



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) <table border="1"><tr><td>Day</td><td>Wind speed (m.p.h.)</td></tr><tr><td>Wednesday</td><td>1.5</td></tr><tr><td>Friday</td><td>6(.0)</td></tr></table>		Day	Wind speed (m.p.h.)	Wednesday	1.5	Friday	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
Day	Wind speed (m.p.h.)								
Wednesday	1.5								
Friday	6(.0)								
2(a) $66.36 \div 6 \times 11$ or $66.36 \div 6 \times (1 + 4 + 6)$ or $66.36 \div 6 + 4 \times 66.36 \div 6 + 66.36$ (= 11.06 + 44.24 + 66.36) or equivalent (£) 121.66		M2 A1	M1 for sight of $66.36 \div 6$ or 11.06, or for sight of '11.6(0)' (Note if $\times 10$ seen, check if there is indication if this was derived from $1 + 4 + 6$, if so accept for possible M2, if no evidence M0) CAO If no marks, award SC1 for an answer of (£)182.49 (from $11 \times 66.36 \div 4$)						
2(b) (First year increased charge) $24 \times 0.05 + 24$ or $24 + 24 \div 10 \div 2$ or equivalent (£) 25.2(0) (Second year increased charge) $25.2(0) \times 0.05 + 25.2(0)$ or $25.2(0) + 25.2(0) \div 10 \div 2$ or equivalent (Increased charge after 2 years is) (£) 26.46		M1 A1 M1 A1	Accept 2520(p). Ignore units given FT 'their 25.2(0)' Accept 2646(p). If units are given they must be correct An answer of (£)26.4(0) (from $24 + 2 \times 1.20$) 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.						

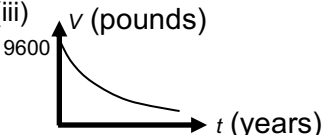
$2(c) \frac{1}{2} \times (2.2 + 1.8) \times \text{height trapezium} + 2.2 \times 2 = 6.8$ $2 \times \text{height trapezium} = 2.4$ or $\text{height trapezium} = 1.2$ (Overall length =) 3.2 (m)	M2 A1 A1	M1 only if brackets omitted for sum of parallel sides in the overall calculation unless dealt with correctly in further working, OR M1 for $\frac{1}{2} \times (2.2 + 1.8) \times \text{height trapezium}$ (brackets must be given or any 'missing brackets' implied by correct interpretation) 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 $6.8 - 2.2 \times 2 = 2.4$ is SC1																
<i>2(c) Alternative method 1:</i> $(2 + \text{ht trap}) \times 2.2 - 2 \times \frac{1}{2} \times [(2.2 - 1.8) \div 2] \times \text{ht trap} = 6.8$ <i>Height of trapezium = 1.2</i> (Overall length =) 3.2 (m)	M2 A1 A1	M1 for $\frac{1}{2} \times [(2.2 - 1.8) \div 2] \times \text{height trapezium}$ or $2 \times \frac{1}{2} \times [(2.2 - 1.8) \div 2] \times \text{height trapezium}$ FT 'their 1.2' + 2 provided at least M1 previously awarded																
<i>2(c) Alternative method 2:</i> $2 \times \frac{1}{2} \times (2 + \text{overall length}) \times [(2.2 - 1.8) \div 2] + \text{overall length} \times 1.8 = 6.8$ (Overall length =) 3.2 (m)	M2 A2	M1 for $\frac{1}{2} \times (2 + \text{overall length}) \times [(2.2 - 1.8) \div 2]$ or $2 \times \frac{1}{2} \times (2 + \text{overall length}) \times [(2.2 - 1.8) \div 2]$ A1 for $2 \times \text{Overall length} = 6.4$ or correct simplified equation in terms of overall length																
3. Unambiguous vertical line 5 cm ± 2 mm from fence Angle bisector between house and fence ± 2° Correct intersection, position of the tree	B1 B1 B1	Accept a horizontal line drawn from the fence, 5cm (± 2 mm) away from the house 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 <table border="1"><tr><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td><td>6th</td><td>7th</td><td>8th</td></tr><tr><td>25</td><td>100</td><td>175</td><td>250</td><td>325</td><td>400</td><td>475</td><td>550</td></tr></table>	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
1st	2nd	3rd	4th	5th	6th	7th	8th											
25	100	175	250	325	400	475	550											
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) $(280 - 100 + 500) \div 50$ or $(280 - 100) \div 50 + 500 \div 50$ (Sell each ticket for) (£) 13.6(0)	M2 A1	M1 for sight of any one of the following: • $(280 + 500) \div 50$ (= £15.60) • $(280 - 100) \div 50$ (= £3.60) • $(- 100 + 500) \div 50$ (= £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 $500 \div 50$ correctly evaluated as (£)10, allow if embedded within other calculation
5(a) <i>Alternative method:</i> $(1000 - 100) \div 250 + 500 \div 50$ or equivalent using any two points on the line, e.g. $(460 - 100) \div 100 + 500 \div 50$ $(640 - 100) \div 150 + 500 \div 50$ (£) 13.6(0)	M2 A1	M1 for sight of any one of the following, or equivalent: • $(1000 - 100) \div 250$ (= £3.60) • $(460 - 100) \div 100$ (= £3.60) • $(640 - 100) \div 150$ (= £3.60) • <u>'an overall cost' - 100</u> <u>'number of people for that overall cost'</u> • $1000 \div 250 + 500 \div 50$ (= £14) • $460 \div 100 + 500 \div 50$ (= £14.60) • $640 \div 150 + 500 \div 50$ (= £ 14.26 or £14.27) • <u>'an overall cost'</u> + $\frac{500}{50}$ <u>'number of people for that overall cost'</u> 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 $500 \div 50$ 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. • <u>'an overall cost' - 100</u> 'number of people for that overall cost' • (200 people) $(820 - 100) \div 200$, • (100 people) $(460 - 100) \div 100$, • (50 people) $(280 - 100) \div 50$ (Charity contribution) $500 \div 400$ (Total) (£) 4.85	M1 M1 A1	FT 'their <u>'an overall cost' - 100</u> '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. • $(820 \div 200 + 1.25 = \text{£}) 5.35$ • $(460 \div 100 + 1.25 = \text{£}) 5.85$ • $(280 \div 50 + 1.25 = \text{£}) 6.85$ • correctly evaluated <u>'an overall cost'</u> + 1.25 'number of people for that overall cost'
5(b) <i>Alternative method:</i> Considering total cost for 400 people, e.g. $(400 \div 50) \times (280 - 100) + 500$ or $8 \times 180 + 500$ or $1440 + 500$ or $(400 \div 100) \times (460 - 100) + 500$ or $4 \times 360 + 500$ or $(400 \div 200) \times (820 - 100) + 500$ or $2 \times 720 + 500$ or equivalent $\div 400$ (£) 4.85	M1 m1 A1	If units are given they must be correct If no marks (due to omission of £100), award SC1 for $(8 \times 280 + 500) \div 400$ or SC2 for answer (£)6.85 or SC1 for $(4 \times 460 + 500) \div 400$ or SC2 for answer (£)5.85 or SC1 for $(2 \times 820 + 500) \div 400$ or SC2 for answer (£)5.35
6(a) $1 \times 10^6 \text{ (mm}^2\text{)}$	B2	Allow $10^6 \text{ (mm}^2\text{)}$ B1 for any one of the following • a calculated area $1\,000\,000 \text{ (mm}^2\text{)}$, 1000^2, $(10^3)^2$ or equivalent • 'their clearly written number' written correctly in standard form
6(b) 2700 $\div (0.)9(0)$ or equivalent $\div (0.)75$ or equivalent 4000 (cm²)	M1 M1 A2	M marks can be awarded in either order Sight of $2700 \div (0.9 \times 0.75)$ is awarded M2 A1 for $2700 \div 0.9 = 3000$ or $2700 \div 0.75 = 3600$ or for $2700 \div 0.675$ or for an appropriate FT division correctly evaluated (Note: sight of $2700 \div 0.675$ is awarded M2 A1)

7. (Area of cross-section) $6 \times \frac{1}{2} \times 30 \times (52 \div 2)$ 2340 (mm²) (Volume of the box) 234000 (mm³) OR for a comparison 2340 (mm²) > 2300 (mm²)	M3 A1 A1	<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> M2 for $\frac{1}{2} \times 30 \times (52 \div 2)$ (= 390) M1 for any use of $52 \div 2$ (= 26) (May be embedded) FT 'their 2340' $\times 100$ correctly evaluated provided at least M2 previously awarded
7. Alternative method (trapezia) (Area of cross-section) $2 \times \frac{1}{2} \times (52 \div 2) \times (30 + 2 \times 30)$ 2340 (mm²) (Volume of the box) 234000 (mm³) OR for a comparison 2340 (mm²) > 2300 (mm²)	M3 A1 A1	M2 for $\frac{1}{2} \times (52 \div 2) \times (30 + 2 \times 30)$ (= 1170) M1 for use of $52 \div 2$ (= 26) FT 'their 2340' $\times 100$ correctly evaluated provided at least M2 previously awarded
7. Alternative method ($\frac{1}{2}ab\sin C$) (Area of cross-section) $6 \times \frac{1}{2} \times 30 \times 30 \times \frac{\sqrt{3}}{2}$ 1350$\sqrt{3}$ or 2338(.2... mm²) or 2340 (mm²) (Volume of box) 233820 mm³ or 234000 (mm³) OR for a comparison 2338(.2 mm²) > 2300 (mm²)	M3 A1 A1	M2 for $\frac{1}{2} \times 30 \times 30 \times \frac{\sqrt{3}}{2}$ M1 for $(6 \times) \frac{1}{2} \times 30 \times 30 \times \sin 60^\circ$ FT 'their 2340' $\times 100$ correctly evaluated provided at least M2 previously awarded
7. Alternative method (triangle area) (Area of triangle) $\frac{1}{2} \times 30 \times (52 \div 2)$ (Minimum area of triangle required) $2300 \div 6$ 383(.33...) Comparison 390 > 383(.33...)	M2 M1 A1 A1	(= 390)

8(a) $4 \times \frac{8}{10} \times \frac{9000}{2000} \quad \text{or}$ $4 \times 0.8 \times 4.5 \quad \text{or equivalent}$ $= 14.4 \quad \text{or equivalent}$ $= 15 \text{ (needed)}$	M2 A1 A1	<u>A table method altering all 3 in the same manner at the same time is M0</u> M1 for correct use of 4 with either 8/10 or 9000/2000 e.g. <table border="1"><thead><tr><th>Bricklayers</th><th>Time</th><th>Bricks</th></tr></thead><tbody><tr><td>3.2</td><td>10</td><td>2000</td></tr><tr><td>18</td><td>8</td><td>9000</td></tr></tbody></table> OR 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	Bricklayers	Time	Bricks	3.2	10	2000	18	8	9000
Bricklayers	Time	Bricks									
3.2	10	2000									
18	8	9000									
<i>Alternative method:</i> $\frac{2000}{8 \times 4} (=62.5 \text{ (bricks per hour per bricklayer)})$ $\frac{9000}{2000 \div (8 \times 4) \times 10}$ $= 14.4 \quad \text{or equivalent}$ $= 15 \text{ (needed)}$	M1 m1 A1 A1	Accept multiples of $2000 \div (8 \times 4) \times 10 (= 625)$ 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. $100x = 13.888...$ and $1000x = 138.888...$ or equivalent AND an attempt to subtract both sides $(x =) \frac{125}{900} \quad \text{or} \quad \frac{1375}{9900} \quad \text{or} \quad \frac{13875}{99900} \quad \text{or equivalent}$ $(x =) \frac{5}{36}$	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 $\frac{4}{5} \times \frac{4}{5}$ ', or 'It should be $\times 0.8^2$ ', or 'Each year it would be valued at $\frac{4}{5}$ of the previous year's value', or 'Each year he should be taking $\frac{1}{5}$ 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) $V = 9600 \times 0.8^t$ or $V = 9600 \times (\frac{4}{5})^t$ or equivalent	B3	Allow pound signs in their formula B2 for 9600×0.8^t or $9600 \times (\frac{4}{5})^t$ or $V = 9600 \times \frac{4^t}{5}$ or $V = \text{initial price} \times 0.8^t$ or $V = \text{initial price} \times (\frac{4}{5})^t$ B1 for sight of 0.8^t or $(\frac{4}{5})^t$ or $9600 \times \frac{4^t}{5}$ or $V = (9600 \times 0.8)^t$ or $\text{initial price} \times 0.8^t$ or $\text{initial price} \times (\frac{4}{5})^t$ or $V = \text{initial price} \times \frac{4^t}{5}$ If no marks awarded: SC1 for $V = 9600 \times 0.2^t$ or $V = 9600 \times (\frac{1}{5})^t$ or SC1 for $V = 9600 \times a^t$, where $0.5 < a < 1$
9(b)(iii) 	B1	
10(a) Uniform scale using intervals of 0.5	B2	B1 for sight of $15 \div 20$ 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) $(15 +) 10 \times 2 + 10 \times 2.5 + 20 \times 0.85 + 30 \times 0.1$ $15 + 20 + 25 + 17 + 3 (= 80)$	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 75 th percentile =) 40 (min) (Lower quartile = time for 25 th percentile) $2x = 5$ or $(20 +) \frac{1}{4} \times 10$ $x = 2.5$ or $\frac{5}{2}$ or $(20 +) 2.5$ or $\frac{5}{2}$ (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: $90 \div 4 = 22.5$ 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 $12 \times (\text{number of a type of buoy made}) \div 72$ or $(\text{number of a type of buoy made}) \div 6$ (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) $\frac{2 \times \pi \times 2^3}{3} + \frac{1 \times \pi \times 2^2 \times h}{3} = 10\pi$ or equivalent $\frac{4\pi h}{3} = 10\pi - \frac{16\pi}{3}$ or equivalent (h =) 3.5 or $\frac{7}{2}$ (m) (Height of buoy =) 5.5 or $\frac{11}{2}$ (m)	M2 m1 A1 A1	M1 for summing 2 terms and equating to 10π, with 1 term being correct For isolating the h term FT from M1 All terms may have been multiplied by 3, or π cancelled CAO FT for 'their h' + 2 provided M1m1 or M2m1 awarded
<u>Alternative method 1:</u> $\frac{2 \times \pi \times 2^3}{3} + \frac{1 \times \pi \times 2^2 \times (H-2)}{3} = 10\pi$ or equivalent $\frac{16\pi}{3} + \frac{4\pi H}{3} - \frac{8\pi}{3} = 10\pi$ or equivalent $\frac{4\pi H}{3} = 10\pi - \frac{16\pi}{3} + \frac{8\pi}{3}$ or equivalent (Height of buoy =) 5.5 or $\frac{11}{2}$ (m)	M2 m1 m1 A1	M1 for summing 2 terms and equating to 10π, with 1 term being correct FT from M1 For isolating the H term FT from M1m1 All terms may have been multiplied by 3, or π cancelled CAO
<u>Alternative method 2:</u> $\frac{2 \times \pi \times 2^3}{3} + \frac{1 \times \pi \times 2^2 \times (H-2)}{3} = 10\pi$ or equivalent $\frac{4\pi(H-2)}{3} = 10\pi - \frac{16\pi}{3}$ or equivalent (H – 2 =) 3.5 or $\frac{7}{2}$ (Height of buoy =) 5.5 or $\frac{11}{2}$ (m)	M2 m1 A1 A1	M1 for summing 2 terms and equating to 10π, with 1 term being correct For isolating the (H – 2) term FT from M1 All terms may have been multiplied by 3, or π cancelled CAO FT for 'their h' + 2 provided M1m1 or M2m1 awarded
12(a) (Area =) $\frac{1 \times 10 \times (0+8 + 2(3 + 4.6 + 6.4))}{2}$ OR $\frac{1 \times 10 \times (8 + 6 + 9.2 + 12.8)}{2}$ = 180 (m) <u>Alternative method:</u> $\frac{(0 + 3) \times 10}{2} + \frac{(3 + 4.6) \times 10}{2} + \frac{(4.6 + 6.4) \times 10}{2} + \frac{(6.4 + 8) \times 10}{2}$ [15 + 38 + 55 + 72] = 180 (m)	M2 A1 M2 A1	Award M1 if only one value incorrect FT from M1 M1 for the sum of these 4 areas with only 1 value (possibly repeated) incorrect FT from M1

12(b) (Total distance $\Rightarrow$) $180 + 20 \times 8$ $\quad \quad \quad = 340 \text{ (m)}$ (Average speed $\Rightarrow$) $340 \div 60$ $\quad \quad \quad \quad \quad = 5.7 \text{ (ms}^{-1}\text{)}$	M1 A1 m1 A2	FT 'their 180' from (a) FT 'their 340' A1 for 5.6(66...) or $5\frac{4}{6}$ 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
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