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

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 – Numeracy Unit 2: Higher Tier	Mark	Comment
1. $380 \times 2.54/100 \times$ or 0.0254×380 $380 \times (1+0.0254)^6$	B1 M1	May be embedded in further calculation Method of adding on different amounts, 6 year period, following attempts to calculate 2.54% (e.g. 380+9.65(2)=389.65(2) ….)
(£)441.72, (£) 441.71(635…),	A1	Accept (£)441 or (£)442 from appropriate working
Conclusion, e.g. No as less than £460	E1	FT from their compounded amount provided M1
Organisation and communication Accuracy of writing	OC1 W1 6	
2.(a) Mid points 0.5, 1.5, 2.5, 3.5 $0.5 \times 12 + 1.5 \times 44 + 2.5 \times 20 + 3.5 \times 4$ 6 + 66 + 50 + 14 (= 136) $\div 80$ (£)1.7(0)	B1 M1 m1 A1	Accept ±1p FT their mid-points, within & including bounds Their $\Sigma fx \div 80$
(b) $60 \times 2.3(0) + 80 \times 1.7(0)$ (=138+136 = 274) $\div (60 + 80)$ (£)1.96	M1 m1 A1 7	FT 'their £1.70' or 'their Σfx evaluated' ÷140. FT their 80 provided from attempted sum of the correct numbers An answer of (£)1.95714… is M1, m1, A0
3.(a) Correct multiplier $\times 0.55 \times 0.8(0)$ $\times 0.44$ Conclusion, e.g. 'not the same as Jane thinks it is ×0.35', '0.35 ≠ 0.44'	B2 B1 E1	B1 for 0.55 and 0.8(0) or $(1–0.45)\times(1–0.2)$ Must show comparative multiplier, i.e. sight of (×)0.35
(b) $T = 0.55(\times)P$ $R = 0.44(\times)P$	B2 B1 7	B1 for $T = P – 0.45(\times)P$ FT their multiplier for (a)

<table>
<tr><th>GCSE Mathematics – Numeracy
Unit 2: Higher Tier</th><th>Mark</th><th>Comment</th></tr>
<tr><td>4. Sight of 5 miles ≈ 8 km or 1 litre = 1.75 pints
7 km/l ≈ 7×5/8 miles/l
≈ 7×5/8 ÷ 1.75 (miles/pint)
≈ 7×5/8 ÷ 1.75 × 8 (mpg)
20 (mpg)</td><td>B1
M1
M1
M1
A1
5</td><td>Or equivalent
Multipliers could appear in any order</td></tr>
<tr><td>5. 52° or 38°indicated appropriately in the triangle
Rig Bay to Jay Cliff = sin52° × 3.2
2.5(216… km)
(3.2 + 2.5… =) 5.7 (km)</td><td>B1
M2
A1
B1
5</td><td>
Sin52° = RtoJ/3.2

FT ‘their RtoJ’ provided M1 awarded</td></tr>
<tr><td>6. Correct substitution into formula.
Using 16553(p)
U = $\frac{16553/1{\cdot}05 - 90 \times 31{\cdot}48}{11{\cdot}546}$ or equivalent

(Units used =) 1120</td><td>M1
m1
m1

A1

4</td><td>Do not penalise using (£)165.53 at this stage.

The two ‘m’ marks may be awarded in either order.
C.A.O. Accept answers of 1120 ± 1</td></tr>
<tr><td>7.(a)
(i) $7.2^2 – 3.4^2 = h^2$ or other correct initial use of Pythagoras’ Theorem
$h^2 = 40.28$ or (h =) √40.28
(h =) 6.3(46… cm)
Volume = ½ × 3.4 × 6.3(46..) × 18.4
198.52(32…) 197(.064) or 197.1

(200 - 198.52(32..cm^3) = 1.48 =) 1.5 (cm^3)

(ii) Explanation, states or implies e.g. ‘too tight’, ‘could be different shape’

(b) 3.35, 3.45, 2.55, 2.65, 6.75, 6.85

Greatest 3.45×2.65×6.85 (=62.626125cm^3) AND
Least 3.35×2.55×6.75 (=57.661875cm^3)
Difference/Least (×100) (4.96425/57.661875)
8.6(%)</td><td>
M1

A1
A1
M1
A1

B1

E1

B2

M1

m1
A1

12</td><td>
Accept $7.2^2 - 3.4^2$, or $7.2^2 = 3.4^2 + …^2$

FT ‘their derived 6.3(46…)
Accept answers from premature approximation
CAO

Sight of all 6 greatest and least values
B1 for any 3 of the 6

Accept 9(%) from correct working</td></tr>
<tr><td>8(a) Correct or reasonable estimates for the population densities, identifying Singapore as greatest and Wales as the least.

7540.78 ÷ 144.790713…
52(.0805…. times)
(b) Wales and Tonga

(c) False
True
False
False
False</td><td>B2

M1
A1
B1

B2

7</td><td>Singapore and Wales may not be identified explicitly but implied in later working.
B1 at least 3 reasonable estimates for the population densities
<table><tr><td>Country</td><td>Population density</td></tr><tr><td>Wales</td><td>144.790713…</td></tr><tr><td>Singapore</td><td>7540.78..</td></tr><tr><td>Bermuda</td><td>1212.018…</td></tr><tr><td>India</td><td>378.55..</td></tr><tr><td>Belgium</td><td>366.706…</td></tr><tr><td>Tonga</td><td>144.819..</td></tr></table>
B1 for 4 correct</td></tr>
</table>

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
9(a) Diagonal^2 = 8^2 + 8^2 Diagonal = 11.3(13..cm) Height = tan32° × ½ Diagonal Height 3.5(347.. cm) (b) Volume pyramid = ⅓ × (8 × 8) × 3.5(347…) 75.4(09…cm^3) (c) Hemisphere: 75.4(09…cm^3) = ½× π ×r^3×4/3 $r^3 = \frac{3 \times 75.4(09\ldots) \times 2}{4 \times \pi}$ Radius hemisphere 3.3(0….cm)	M1 A1 M2 A1 M1 A1 M1 m1 A1 10	 FT their derived diagonal M1 for tan32° = height/ ½ Diagonal FT their derived height FT their derived volume of pyramid or total volume Isolating r^3 or r *Allow SC1 if worked with volume of sphere equated to derived cap volume with r evaluated accurately*
10.(a) **D:** Giving each pupil a raffle ticket and then randomly drawing raffle tickets for selection (b) $\frac{23456}{23456 + 43244 + 83124 + 11782 + 63789}$ $\frac{23456}{225395}$ × 250 26 (people)	B1 M1 m1 A1 4	 Intention to find Central Party share of the votes OR sight of 0.104066(194) × 250 Must be given as a whole number

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
11.		*Allow equivalent working (e.g. working in weeks, months or annually)* *Allow reasonable approximation at each stage* *Penalise once only for use of 48 weeks (12 × 4 weeks)*
NATIONAL INSURANCE		
[Weekly gross salary (£)47840 ÷ 52 =] (£)920	B1	
0.12 × [(£)805 – (£)153]+0.02 × [(£)920 – (£)805]	M2	M1 for one FT 'their (£)920'
(£)80.54	A2	A1 for (£)78.24 or (£)2.30 FT 'their (£)78.24' + 'their (£)2.30' (may be seen in later workings)
TAX		
(0.2 × 31865=)(£)6373	B1	
0.4 × (47840 – 41865)	M1	Accept 0.4 × (47840 – 41866)
(£)2390.(00)	A1	Accept (£)2389.6(0)
(6373 + 2390.(00)=) (£)8763	B1	Accept (6373 + 2389.6(0)=) (£)8762.6(0) FT 'their (£)6373' + 'their(£)2389.6(0)' Award B1 for sight of (£)168.52 or (£)168.51 (may be seen in later workings)
PENSION		
[(£)920 × 0·085=] OR [(£)47840 × 0·085 ÷ 52]	M1	FT 'their (£)920'
(£)78.2(0)	A1	
TOTAL (Weekly)		
920 – [80.54 + 168.52 + 78.2(0)]	M1	Accept 920 – [80.54 + 168.51 + 78.2(0)] FT all their values for 'weekly gross salary', 'tax', 'NI' and 'pension'
=(£)592.74	A1 13	Accept (£)592.75