MATHEMATICS 2nd SAMs 2017 Unit 1 (Non-calculator) Higher Tier	Mark	MARK SCHEME Comments (Page 1)
1.(a) $1 - (0{\cdot}5 + 0{\cdot}18 + 0{\cdot}27)$ $= 0{\cdot}05$ (b) $0{\cdot}18 + 0{\cdot}27$ $= 0{\cdot}45$ (c) $0{\cdot}5 \times 0{\cdot}18$ $= 0{\cdot}09$	M1 A1 M1 A1 M1 A1 6	Accept equivalent answers (percentages or fractions) throughout.
2.(a) - 6 (b) Six correct plots. Curve drawn. (c) Correct values <u>from their graph</u>. (d) Correct coordinates <u>from their graph</u>. (e) 'The scale on the y-axis'.	B1 B1 B1 B1 B2 B1 7	 FT 'their (2,-6)'. FT 'their plots'. Minimum must be at (a, b) with 0<a<1 and b<-11. Answers should be –1·3 and 2·6, but readings must from their graph. B1 for each. Should be (0·67, -11·3), but readings must from their <u>curved</u> graph. Accept unambiguous wording.
3.(a) False AND a counter example given. (b) True AND a statement that refers to both '$(\text{odd})^2$ being odd' AND 'odd × odd being odd'.	E1 E2 3	 Accept any equivalent intention to refer to both facts OR a single statement to cover both. E1 for reference to one of the two facts.
4. Use of $\frac{(2n-4)}{n} \times 90°$ OR $180° - \frac{360°}{n}$ Pentagon: 108(°) Hexagon: 120(°) Isosceles triangle: $180 - 2 \times 69$ $= 42(°)$ (Angle sum =) $90(°) + 108(°) + 120(°) + 42(°)$ $= 360(°)$ Organisation and communication Accuracy of writing	M1 A1 A1 M1 A1 B1 OC1 W1 8	Used with n = 5 OR n = 6. Sight of either 108 or 120 implies M1.
5.(a) 2 (b) $y = -2$ (c) (3 , 7)	B1 B1 B1 3	
6.(a) $4{\cdot}5 \times 10^6$ (b) $1{\cdot}35 \times 10^{-4}$	B2 B2 4	B1 for $0{\cdot}45 \times 10^7$ or 4 500 000. B1 for $13{\cdot}5 \times 10^{-5}$ or (0)·000135

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7.(a) $0{\cdot}4 \times x = 0{\cdot}12$ $x = 0{\cdot}3$ 0·6 on correct branch ('Snowdon – No') 0·3, 0·7, 0·3 and 0·7 on correct branches. (b) $0{\cdot}6 \times 0{\cdot}7$ $= 0{\cdot}42$	M1 A1 B1 B1 M1 A1 6	FT consistent pairing for 'their 0·3' but not for use of 0·6 and 0·4. B0 if 0·5 used on all four branches. FT 'their values'.
8.(a) $8 - x = 3(5 - x)$ or $8 - x = 15 - 3x$ $2x = 7$ $x = 3½$ or $7/2$ (b) $2a\,(3a - 4b)$ (c) $(3x - 4)^3$	B1 B1 B1 B2 B1 6	FT until 2nd error. Mark final answer. B1 for $2a\,(3a - \ldots..)$ or $2a\,(\ldots. - 4b)$ B1 for $2\,(3a^2 - 4ab)$ or $a\,(6a - 8b)$ Do not accept with missing brackets.
9. Any 2 of the lines $x = -1$, $x+2y=8$ and $y = 2x+1$ correct. Correct region shaded.	B2 B1 3	B1 for any 1 correct line. If $x = -1$ and $y = -1$ are both shown do not award a mark unless $x = -1$ is selected for the region or clearly labelled. CAO. Accept indication by 'shading out'.
10. $\frac{\Theta}{360} \times 2\pi r + 2r$ $\frac{\Theta}{360} \times 2\pi \times 4{\cdot}5 + 2 \times 4{\cdot}5 = 34$ $\Theta = \frac{25 \times 360}{9\pi}$ $\Theta = \frac{1000}{\pi}$	S1 B1 B1 B1 4	 FT for the correct manipulation of their equation with r in two terms, equivalent level of difficulty.
11. Sight of the volume scale factor or 5^3 OR $0{\cdot}2^3$. (Number of ornaments =) 875 ÷ 125 OR 875 × 0·008. = 7	B2 M1 A1 4	B1 for sight of 5 OR 0·2.
12. (a) $\sqrt[3]{\frac{125}{8}}$ (b) π^2	B1 B1 2	
13. (a) Frequency densities of 0·6, 4·4, 6, 6·8, 1·5 Histogram of their frequency densities drawn. (b) An attempt to add the areas of the bars. (10 + 11 + 17 + 20 + 22) = 80 Search for the median within the 502·5 – 505 group e.g. 502·5 + 2/20 × 2 ·5 = 502·75(g)	M2 A1 M1 A1 M1 A1 7	M1 for any 3 or 4 correct. Provided M1 awarded. CAO. FT 'their 80' provided a clear attempt made to add the areas of the bars.

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14. Rearranging equation to $x^2 + x - 1 = 0{\cdot}5x + 1$ Line $y = 0{\cdot}5x + 1$ drawn Solution of approximately −1·7 AND 1·2.	M1 A1 A1 3	 A solution obtained using the formula gets M0A0A0.
15. Numerator of $(2x + 7)(x + 3)$ Denominator of $(2x + 7)(2x - 7)$ $\frac{x+3}{2x-7}$	B2 B2 B1 5	B1 for $(2x \ldots 7)(x \ldots 3)$. B1 for $(2x \ldots 7)(2x \ldots 7)$. FT provided no more than 1 previous error and provided simplification required.
16. (a) 4/20 × 3/19 = 12/380 (= 3/95) (b) Strategy 1 – P(MM) – P(DD) – P(WW) OR equivalent. P(MM) = 10/20 × 9/19 or P(DD) = 6/20 × 5/19 or P(WW) = 4/20 × 3/19 or other non-replacement product. 1 – {(10/20×9/19) + (6/20×5/19) + (4/20×3/19)} = 248/380 (= 62/95)	M1 A1 S1 M1 A1 A1 6	 For the idea, not notation. Accept missing brackets. Or alternative full calculation shown. Allow missing brackets if intention clear. ISW. Ignore incorrect cancelling.
17. Horizontal translation to the left with the curve crossing the x-axis to the left of zero. y=f(x +3) crossing the x-axis at −3 and −1. Reflection about the x-axis.	B1 B1 B1 3	 FT their y = f(x + 3).