1	e.g. 4×6 (= 24)		4	M1	for finding the perimeter of square
	e.g. ("24" – 6) ÷ 2 (= 9)			M1	for finding the length of the longest side in the triangle
	e.g. $18 \times 3 + 6$ or "9" $\times 6 + 6$			M1	oe, allow their length of the longest side in the triangle as long as clearly stated or identified (could be on diagram)
		60		A1	dep on M2
					Total 4 marks

2	$(10 – 2) \times 180$ oe (= 1440) **or** $(6 – 2) \times 180$ oe (= 720)		4	M1	for a method to find the sum of the interior angles of a decagon or a hexagon
	'1440' – 148 – 2×150 – 2×168 – 2×134 – 2×125 (=138) **or** '1440' – 1302 (= 138) **or** '720' – 148÷2 – 150 – 168 – 134 – 125 (= 69) **or** '720' – 651 (= 69)			M1	Allow omission of one angle
	360 – '138' or 360 – 2 × '69'			M1	
		222		A1	
	Alternative method (exterior angles)				
	360 – 2×(180 – 125) – 2×(180 – 134) – 2×(180 – 168) – 2×(180 – 150) – (180 – 148) **or** 360 – 2×55 – 2×46 – 2×12 – 2×30 – 32		4	M2	If not M2 then award M1 for at least 3 or (180 – 125) , (180 – 134) , (180 – 168) , (180 – 150), (180 – 148) **or** at least 3 of 55, 46, 12, 30, 32
	180 + '42'			M1	
		222		A1	
					Total 4 marks

3	180 – 2 × 66 (= 48) (360 – "48") ÷ 2 (= 156) 180 – "156" (= 24) 360 ÷ "24"		3	M1	
				M1	
	Alt : 180 – 2 × 66 (= 48) 360 ÷ (0.5 × "48")			M1	
				M1	
		15		A1	
					Total 3 marks

4	180 – 140 (= 40) or $180(n – 2) = 140n$ oe		3	M1	Correct method to find exterior angle or correct substitution into formula
	360 ÷ '40' or $40n = 360$ oe			M1	
		9		A1	
					Total 3 marks

5	$(5 – 2) \times 180 ÷ 5$ (= 108) **or** 360 ÷ 5 (= 72)		5	M1	for method to find an interior or exterior angle of a pentagon
	$(6 – 2) \times 180 ÷ 6$ (= 120) **or** 360 ÷ 6 (= 60)			M1	for method to find an interior or exterior angle of a hexagon
	360 – 108 – 120 (= 132) **or** 60 + 72 (= 132) **or** (180 – '120') + (180 – '108')			M1	dep on M2 for a correct method to find angle *EDI* using correct figures
	360 – '72' – '60' – '132' (= 96)			M1	for a complete method to find angle *x*
		96		A1	dep on correct working
				Note:	Angles may be seen on diagram throughout
					Total 5 marks

6	360 – (59 + 115 + 68) (= 118)		4	M1	angle values may be seen on diagram throughout
		$x = 62$		A1	from correct working
	Angles in a <u>quadrilateral</u> add up to 360. Accept "4-sided shape" Angles on a straight <u>line</u> add to 180° Base angles in an <u>isosceles</u> triangle (are equal)			B2	(dep on M1) for all correct reasons for their method
				(B1	(dep on M1) for 1 correct reason for their method)
					Total 4 marks

7	eg $3x – 24 + 102 – x = 180$ oe **or** $90 + 90 + 3x – 24 + 102 – x = 360$ oe		3	M1	for setting up a correct equation
	eg $2x = 180 – 78$ oe **or** $2x = 360 – 258$ oe **or** eg $(180 + 24 – 102) ÷ 2$ or $360 – (90 + 90 – 24 +102) ÷ 2$			M1	for simplifying and isolating the *x* term **or** for a complete calculation to find the value of *x*
		51		A1	
					Total 3 marks

8	eg $\tan BAP = \dfrac{2}{5}$ or $\sin BAP = \dfrac{2}{\sqrt{5^2 + 2^2}}$ or $\dfrac{\sin BAP}{2} = \dfrac{\sin 90}{\sqrt{5^2 + 2^2}}$ $\cos BAP = \dfrac{5}{\sqrt{5^2 + 2^2}}$ or $\cos BAP = \dfrac{5^2 + (\sqrt{5^2 + 2^2})^2 - 2^2}{2 \times 5 \times \sqrt{29}}$		5	M1	for setting up a trig equation for angle *BAP*
	eg $(BAP =) \tan^{-1}\left(\dfrac{2}{5}\right) (= 21.8...)$ or $(BAP =) \sin^{-1}\left(\dfrac{2}{\sqrt{5^2 + 2^2}}\right)$ or $(BAP =) \sin^{-1}\left(\dfrac{2 \sin 90}{\sqrt{5^2 + 2^2}}\right)$ $(BAP =) \cos^{-1}\left(\dfrac{5}{\sqrt{5^2 + 2^2}}\right)$ or $BAP = \cos^{-1}\left(\dfrac{5^2 + (\sqrt{5^2 + 2^2})^2 - 2^2}{2 \times 5 \times \sqrt{5^2 + 2^2}}\right)$			M1	for a complete method to find angle *BAP* (= 21.8….) [M2 for $90 - \tan^{-1}\dfrac{5}{2}$ ie $90 - 68.2$]
	eg (int angle =) $(6 - 2) \times 180 \div 6 (= 120)$ **or** (ext angle =) $360 \div 6 (= 60)$			M1	**Indep** for a method to find the size of one interior **or** one exterior angle in a regular hexagon – **could be seen on diagram**
	eg "120" – "21.8" **or** $180 - "60" - "21.8"$			M1	for a complete method to find angle *PAF* where all values have come from a correct method
		98.2		A1	accept $98.1 - 98.3$
					Total 5 marks

9	$360 \div 8 (= 45)$ or $360 \div 5 (= 72)$ or $180 - (360 \div 8) (= 135)$ oe or $180 - (360 \div 5) (= 108)$ oe		4	M1 finding interior or exterior angle of octagon or pentagon Angles may be seen on diagram – but must be obtuse if interior and acute if exterior.
	'72' – '45' (= 27) or '135' – '108' (= 27)			M1 (dep 1st M1) using a pair of interior or pair of exterior angles to find angle *IBC* Angle may be seen on diagram.
	$\dfrac{180 - '27'}{2} (= 76.5)$			M1
		76.5		A1
				Total 4 marks

10	$\dfrac{360}{10} (= 36)$ ext angle **or** $\dfrac{(10 - 2) \times 180}{10} (= 144)$		4	M1	method to find interior or exterior angle. (angles may be seen on diagram)
	$x = "144" - 90 (= 54)$ or $x = \dfrac{"540" - 3 \times "144"}{2} (= 54)$ or $x = 90 - "36"(= 54)$ 54 on the diagram is insufficient – must see working			M1	method to find *x* (must show it is intended to be *x*) eg use of int angle – 90º use of ext angle + x = 90º use of pentagon *GHIJA* All figures in " " must come from correct working
	$BAD = CDA = GDE = DGF = \dfrac{360 - 2 \times "144"}{2} (= 36)$			M1	A correct method to find an angle of 36º within the shape (not exterior angle) or 36º shown in correct place in diagram
	There are other correct methods. Please check for correct working.	$x = 54$ $y = 54$		A1	dep on M3 to find each of *x* and *y* and the correct value of 54 for both from correct working
					Total 4 marks
ALT	$ADG = "144" - 2 \times "36" (= 72)$			M1	
	JA is parallel to *GD*			M1	
	$DGA = DAG$ (*y*) [isosceles triangle]			M1	
	$x = DGA = y$	shown		A1	
	There are other correct methods. Please check for correct working.				**Total 4 marks**

11	$(ABD =)$ 360 – 52 – 112 – 90 $(= 106)$			4	M1	may be marked in correct place on diagram
	$(CBD =)$ 180 – "106" $(=74)$				M1	may be marked in correct place on diagram
			32		A1	
			Reasons given		B1	dep on M1
						At least two appropriate reasons given. "angles in a quadrilateral add to 360°" accept 4-sided shape.
						"angles on a straight line add to 180°" **or** angles on a straight line add to 180°
						"angles in a triangle add to 180°" **or** angles in a triangle sum to 180°
						"base angles in an isosceles triangle (are equal)"
						Total 4 marks

12	$SCD = 128°$ **or** $BCS = 32°$ **or** $TSC = 180 – 128$ $(= 52)$			4	M1	angles need to be identified or may be seen marked on the diagram	M2 for $(BCD =)$ 128 + 32 $(= 160)$ **or** $(DCV =)$ 52 – 32 $(= 20)$ (may be seen marked on the diagram). To award these marks 160 or 20 must be clearly used or identified as the interior or exterior angle.
	eg $(\text{int} \angle =)128 + 32(=160)$ **or** $(\text{ext}\angle =)180 – (128 + 32)(= 20)$ **or** $(\text{ext}\angle =)"52" – 32(= 20)$				M1	(dep on previous M1) for method to find the size of one interior or exterior angle, may be seen marked on the diagram.	
	eg $180(n – 2) = "160"n$ **or** $360 \div "20"$				M1	for setting up an equation for the sum of interior angles **or** $360 \div "20"$	
	Working required		18		A1	dep on M2	
							Total 4 marks

13	3 × 180 (= 540) or 360 – [(180 – 90) + (180 – 135) + (180 – 67) + (180 – 119)] (= 51) or 360 – (90 + 45 + 113 + 61) (= 51)			3	M1	
	90 + 135 + 67 + 119 + x = "540" oe 411 + x = "540" oe or "540" – (90 + 135 + 67 + 119) or 3 × 180 – (90 + 135 + 67 + 119) oe or 540 – 411 or 180 – "51" oe				M1	
	Correct answer scores full marks (unless from obvious incorrect working)		129		A1	
						Total 3 marks

| 14 | eg $(DEK =) \dfrac{360}{9}$ **or** 40 **or** (interior angle =) $\dfrac{(9 – 2) \times 180}{9}$ **or** 140 **or** $OFK = 140 \div 2$ (= 70) **or** $FOK = \dfrac{2}{9} \times 360$ (= 80) **or** $EDK = 180 – 0.5 \times 140$ (=110) Angles marked correctly (any exterior or interior angle) gains this mark | | | 3 | M1 | method to find interior or exterior angle or correct interior or exterior angle stated or shown correctly on diagram or for using 70° for OFK or 80° for FOK or 110 for EDK

If a student has only found an interior or exterior angle and has clearly mixed up interior and exterior angles this mark cannot be awarded but can still be awarded for any of the other angles stated |
	$EDK = 110$ and $DEK = 40$ or $FOK = 80$ and $OFK = 70$ or $ODE = 70$ and $DEK = 40$ or $FED = 140$ and $EDK = 110$ oe				M1	For two correct angles that can lead directly to the answer in a single step (eg 180 – both angles or one angle minus the other)
	Correct answer scores full marks (unless from obvious incorrect working)		30		A1	
						Total 3 marks