



GCSE MARKING SCHEME

SUMMER 2022

**GCSE
MATHEMATICS – NUMERACY
UNIT 2 – INTERMEDIATE TIER
3310U40-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2022 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.

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3.				If an answer space blank, check working below the table to mark any unambiguous intention
Number of units	520		B1	Answer shown in the space in the row with the meter readings takes precedence If the space in the row with meter reading is blank, allow if 520 seen in the charge for electricity row
Charge for units	$520 \times (0.)21$		M1	FT 'their 520', the number of units used must be given or clear from the units row Award for sight of digits 1092(0) or equivalent on FT
		(£) 109.2(0)	A1	Must be in pounds.
(Standing charge)	(3 months)	(£) 21(.00)	B1	
Total charges		(£) 130.2(0)	B1	FT 'their 109.2(0)' + 'their 21(.00)' correctly evaluated, provided neither amount = 0
VAT at 5%		(£) 6.51	B1	FT 5% of 'their 130.2(0)' correctly evaluated, allow rounding or truncation to a penny (2 d.p.)
Amount to pay		(£) 136.71	B1	CAO

4(a) (Circumference) $\pi \times 140$ Answer in the range 439 (cm) to 440 (cm) $\pi \times 140 - 176 - 128 - 60$ or $\pi \times 140 - 364$ or equivalent Answer in the range 75.6 (cm) to 76 (cm)	M1 A1 M1 A1	Do not accept embedded within an incorrect calculation for the circumference May be implied in later working FT 'their derived circumference' from a calculation involving π (including use of πr or πr^2), including from previous truncation or rounding errors CAO, answer must be in the range stated. If no final answer given, check if an answer has been inserted in the statement in the question
4(b) (Area $\Rightarrow$) $\frac{1}{2} \times (4.3 + 5.6) \times 2.5$ or $2.5 \times 4.3 + \frac{1}{2} \times 2.5 \times (5.6 - 4.3)$ or equivalent 12.375 (m²) (Number of bags) $12.375 \div 0.9$ or 13.75 14 (bags) (Cost of fertilizer is $14 \times \text{£}1.15$) (£) 16.1(0)	M1 A1 M1 A1 B1	Allow 12.37(m²), 12.38(m²) or 12.4 (m²) provided not from incorrect working (e.g. $4.3 + 2.5 + 5.6 = 12.4$) May be implied in further working FT 'their 12.375' including the use of 12.375 rounded or truncated Allow for a trial and improvement method provided the final trial gives 14 bags, e.g. for sight of $0.9 \times 14 = 12.6$ Must be rounded up to a whole number of bags Allow for an embedded answer of 14 (e.g. from within a multiplication) FT provided a whole number of bags considered and at least 1 mark (M1) previously awarded

5(a) Every 15 minutes	B1	
5(b) 14(:)00 or 2 p.m.	B1	Allow an answer of 2 or 14(:)00p.m. Do not accept an answer of 2 a.m.
5(c) 11 (°C)	B1	
5(d)(i) 5 points plotted accurately: (12:00, 100), (13:00, 105), (14:00, 110), (15:00, 109), (16:00, 109)	B1	Plotting of 100 and 110 should be intention of being on the appropriate line Tolerance for plotting 105 and 109 is within the appropriate small square Ignore any joining of plotted points
5(d)(ii) Appropriate reason, e.g. 'the rise in temperature doesn't look very much', 'it is only temperatures from 100°C that are needed', 'not showing the warning light was on as often as it was', 'it doesn't show the fluctuating temperature', 'doesn't show the number of warnings given (when over 110°C)', 'more details are required to show the warnings',	E1	Ignore additional spurious or incorrect statements for accepted and allowed responses Allow, e.g. 'misleading' with a suitable reason given 'doesn't give the same detail (as the first graph)', 'doesn't give the details of temperature changes', 'it doesn't show all the temperature changes', 'doesn't give the same accuracy (as the first graph)', 'doesn't give the accurate temperature changes', 'only shows specific times', 'only recording once an hour', 'there is no data to fill the gaps', 'the temperatures between are not shown', It doesn't give all the information', 'not all the points plotted from the previous graph', 'small scale', 'the temperature goes up in 2's rather than 0.5', 'lost loads of the data', 'there are not many points', 'it doesn't change much to show when something went wrong', 'there are no temperatures recorded below 100°C' Do not accept, e.g. 'misleading', 'not accurate', 'it doesn't give the accurate temperatures', 'the temperatures aren't the same as the first graph', 'most points are not over 110°C', 'the temperature goes higher on the axis than the other graph'
6(a)(i) $100 \leq x < 150$	B1	
6(a)(ii) Midpoints 40, 70, 90, 125, 175 $40 \times 4 + 70 \times 8 + 90 \times 11 + 125 \times 12 + 175 \times 17$ $(= 160 + 560 + 990 + 1500 + 2975 = 6185)$ $\div 52$ $118.9(4..miles) \text{ or } 119 \text{ (miles)}$	B1 M1 m1 A1	Check the table FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout

6(b) (Number of miles next month is) 440×1.12 (Increased cost of fuel is) $1.3(0) \times 1.1(0)$ (Number of miles next month is) 492.8 (miles) AND (Increased cost per litre of fuel is) (£) 1.43 (Cost of fuel next month is) $\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)$ or $\frac{492.8}{11} \times 1.43$ (£) 64.06(4)	M1 M1 A1 m1 A1	Or equivalent, e.g. $440 + 440 \times 12 \div 100$ $(=440 + 52.80 = 492.80)$ Penalise, A0, if prematurely approximated in further working, but FT for possible final A1 Penalise any premature approximation in the 1st A0 FT provided M1, M1 previously awarded ISW. Allow an answer of (£)64.1(0) or (£)65 Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)64 to (£)64.10, (£)64.35
6(b) <u>Alternative method 1</u> (Cost of fuel last month) $1.3(0) \times 440 \div 11$ or $1.3(0) \times 40$ (£) 52 (Cost of fuel next month) $52 \times 1.1(0) \times 1.12$ (£) 64.06(4)	M1 A1 m2 A1	May be implied in further working Penalise, A0, if prematurely approximated in further working, but FT for possible final A1 FT 'their $1.3(0) \times 440 \div 11$' m1 for one of the following: $52 \times 1.1(0)$ (= 57.20) 52×1.12 (= 58.24) ISW. Allow an answer of (£)64.1(0) or (£)65 FT only m2, no FT from m1. Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)63.84, (£)64.02
6(b) <u>Alternative method 2</u> (Fuel next month) $1.12 \times 440 \div 11$ or 1.12×40 44.8 (litres) (Cost of fuel next month) $44.8 \times 1.3(0) \times 1.1(0)$ (£) 64.06(4)	M1 A1 m2 A1	May be implied in further working Penalise, A0, if prematurely approximated in further working, but FT for possible final A1 FT 'their $1.12 \times 440 \div 11$' m1 for one of the following: $44.8 \times 1.3(0)$ (= 58.24) $44.8 \times 1.1(0)$ (= 49.28) ISW. Allow an answer of (£)64.1(0) or (£)65 FT only m2, no FT from m1. Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)63.84, (£)64.02
6(b) <u>Alternative method 3</u> (Cost of fuel next month) $\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)$ (£) 64.06(4)	M4 A1	Must be shown as one complete calculation to be followed by a final answer ISW. Allow an answer of (£)64.1(0) or (£)65

7(d) (Number of 0-to-64-year olds) 0.75×270400 or $270400 - 0.25 \times 270400$ 202800 (Number of 0-to-14-year olds) $9 \times 202800 \div (9+41)$ or 9×4056 36504	M1 A1 M1 A1	May be implied in further working FT 'their derived 202800', not 270400
<u>7(d) Alternative method 1</u> (Proportion) $9 \times 270400 \div (9+41)$ 48672 (Number of 0-to 14-year olds) 0.75×48672 or $48672 - 0.25 \times 48672$ or $48672 - 12168$ 36504	M1 A1 M1 A1	May be implied in further working FT 'their derived 48672', not 270400
<u>7(d) Alternative method 2</u> (Overall ratio) $(9 : 41 :) \frac{9 + 41}{3}$ (9 : 41 :) 16.66666.... (Number of 0-to 14-year olds) $9 \times 270400 \div (9+41 + \frac{1}{3}(9 + 41))$ 36504	M1 A1 M1 A1	 Allow 16.6(...) or 16.7 May be implied in further working FT 'their $\frac{1}{3}(9 + 41)$ ' Do not FT from rounding or truncation of 50/3

8. (Let x be the initial angle of lean) (Let y be the final angle of lean) $\sin x = 30/110$ $\sin y = 60/110$ $(x =) \sin^{-1}(30/110)$ or $(x =) \sin^{-1} 0.2727...$ OR $(y =) \sin^{-1}(60/110)$ or $(y =) \sin^{-1} 0.5454...$ 15.8266...($^{\circ}$) AND 33.0557....($^{\circ}$) (and statement or calculation to show 33.0557....($^{\circ}$) > 2 $\times$ 15.8266...($^{\circ}$))	M1 M1 M1 A2	Allow M marks for - same variable is used for both angles of lean - an appropriate statement of the sine rule, e.g. $30/\sin x = 110/\sin 90$ or $\sin y/60 = \sin 90/110$ Also implies appropriate previous M1 Accept rounded or truncated angles for A2 or A1 for 15.8266...($^{\circ}$) or 33.0557....($^{\circ}$)
<u>8. Alternative method 1</u> (To find initial angle of lean) $\sin x = 30/110$ $(x =) \sin^{-1}(30/110)$ or $(x =) \sin^{-1} 0.2727...$ (x =) 15.8266...($^{\circ}$) (To find horizontal lean if angle of lean was doubled) $\sin (2 \times 15.8266...(^{\circ})) = \text{horizontal lean}/110$ or (Horizontal lean =) $110 \times \sin (2 \times 15.8266...(^{\circ}))$ 57.725 (cm) (and statement that < 60 cm)	M1 M1 A1 M1 A1	Allow for an appropriate statement of the sine rule, $30/\sin x = 110/\sin 90$ or $\sin x/30 = \sin 90/110$ Also implies previous M1 Accept rounded or truncated angles FT rounded or truncated double 'their derived 15.8266...($^{\circ}$)' FT answer must be < 60 (cm)
<u>8. Alternative method 2</u> (To find final angle of lean) $\sin y = 60/110$ $(y =) \sin^{-1}(60/110)$ or $(y =) \sin^{-1} 0.5454...$ (y =) 33.0557...($^{\circ}$) (To find horizontal lean if angle of lean was halved) $\sin (1/2 \times 33.0557...(^{\circ})) = \text{horizontal lean}/110$ or (Horizontal lean =) $110 \times \sin (1/2 \times 33.0557...(^{\circ}))$ 31.29...(cm) (and statement that > 30 cm)	M1 M1 A1 M1 A1	Allow for an appropriate statement of the sine rule, $60/\sin y = 110/\sin 90$ or $\sin y/60 = \sin 90/110$ Also implies previous M1 Accept rounded or truncated angles FT rounded or truncated $\frac{1}{2}$ 'their derived 33.0557...($^{\circ}$)' FT answer must be > 30 (cm)

9. (80 litres = 80 000 cm³) $80\,000 = \pi \times 36^2 \times \text{height}$ or equivalent (Height =) $\frac{80\,000}{\pi \times 36^2}$ or equivalent Answers in the range 19.6 to 19.7 (cm)	M2 May be shown in stages, but place value must be correct for the award of M2 M1 for sight of any 1 of the following: • (80 litres =) 80 000 (cm³) • $\pi \times 36^2 (\times \text{height})$ • sight of $\pi \times 36^2 (\approx 4069 \text{ to } 4072)$ • sight of $(\pi \times 36^2 \approx) 4069 \text{ to } 4072 \text{ or } 1296\pi$ • $80\,000 = \pi \times 36^2 \times \text{height}$ with place value errors with digits 8 and/or 36 Allow for sight of $\pi \times 36^2$ or 80 000 (cm³) even if embedded, contradicted in further working or not used m1 For a correct rearrangement, provided the denominator is a multiple of π Allow if the intended calculation includes a place value error with digits 8 and/or 36 Also possible FT from M1 A1 CAO, must be in centimetres Accept 20(cm) from correct working
10. (Income taxed at Basic rate) $2400 \times 100 \div 20$ or $2400 \div 0.2$ or 2400×5 or equivalent 12000 (dollars) (Khalida's income) $12000 + 5000$ 17000 (dollars)	M1 May be seen in stages Allow for sight of, e.g. • 10% of 12000 • $12000 \times 0.8 = 9600$ A1 Allow an embedded answer e.g. $12000 \times 0.2 = 2400$ Accept if found by trial and improvement or reverse working for M1 A1, e.g. • 10% of 12000 = 1200 with an answer 12000 • $12000 \times 0.8 = 9600$ with an embedded answer $12000 - 9600 = 2400$ Allow M1 A1 for a final answer of 12000, provided not from incorrect working. M1 FT their derived '12000' provided $2400 < \text{'their 12000'} < 20000$, i.e. 'their income taxed at Basic rate' + 5000 A1 Mark final answer. The answer given in the answer space takes precedence.