

MATHEMATICS - NUMERACY 2nd SAMs 2017 Unit 2 (Calculator allowed) Higher Tier	Mark	MARK SCHEME Comments (Page 1)
1. $2 \times l + 2 \times w + 4 \times h + 18$ (cm) or equivalent (and no extras)	B2 2	B1 for 1 error or 1 slip in notation. Treat an answer of $l + w + 4 \times h + 18$ as 1 error (omitting bottom), hence award B1. If B2 penalise extra incorrect working -1.
2.(a) 250×4.37 $= 1092.5(0)$ (Buys)1050 (zloty) $1050 \div 4.37$ $= (£)240.27(46)$ Organisation and communication Accuracy of writing (b) $(1050 - 340.40 =) 709.6(0)$ $709 \div 4.43$ (£) 160.05	M1 A1 A1 M1 A1 OC1 W1 B1 M1 A1 10	FT provided M1 awarded FT 'their 1050 zloty' provided rounded to the nearest 50. Must be in zloty not £s. FT 'their (a)' provided >340.40 FT rounding down their 709.60 to whole number Accept (£)160.04 but not (£)160.045 An answer of (£)160.18 (omitting to round down) should be awarded B1 then SC1 in (b). An answer of (£)160.27 (rounding up instead of down) should be awarded SC1, with B1 if 709.6(0) seen.
3. 400×1.01^{14} or equivalent full method (£)459.79	M2 A1 3	M1 for correctly multiplying by 1.01^n where n is a positive integer. Award M2A0 for (£)459.789(685...)
4. (a) $50\,000 \div 0.35 =$ 142857 (b) (Total power in MW is) $2.0 \times 30 + 3.5 \times 54 + 3.6 \times 25 + 3.0 \times 60$ (Total number of turbines $30 + 54 + 25 + 60 = 169$) (Mean full power of a turbine is) $519 \div 169$ 3.07(1.... MW) (At 45% power) $0.45 \times 3.07(\dots)$ or equivalent 1.38 (MW)	M1 A1 M1 m1 A1 m1 A1 7	 $(\Sigma fx = 60 + 189 + 90 + 180 = 519)$ FT 'their Σfx ' ÷ 'their 517' CAO. Do not accept 3.1 or 3 (MW) FT 'their 3.07(...)' provided M1, m1 previously awarded Their answer must be given correct to 2 decimal places, i.e. award M1A0 for 1.381(95...) or 1.3815 or 1.382. Alternative: (45% power) $0.45 \times 2, 0.45 \times 3.5, 0.45 \times 3.6,$ 0.45×3 M1 $0.9 \times 30 + 1.575 \times 54 + 1.62 \times 25 + 1.35 \times 60$ m1 233.55 (MW) CAO A1 $\div 169$ m1 1.38 (MW) A1

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5. (a) 0, 5, 25, 49, 83, 113, 120 (b) 3 unique vertical plots correct at upper bounds All plots correct and joined, including to 0 at t=2.5 (c) Use of 15 minutes. Conclusion: Target beaten by $2\frac{1}{2}$ minutes. (d) TRUE FALSE TRUE TRUE FALSE	B2 M1 A1 M1 A1 B2 8	B1 for any three correct values, OR FT from 1 error for finding 3 further cumulative values accurately. Only FT their cumulative table to (c) <i>Accuracy of plotting: time on the grid line, cumulative frequency within the appropriate square with 1st & last plots on the grid lines.</i> B1 for any 4 correct. FT their cumulative frequency diagram. CAO CAO FT their cumulative frequency diagram. CAO
6. (a) Form and use a right-angled triangle with base 55 cm and height 50 cm. $\tan x = 50/55$ $42(^{\circ})$ or $42.3(^{\circ})$ (b) Reason, e.g. 'original measurements may not have been accurate', or 'doesn't consider the thickness of the wood', ...	S1 M1 A3 E1 6	Or alternative FULL method. A2 for $42.27...(^{\circ})$ A1 for $\tan^{-1} 0.909...$ or $\tan^{-1} (50/55)$
7. Attempt to use Pythagoras' Theorem, e.g. $\text{length}^2 + \text{width}^2 = 2.5^2$ Use of $\text{length} = 2 \times \text{width}$ $(2 \times \text{width})^2 + \text{width}^2 = 2.5^2$ or equivalent $\text{width}^2 = 1.25$ or $\text{width} = \sqrt{1.25}$ Width 1.1(2 metres) or 1.118(03... metres)	M1 M1 m1 m1 A1 5	OR equivalent. If units are given they must be correct. <i>Alternative:</i> <i>Attempt to use Pythagoras' Theorem, e.g. $\text{length}^2 + \text{width}^2 = 2.5^2$</i> M1 <i>Use of $\text{length} = 2 \times \text{width}$</i> M1 <i>Trial of a pair of values (< 2.5), one double the other in Pythagoras' Theorem</i> m1 <i>Trial of a pair of values (< 2.5), one double the other in Pythagoras' Theorem with improvement, closer to 2.5m</i> m1 <i>Width 1.1 metres or equivalent .</i> A1
8. $((\text{€})168) \div 1.15$ $\times 1.2(0)$ $\times 0.88$ $= 154.27$ (euros)	M1 M1 M1 A1 4	Or equivalent e.g. $\times 120 / 115$ CAO

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9. Volume = $\frac{4}{3} \times \pi \times 0.8^3 (\times 1000)$ [OR $\frac{4}{3} \times \pi \times 0.008^3 (\times 1000)$] = 2144(.6605...) cm³ [OR 0.002144(6605...) m³]. Use of conversion 1 m³ = 1 000 000 cm³. Use of mass / volume e.g. 16.935 ÷ 0.002144 7896 (kg / m³)	M1 A1 B1 M1 A1 5	Accept incorrect place value for digit 8 for M1. Accept answers in range 2143 to 2146 Or 2048 π / 3 FT 'their derived volume' from dimensionally correct use of formula. Accept answers in the range 7893 to 7901.
10. (Area of brooch =) $110 / 360 \times \pi \times 2.8^2$ OR $110 / 360 \times \pi \times 28^2$ = 7.52(5...) (cm²) or 752.58(5...) (mm²) or equivalent e.g. $539\pi / 225$ (cm²) or $2156 \pi / 9$ (mm²) (Cost of gold leaf per unit =) (£)48 ÷ (8 × 8) (per cm²) or (£)48 ÷ (80 × 80) (per mm²) = (£)0.75 (per cm²) or (£)0.0075 (per mm²) or equivalent in pence (Cost of gold leaf for brooch = 7.52(5...) × 0.75 or 752(.585...) × 0.0075) = (£)5.64 which is rounded UP to give (£)5.65 (b) (i) £5.13 (ii) £3.04	M1 A1 M1 A1 A1 B1 B1 7	Accept answers in range 7.52 to 7.53 (cm²) Accept (£)5.64 (rounded down) or (£)5.65 (directly from rounded area)
11. (a) Use of $i = 0.076$ AND $n = 4$ $(1 + 0.076 / 4)^4 - 1$ AER 7.82(%) (b) Explanation, based on need for fair comparison of interest rates.	B1 M1 A2 E1 5	Check table. Correct substitution in the formula. A1 for 0.078(19...) or incorrect rounding or truncation of the AER percentage. Accept 'percentage of interest paid annually'. Must mention 'year' or 'annual'.

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12. Radius of the cylinder = 0.5 cm OR diameter = 1 cm Idea that height of cylinder is approximately the circumference of the ring. Circumference of ring = $2 \times \pi \times$ value between 9 and 10 inclusive Volume = $\pi \times 0.5^2 \times$ circumference of ring Volume in the range 44.3 to 49.4 (cm³) inclusive. Statement about assumption, e.g. volume of cylinder used to calculate volume of toy, use of mid-value for radius of ring. Justification, e.g. used smaller radius so actual volume will be greater, or used larger radius so actual volume will be less, or used 9.5 cm as height of cylinder is clearly between 9 cm and 10 cm.	B1 S1 M1 M1 A1 E1 E1 7	May be shown on the diagram May be internal, external or somewhere in between. Accept sight of $9 \times \pi$ or $10 \times \pi$ for S1.
13. (a) D (b) $22.5 \times 60 \times 60 \div 1000$ ‘Yes’ AND 81 (km / h)	B1 B1 M1 M1 A1 5	FT ‘their 22.5’ CAO
14. (Ratio of lengths 45 : 60 =) 3 : 4 (Height of small pyramid =) 90 (cm) (Volume of frustum =) $\frac{1}{3} \times 60^2 \times 120 - \frac{1}{3} \times 45^2 \times 90$ = 83.25 (litres)	B1 B1 M2 A2 6	M1 for one correct product attempted for a volume (or sight of 144 000 or 60 750) A1 for 83 250 (cm³) FT their answer in cm³ for conversion to litres for final A1. <i>Alternative solution:</i> Ratio of lengths = 3 : 4 B1 Ratio of volumes = 27 : 64 B1 Volume of large pyramid = 144 000 cm³ B1 Volume of frustum = $\frac{64 - 27}{64} \times 144\,000$ M1 83.25 (litres) A2 Award A1 for 83 250 (cm³) FT their answer in cm³ for conversion to litres for final A1.