

ANGLES IN POLYGONS

Pearson Edexcel - Thursday 4 June 2020 - Paper 2 (Calculator) Foundation Tier

1.

28	24	M1 A1	for a complete method eg $360 \div 15 (=24)$ cao	If extra steps are shown do not award this mark.
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Pearson Edexcel - Monday 8 June 2020 - Paper 3 (Calculator) Foundation Tier

2.

11	110	M1 M1 A1	for use of angles in a quadrilateral add to 360° , eg $360 - 130 - 95 - 65 (= 70)$ for $180 - "70"$ or for $(130 + 95 + 65) - 180$ cao	May be seen in diagram or as a sum to 360° . $(130 + 95 + 65) - 180$ gains M2
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Pearson Edexcel - Tuesday 11 June 2019 - Paper 3 (Calculator) Foundation Tier

3.

28	162 supported	M1 M1 M1 C1	for method to find sum of the interior angles of a hexagon eg $(6 - 2) \times 180 (= 720)$ oe OR for method to find sum of the interior angles of a pentagon, eg $(5 - 2) \times 180 (= 540)$ OR for method to find angle AFC or BCF , eg $(360 - 2 \times 117) \div 2 (= 63)$ OR for dropping a perpendicular from A or B to ED with 90° marked on ED and 27° at the top M1 for method to use ratio 2 : 1 eg marks as $2x$ and x or as x and $\frac{1}{2}x$ on diagram OR for $([\text{angle sum of hexagon}] - 2 \times 117) \div 6 (= 81)$ oe or $([\text{angle sum of hexagon}] \div 2 - 117) \div 3 (= 81)$ oe or $117 + 117 + 2x + 2x + x + x = [\text{angle sum of hexagon}]$ oe OR eg $([\text{angle sum of pentagon}] - 117 - 180) \div 3 (= 81)$ oe or $117 + 180 + 2x + x = [\text{angle sum of pentagon}]$ oe M1 for finding angle $FED = 81$ or for finding angle $CDE = 81$ OR for complete process to find angle AFE eg $([\text{angle sum of hexagon}] - 2 \times 117) \div 6 \times 2$ oe OR $([\text{angle sum of pentagon}] - 117 - 180) \div 3 \times 2$ oe C1 for accurate working leading to angle $AFE = 162$	Must be a complete process that would lead to a figure of 720 if evaluated correctly. For a pentagon there must be an indication that they have divided the hexagon into two halves. 63 may be shown on the diagram for angle AFC or angle BCF Ratio must be used correctly if awarded for diagram Award provided $[\text{angle sum of hexagon}]$ is greater than 700 or $[\text{angle sum of pentagon}]$ is greater than 500 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified. This may be shown by solving a correct equation to find the value of x . Award marks for 162 on the diagram with working and not contradicted by the answer line. Award 0 marks for 162 without working.
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Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Foundation Tier

4.

14	shown	M1	for method to find angle ADC , eg $180 - 75 (= 105)$	Must be clear link to angle ADC , may be marked on diagram
		M1	for angle $BCD = 50$	
		M1	for method to find angle ABC , eg $360 - 100 - 50 = "105"$	Must be clear method/explanation shown. Angle marked on diagram is not sufficient.
		C1	(dep M3) for angles ADC , BCD and ABC correct and at least 2 appropriate reasons, eg <u>vertically opposite angles</u> are equal or <u>vertically opposite angles</u> are equal, <u>angles on a straight line</u> add to <u>180°</u> , <u>angles in a quadrilateral/kite</u> add up to <u>360°</u> ; <u>angles at a point</u> add up to <u>360°</u>	

5.

28	24	P1	starts process, eg $x + 11x = 180$ or $180 \div 12 (= 15)$ or interior angle + exterior angle = 180 oe	
		P1	complete process to find number of sides, eg $360 \div (180 \div 12)$	
		A1	cao	

Pearson Edexcel - Tuesday 12 June 2018 - Paper 3 (Calculator) Foundation Tier

6.

26	140	P1	for complete process to find sum of the interior angles of a pentagon eg $(5 - 2) \times 180$ or exterior $360 \div 5 = 72$, interior $180 - 72 = 108$, 108×5 OR for complete process to find sum of the exterior angles of the pentagon eg $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90)$	Must be a complete process that could lead to a figure of 540 if that process is evaluated incorrectly
		A1	for sum of interior angles is 540 OR for sum of exterior angles is 360	
		P1	for start to process to find angle ABC eg [angles in a pentagon] $- 115 - 125 - 90 (= 210)$ or $115 + 125 + 90 + x + 2x =$ [angles in a pentagon] OR $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90) = 360$	Award provided [angles in a pentagon] is greater than 400 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified
		P1	for process to find angle ABC eg " 210 " $\div 3 (= 70)$, " 210 " divided in the ratio 2 : 1 or for process to find angle BCD eg $\frac{2}{3} \times "210"$ or for $3x = "210"$ or $-3x = -"210"$	
		A1	cao	Award marks for 140 on the diagram with working and not contradicted by the answer line. Award 0 marks for 140 without working.

Pearson Edexcel - Wednesday 8 November 2017 - Paper 3 (Calculator) Foundation Tier

7.

7		shown	M1 M1 C2 [C1 OR M1 M1 C2	<p>for (angle BCA) = $180 - 117 (= 63)$</p> <p>for (angle CAB) = $180 - "63" - 54 (= 63)$ or (angle CAB) = $117 - 54 (= 63)$</p> <p>for statement, eg. isosceles since angle $BCA =$ angle $CAB = 63$ with fully correct reasons, from: <u>angles</u> on a <u>straight line</u> add up to 180° <u>angles</u> in a <u>triangle</u> add up to 180° <u>exterior angle</u> of a <u>triangle</u> is equal to sum of interior opposite angles</p> <p>[C1 for angle $BCA = 63$ and angle $CAB = 63$ and one of the above reasons]</p> <p>OR</p> <p>M1 for $\frac{(180-54)}{2} (= 63)$</p> <p>M1 for identification of two angles in triangle ABC being "63"</p> <p>C2 for statement, eg. isosceles since angle $BCA =$ angle $CAB = 63$ and <u>angles</u> on a <u>straight line</u> add up to 180° and fully correct reasons: base angles of an <u>isosceles triangle</u> are equal and <u>angles</u> in a <u>triangle</u> add up to 180°</p>
			[C1	<p>for angle $BCA = 63$ and angle $CAB = 63$ and one reason from: base angles of an <u>isosceles triangle</u> are equal <u>angles</u> in a <u>triangle</u> add up to 180°]</p>

Pearson Edexcel – Specimen 2 - Paper 2 (Calculator) Foundation Tier

8.

25		105	P1 P1 A1	<p>for process to find the exterior angle or interior angle of a hexagon or octagon</p> <p>for process to find the both exterior angles or both interior angles</p> <p>for 105 from correct working</p>
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Pearson Edexcel – Specimen 2 - Paper 3 (Calculator) Foundation Tier

9.

13	(a) i ii	115	B1 C1	<p>cao</p> <p>angles in a triangle add to 180</p>
	(b)	100	P1 A1	<p>complete process to find y ft from (a)</p> <p>for 100 or ft from (a)</p>

OCR Thursday 05 November 2020- Morning (Non-Calculator) Foundation Tier

10.

5	(a)	(i)	Equilateral	1		
5	(a)	(ii)	Rhombus	1		
5	(b)	(i)	Draws both lines of symmetry correctly	1		Mark intention
5	(b)	(ii)	She is incorrect oe and gives rhombus or parallelogram as the other quadrilateral	2	M1 for correct description of RS of any other quadrilateral e.g square has order 4	For M1 ISW other comments that do not refer to symmetry See AG
5	(c)		Arrows facing the same way added to AB and DC	1		Condone more than one arrow facing the same way on AB and DC

OCR November 09 November 2020- Morning (Calculator) Foundation Tier

11.

19	(a)		30 final answer	2	B1 for 150 or 30 seen or M1 for $360 \div 12$ oe	e.g. $180 - \frac{180 \times 10}{12}$
	(b)		150 or FT(180 – (a))	1		Only allow FT if $0 < \text{their (a)} < 180$

OCR Tuesday 5 November 2019 – Morning (Calculator) Foundation Tier

12.

19	(a)		30 final answer	2	B1 for 150 or 30 seen or M1 for $360 \div 12$ oe	e.g. $180 - \frac{180 \times 10}{12}$
	(b)		150 or FT(180 – (a))	1		Only allow FT if $0 < \text{their (a)} < 180$

OCR Tuesday 6 November 2018 – Morning (Calculator) Foundation Tier

13.

2	(a)		Cylinder	1		
	(b)		90° symbol marked at BCD cao	1		Accept 90° with arc
3			364.8[0]	2	M1 for 320×1.14	

OCR Monday 12 November 2018 – Morning (Calculator) Foundation Tier

14.

10	(a)		Two correct shapes each with correct name	4	B1 for each shape B1 dep on drawing seen for each correct name	Condone omission of diagonal Mark clear intention Kite or Rectangle must be joined along longest side Parallelogram must be joined along a shorter side Allow as additions to the given triangles
	(b)		30 30 120 60 60 60	2	B1 for one set	If answer line blank, may be seen on diagram

15.

18	(a)		360 ÷ 6 = 60 180 – 60 [= 120]	B1 B1	Dep on first B1 scored Alternative method: M2 for $\frac{180 \times (6 - 2)}{6} = 120$ M1 for attempt to use $\frac{180(n - 2)}{n}$	Accept 180 × 4 as numerator Working must be seen May have incorrect <i>n</i> or contain numerical errors
	(b)		12	4	M3 for 360 ÷ 30 or M2 for 180 – (360 – 90 – 120) soi 30 or M1 for 360 – 90 – 120 soi 150	Allow 120 – 90 or 120 + 90 – 180 May be on diagram

OCR Thursday 7 June 2018 – Morning (Non Calculator) Foundation Tier

16.

7			angle BDC = 44 correct reasons leading to angle BDC = 44	2 2	B1 for angle ABD = 44 or angle ADC = 100 or M1 <i>their</i> BDC = <i>their</i> ABD two marks for [co-]interior angles [add up to 180] or allied angles [add up to 180] or angles between parallel lines [add up to 180] OR one mark for each relevant reason (maximum of two) from [angles in a] triangle [add up to] 180 alternate [angles are equal] corresponding [angles are equal] angles on a straight line [add up to] 180	Notation not required but values need to be identified eg the angle must be named or the value written in the correct place in the diagram or for BDC, on the answer line Ignore answer line if angle BDC is identified correctly in working If BDC is only correctly labelled on the diagram max B1 scored Reasons must be correct for <i>their</i> method leading to angle BDC = 44. 180 may be implied in these reasons by a correct calculation
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Pearson Edexcel – Sample Papers - Paper 1 (Non-Calculator) Foundation Tier

17.

23		152	<p>M1 Start to method $ABD = 38^\circ$ and BAD or DBC or $DCB = 38^\circ$</p> <p>M1 ADB or $BDC = 180 - 2 \times 38 (=104)$</p> <p>A1 for 152 with working</p>
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18.

28		$x = 21, y = 50$	<p>P1 process to start solving problem eg. form an appropriate equation</p> <p>P1 complete process to isolate terms in x</p> <p>A1 for $x = 21$</p> <p>P1 complete process to find second variable</p> <p>A1 $y = 50$</p>
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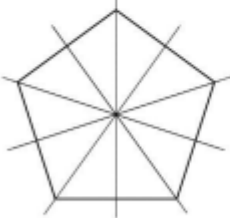
OCR Sample Question Paper 3 – Morning/Afternoon (Calculator) Foundation Tier

19.

7	(a)	125	1 1 A01.2		
	(b)	20	4 2 A02.1a 2 A02.4a	<p>B1 for $PAB = SAD = 45$</p> <p>B1 for $BAD = 90$</p> <p>M1 for $360 - (their '125' + their '90' + 125)$</p>	May be seen on diagram

20.

8(a)	Alternative method 1		
	360 – 108 or 252	M1	oe eg 360 + 5 + 180 may be on diagram
	their 252 × 5	M1dep	oe eg 5 × (180 – 108) + 5 × 180 or 5 × 72 + 5 × 180 or 5 × (72 + 180)
	1260	A1	SC1 answer 540
	Alternative method 2		
	5 × 360 or 1800 and 5 × 108 or 540	M1	
	5 × 360 – 5 × 108 or 1800 – 540	M1dep	oe
	1260	A1	SC1 answer 540
	Additional Guidance		
	Allow 252 seen on the diagram or in the working even if not used		M1

8(b)	Line through each vertex to the midpoint of the opposite side	B1	mark intention
			
	Additional Guidance		
Allow dotted lines			

8(c)	There could be 0 or 1	B1	
	Additional Guidance		

AQA Tuesday 6 November 2018 – Morning (Non-Calculator) Foundation Tier

15	$ADC = 110$ or $BAD = 180 - 110$ or $BAD = 70$ or $BCD = 180 - 110$ or $BCD = 70$ or any indication that angle $EAD = \text{angle } EDA$ or any indication that angle $BCD = \text{angle } ADE$	M1	may be seen on diagram eg both written as x or both having the same value
	$EDA = 180 - 110$ or $EDA = 70$ or $EAD = 180 - 110$ or $EAD = 70$	M1dep	may be seen on diagram
	40	A1	
	Additional Guidance		
	Angle values must be identified with the correct angle, either by notation or use of the diagram Notation such as $D = 110$ or $C = 70$ is not acceptable (although marks may still be awarded for correct position of angles on diagram)		
	Work on the diagram can score up to M2		
	Subject to the previous comment, award the higher mark for work seen on diagram and work seen in working space		
Ignore incorrect angles when awarding up to M2, but any incorrect work cannot score M2A1			
40 marked as angle AED on diagram but :- 180 on answer line or no sign of 40 as final answer in working		M2A0	

AQA Tuesday 6 November 2018 – Morning (Non-Calculator) Foundation Tier

22.

28	Alternative method 1		
	(5 – 2) × 180 or 3 × 180 or 540 or 180 – (360 ÷ 5) or (180 – 72) or 108	M1	oe
	Ticks 'No' and 540 or Ticks 'No' and 108	A1	
	Alternative method 2		
	States that a pentagon cannot have five (or all) right angles or states that a pentagon can have five (or all) obtuse angles or states that the maximum number of right angles is three or draws a pentagon with exactly three right angles shown	M1	
Ticks 'No' and states that a pentagon cannot have five (or all) right angles or states that the maximum number of right angles is three or states that a pentagon can have five (or all) obtuse angles and draws a correct diagram of an attempted pentagon with four right angles shown or draws a pentagon with exactly three right angles shown or draws a pentagon with five obtuse angles	A1		

28 cont	Additional Guidance	
	If comparing 72° to 90° , they must state that they are referring to the exterior angles	
	If 'Yes' is ticked, M1 can still be scored	
	If neither box is ticked, 'No' must be implied by the explanation for M1A1	

AQA Thursday 2 November 2017 – Morning (Non-Calculator) Foundation Tier

23.

18	Alternative method 1		
	Angle $DAB = 70$	B1	may be on diagram
	Angle $ABC = 360 - \text{their } 70 - 90 - 120$ or Angle $ABC = 80$	M1	may be on diagram
	Valid reason	A1	eg $180 - 80 = 100$ $80 + 100 = 180$ angles on a straight line add to 180 $(360 - 80 - 80)/2 = 100$
	Alternative method 2 working backwards from $x = 100$		
	Angle $ABC = 180 - 100$ or Angle $ABC = 80$	M1	may be on diagram
	Angle $DAB = 360 - \text{their } 80 - 90 - 120$ or Angle $DAB = 70$	M1dep	may be on diagram
	Valid reason	A1	eg opposite angles are equal vertically opposite angles (are equal) $180 - 70 = 110$ and $180 - 110 = 70$
	Additional Guidance		
	Incorrect angles seen anywhere around A or B cannot score the A1		

AQA Wednesday 8 November 2017 – Morning (Calculator) Foundation Tier

24.

22	Alternative method 1 of 2		
	$PAB = 51$ or $PAD = 51$ or $APC = 180 - 51$ or $APC = 129$	M1	
	$ABP = 180 - 51 - \text{their } 51$ or $ABP = 180 - 102$ or $ABP = 78$ or $ADC = 180 - \text{their } 51 - \text{their } 51$ $ADC = 180 - 102$ $ADC = 78$	M1dep	$PAB = 51$ and $PAD = 51$ or $BAD = 102$
	$BCD = 180 - \text{their } 78$ or $BCD = 360 - \text{their } 129 - \text{their } 51 - \text{their } 78$ or $BCD = 360 - 258$ or $BCD = 102$ or $4x = 180 - \text{their } 78$ or $4x = 360 - \text{their } 129 - \text{their } 51 - \text{their } 78$ or $4x = 360 - 258$ or $4x = 102$ or $102 \div 4$	M1dep	oe eg $BCD = (360 - 2 \times \text{their } 78) \div 2$ or $4x = (360 - 2 \times \text{their } 78) \div 2$
	25.5	A1	

Alternative method 2 continues on the next page

22 cont	Alternative method 2 of 2		
	$ABC = 180 - 3x - x$ or $ABC = 180 - 4x$ or $APC = 180 - 51$ or $APC = 129$	M1	
	$PAB = 2x$ or $APB = 2x$ or $2x = 51$	M1dep	
	$51 \div 2$	M1dep	
	25.5	A1	
	Additional Guidance		
	Angles must be labelled or shown on the diagram		

AQA Thursday 25 May 2017– Morning (Non-Calculator) Foundation Tier

25.

23	$360 \div 20$ or $20 \times 18 = 360$	M1	oe
	18	A1	
	Additional Guidance		
	If using interior angle method, must get as far as $360 \div 20$ for M1		