GCSE MARKING SCHEME

AUTUMN 2019

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

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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 2019 MARK SCHEME

GCSE Mathematics – Numeracy **Unit 1: Higher Tier**	**Mark**	**Comments**
1. At least two groups without gaps or overlaps that cover the full age range	B1	All groups shown need to have no gaps or overlaps Allow if lower age covers 18 or younger, i.e. lower age must include 18 e.g. '18 to 21, 22 and over', 'Under 18, 18 and over', Allow if upper age covers 50 (or older), i.e. upper age must cover at least up to 50 e.g. '18 – 30, 31 – 50' Allow, e.g. '0 – 20, 21 – 50, 51+' Do not accept, e.g. 'Under 18, over 18', '0 – 20, 21 – 50, **50+**', '15<18, 18<21, 21<25, 26+', '15<18, 19<21, 22<25, 26+',
At least 3 appropriate criteria, e.g. 'Extremely happy, happy, unhappy', 'Scale of 0 to 10, with statement that 10 very happy', 'very (happy), fairly (happy), not really (happy), not (happy)'	B1	Allow if: • a 'neutral' category not given • there is an imbalance between 'happy' and 'unhappy' type categories Accept appropriate use of smiley and sad faces Allow a mix 'happy, sad, not sure' with some text and some emojis Do not accept, e.g. 'scale of 0 to 10' without stating which end of the scale is unhappy or happy, 'yes, (sometimes), no'

2(a) Short diagonal 40 (cm) **and** longer diagonal 50 (cm)	B1	Check diagram
(longer diagonal should be >) 1.20 × 40 or equivalent, OR (shorter diagonal should be <) 50 ÷ 1.2 OR (100 ×) $\frac{50}{40}$	M1	FT 'their 40' and 'their 50' provided • at least one of these values is correct • 'their 40' ≠ 20 • 'their 50' ≠ 22 or 28
(longer diagonal should be >) 48 (cm), OR (shorter diagonal should be <) 41.6(6.. cm) OR ((100) × $\frac{50}{40}$ =) 1(.)25	A1	FT
Conclusion, e.g. 'Yes (certain to fly in strong wind)' 'Yes as 48 < longer diagonal' 'Yes (125% > 120%)' 'Yes (1.25 > 1.2(0))'	E1	FT provided M1 awarded Do not accept working for area seen in (a) unless used in (b)
2(b) (Method to calculate area) e.g. • ½ × 40 × 50 • 2 × ½ × 20 × 22 + 2 × ½ × 20 × 28 (=440 +560) • ½ × 40 × 22 + ½ × 40 × 28	M2	FT 'their 40' and 'their 50' Allow if working for area seen in (a) and used in (b) M1 for correct method for at least 2 of the 4 possible triangles, e.g. implied from sight of 20 × 22, 440, 20 × 28 or 560
(Area of the kite) 1000 (cm^2)	A1	CAO
(Length of tail) 3.1 (m)	B1	FT provided at least M1 previously awarded for correct length selected from choice of the correct group
3(a) 0.88 (× 2) × 20 ÷ 4	M1	M marks can be awarded in either order (= (2 ×) 4.4) Or equivalent full method that could lead to a correct answer (Note: 2 × 0.88 × 20 ÷ 4 = 2 × 4.4 or 5 × 1.76)
÷ 2.2	M1	
4 (kg)	A1	CAO If no marks, award SC1 for sight of (2 × 0.88 =) 1.76 (lbs)
3(b) Conversion to cm, e.g. 5 × 1000 × 100 (× 7) 3.5×10^6 (cm)	M1 A2	(= 500 000 (× 7)) A1 for any one of the following: • an answer of 3 500 000 (cm) • 3 500 000 (cm) implied by incorrect standard form, e.g. 35×10^5 • for correct expression of 'their 3 500 000' in standard form provided from 5 × 1000 × 100 × 7 • if 7 has been omitted, for an answer of 5×10^5 If no marks, award SC1 for 'their number of cm', n, provided n < 0.001 ($n < 1 \times 10^{-3}$) or n >1000 ($n > 1 \times 10^3$) , correctly written in standard form

4. Sight of 300 000 (pesos) **or** 100 000 (pesos) or sight of 500 000 – 200 000 **and** 600 000 – 500 000	B1	Ignore £ or other currency for pesos May be implied Allow for sight of 200 000 – 500 000 **and** 500 000 – 600 000
(Tax at 10%) 0.10 × (500 000 – 200 000) or 0.10 × 300 000 or equivalent	M1	FT use of 'their (500 000 – 200 000)' from an error in subtraction
30 000 (pesos)	A1	CAO, not FT
(Tax at 35%) 0.35 × 100 000 or or 0.35 × (600 000 – 500 000) or equivalent	M1	FT use of 'their (600 000 – 500 000)' as 'their 100 000' from an error in subtraction
35 000 (pesos)	A1	CAO, not FT
(Total tax due) 65 000 (pesos)	B1	FT 'their 30 000' + 'their 35 000' provided both M1 marks previously awarded Note: If bounds are taken as 1 peso different to those above, award B0 to start, but FT for amounts 1 peso different to those shown above, including award of possible A marks
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.
5(a) **Sight,** for the garage, of 2.55(m) or 255(cm)	B1	Provided not from incorrect working (i.e. 40 × 5 + 55 = 255 is awarded B0)
Sight, for the boxes, of 35(cm) and 52.5(cm)	B1	
255 – (5 × 35 + 52.5) or 255 – 175 – 52.5 or 255 – 227.5 or equivalent	M1	FT provided 250 <'their 255'≤ 260 or 2.5<'their 2.55'≤ 2.6 and provided 30 ≤ 'their 35' <40 and 50 ≤ 'their 52.5' <55 FT from consistent place value error for a similar range for 'their bounds'
27.5 (cm) or 0.275 (m)	A1	CAO. ISW
5(b) 56 ÷ 0.7 or equivalent (£) 80	M1 A1	

6(a) 104 seconds	B1	
6(b) 86 seconds	B1	
6(c) Sight of median 1st July 2018 78 (seconds) AND Sight of median 1st July 2019 56 or 57 (seconds) AND States or implies 'Yes'	B2	Check the diagrams Allow statements without giving medians, e.g. 'medians are (just) less than 80 and less than 60 respectively' If medians are stated they must be correct, otherwise possible maximum of B1 B1 for • 1 of the medians correct with an appropriate FT interpretation, or • both medians correct without correct interpretation or with incorrect interpretation
6(d)(i) 100 (seconds)	B1	
6(d)(ii) (0.75 × 80 =) 60 (calls) 72 (seconds)	M1 A1	60 seen in the answer space is awarded M1 A0 If no marks, award SC1 for a misread of the graph implied from sight of answers 66, 76 or an answer between 71 and 73 (excluding 72)
7(a) 18/24 ×20 or 3/4 × 20 or 20/24 × 18 or 5/6 × 18 or 18 ÷ 1.2 or 18 – 18/6 or equivalent 15 (cm)	M1 A1	
7(b) 20/24 × 42 or 5/6 × 42 or 42 ÷ 1.2 or 42 × 15/18 or 42 ÷ 18/15 or 42 – 42 ÷ 6 or 42/24 × 20 or 7/4 × 20 or equivalent 35 (cm) 35 (cm) with 'No' stated or implied OR States or implies 'No' with a reason, e.g. 'gatepost is only 30 cm wide', '35 (cm) > 30 (cm)',	M1 A1 E1	FT 'their scale factor' or 'their 15' from (a) FT 'their 35' with appropriate interpretation provided M1 previously awarded

8(a) $1.8\times20 + 2.4\times15 + 2\times15 + 1.5\times20 + 0.6\times30$ (36) (36) (30) (30) (18) $= 150$ (Estimate of number of passengers ≥ 60 =) 33 (Percentage of passengers ≥ 60 =) $\frac{33}{150}$ (× 100) = 22 (%)	M1 A1 B1 m1 A1	Allow M1 for the sum of any 3 correct products CAO FT their $\frac{\text{'}1.5\times20\text{'} + \text{their '}0.6\times30\text{'}}{2}$ FT 'their derived 33' from working with frequencies and 'their 150' provided M1 previously awarded On FT, needs to be in its simplest form If they give a decimal answer, it needs to be correct to the nearest whole number when rounded or truncated Mark final answer
8(b) Uniform scale starting at 0 up to at least 2.4 AND a label of 'Frequency density' on the vertical axis Correct bars of height 1.8, 2.4, 2, 1.5, 0.6	 B1 B2	Use overlay provided Condone omitting 0 on the vertical axis Allow 2 numbers only (other than 0) given on the vertical axis showing a uniform scale B1 for any 3 correct bars

8(c) Statements required: • Number the passengers from (0)1 to 40 • Consider successive 2-digit numbers • Ignore repeats • Do not use numbers outside the range (Working in rows would give passengers) 20, (0)5, 11, 39, ~~20~~, 37, 30 ISW OR (Working in columns would give passengers) 20, (0)5, ~~20~~, 37, 30, 11, 32 ISW	E2 B1	All 4 needed for E2 E1 for any 2 or 3 correct statements Allow an equivalent numbering system e.g. (0)0 to 39 Their numbering system can be implied by the range of numbers they state they will choose from Allow the 2nd statement to be implied by their numbering of the passengers (from 01) AND their use of 2 digit numbers in their answer OR 2 digit numbers used in their answer and 05 seen e.g. Do not use 00 and 41 – 99, OR Use the numbers (0)1 to 40 Do not allow 'Use numbers less than 40' if they have numbered the passengers from 01 to 40
<u>Alternative method:</u> • *Number the passengers from (0)1 to 40* • *Consider successive 2-digit numbers* • *Divide each number by 40 and use the remainder to choose a passenger* • *Ignore 00 and 81 to 99 or 80 to 99, and ignore repeats.* *(Working in rows would give passengers)* *(0)1, 20, (0)5, 18, ~~89~~, ~~45~~, ~~91~~, 11, 35 ISW OR* *(Working in columns would give passengers)* *(0)1, 20, 12, ~~86~~, (0)5, 18, ~~60~~, ~~20~~, ~~89~~, ~~45~~, 37 ISW*	*E2* *B1*	*All 4 needed for E2* *E1 for any 2 or 3 correct statements* *Allow an equivalent numbering system e.g. (0)0 to 39* *Their numbering system can be implied by the range of numbers they state they will choose from* *Allow the 2nd statement to be implied by their numbering of the passengers (from 01) AND their use of 2 digit numbers in their answer OR* *2 digit numbers used in their answer and 01 or 05 seen* *If (0)0 to 39 used, when the remainder is 0, passenger 00 is selected)*

9(a) Tangent drawn at time 16 seconds Difference in y ÷ difference in x Correctly evaluated gradient from their tangent	M1 m1 A1	 M1m1A0 if only 1 correct difference in the division ISW Approximately 4 Accept a correct improper fraction (unless it gives a whole number), mixed number or decimal If they give a decimal answer, it needs to be correct to 1 decimal place, rounded or truncated
9(b) $\frac{1}{2} \times 4 \times (0 + 60 + 2(8 + 16 + 26 + 40))$ OR $\frac{1}{2} \times 4 \times (0 + 60 + 16 + 32 + 52 + 80)$ = 480 (m) or equivalent $(480 \div 1000) \times 5 \div 8$ OR $(480 \div 1000) \div 1.6$ OR $(480 \div 1000) \times 0.625$ = 0.3 (miles)	 M2 A1 M1 A1	 Award M1 if only one value incorrect FT from M1 FT 'their 480' provided an attempt made to use the trapezium rule On FT, needs to be correct to 1 decimal place, rounded or truncated
Alternative method: $\frac{0 + 8}{2} \times 4 + \frac{8 + 16}{2} \times 4 + \frac{16 + 26}{2} \times 4 + \frac{26 + 40}{2} \times 4 + \frac{40 + 60}{2} \times 4$ *[16 + 48 + 84 + 132 + 200]* *= 480 (m) or equivalent* *(480 ÷ 1000) × 5 ÷ 8 OR (480 ÷ 1000) ÷ 1.6 OR (480 ÷ 1000) × 0.625* *= 0.3 (miles)*	 *M2* *A1* *M1* *A1*	 *Each area may be seen as the sum of the area of a rectangle and triangle* *M1 for the sum of these 5 areas with one error (possibly repeated) in reading the scale* FT from M1 *FT 'their 480' provided an attempt made to sum the area of the 5 trapeziums* *On FT, needs to be correct to 1 decimal place, rounded or truncated*

9(c) $8^2 + 10^2$ or $14^2 - 10^2$ or $14^2 - 8^2$ OR $\sqrt{8^2 + 10^2}$ or $\sqrt{14^2 - 10^2}$ or $\sqrt{14^2 - 8^2}$	M1	
$\sqrt{14^2 - (8^2 + 10^2)}$	M2	M1 for $14^2 - (8^2 + 10^2)$. May be seen in stages. Only award this M1 or M2 if 'their 14^2 is greater than 'their $(8^2 + 10^2)$'
(Height =) $\sqrt{32}$	A1	May be implied by Height^2 = 32
$= 4\sqrt{2}$ (cm)	B2	For B2, FT 'their derived 32' provided they have attempted to work with 2 triangles, is of equivalent difficulty, AND their 'b' is as small as possible when in the form $a\sqrt{b}$ For B1, FT 'their derived 32' B1 for writing 32 as a product of 2 or more factors where one of the factors OR the product of a pair of their factors is a square number e.g. 16 × 2, 2 × 2 × 8, OR B1 for writing $\sqrt{32}$ as a product of 2 or more factors where one of the factors OR the product of a pair of their factors gives a whole number e.g. $\sqrt{2} \times \sqrt{2} \times \sqrt{8}$, $2 \times \sqrt{8}$
10(a) Sight of $\frac{\text{Angle}}{360} \times 2\pi \times 20$	B1	Accept numerical values of π used
$\frac{\text{Angle}}{360} \times 2\pi \times 20 = \pi \times 15$ or equivalent	M1	
(Angle =) $\frac{\pi \times 15 \times 360}{2\pi \times 20}$ or equivalent	m1	This m1 implies the previous B1M1
$= 135$ (°)	A1	CAO
Alternative method 1: *Sight of $\frac{\text{Angle}}{360} \times \pi \times 20^2$*	*B1*	*Accept numerical values of π used*
$\frac{\text{Angle}}{360} \times \pi \times 20^2 = \pi \times 7.5 \times 20$ or equivalent	*M1*	
(Angle =) $\frac{\pi \times 7.5 \times 20 \times 360}{\pi \times 20^2}$	*m1*	
$= 135$ (°)	*A1*	*CAO*
Alternative method 2: *Sight of circumferences 15π AND 40π OR* *Sight of appropriate areas 150π AND 400π*	*B1*	
Sight of *$\frac{3}{8}$ or $\frac{15(\pi)}{40(\pi)}$ or $\frac{150(\pi)}{400(\pi)}$ OR 3:8 or $15(0\pi) : 40(0\pi)$*	*B1*	*This B1 implies the first B1*
$\frac{3}{8} \times 360$ or equivalent	*M1*	*This implies the previous B1B1*
$= 135$ (°)	*A1*	*CAO*

10(b) (Area of sector =) $\frac{150}{360} \times \pi \times 24^2$ $\frac{5}{12} \times \pi \times 24^2$ OR $5 \times \pi \times 2 \times 24$ OR $\frac{150}{5} \times \pi \times 8$ OR $\frac{8640(0)\ \pi}{36(0)}$ $= 240\pi$ (Area wasted in cm^2 =) $1200 - 240\pi$ or $240(5 - \pi)$	M1 m1 A1 B1	Accept numerical values of π used for a possible M1m1 only May be embedded or implied in final answer Mark final answer, but do not penalise incorrect attempts to factorise a correct answer Accept partially factorised final answer FT 'their 240π' provided M1 awarded AND 'their 240π' is in its simplest form AND is a multiple of π
11. (Volume needed =) $\frac{1000}{8}$ (= 125 (cm^3)) $5\times5\times4 + \frac{1}{3}\times5^2 \times \text{height} = \frac{1000}{8}$ or equivalent (height =) $\frac{(125 - 5\times5\times4) \times 3}{5^2}$ = 3 (cm)	B1 M2 m1 A1	May be implied in later working M1 for: • $5\times5\times4 + \frac{1}{3}\times5^2 \times \text{height}$, OR • (… +) $\frac{1}{3}\times5^2 \times \text{height} = \frac{1000}{8}$ Depends on M2 previously awarded A correctly rearranged formula to make 'height' the subject CAO
Alternative method: *(Mass of cuboid =) (5 × 5 × 4) × 8* *= 800 (g)* *$\frac{1}{3} \times 5^2 \times$ height × 8 = 1000 – 800 or equivalent* *(height =) $\frac{200 \times 3}{5^2 \times 8}$* *= 3 (cm)*	*M1* *A1* *M1* *m1* *A1*	*FT 'their 800' provided previous M1 awarded* *CAO*