UNIT 2: CALCULATOR-ALLOWED, HIGHER TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

2. Marking Abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
MR = misread
PA = premature approximation
bod = benefit of doubt
oe = or equivalent
si = seen or implied
ISW = ignore subsequent working

F.T. = follow through ( indicates correct working following an error and  indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads

When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- 'm' marks are dependant method marks. They are only given if the relevant previous 'M' mark has been earned.
- 'A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

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 $4 \le x \le 5$ 2 correct evaluations $4{\cdot}65 \le x \le 4{\cdot}85$, one < 0 one > 0. 2 correct evaluations $4{\cdot}75 \le x \le 4{\cdot}85$, 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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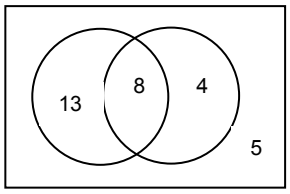
6. Sight of (Perimeter of bed A=) $2x + 2y = 18$ AND (Perimeter of bed B=) $4x + 2y + 6 = 34$ or equivalent Correct method to solve equations simultaneously. $x = 5$ $y = 4$ (Area of B =) 10 × 7 = 70(m^2)	B1 M1 A1 A1 M1 A1 6	 F.T. 'their equations' if of equivalent difficulty. Both values consistent 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*'.

GCSE Mathematics Unit 2: Higher Tier	Marks	Comments
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	