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 ÷ 4.37 = (£)240.27(46) Organisation and communication Accuracy of writing (b) (1050 – 340.40 =) 709.6(0) 709 ÷ 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 ÷ 0.35 = 142857 (b) (Total power in MW is) 2.0×30 + 3.5×54 + 3.6×25 + 3.0×60 (Total number of turbines 30+54+25+60 = 169) (Mean full power of a turbine is) 519 ÷ 169 3.07(1…. MW) (At 45% power) 0.45 × 3.07(….) or equivalent 1.38 (MW)	M1 A1 M1 m1 A1 m1 A1 7	 (Σfx = 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) 0.45×2, 0.45×3.5, 0.45×3.6, 0.45×3 M1* *0.9×30 + 1.575×54 + 1.62×25 + 1.35×60 m1* *233.55 (MW) CAO A1* *÷169 m1* *1.38 (MW) A1*

MATHEMATICS - NUMERACY **2nd SAMs 2017** **Unit 2 (Calculator allowed) Higher Tier**	**Mark**	**MARK SCHEME** **Comments (Page 2)**
5. (a) 0, 5, 25, 49, 83, 113, 120	B2	B1 for any three correct values, OR FT from 1 error for finding 3 further cumulative values accurately. Only FT their <u>cumulative table</u> to (c)
(b) 3 unique vertical plots correct at upper bounds All plots correct and joined, including to 0 at t=2.5	M1 A1	*Accuracy of plotting: time on the grid line, cumulative frequency within the appropriate square with 1st & last plots on the grid lines.*
(c) Use of 15 minutes. Conclusion: Target beaten by $2\frac{1}{2}$ minutes.	M1 A1	
(d) TRUE FALSE TRUE TRUE FALSE	B2 8	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(°) or 42.3(°) (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….(°) A1 for $\tan^{-1}$ 0.909… or $\tan^{-1}$ (50/55)
7. Attempt to use Pythagoras' Theorem, e.g. length^2 + width^2 = 2.5^2 Use of length = 2 × width (2 × width)^2 + width^2 = 2.5^2 or equivalent width^2 = 1.25 or width = √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. *Alternative:* *Attempt to use Pythagoras' Theorem, e.g. length^2 + width^2 = 2.5^2 M1* *Use of length = 2 × width M1* *Trial of a pair of values (< 2.5), one double the other in Pythagoras' Theorem m1* *Trial of a pair of values (< 2.5), one double the other in Pythagoras' Theorem with improvement, closer to 2.5m m1* *Width 1.1 metres or equivalent . A1*
8. ((€)168) ÷ 1.15 × 1.2(0) × 0.88 = 154.27 (euros)	M1 M1 M1 A1 4	 Or equivalent e.g. × 120 / 115 CAO

MATHEMATICS - NUMERACY 2nd SAMs 2017 Unit 2 (Calculator allowed) Higher Tier	Mark	MARK SCHEME Comments (Page 3)
9. Volume = $4/3 \times \pi \times 0.8^3$ (× 1000) [OR $4/3 \times \pi \times 0.008^3$ (× 1000)]	M1	Accept incorrect place value for digit 8 for M1.
= 2144(.6605...) cm^3 [OR 0.002144(6605...) m^3].	A1	Accept answers in range 2143 to 2146 Or $2048\pi / 3$
Use of conversion 1 m^3 = 1 000 000 cm^3.	B1	FT 'their derived volume' from dimensionally correct use of formula.
Use of mass / volume e.g. 16.935 ÷ 0.002144	M1	
7896 (kg / m^3)	A1 5	Accept answers in the range 7893 to 7901.
10. (Area of brooch =) $110 / 360 \times \pi \times 2.8^2$ OR $110 / 360 \times \pi \times 28^2$	M1	
= 7.52(5...) (cm^2) or 752.58(5...) (mm^2) or equivalent e.g. $539\pi / 225$ (cm^2) or $2156\pi / 9$ (mm^2)	A1	Accept answers in range 7.52 to 7.53 (cm^2)
(Cost of gold leaf per unit =) (£)48 ÷ (8 × 8) (per cm^2) or (£)48 ÷ (80 × 80) (per mm^2)	M1	
= (£)0.75 (per cm^2) or (£)0.0075 (per mm^2) or equivalent in pence	A1	
(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	A1	Accept (£)5.64 (rounded down) or (£)5.65 (directly from rounded area)
(b) (i) £5.13	B1	
(ii) £3.04	B1 7	
11. (a) Use of $i = 0{\cdot}076$ AND $n = 4$	B1	Check table.
$(1 + 0{\cdot}076 / 4)^4 - 1$	M1	Correct substitution in the formula.
AER 7·82(%)	A2	A1 for 0·078(19...) or incorrect rounding or truncation of the AER percentage.
(b) Explanation, based on need for fair comparison of interest rates.	E1 5	Accept 'percentage of interest paid annually'. Must mention 'year' or 'annual'.

MATHEMATICS - NUMERACY 2nd SAMs 2017 Unit 2 (Calculator allowed) Higher Tier	Mark	MARK SCHEME Comments (Page 4)
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 (cm^3) 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 (cm^3) FT their answer in cm^3 for conversion to litres for final A1. *Alternative solution:* *Ratio of lengths = 3 : 4* *B1* *Ratio of volumes = 27 : 64* *B1* *Volume of large pyramid = 144 000 cm^3* *B1* *Volume of frustum = $\frac{64 - 27}{64} \times 144\,000$* *M1* *83·25 (litres)* *A2* *Award A1 for 83 250 (cm^3)* *FT their answer in cm^3 for conversion to litres for final A1.*