UNIT 2: CALCULATOR-ALLOWED, HIGHER TIER

GCSE Mathematics Unit 2: Higher Tier	Marks	Comments
1. Total of interior angles $5 \times 180(°)$ $= 900(°)$ 900 – sum of 4 angles given (594°) (=306) ÷3 (Each of the 3 angles is) 102(°)	M1 A1 M1 m1 A1 5	Or equivalent full method F.T. 'their 900' provided >594 Unique division by 3, no further operations Alternative: Corresponding exterior angles are 66(°), 30(°), 20(°) and 10(°) B1 Remaining exterior angles = 360 – sum of exterior angles found (126°) (=234°) M1 ÷ 3 m1 (Each of the remaining 3 exterior angles =) 78(°) A1 (Each of the remaining 3 interior angles =) 102(°) A1 *F.T. provided B1, M1, m1, 180 – 'their 78'*
2. (a) 2, 2, 2, 2, 3, 3. $2^4 \times 3^2$ (b) (i) 12 OR $2^2 \times 3$ (ii) 720 OR $2^4 \times 3^2 \times 5$	M1 A1 B1 B1 B1 5	For a method that produces 2 prime factors from the set {2,2,2,2,3,3}. C.A.O. for the sight of the six correct factors and no extras (ignore 1s). F.T. their answer if at least one index form used with at least a square. Allow $(2^4)(3^2)$ or $2^4 . 3^2$. Inclusion of 1 as a factor is B0. F.T. 'their answer to (a)' if of equivalent difficulty. F.T. 'their answer to (a)' if of equivalent difficulty.
3(a) $2n < 11$ $n < 11/2$ OR $n < 5{\cdot}5$ (b) 5	B1 B1 B1 3	Use of '=' is B0 unless restored for final answer. Implies 1st B1. F.T. their answer to (.a)
4. One correct evaluation $4 \leq x \leq 5$ 2 correct evaluations $4{\cdot}65 \leq x \leq 4{\cdot}85$, one < 0 one > 0. 2 correct evaluations $4{\cdot}75 \leq x \leq 4{\cdot}85$, one < 0 one > 0. $x = 4{\cdot}8$	 B1 B1 M1 A1 4	*Correct evaluation regarded as enough to identify if negative or positive. If evaluations not seen accept 'too high' or 'too low'.* x $x^3 - 7x - 75$ 4 –39 4·1 –34·779 4·2 –30·312 4·3 –25·593 4·4 –20·616 4·5 –15·375 4·6 –9·864 4·65 –7·005... 4·7 –4·077 4·75 –1·078... 4·8 1·992 4·85 5·134... 4·9 8·349 5 15
5.(a) 0.35 0.8 0.2 0.8 on the correct branches (b) 0.65×0.2 $= 0.13$	B2 M1 A1 4	B1 for any two correct entries. Accept fractions

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6. Sight of (Perimeter of bed A=) $2x + 2y = 18$ AND (Perimeter of bed B=) $4x + 2y + 6 = 34$ or equivalent Correct method to solve equations simultaneously. $x = 5$ $y = 4$ (Area of B =) 10 × 7 = 70(m^2)	B1 M1 A1 A1 M1 A1 6	 F.T. 'their equations' if of equivalent difficulty. Both values consistent with 'their equations'. F.T. 'their derived values for x and y'. $2x \times (y + 3)$
7. $(x - 5)(x + 4)$ $x = 5$ AND $x = -4$	B2 B1 3	B1 for $(x \ldots 5)(x \ldots 4)$. Strict F.T. from their brackets
8 (a) (0 , 2) (b) 7 units (c) $y = \frac{-x}{7} + 3$	B1 B1 B1 3	
9(a) *AD* = 16 × sin56° = 13·2(64...)(cm) OR 13·3(cm) (b) (*EC* =) 9·7(...) tan x = 9·7(...) / 15 x = 32·9...(°) or 33(°) Organisation and communication Accuracy of writing	M2 A1 B1 M1 A1 OC1 W1 8	M1 for sin56° = *AD*/16 C.A.O. Allow 13 from correct work but penalise final answer –1 for premature approximation. F.T. 23 – 'their *AD*'. F.T. 'their *EC*'
10.(a) $\frac{b-a}{ab} = \frac{1}{c}$ $c = \frac{ab}{b-a}$ (b) $x = \{-4 \pm \sqrt{(4^2 - 4\times3\times-18)}\} / 2\times3$ $= [-4 \pm \sqrt{232}] / 6$ $x = 1{\cdot}87$ and $x = -3{\cdot}21$	B1 B1 M1 A1 A1 5	 Allow one slip in substitution in correct formula. C.A.O.
11(a) *AP* = *CR* AND *AS* = *CQ* *SÂP* = *QĈA* (So triangles are congruent because of) SAS (b) Rhombus because of equal sides.	B1 B1 B1 B1 4	With reference to mid-points. With reference to 90°. Must refer to equal sides.
12. $\frac{x}{360} \times \pi \times r^2 = r^2$ $x = \frac{360}{\pi}$ = 114(·5..°) or 115$^{(\circ)}$	M1 A1 A1 3	Accept their symbol or word for '*r*'.

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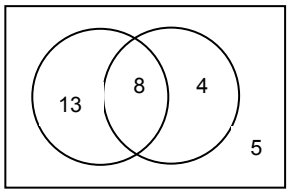
13 (a) $x(x+6) - x(x-3)$ as a <u>numerator.</u>	M1	Accept intention of brackets when working not shown, e.g. $x^2 + 6x - x^2 - 3x$.
$(x-3)(x+6)$ as a <u>denominator.</u>	M1	
$9x / (x-3)(x+6)$	A1	C.A.O. If $(x-3)(x+6)$ expanded, must be correct. If M1, M1, A1 awarded penalise further incorrect work –1. If no marks then SC1 for $9x$.
(b) $(7x+10)(7x-10)$	B2	B1 for $(7x \ldots 10)(7x \ldots\ldots 10)$
$2(7x+10)$	B1	
$\frac{(7x-10)}{2}$	B1	F.T. provided no more than 1 previous error and provided simplification required. Mark final answer. Accept $3{\cdot}5x - 5$
	7	
14(a) 	B2	For all correct. B1 for two or three correct.
(b) 8/21	B2	F.T. their complete Venn diagram. B1 for a numerator of 8 in a fraction < 1. B1 for a denominator of 21 in a fraction < 1.
	4	
15 (a) $\frac{1}{\sqrt{3}}$	B1	
(b) $\frac{-\sqrt{3}}{2}$	B1	
(c) $y = ax^3 + b$	B1	
	3	
16. Sine curve	M1	Intention to sketch a portion of a sine curve with minimum period of 360°.
Correct sine curve with 2, 3 and 4 shown on the y-axis and 0°, 180° and 360° shown or implied.	A1	
	2	
17. Use of cosine rule with triangle ABC **AND** ½ab sinC with triangle ACD.	S1	Or alternative full strategy.
$AC^2 = 8{\cdot}8^2 + 7{\cdot}2^2 - 2 \times 8{\cdot}8 \times 7{\cdot}2 \times \cos 84$	M1	
$AC = 10{\cdot}77(.....)$(cm)	A2	A1 for $AC^2 = 116(\cdot 03...)$
(Area ACD =) ½ × 18·6 × AC × sin47	M1	F.T. their derived AC
= 73·2(6....)(cm^2)	A1	
	6	
18.(a) 14	B1	
(b) 6/20 × 5/19	M1	
0·078 .	A1	
Statement that this is less than 8%	A1	
(c) NO and use of 0·3 × 0·3 or equivalent.	E1	Accept explanation based on large sample size.
	5	