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# **GCSE MARKING SCHEME**

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**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.



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

<p>4(a) (Circumference) <math>\pi \times 140</math></p> <p>Answer in the range 439 (cm) to 440 (cm)</p> <p><math>\pi \times 140 - 176 - 128 - 60</math> or <math>\pi \times 140 - 364</math> or equivalent</p> <p>Answer in the range 75.6 (cm) to 76 (cm)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Do not accept embedded within an incorrect calculation for the circumference</p> <p>May be implied in later working</p> <p>FT 'their derived circumference' from a calculation involving <math>\pi</math> (including use of <math>\pi r</math> or <math>\pi r^2</math>), including from previous truncation or rounding errors</p> <p>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</p>
<p>4(b) (Area =) <math>\frac{1}{2} \times (4.3 + 5.6) \times 2.5</math> or <math>2.5 \times 4.3 + \frac{1}{2} \times 2.5 \times (5.6 - 4.3)</math> or equivalent</p> <p>12.375 (m<sup>2</sup>)</p> <p>(Number of bags) <math>12.375 \div 0.9</math> or 13.75</p> <p>14 (bags)</p> <p>(Cost of fertilizer is <math>14 \times \text{£}1.15</math>) (£) 16.1(0)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p>	<p>Allow 12.37(m<sup>2</sup>), 12.38(m<sup>2</sup>) or 12.4 (m<sup>2</sup>) provided not from incorrect working (e.g. <math>4.3 + 2.5 + 5.6 = 12.4</math>) May be implied in further working</p> <p>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 <math>0.9 \times 14 = 12.6</math></p> <p><b>Must be</b> rounded up to a whole number of bags Allow for an embedded answer of 14 (e.g. from within a multiplication)</p> <p>FT provided a whole number of bags considered and at least 1 mark (M1) previously awarded</p>

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' <b>with</b> 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) or 119 (miles)	B1  M1  m1  A1	Check the table  FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout

<p>6(b) (Number of miles next month is) <math>440 \times 1.12</math></p> <p>(Increased cost of fuel is) <math>1.3(0) \times 1.1(0)</math></p> <p>(Number of miles next month is) 492.8 (miles) <b>AND</b></p> <p>(Increased cost per litre of fuel is) (£) 1.43</p> <p>(Cost of fuel next month is) <math>\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)</math> or <math>\frac{492.8}{11} \times 1.43</math> (£) 64.06(4)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>m1</p> <p>A1</p>	<p>Or equivalent, e.g. <math>440 + 440 \times 12 \div 100</math> (<math>=440 + 52.80 = 492.80</math>)</p> <p>Penalise, A0, if prematurely approximated in further working, but FT for possible final A1 Penalise any premature approximation in the 1<sup>st</sup> A0</p> <p>FT provided M1, M1 previously awarded</p> <p>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</p>
<p>6(b) <u>Alternative method 1</u> (Cost of fuel last month) <math>1.3(0) \times 440 \div 11</math> or <math>1.3(0) \times 40</math> (£) 52</p> <p>(Cost of fuel next month) <math>52 \times 1.1(0) \times 1.12</math> (£) 64.06(4)</p>	<p>M1</p> <p>A1</p> <p>m2</p> <p>A1</p>	<p>May be implied in further working Penalise, A0, if prematurely approximated in further working, but FT for possible final A1</p> <p>FT 'their <math>1.3(0) \times 440 \div 11</math>' m1 for one of the following:</p> <ul style="list-style-type: none"> <li>• <math>52 \times 1.1(0)</math> (= 57.20)</li> <li>• <math>52 \times 1.12</math> (= 58.24)</li> </ul> <p>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</p>
<p>6(b) <u>Alternative method 2</u> (Fuel next month) <math>1.12 \times 440 \div 11</math> or <math>1.12 \times 40</math> 44.8 (litres)</p> <p>(Cost of fuel next month) <math>44.8 \times 1.3(0) \times 1.1(0)</math> (£) 64.06(4)</p>	<p>M1</p> <p>A1</p> <p>m2</p> <p>A1</p>	<p>May be implied in further working Penalise, A0, if prematurely approximated in further working, but FT for possible final A1</p> <p>FT 'their <math>1.12 \times 440 \div 11</math>' m1 for one of the following:</p> <ul style="list-style-type: none"> <li>• <math>44.8 \times 1.3(0)</math> (= 58.24)</li> <li>• <math>44.8 \times 1.1(0)</math> (= 49.28)</li> </ul> <p>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</p>
<p>6(b) <u>Alternative method 3</u> (Cost of fuel next month) <math>\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)</math> (£) 64.06(4)</p>	<p>M4</p> <p>A1</p>	<p><b>Must be shown as one complete calculation to be followed by a final answer</b> ISW. Allow an answer of (£)64.1(0) or (£)65</p>

7(a) 219(°) ( $\pm 2^\circ$ )	B1	
7(b) $\frac{114}{1.45}$ or $114 \div (87/60)$ or $114 \times \frac{60}{87}$ or equivalent  78.6(2...) (km/h)	M2  A1	M1 for one of the following: <ul style="list-style-type: none"> <li>idea of distance/time, e.g. 114/1.27, 114/87, 114/5220, 114/1hr 27 minutes, including approximated as 114/1.5, may be implied by answers to these calculations (see note) provided not from incorrect working</li> <li>sight of 1.45 (hours)</li> </ul> A1 Accept 79 (km/h) provided not from incorrect working Do not FT from M1
7(c) (Conversion to Japanese yen) $800 \times 135.72$ 108 576 (Japanese yen)  (Can buy) 108 000 (Japanese yen)  (Cost in pounds is) $108\,000 \div 135.72$ or $(800 -) 576 \div 135.72$  (£) 795.76	M1 A1  B1  M1  A1	Allow for an equivalent amount given using the notes available, e.g. 21 5000 (yen) <b>and</b> 3 1000 (yen), or equivalent using only 5000 and 1000 yen notes FT 'their derived 108 576' provided evidence of rounding down to nearest 1000  M1 FT 'their derived 108 576' and 'their derived 108 000' provided 'their 108 000' in whole number of 1000s (including from rounding 108 576 up)  A1 ISW. Allow (£)795.75 Allow on FT rounded or truncated to a penny



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

<p>8. (Let x be the initial angle of lean) (Let y be the final angle of lean)</p> <p><math>\sin x = 30/110</math></p> <p><math>\sin y = 60/110</math></p> <p>(x =) <math>\sin^{-1}(30/110)</math> or (x =) <math>\sin^{-1} 0.2727...</math> OR (y =) <math>\sin^{-1}(60/110)</math> or (y =) <math>\sin^{-1} 0.5454...</math></p> <p>15.8266...(<math>^{\circ}</math>) <b>AND</b> 33.0557...(<math>^{\circ}</math>) (and statement or calculation to show 33.0557...(<math>^{\circ}</math>) &gt; 2 x 15.8266...(<math>^{\circ}</math>) )</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A2</p>	<p>Allow M marks for</p> <ul style="list-style-type: none"> <li>same variable is used for both angles of lean</li> <li>an appropriate statement of the sine rule, e.g. <math>30/\sin x = 110/\sin 90</math> or <math>\sin y/60 = \sin 90/110</math></li> </ul> <p>Also implies appropriate previous M1</p> <p>Accept rounded or truncated angles for A2 or A1 for 15.8266...(<math>^{\circ}</math>) or 33.0557...(<math>^{\circ}</math>)</p>
<p><u>8. Alternative method 1</u> (To find initial angle of lean) <math>\sin x = 30/110</math></p> <p>(x =) <math>\sin^{-1}(30/110)</math> or (x =) <math>\sin^{-1} 0.2727...</math> (x =) 15.8266...(<math>^{\circ}</math>)</p> <p>(To find horizontal lean if angle of lean was doubled) <math>\sin (2 \times 15.8266...(^{\circ})) = \text{horizontal lean}/110</math> or (Horizontal lean =) <math>110 \times \sin (2 \times 15.8266...(^{\circ}))</math></p> <p>57.725 (cm) (and statement that &lt; 60 cm)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Allow for an appropriate statement of the sine rule, <math>30/\sin x = 110/\sin 90</math> or <math>\sin x/30 = \sin 90/110</math></p> <p>Also implies previous M1 Accept rounded or truncated angles</p> <p>FT rounded or truncated double 'their derived 15.8266...(<math>^{\circ}</math>)'</p> <p>FT answer must be &lt; 60 (cm)</p>
<p><u>8. Alternative method 2</u> (To find final angle of lean) <math>\sin y = 60/110</math></p> <p>(y =) <math>\sin^{-1}(60/110)</math> or (y =) <math>\sin^{-1} 0.5454...</math> (y =) 33.0557...(<math>^{\circ}</math>)</p> <p>(To find horizontal lean if angle of lean was halved) <math>\sin (1/2 \times 33.0557...(^{\circ})) = \text{horizontal lean}/110</math> or (Horizontal lean =) <math>110 \times \sin (1/2 \times 33.0557...(^{\circ}))</math></p> <p>31.29...(cm) (and statement that &gt; 30 cm)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Allow for an appropriate statement of the sine rule, <math>60/\sin y = 110/\sin 90</math> or <math>\sin y/60 = \sin 90/110</math></p> <p>Also implies previous M1 Accept rounded or truncated angles</p> <p>FT rounded or truncated <math>\frac{1}{2}</math> 'their derived 33.0557...(<math>^{\circ}</math>)'</p> <p>FT answer must be &gt; 30 (cm)</p>

<p>9. (80 litres = 80 000 cm<sup>3</sup>)  <math>80\,000 = \pi \times 36^2 \times \text{height}</math> or equivalent</p> <p>(Height =) <math>\frac{80\,000}{\pi \times 36^2}</math> or equivalent</p> <p>Answers in the range 19.6 to 19.7 (cm)</p>	<p>M2</p> <p>m1</p> <p>A1</p>	<p>May be shown in stages, but place value must be correct for the award of M2</p> <p>M1 for sight of any 1 of the following:</p> <ul style="list-style-type: none"> <li>• (80 litres =) 80 000 (cm<sup>3</sup>)</li> <li>• <math>\pi \times 36^2</math> (<math>\times</math> height)</li> <li>• sight of <math>\pi \times 36^2</math> (<math>\approx</math> 4069 to 4072)</li> <li>• sight of <math>(\pi \times 36^2 \approx)</math> 4069 to 4072 or <math>1296\pi</math></li> <li>• <math>80\,000 = \pi \times 36^2 \times \text{height}</math> with place value errors with digits 8 and/or 36</li> </ul> <p>Allow for sight of <math>\pi \times 36^2</math> or 80 000 (cm<sup>3</sup>) even if embedded, contradicted in further working or not used</p> <p>For a correct rearrangement, provided the denominator is a multiple of <math>\pi</math></p> <p>Allow if the intended calculation includes a place value error with digits 8 and/or 36</p> <p>Also possible FT from M1</p> <p>CAO, must be in centimetres</p> <p>Accept 20(cm) from correct working</p>
<p>10. (Income taxed at Basic rate) <math>2400 \times 100 \div 20</math>  or <math>2400 \div 0.2</math> or <math>2400 \times 5</math> or equivalent</p> <p>12000 (dollars)</p> <p>(Khalida's income) <math>12000 + 5000</math></p> <p>17000 (dollars)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>May be seen in stages</p> <p>Allow for sight of, e.g.</p> <ul style="list-style-type: none"> <li>• 10% of 12000</li> <li>• <math>12000 \times 0.8 = 9600</math></li> </ul> <p>Allow an embedded answer e.g. <math>12000 \times 0.2 = 2400</math></p> <p>Accept if found by trial and improvement or reverse working for M1 A1, e.g.</p> <ul style="list-style-type: none"> <li>• 10% of 12000 = 1200 with an answer 12000</li> <li>• <math>12000 \times 0.8 = 9600</math> with an embedded answer <math>12000 - 9600 = 2400</math></li> </ul> <p>Allow M1 A1 for a final answer of 12000, provided not from incorrect working.</p> <p>FT their derived 12000' provided <math>2400 &lt; \text{'their 12000'} &lt; 20000</math>, i.e. 'their income taxed at Basic rate' + 5000</p> <p>Mark final answer. The answer given in the answer space takes precedence.</p>