

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

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<p>9. Volume = $\frac{4}{3} \times \pi \times 0.8^3$ ($\times 1000$) [OR $\frac{4}{3} \times \pi \times 0.008^3$ ($\times 1000$)]</p> <p style="text-align: center;">= 2144(.6605...) cm^3 [OR 0.002144(6605...) m^3].</p> <p>Use of conversion $1 \text{ m}^3 = 1\,000\,000 \text{ cm}^3$.</p> <p>Use of mass / volume e.g. $16.935 \div 0.002144$</p> <p style="text-align: center;">7896 (kg / m^3)</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>5</p>	<p>Accept incorrect place value for digit 8 for M1.</p> <p>Accept answers in range 2143 to 2146 Or $2048 \pi / 3$</p> <p>FT 'their derived volume' from dimensionally correct use of formula.</p> <p>Accept answers in the range 7893 to 7901.</p>
<p>10. (Area of brooch =) $110 / 360 \times \pi \times 2.8^2$ OR $110 / 360 \times \pi \times 28^2$</p> <p style="text-align: center;">= 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)</p> <p>(Cost of gold leaf per unit =) $(\pounds)48 \div (8 \times 8)$ (per cm^2) or $(\pounds)48 \div (80 \times 80)$ (per mm^2)</p> <p style="text-align: center;">= $(\pounds)0.75$ (per cm^2) or $(\pounds)0.0075$ (per mm^2) or equivalent in pence</p> <p>(Cost of gold leaf for brooch = $7.52(5...) \times 0.75$ or $752(.585...) \times 0.0075$) = $(\pounds)5.64$ which is rounded UP to give $(\pounds)5.65$</p> <p>(b) (i) £5.13</p> <p style="padding-left: 40px;">(ii) £3.04</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>7</p>	<p>Accept answers in range 7.52 to 7.53 (cm^2)</p> <p>Accept $(\pounds)5.64$ (rounded down) or $(\pounds)5.65$ (directly from rounded area)</p>
<p>11. (a) Use of $i = 0.076$ AND $n = 4$ $(1 + 0.076 / 4)^4 - 1$ AER 7.82(%)</p> <p>(b) Explanation, based on need for fair comparison of interest rates.</p>	<p>B1</p> <p>M1</p> <p>A2</p> <p>E1</p> <p>5</p>	<p>Check table.</p> <p>Correct substitution in the formula. A1 for 0.078(19...) or incorrect rounding or truncation of the AER percentage.</p> <p>Accept 'percentage of interest paid annually'. Must mention 'year' or 'annual'.</p>

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<p>12. Radius of the cylinder = 0.5 cm OR diameter = 1 cm</p> <p>Idea that height of cylinder is approximately the circumference of the ring.</p> <p>Circumference of ring = $2 \times \pi \times$ value between 9 and 10 inclusive</p> <p>Volume = $\pi \times 0.5^2 \times$ circumference of ring</p> <p>Volume in the range 44.3 to 49.4 (cm³) inclusive.</p> <p>Statement about assumption, e.g. volume of cylinder used to calculate volume of toy, use of mid-value for radius of ring.</p> <p>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.</p>	<p>B1</p> <p>S1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>E1</p> <p>E1</p> <p>7</p>	<p>May be shown on the diagram</p> <p>May be internal, external or somewhere in between. Accept sight of $9 \times \pi$ or $10 \times \pi$ for S1.</p>
<p>13. (a) D</p> <p>(b) 22.5 $\times 60 \times 60$ $\div 1000$ 'Yes' AND 81 (km / h)</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>5</p>	<p>FT 'their 22.5'</p> <p>CAO</p>
<p>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)</p>	<p>B1</p> <p>B1</p> <p>M2</p> <p>A2</p> <p>6</p>	<p>M1 for one correct product attempted for a volume (or sight of 144 000 or 60 750)</p> <p>A1 for 83 250 (cm³) FT their answer in cm³ for conversion to litres for final A1.</p> <p><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.</p>