSE – Monday 24 May 2018 – Paper 1 (Non - Calculator) Higher Tier

15.

11	Alternative method 1 – width of small rectangle is x (any letter)		
	x and $2x$ or $x + 2x + x + 2x$ or $6x$	M1	oe
	$x + 2x + x + 2x = 15$ or $6x = 15$	M1dep	oe
	$(x =) 2.5$	A1	from correct working or with 5 as the other dimension or with 7.5 as the length of the large rectangle
	25	A1ft	ft $10 \times$ their 2.5 with M1M1 awarded
	Alternative method 2 – length of small rectangle is x (any letter)		
	x and $\frac{x}{2}$ or $x + \frac{x}{2} + x + \frac{x}{2}$ or $3x$	M1	oe
	$x + \frac{x}{2} + x + \frac{x}{2} = 15$ or $3x = 15$	M1dep	oe
	$(x =) 5$	A1	from correct working or with 2.5 as the other dimension or with 7.5 as the length of the large rectangle
	25	A1ft	ft $5 \times$ their 5 with M1M1 awarded
	Alternative method 3 – a = width of small rectangle and b = length of small rectangle (any letters)		
	$b = 2a$ or $10a$ or $5b$	M1	correct expression for perimeter of the large rectangle in one variable
	$6a = 15$ or $3b = 15$	M1dep	correct equation in one variable
	$(a =) 2.5$ or $(b =) 5$	A1	from correct working or with both values correct or with one value correct and 7.5 as the length of the large rectangle
	25	A1ft	ft $10 \times$ their a or $5 \times$ their b with M1M1 awarded

11(cont)	Alternative method 4 – trial and improvement using ratio of sides		
	length = 2 × width seen or implied	M1	
	Two correctly evaluated trials for perimeter of small rectangle with length = 2 × width	M1dep	eg 8 + 4 + 8 + 4 = 24 and 10 + 5 + 10 + 5 = 30
	2.5 and 5	A1	implied by 2.5 + 5 + 2.5 + 5 = 15
	25	A1	
	Additional Guidance		
	Note that there is no ft in method 4		
	In all methods, marks can be awarded for annotation of the diagram, with lengths clearly identified, or working inside or alongside the diagram eg 2.5 and 5 marked correctly as the dimensions of the small rectangle 2.5 marked as the width of the small rectangle and 7.5 marked as the length of the large rectangle		M1M1A1 M1M1A1
	If full marks not awarded, mark both the diagram and working then award the better mark		
	In alt 4, one or more trials may be crossed out to indicate that they do not give the correct perimeter. Do not treat this as the usual crossed out work not to be marked if replaced.		

AQA GCSE – Thursday 7 June 2018 – Paper 2 (Calculator) Higher Tier

16.

19	Alternative method 1 Using one half of the isosceles triangle		
	(base angle =) 35 or (top angle =) 55	B1	may be on diagram
	$\cos(\text{their } 35) = \frac{6}{x}$ or $\sin(\text{their } 55) = \frac{6}{x}$ or $6^2 + (6 \tan(\text{their } 35))^2$	M1	oe eg $\frac{\sin 90}{x} = \frac{\sin(\text{their } 55)}{6}$ any letter their 35 must be acute their 55 must be acute
	$\frac{6}{\cos(\text{their } 35)}$ or $\frac{6}{\sin(\text{their } 55)}$ or $\sqrt{6^2 + (6 \tan(\text{their } 35))^2}$ or 7.3(2...)	M1dep	oe
	[50.6, 50.65]	A1ft	ft B0M2 with evaluation of $36 + 2 \times \text{their } 7.3(2\dots)$

Mark scheme and additional guidance continues on the next page

19 cont	Alternative method 2 Using the isosceles triangle		
	(base angle =) 35 or (top angle =) 110	B1	may be on diagram
	$\frac{x}{\sin(\text{their } 35)} = \frac{12}{\sin(\text{their } 110)}$ or $12^2 = x^2 + x^2 - 2 \times x \times x \times \cos(\text{their } 110)$ or $x^2 = x^2 + 12^2 - 2 \times x \times 12 \times \cos(\text{their } 35)$	M1	oe any letter their 35 must be acute their 110 cannot be 125
	$\frac{12}{\sin(\text{their } 110)} \times \sin(\text{their } 35)$ or $\sqrt{\frac{12^2}{2 - 2 \cos(\text{their } 110)}}$ or $\frac{12^2}{2 \times 12 \times \cos(\text{their } 35)}$ or 7.3(2...)	M1dep	oe
	[50.6, 50.65]	A1ft	ft B0M2 with evaluation of 36 + 2 × their 7.3(2...)
	Additional Guidance		
	Allow B1 even if the angle is not subsequently used		
Alt 2 Top angle 90		M0M0A0	
Answer [50.6, 50.65] (possibly from scale drawing)		B1M1M1A1	