

UNIT 1: NON-CALCULATOR, 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

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GCSE Mathematics – Numeracy Unit 1: Higher Tier	Mark	Comment									
1. Perpendicular bisector Stornaway and Ullapool ($\pm 2^\circ$) Use of correct scale (1cm = 10 miles) Arc from Portree 30 miles shown as approximately 3× distance Muir to Dingwell (i.e. 3cm) Free hand distance 10 miles off shore (i.e. 1cm) Indication of possible sightings Range of bearing $\pm 2^\circ$	B1 B1 B1 B1 B1 B2 7	Award for use of 3cm in arc or 1cm in free hand drawing below FT their Muir to Dingwall distance FT for attempted perpendicular and arc only FT provided at least B2 previously awarded B1 for any 1 bearing within the correct range									
2.(a) Area of ends: $10 \times 1 + 10 \times 3$ Area of the floor: 20.1×10 Vertical sides with slopes: $\frac{1}{2} \times 20 \times (1+3) \times 2$ Total surface area of 5 faces: $10 \times 1 + 10 \times 3 + 20.1 \times 10 + 2 \times \frac{1}{2} \times 20 \times (1+3)$ $(10 + 30 + 201 + 80 \text{ or } 10 + 30 + 201 + 40 + 40 =)$ $321 \text{ (m}^2\text{)}$ Total cost £ $321 \times 20 + 6 \times 150$ (£)7320 2(b)(i) >£140: with pool $120 - 105 (=15)$ AND without pool $120 - 115 (=5)$ 10 (hotels) (ii) <table border="1"> <thead> <tr> <th></th><th>Median (£)</th><th>IQR (£)</th></tr> </thead> <tbody> <tr> <td>With pool</td><td>108</td><td>$(130 - 74 =)$ 56</td></tr> <tr> <td>Without pool</td><td>74</td><td>$(90 - 66 =)$ 24</td></tr> </tbody> </table> Interpretation must refer to the greater spread AND greater median of prices in hotels with a pool or equivalent e.g. The prices are generally lower and less varied in hotels without pools.		Median (£)	IQR (£)	With pool	108	$(130 - 74 =)$ 56	Without pool	74	$(90 - 66 =)$ 24	B1 B1 B1 M1 A2 M1 A1 M1 A1 B3 E1 14	May be seen with a calculation ×£25 FT their 5 faces provided at least B2 previously awarded. A1 for at least 3 areas accurately evaluated in a sum of areas of 5 sides FT 'their derived 321' Medians and IQRs correct B2 for any 3 of the 4 correct B1 for any 1 or 2 of the 4 correct Depends on previous award of at least B2
	Median (£)	IQR (£)									
With pool	108	$(130 - 74 =)$ 56									
Without pool	74	$(90 - 66 =)$ 24									
3.(a) £1 coin (b) 8×10^{-3} (c) 307 (d) $3860 \div 200$ $19.3 \text{ (g/cm}^3\text{)}$	B1 B1 B1 M2 A1 6	M1 for digits 3860 divided by 200 with incorrect place value									
4. $4 \times \frac{1}{3}$ or equivalent $\times 2\frac{1}{2}$ or equivalent. = 20/6(hrs) or equivalent OR 200(min) = 3hrs 20 min.	M1 M1 A1 A1 4	Do not accept $20 \div 6$. F.T. if at least one M1 and of equivalent difficulty. <i>If question is misread as 'It took Machine A 4 hours How long did it take Machine B.....?'</i> Award SC1 for $(4 \times 3) / 2\frac{1}{2}$ or 4.8 hours and a further SC1 for 4hrs 48min.									

GCSE Mathematics – Numeracy Unit 1: Higher Tier	Mark	Comment
5.(a) $\frac{1}{4}$ or equivalent (b) TRUE FALSE TRUE TRUE FALSE FALSE	B1 B2 3	B1 for any 4 correct
6.(a)(i) $(800 - 300)/50 = 10$ (ii) Explanation, e.g. 'extra cost per person', '£10 per person', '£100 extra for every 10 people' (iii) Explanation, e.g. 'fixed charge' (b) (£)200	M1 A1 E1 E1 B1 5	Or equivalent Do not accept 'more people the more paid' FT from their gradient if reasonable Accept 'conference cost starts at £300', or 'hire cost' CAO
7.(a) Using ratio 30 : 1 or equivalent. (Ratio of areas =) 900 : 1 or equivalent. (Area of large logo =) $5 \times 900 (= 4500\text{cm}^2)$ (Cost =) (£)200 $\times 0.45$ (£) 90 Organisation and communication Accuracy of writing (b)(i) Perimeter = $a - 5b + 2c - d$ (ii) Area = $a(5b + 2c - d)$	B1 M1 m1 m1 A1 OC1 W1 B1 B1 9	Allow M1 for sight of 270 : 9 or equivalent notation. F.T. '(their length ratio) ² '.
8. (a) Tangent at t = 30 Use of difference in v / difference in t Acceleration (reasonable for their tangent) m/s^2 or ms^{-2} (b) Use of area under the curve from 0 to 30 seconds Correct method, including $\frac{1}{2} \times 4 \times 30$ or $\frac{1}{2} \times 5 \times 30$ Correct answer to calculation, e.g. 60(m) to 75(m)	M1 M1 A1 U1 S1 M1 A1 7	Accept with or without sight of a tangent Must be evaluated from their tangent Independent <i>Treat area 0 to 50 seconds as MR-1 then FT</i> Accept any suitable calculation for 1 or more blocks of area If units are given they must be correct <i>Trapezium rule (approximate values)</i> $10 \times [0 + 4.4 + 2(1.75 + 3.4)]/2 = 73.5(\text{m})$
9. (a) Frequency density = 1 indicated on graph (b) FALSE TRUE FALSE FALSE FALSE (c) Total number of pupils: $5 \times 2 + 14 \times 0.5 + 10 \times 0.5 + 6 \times 1 + 4 \times 1 + 1 \times 2$ 34 5 to 7 seconds total number: $(14 \times 0.5 + 10 \times 0.5 + 6 \times 1 =) 18$ Convincing 60% of 34 = 20.4 which is > 18 or 18 is 60% of 30, so it's less than 60% of 34.	B2 B2 M1 A1 B1 B1 8	B1 for sight of 1 or $2 \div 2$ B1 for 4 correct (10 + 7 + 5 + 6 + 4 + 2) FT provided at least 2 of the 3 correct FT provided similar difficulty <i>Alternative method</i> $18/34 \approx 0.529... \text{ or } 52.9\% < 60\%$

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10. (£) 120×1.2 (£) 144 (£) $144 \div 0.75$ or equivalent (£) 192	M1 A1 M1 A1 4	FT 'their (£)144'
11.(a) (i) $\frac{3}{4} \times 28 \times (\text{£}) 8$ (million) $\times 1.1$ (£) 184.8 million or equivalent (ii) $\text{£}1 \times 10^8$ (b)(i) M25 $1\frac{1}{5}$ longer than M62 or equivalent e.g. (1960-1976) $7.7 \times 10^8 \times 6/5$ (for approximately same length of M25) $9(.24) \times 10^8$ Conclusion, e.g. 'very similar cost per mile' (b)(ii) Decision, e.g. to estimate an average cost for a vehicle for the period, e.g. car £4, lorry £10 Reasonable accurate calculation for toll fees for 1 day, e.g. $20\,000 \times 4 + 19\,000 \times 10 = (\text{£}) 270\,000$ (per day) Build cost $\div$ toll fee taken per day (may include approximation) $900\,000\,000 \div 270\,000$ (≈ 3300) OR $900\,000\,000 \div 300\,000$ ($= 3000$) $\div 365$ (or approximation of the days in a year, e.g. 300 or 350) $(3300 \div 365 \approx 9 \text{ years})$ ($3000 \div 300 = 10 \text{ years}$) Accept answers between 8 to 11 years from reasonable approximations and accurate calculations (may be approximations) AND assumptions/approximations/estimates have been clear in working.	M1 m1 A1 B1 M1 M1 A1 E1 S1 B1 M1 m1 A1	 Decide on reasonable comparison Method calculation (with approximations) for comparison Accurate calculation (with approximations) Accept a conclusion that there was a decrease in costs e.g. No, there was a decrease of about £33 000 per mile OR Build cost $\div$ toll fee taken per month OR $\div 12$ (when working in months) Additional assumptions may include that the costs given are able to be compared or that comparable effects of inflation are being overlooked etc. <i>Additional method</i> <i>Daily revenue in 2003</i> $= 20000 \times 2 + 19000 \times 10 = (\text{£}) 230000$ <i>Number of days</i> $= 9 \times 10^8 \div 230000 \approx 4000$ <i>days, i.e. about 11 years</i> <i>Daily revenue in 2012</i> $= 20000 \times 5.5 + 19000 \times 11 = (\text{£}) 319000$ <i>Number of days</i> $= 9 \times 10^8 \div 319000 \approx 3000$ <i>days, i.e. about 8 years</i> <i>So, it will take between 8 years and 11 years</i> <i>to recover the costs, so about 10 years</i>