GCSE MARKING SCHEME

AUTUMN 2020

GCSE
MATHEMATICS - NUMERACY
UNIT 1 – HIGHER TIER
3310U50-1

INTRODUCTION

This marking scheme was used by WJEC for the 2020 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE MATHEMATICS - NUMERACY
AUTUMN 2020 MARK SCHEME

GCSE Mathematics Numeracy **Unit 1: Higher Tier**	Mark	Comments
1(a)(i) (6.4, 5.6) unambiguously marked	B1	
1(a)(ii) Unambiguously stating or implying 'No' with a reason, e.g. 'shows negative correlation (this week)', 'likely to be similar to this week', 'more rain, less sunshine'	E1	Allow 'No' with, e.g. 'can't tell from this week', 'can't predict the weather (from last week)', 'can't know this' Do not accept, e.g. 'you can't have a positive correlation (both can't increase)'
1(b) Day: Wednesday — Wind speed (m.p.h.): **1.5** Day: Friday — Wind speed (m.p.h.): **6(.0)**	B1 B1	If no marks, award B1 if the results are reversed If no marks, award SC1 for answers of (Wednesday) 1.4 and (Friday) 5.6
2(a) 66.36 ÷ 6 × 11 or 66.36 ÷ 6 × (1 + 4 + 6) or 66.36 ÷ 6 + 4 × 66.36 ÷ 6 + 66.36 (= 11.06 + 44.24 + 66.36) or equivalent	M2	M1 for sight of 66.36 ÷ 6 or 11.06, or for sight of '11.6(0)' (*Note if ×10 seen, check if there is indication if this was derived from 1 + 4 + 6, if so accept for possible M2, if no evidence M0)*
(£) 121.66	A1	CAO If no marks, award SC1 for an answer of (£)182.49 (from 11 × 66.36 ÷ 4)
2(b) (First year increased charge) 24 × 0.05 + 24 or 24 + 24 ÷ 10 ÷ 2 or equivalent	M1	
(£) 25.2(0)	A1	Accept 2520(p). Ignore units given
(Second year increased charge) 25.2(0) × 0.05 + 25.2(0) or 25.2(0) + 25.2(0) ÷ 10 ÷ 2 or equivalent	M1	FT 'their 25.2(0)'
(Increased charge after 2 years is) (£) 26.46	A1	Accept 2646(p). If units are given they must be correct An answer of (£)26.4(0) (from 24 + 2 × 1.20) implies M1, A1, m0, A0 Sight of 24×1.05^2 implies M2, also award A1 for 24 × 1.1025
Organisation and communication	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Writing	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

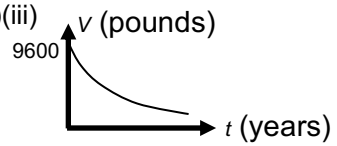
2(c) ½ ×(2.2 + 1.8) × height trapezium + 2.2 × 2 = 6.8	M2	M1 only if brackets omitted for sum of parallel sides in the overall calculation unless dealt with correctly in further working, OR M1 for ½ ×(2.2 + 1.8) × height trapezium (brackets must be given or any 'missing brackets' implied by correct interpretation)
2 × height trapezium = 2.4 or height trapezium = 1.2	A1	
(Overall length =) 3.2 (m)	A1	FT 'their 1.2' + 2 provided at least M1 previously awarded If no marks, award SC1 for area of the trapezium as 2.4 (m^2) provided not from incorrect working, e.g. 6.8 – (2.2 + 1.8 + (0).2 + (0).2) = 2.4 is SC0 6.8 – 2.2 × 2 = 2.4 is SC1
2(c) Alternative method 1: *(2+ht trap)×2.2 – 2×½×[(2.2 – 1.8) ÷ 2] ×ht trap = 6.8*	*M2*	*M1 for ½×[(2.2 – 1.8) ÷ 2] ×height trapezium or* *2×½×[(2.2 – 1.8) ÷ 2] × height trapezium*
Height of trapezium = 1.2	*A1*	
(Overall length =) 3.2 (m)	*A1*	*FT 'their 1.2' + 2 provided at least M1 previously awarded*
2(c) Alternative method 2: *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]* *+ overall length×1.8 =6.8*	*M2*	*M1 for ½×(2+overall length)× [(2.2 – 1.8) ÷ 2] or* *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]*
(Overall length =) 3.2 (m)	*A2*	*A1 for 2 × Overall length = 6.4 or correct simplified equation in terms of overall length*
3.Unambiguous vertical line 5 cm ± 2 mm from fence	B1	
Angle bisector between house and fence ± 2°	B1	Accept a horizontal line drawn from the fence, 5cm (± 2 mm) away from the house
Correct intersection, position of the tree	B1	FT from B1 for intersection of two straight lines provided both lines within tolerance ± 4 mm or ± 4° Award B3 if the correct position is indicated provided not from incorrect working
4(a) (600 ÷ 8 =) 75 1st 2nd 3rd 4th 5th 6th 7th 8th 25 100 175 250 325 400 475 550	B1 B1	May be seen amongst other inappropriate working, but not from 75 written in the table FT 'their 600 ÷ 8' incorrectly evaluated
4(b) States it is a random selection (from the first 75 pupils)	E1	Ignore any additional spurious statements Allow for statement that implies 'random' selection, e.g. 'sticks a pin in (a printout of) the spreadsheet', 'the headteacher picked a random number', 'everyone had a fair chance of selection' Do not accept, e.g. 'selects a random odd number' 'using a systematic sampling method' without further clarification,

5(a) (280 – 100 + 500) ÷ 50 or (280 – 100) ÷ 50 + 500 ÷ 50 (Sell each ticket for) (£) 13.6(0)	M2 A1	M1 for sight of any one of the following: • (280 + 500) ÷ 50 (= £15.60) • (280 – 100) ÷ 50 (= £3.60) • (– 100 + 500) ÷ 50 (= £8) If units are given they must be correct FT from M1 awarded If no marks, award SC1 for either of the following: • an answer of (£)680 (from 280 – 100 + 500) • sight of 500 ÷ 50 correctly evaluated as (£)10, allow if embedded within other calculation
5(a) Alternative method: *(1000 – 100) ÷ 250 + 500 ÷ 50* *or equivalent using any two points on the line, e.g.* *(460 -100) ÷ 100 + 500 ÷ 50* *(640 -100) ÷ 150 + 500 ÷ 50* *(£) 13.6(0)*	*M2* *A1*	*M1 for sight of any one of the following, or equivalent:* • *(1000 – 100) ÷ 250 (= £3.60)* • *(460 -100) ÷ 100 (= £3.60)* • *(640 -100) ÷ 150 (= £3.60)* • *'an overall cost' - 100* *'number of people for that overall cost'* • *1000 ÷ 250 + 500 ÷ 50 (= £14)* • *460 ÷ 100 + 500 ÷ 50 (= £14.60)* • *640 ÷ 150 + 500 ÷ 50 (= £ 14.26 or £14.27)* • *'an overall cost'* + *500* *'number of people for that overall cost'* *50* *If units are given they must be correct* *FT from M1 awarded with answer rounded or truncated to a penny* *If no marks, award SC1 for sight of 500 ÷ 50 correctly evaluated as (£)10, allow if embedded within other calculation*

5(b) Considering a factor of 400 (200, 100 or 50) people or other suitable point, excluding £500 for charity, e.g. • $\frac{\text{'an overall cost'} - 100}{\text{'number of people for that overall cost'}}$ • (200 people) (820 – 100) ÷ 200, • (100 people) (460 – 100) ÷ 100, • (50 people) (280 – 100) ÷ 50 (Charity contribution) 500 ÷ 400 (Total) (£) 4.85	M1 M1 A1	FT 'their $\frac{\text{'an overall cost'} - 100}{\text{'number of people for that overall cost'}}$' i.e. 'their 3.60' (= £3.60) (= £ 1.25) May be embedded within stages of calculation If units are given they must be correct If M0, M1, A0 also award SC1 for correct evaluation resulting from the omission of deducting £100, e.g. • (820 ÷ 200 + 1.25 = £) 5.35 • (460 ÷ 100 + 1.25 = £) 5.85 • (280 ÷ 50 + 1.25 = £) 6.85 • correctly evaluated $\frac{\text{'an overall cost'}}{\text{'number of people for that overall cost'}}$ + 1.25
5(b) Alternative method: *Considering total cost for 400 people, e.g.* *(400 ÷ 50) × (280–100) + 500 or 8 × 180 + 500* *or 1440 + 500* *or (400 ÷ 100) × (460–100) + 500 or 4 × 360 + 500* *or (400 ÷ 200) × (820–100) + 500 or 2 × 720 + 500* *or equivalent* *÷ 400* *(£) 4.85*	*M1* *m1* *A1*	*If units are given they must be correct* *If no marks (due to omission of £100), award* *SC1 for (8 × 280 + 500) ÷ 400* *or SC2 for answer (£)6.85* *or SC1 for (4 × 460 + 500) ÷ 400* *or SC2 for answer (£)5.85* *or SC1 for (2 × 820 + 500) ÷ 400* *or SC2 for answer (£)5.35*
6(a) 1×10^6 (mm^2)	B2	Allow 10^6 (mm^2) B1 for any one of the following • a calculated area 1 000 000 (mm^2), 1000^2, $(10^3)^2$ or equivalent • 'their clearly written number' written correctly in standard form
6(b) 2700 ÷ (0.)9(0) or equivalent ÷ (0.)75 or equivalent 4000 (cm^2)	 M1 M1 A2	M marks can be awarded in either order Sight of 2700 ÷ (0.9 × 0.75) is awarded M2 A1 for 2700 ÷ 0.9 = 3000 or 2700 ÷ 0.75 = 3600 or for 2700 ÷ 0.675 or for an appropriate FT division correctly evaluated *(Note: sight of 2700 ÷ 0.675 is awarded M2 A1)*

7.		<u>In all alternative methods for answering this question accept alternative working in cm, if place value error in conversion of units penalise -1 once only</u>
(Area of cross-section) $6 \times ½ \times 30 \times (52 \div 2)$	M3	M2 for $½ \times 30 \times (52 \div 2)$ (= 390) M1 for any **use of** $52 \div 2$ (= 26) (May be embedded)
$2340\ (mm^2)$	A1	
(Volume of the box) $234000\ (mm^3)$ OR for a comparison $2340\ (mm^2) > 2300\ (mm^2)$	A1	FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded
7. Alternative method (trapezia) *(Area of cross-section) $2 \times ½ \times (52 \div 2) \times (30 + 2 \times 30)$*	*M3*	*M2 for $½ \times (52 \div 2) \times (30 + 2 \times 30)$ (= 1170)* *M1 for use of $52 \div 2$ (= 26)*
$2340\ (mm^2)$	*A1*	
(Volume of the box) $234000\ (mm^3)$ *OR* *for a comparison $2340\ (mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
7. Alternative method (½absinC) *(Area of cross-section) $6 \times ½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$*	*M3*	*M2 for $½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$* *M1 for (6 ×) $½ \times 30 \times 30 \times \sin 60°$*
$1350\sqrt{3}$ or $2338(.2...\ mm^2)$ or $2340\ (mm^2)$	*A1*	
(Volume of box) $233820\ mm^3$ or $234000\ (mm^3)$ *OR* *for a comparison $2338(.2\ mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
7. Alternative method (triangle area) *(Area of triangle) $½ \times 30 \times (52 \div 2)$*	*M2*	*(= 390)*
(Minimum area of triangle required) $2300 \div 6$	*M1*	
$383(.33...)$	*A1*	
Comparison $390 > 383(.33...)$	*A1*	

8(a) $4 \times \frac{8}{10} \times \frac{9000}{2000}$ or $4 \times 0.8 \times 4.5$ or equivalent $= 14.4$ or equivalent $= 15$ (needed)	 M2 A1 A1	A table method altering all 3 in the same manner at the same time is M0 M1 for correct use of 4 with either 8/10 or 9000/2000 e.g. Bricklayers Time Bricks 3.2 10 2000 OR 18 8 9000 Must be from M2 Allow sight of 14.(…) or 14 with a remainder May not be seen FT provided at least M1 awarded, a second step attempted to find the number of bricklayers needed for 9000 bricks in 10 hours AND rounding up required Accept an answer of 14 provided their assumption in (b) states that some bricklayers can work at a quicker rate than others
Alternative method: *$\frac{2000}{8\times4}$ (=62.5 (bricks per hour per bricklayer))* *$\frac{9000}{2000\div(8\times4)\times10}$* *= 14.4 or equivalent* *= 15 (needed)*	*M1* *m1* *A1* *A1*	*Accept multiples of $2000\div(8\times4)\times10$ (= 625) in order to reach 9000* *Must be from M2* *Allow sight of 14.(…) or 14 with a remainder* May not be seen *Or 14 bricklayers can lay 8750 bricks, or* *15 bricklayers can lay 9375 bricks* *FT provided at least M1 awarded, a second step attempted to find the number of bricklayers needed for 9000 bricks in 10 hours AND rounding required* *Accept an answer of 14 provided their assumption in (b) states that some bricklayers can work at a quicker rate than others*
8(b) Valid assumption e.g. 'All bricklayers work at the same rate', or 'All bricklayers took no breaks (or took breaks as often as before)', or 'The weather did not affect the work', or 'All the bricks are the same size', or 'All conditions remain the same', or 'Bricklayers work at the same constant rate'	 E1	 Accept an assumption that some bricklayers can work at a quicker rate than others provided a final answer of 14 given in (a) Do not accept an assumption based on the need to round 14.4
9(a) e.g. $100x = 13.888\ldots$ and $1000x = 138.888\ldots$ or equivalent AND an attempt to subtract both sides $(x =) \frac{125}{900}$ or $\frac{1375}{9900}$ or $\frac{13875}{99900}$ or equivalent $(x =) \frac{5}{36}$	 M1 A1 A1	 Accept e.g. $\frac{1.25}{9}$ FT 'their 125/900' provided of equivalent difficulty

9(b)(i) Appropriate explanation e.g. 'It should be 4/5 × 4/5', or 'It should be × 0.8^{2}', or 'Each year it would be valued at 4/5 of the previous year's value', or 'Each year he should be taking 1/5 off the value'	E1	Allow sight of correct calculation only Allow incorrect notation e.g. $9600 \times \frac{4^2}{5}$ Do not accept e.g. 'Because this calculates the amount lost'
9(b)(ii) $V = 9600 \times 0{\cdot}8^t$ or $V = 9600 \times (4/5)^t$ or equivalent	B3	Allow pound signs in their formula B2 for $9600 \times 0{\cdot}8^t$ or $9600 \times (4/5)^t$ or $V = 9600 \times \frac{4^t}{5}$ or V = initial price × $0{\cdot}8^t$ or V = initial price × $(4/5)^t$ B1 for sight of $0{\cdot}8^t$ or $(4/5)^t$ or $9600 \times \frac{4^t}{5}$ or $V = (9600 \times 0{\cdot}8)^t$ or initial price × $0{\cdot}8^t$ or initial price × $(4/5)^t$ or V = initial price × $\frac{4^t}{5}$ If no marks awarded: SC1 for $V = 9600 \times 0{\cdot}2^t$ or $V = 9600 \times (1/5)^t$ *or* SC1 for $V = 9600 \times a^t$, where $0{\cdot}5 < a < 1$
9(b)(iii)  	B1	
10(a) Uniform scale using intervals of 0.5	B2	B1 for sight of 15 ÷ 20 OR B1 for a correct first entry on their scale e.g. 0.5 on the first graduation OR B1 for blank scale in (a) but evidence of the correct scale used in (b) Note: a correct value with none incorrect can be awarded B2
10(b) (15 +) 10×2 + 10×2.5 + 20×0.85 + 30×0.1 15 + 20 + 25 + 17 + 3 (= 80)	M1 A1	FT their uniform scale for a possible M1 only Working may be seen on the graph, including the use of every $2cm^2$ represents 5 people Allow M1 for the sum of all 5 products with any 2 correct (not including 15) CAO If no marks awarded, award SC1 for sight of (15), 20, 25, 17, 3
10(c) (Upper quartile = time for 75th percentile =) 40 (min) (Lower quartile = time for 25th percentile) 2x = 5 or (20 +) ¼ × 10 x = 2.5 or 5/2 or (20 +) 2.5 or 5/2 (Lower quartile =) 22.5 (minutes) (Estimate of IQR =) 17.5 (minutes)	B1 M1 A1 A1 B1	Working may be seen on the graph Or $\frac{5}{20} \times 10$ Note: 90÷4 = 22.5 is M0A0A0 An unsupported lower quartile of 22.5 with an upper quartile of 67.5 is awarded B0M0A0A0 FT 'their 40' – 'their 22.5' correctly evaluated provided at least 1 mark previously awarded

10(d) 'No' AND a correct explanation e.g. 'The smaller inter-quartile range on Saturday implies the waiting times are more closely grouped (or less dispersed) then on Tuesday, but tells us nothing about the length of the waiting times on these two days', or 'Inter-quartile range is not an average', or 'Inter-quartile range only gives a measure of the spread of the data', or 'The difference in the medians would tell us if the waiting times were quicker'	E1	If neither box has been ticked, accept 'No' being clearly implied in their explanation Do not accept e.g. 'Not enough data', or 'Only one Saturday and one Tuesday have been recorded'
11(a) (Total number made each week =) 72 12 × (number of a type of buoy made) ÷ 72 or (number of a type of buoy made) ÷ 6 (List of unrounded answers) 3, 4.5, 3.8(…), 0.6(6…) OR 3, $4\frac{1}{2}$, $3\frac{5}{6}$, $\frac{2}{3}$ or equivalent (Number in sample =) 3, 4, 4, 1	B1 M1 A1 A1	 Sight of this calculation for any type of buoy FT 'their 72' OR A1 for 3, 5, 4, 1 Implies the award of M1 If M1A0 awarded, FT from their unrounded answers for this A1 provided: • any 2 or 3 unrounded answers are correct, AND • the correct numbers in the sample are given for their unrounded answers (including any decisions regarding rounding down), AND • the sample numbers add to 12 If no working shown, or only B1 awarded SC1 for 3, 4, 4, 1

11(b) $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times h = 10\pi$ or equivalent	M2	M1 for summing 2 terms and equating to 10π, with 1 term being correct
$\frac{4\pi h}{3} = 10\pi - \frac{16\pi}{3}$ or equivalent	m1	For isolating the h term FT from M1 All terms may have been multiplied by 3, or π cancelled
(h =) 3.5 or $\frac{7}{2}$ (m)	A1	CAO
(Height of buoy =) 5.5 or $\frac{11}{2}$ (m)	A1	FT for 'their h' + 2 provided M1m1 or M2m1 awarded
Alternative method 1: $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times(H-2) = 10\pi$ *or equivalent*	*M2*	*M1 for summing 2 terms and equating to 10π, with 1 term being correct*
$\frac{16\pi}{3} + \frac{4\pi H}{3} - \frac{8\pi}{3} = 10\pi$ *or equivalent*	*m1*	*FT from M1*
$\frac{4\pi H}{3} = 10\pi - \frac{16\pi}{3} + \frac{8\pi}{3}$ *or equivalent*	*m1*	*For isolating the H term* *FT from M1m1* *All terms may have been multiplied by 3, or π cancelled*
(Height of buoy =) 5.5 or $\frac{11}{2}$ *(m)*	*A1*	*CAO*
Alternative method 2: $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times(H-2) = 10\pi$ *or equivalent*	*M2*	*M1 for summing 2 terms and equating to 10π, with 1 term being correct*
$\frac{4\pi(H-2)}{3} = 10\pi - \frac{16\pi}{3}$ *or equivalent*	*m1*	*For isolating the (H – 2) term* *FT from M1* *All terms may have been multiplied by 3, or π cancelled*
(H – 2 =) 3.5 or $\frac{7}{2}$	*A1*	CAO
(Height of buoy =) 5.5 or $\frac{11}{2}$ *(m)*	*A1*	FT for 'their h' + 2 provided M1m1 or M2m1 awarded
12(a) (Area =) $\frac{1}{2}\times10\times(0+8+2(3+4.6+6.4))$ OR $\frac{1}{2}\times10\times(8+6+9.2+12.8)$	M2	Award M1 if only one value incorrect
= 180 (m)	A1	FT from M1
Alternative method: $\frac{(0+3)}{2}\times10 + \frac{(3+4.6)}{2}\times10 + \frac{(4.6+6.4)}{2}\times10 + \frac{(6.4+8)}{2}\times10$ *[15 + 38 + 55 + 72]*	*M2*	*M1 for the sum of these 4 areas with only 1 value (possibly repeated) incorrect*
= 180 (m)	*A1*	*FT from M1*

12(b) (Total distance =) 180 + 20×8 = 340 (m) (Average speed =) 340 ÷ 60 = 5.7 (ms^{-1})	M1 A1 m1 A2	FT 'their 180' from (a) FT 'their 340' A1 for 5.6(66…) or $5^4/_6$ or for an improper fraction equivalent to 340/60 e.g. 34/6, OR A1 for 6 from correct working OR A1 if their correctly evaluated answer on FT does not require rounding to 2sf