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# **GCSE MARKING SCHEME**

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**AUTUMN 2017**

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

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2017 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.

GCSE Mathematics – Numeracy Unit 1: Higher Tier Autumn 2017 Final	Mark	Comment
1(a)(i) (Ysgol) Caewen and (Year Group) 10	B1	
1(a)(ii) FALSE TRUE FALSE TRUE TRUE	B3	All 5 correct  B2 for any 4 correct B1 for any 3 correct
1(b)(i) 1480 (miles)	B2	B1 for sight of any one of <ul style="list-style-type: none"> <li>• <math>200 \div 5</math></li> <li>• 40 (miles) in 1 year</li> <li>• 80 (miles in 2 years)</li> </ul> B0 for an answer for 2018 as 1600 (miles) <i>Ignore statement of incorrect unit, such as km for miles</i>
1(b)(ii) Reason suggesting rate of increase not necessarily linear, e.g. 'unlikely to be a constant rate of increase', 'not a uniform pattern each year', 'they can vary', 'because there can be more one year than another year', 'it is a total over 5 years so the number each year can increase or decrease', 'not the same miles every time', 'there could be more routes in different years', 'don't know what will happen', 'because this is just an estimate based on previous data', 'cycling becoming more popular, rate may increase because of it' 'could have run out of money'	E1	Do not allow if additional incorrect statements are made  Allow, e.g. 'because it can change', 'perhaps they have not built any more since 2016', 'cycling becoming more popular', 'January 2018 hasn't happened yet'  Do not accept, e.g. 'because it is an estimate'



<p>3(a)(i) Median in the inclusive range 16.8 to 17 (minutes)</p> <p>Interquartile range 19 to 19.3 - 14 to 14.3 Answer in the range 4.7 to 5.3 (minutes)</p>	<p>B1</p> <p>M1 A1</p>	
<p>3(a)(ii) Reason, e.g. 'the points on the diagram have been joined with straight lines', 'the data has been grouped, so actual times have been lost', 'the raw data is more detailed (than graph)', 'not exact using a cumulative frequency diagram', 'it is just an estimate using the diagram'</p>	<p>E1</p>	<p>Allow, e.g. 'the raw data is more detailed than Meirion's data' (although both Meirion's data!), 'the points could be joined by a curve'</p> <p>Do not accept, e.g. 'seconds can not be presented'</p>
<p>3(b) 34 – 12 22 (of his customers)</p>	<p>M1 A1</p>	
<p>3(c) Sight of either of the following:</p> <ul style="list-style-type: none"> <li>• (80% of 120 =) 96 (customers) <b>OR</b> (20 minutes is) 102 (customers)</li> <li>• (20% not cleaned in 20 minutes is) 24 (customers) <b>OR</b> 18 (customers more than 20 minutes)</li> </ul> <p>Sight of any of the following:</p> <ul style="list-style-type: none"> <li>• (80% of 120 =) 96 (customers) <b>AND</b> (20 minutes is) 102 (customers)</li> <li>• (20% not cleaned in 20 minutes is) 24 (customers) <b>AND</b> 18 (customers more than 20 minutes)</li> <li>• (96 customers is )19.3 to 19.8 (minutes)</li> <li>• (102 customers is <math>102/120 \times 100 =</math>) 85%</li> <li>• (102 customers is <math>102/120 \times 100 =</math>) 85%</li> <li>• (18 customers is <math>18/120 \times 100 =</math>) 15%</li> </ul> <p>Conclusion 'yes'</p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Accept readings on the graph</p> <p>Accept readings on the graph</p> <p>CAO from correct working only and M2 awarded Accept 'no as 85% (<b>not</b> 80%) in less than 20 minutes'</p>

4(a) 21p	B1	
4(b)		<u>Throughout: if units are given they must be correct, or a consistent FT from 5 charges in (a)</u>
Number of units of electricity (14400 – 13900 =) 500 (units)	B1	
(Charge for electricity =) 500 × 21p	M1	FT 'their 14400 – 13900', or 14400 – 13450 (= 950) Allow M1 (but A0) for any of, e.g. <ul style="list-style-type: none"> <li>• (14400 × 21p =) (£)3024</li> <li>• (13900 × 21p =) (£)2919</li> <li>• (13450 × 21p =) (£)2824.5(0)</li> <li>• ( 450 × 21p =) (£)94.5(0)</li> </ul> or equivalent answers in pence (These do not involve a subtraction of units)
(£)105	A1	Accept 10500p or £105.00p FT provided subtraction of units has been attempted calculation examples: <ul style="list-style-type: none"> <li>• 21p × 950 = (£)199.5(0)</li> <li>• 20.5p × 500 = (£)102.5(0)</li> <li>• 21.5p × 500 = (£)107.5(0)</li> <li>• 22p × 500 = (£)110</li> <li>• 22.5p × 500 = (£)112.5(0)</li> </ul>
Standing charge for August, September and October (£)23.4(0)	B1	CAO
Total charges (105 + 23.40 =) (£)128.4(0)	B1	FT 'their charge for electricity' + 'their standing charge', <b>provided</b> these amounts are from: <ul style="list-style-type: none"> <li>• M1 previously awarded, <b>and</b></li> <li>• 'their standing charge &gt; £22.80 but ≤£24</li> </ul> FT 500 units examples: (20.5p) £23.40 + 102.50 = £125.90 (21.5p) £23.40 + 107.50 = £130.90 (22p) £23.40 + 110.00 = £133.40 (22.5p) £23.40 + 112.50 = £135.90
5% VAT (£)6.42	B1	FT provided at least M1 and B1 previously awarded (Possible VAT FT 500 units with <u>consistent</u> use of: 20.5p leads to £6.29, £6.295, £6.30 21.5p leads to £6.54, £6.55, £6.545 22p leads to £6.67 22.5p leads to £6.79, £6.795, or £6.80
Total bill (£)134.82	B1	CAO
<b>See next page.</b>		

<p>Budget calculation involving at least 2 of the key amounts, i.e.  <math>(£)470 - (£)134.82 - (£)330</math>, or  <math>(£)470 - (£)134.82</math>, or  <math>(£)470 - (£)330</math>, or  <math>(£)134.82 + (£)330</math></p>	M1	FT 'their £134.82' provided at least 3 marks previously awarded
<p>Conclusion from a correctly evaluated calculation, e.g.          'yes'          'able to afford as £335.18 left after paying for electricity',          'afford as would be left with £140 after buying the washing machine to pay the electricity bill',          'she can buy it and have £5.18 left',          'it only costs £464.82, £470 in the bank'</p>	A1	FT from M1 for an appropriate conclusion with a correctly evaluated calculation
<p>Organisation and communication</p>	OC1	<p>For OC1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanations and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul>
<p>Accuracy of writing</p>	W1	<p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc.</li> </ul>

5(a)(i) Orange pippin and 57 (mm)	B1	Accept 'orange' or 'pippin' as indication of the correct tree
5(a)(ii) 41 (mm)	B1	
5(a)(iii) Pink Lady and 33 (mm)	B2	B1 for any of the following: <ul style="list-style-type: none"> <li>• Gala with 30 (mm)</li> <li>• Orange pippin 29 (mm)</li> <li>• Pink Lady with 79 – 46</li> <li>• No apple indicated but IQR answer 33 (mm)</li> </ul>
5(b)  Gala selected with a reason e.g. '(highest) upper quartile', '25% over 80 mm'  <b>OR</b>  Pink Lady selected with a reason e.g. '(highest) median', 'half are over 63 mm'	B1	Ignore units throughout Do not accept reasons based on range or IQR Do not ignore any additional statements of range, IQR, lower quartile  Ignore an incorrect median stated for Pink Lady, e.g. 66mm, provided it is >61 and <67(mm)
6. e.g. $10x = 8.333\dots$ and $100x = 83.333\dots$ and attempt to subtract $75/90$ or equivalent  (Fraction of pizza each of the 3 friends receive =) $5/18$ (ISW)	M1  A1  A2	Or equivalent  e.g. $825/990$ or $5/6$ . Allow e.g. $7.5/9$  FT 'their $75/90$ ' provided M1 awarded A1 for $75/270$ or equivalent, e.g. $275/990$ , $7.5/27$  <i>Alternative method:</i> <i>M1 for <math>0.2777\dots</math> (showing that the 7 repeats; from <math>0.8333 \div 3</math>)</i> <i>M1 for e.g. <math>10x = 2.777\dots</math> and <math>100x = 27.777\dots</math> and attempt to subtract</i> <i>A2 for <math>5/18</math></i> <i>A1 for e.g. <math>25/90</math> or <math>275/990</math> or <math>2.5/9</math></i>

7(a) Correct bar of height 1.6	B1	
7(b) 45 (seconds)	B1	
7(c) $(5 \times 2) + (5 \times 5) + (10 \times 2.4) + 16 + (15 \times 1)$ or $10 + 25 + 24 + 16 + 15$  = 90	M1  A1	Allow M1 for any 3 correct including the use of 16  CAO
7(d)(i) $10 + 25 + (3/10 \times 24)$  = $42(-.2)$ Statement e.g. 'This is less than 45 which is 50%' or 'Gareth came about 42 <sup>nd</sup> which is in the fastest 50%'	M1  A1 A1	FT 'their 24'  CAO FT 'their 90' and FT from M1A0  <i>Alternative methods:</i> M1 for $2.4x = 10$ OR $2.4x = 14$ FT 'their 90' A1 for (50% mark =) $19(.1666..)$ (sec) A1 for statement e.g. 'Gareth's time is in the fastest 50%'  OR  M1 for $90/2 - 10 - 25$ (= 10 pupils) FT 'their 90' A2 for a statement e.g. 'if fewer than 10 (pupils) took between 15 and 18 seconds (then it would be true)', or 'Gareth needs to be in the first 10 (pupils) in the 15 to 25 group', or 'Gareth could be one of the fastest 10 in the 15 to 25 group'  A1 for a statement e.g. 'if fewer than this in the group took less than 18 (seconds)', or 'Gareth needs to be in the first 10 (pupils) in the group', or 'Gareth could be one of the fastest in the 15 to 25 group'
7(d)(ii) Valid explanation e.g. 'The times of the 24 pupils in the 15 to 25 second group could be closer to 15 seconds' or 'There could be more times than expected in the range 15 to 18 seconds', or 'Gareth could be one of the slowest people in the 15 to 25 second group', or 'There could be 10 pupils quicker than him in the 15 to 25 group', or 'The median could be lower than 18', or 'He could be one of the other 14 in the group 15 to 25'	E1	FT 'their 90' Do not accept e.g. 'Gareth could have been slower than the 45 <sup>th</sup> person'

<p>8(a) (Scale factor =) <math>\frac{3}{2}</math> OR <math>\frac{2}{3}</math> or equivalent Sight of <math>(\frac{3}{2})^2</math> OR <math>(\frac{2}{3})^2</math> or equivalent (Cost of paint =) <math>1.60 \times (\frac{3}{2})^2</math> or equivalent = (£)3.6(0)</p>	<p>B1 B1 M1 A1</p>	<p>Sight of (£)2.4(0) implies this B1 This implies previous B1</p>
<p>8(b) 12 <math>\div 1.2</math> or <math>\times 5/6</math> OR <math>\div 1.25</math> or <math>\times 4/5</math> = (£) 10 OR = (£) 9.6(0)  <math>\div 1.25</math> or <math>\times 4/5</math> OR <math>\div 1.2</math> or <math>\times 5/6</math>  = (£) 8</p>	<p>M1 A1  M1  A1</p>	<p>(£)9.6(0) followed by <math>0.75 \times 9.6(0) =</math> (£)7.2(0) indicates an incorrect method M0A0M0A0  FT 'their 10' OR 'their 9.6(0)' provided previous M1 awarded  An intermediate answer of (£)9 followed by <math>0.8 \times 9 =</math> (£)7.2(0) indicates an incorrect method M0A0M0A0  <i>Alternative method:</i> M2 for <math>(12 \div 1.2) \div 1.25</math> or <math>12 \times 5/6 \times 4/5</math> or equivalent A2 for (£)8 A1 for intermediate answers of (£)10 or (£)9.6(0)</p>
<p>9(a) 1.65 to 1.75 (seconds) inclusive</p>	<p>B1</p>	
<p>9(b) Split into at least 5 areas and attempt to sum (Area =) <math>\frac{1}{2} \times 1 \times (0 + 4 + 2(4 + 5 + 4.8 + 4.2))</math>  = 20 (m)</p>	<p>M1 M1  A1</p>	<p>No marks for an unsupported 20  Allow 1 error Or equivalent (Areas of 2, 4.5, 4.9, 4.5, 4.1) (If 10 areas used, areas of 0.5, 1.5, <math>2.3, \approx 2.5, \approx 2.46, \approx 2.4, \approx 2.37, \approx</math> <math>2.22, \approx 2.08, \approx 2.04</math>) Allow 1 slip in reading the scale CAO A1 for an answer of <math>\approx 20.4</math> (m) if 10 areas used CAO</p>
<p>9(c)(i) (Distance travelled by Delyth =) <math>\frac{1}{2} \times 3 \times 5</math> (=7.5(m)) (Distance apart =) 12.5 (m)</p>	<p>B1 B1</p>	<p>Or full trapezium rule method FT 'their 20' – 7.5 provided first B1 awarded</p>
<p>9(c)(ii) Reason e.g. 'Most area calculations for Catrin are underestimates', or 'The trapeziums lie under the line', or 'The trapeziums cut off bits of the graph', or 'The curve is above the area calculated', or 'The area of the trapeziums is lower than the area under the curve'</p>	<p>E1</p>	<p>Do not accept e.g. 'Parts of the graph haven't been used' 'Doesn't include the bumps' 'Does not take into account the curvature of the graph'</p>

<p>10(a) height = <math>14 \times 20 \div 8</math> or <math>14 \times 2.5</math> or equivalent</p> <p style="text-align: center;"><math>= 35</math> (cm)</p>	<p>M1</p> <p>A1</p>	<p>Allow M1 for <math>\frac{\text{height}}{14} = \frac{20}{8}</math>, OR</p> <p><math>\frac{\text{height}}{20} = \frac{14}{8}</math></p>
<p>10(b) (radius =) <math>15 \times 8 \div 20</math> or <math>15 \times 0.4</math> or equivalent</p> <p style="text-align: center;"><math>= 6</math> (cm)</p> <p>(Volume =) <math>\frac{1}{3} \times \pi \times 6^2 \times 15</math></p> <p style="text-align: center;"><math>= 180\pi</math> (cm<sup>3</sup>) (ISW)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>e.g. <math>15 \times 14 \div 35</math> FT 'their 35'</p> <p>FT 'their 6' provided previous M1 awarded</p> <p><i>Alternative methods:</i> <i>If candidates clearly work with similar volumes, then</i> B1 for <math>\frac{3}{4}</math> or <math>\frac{4}{3}</math> or equivalent B1 for <math>(\frac{3}{4})^3</math> or <math>(\frac{4}{3})^3</math> or equivalent M1 for <math>\frac{1}{3} \times \pi \times 8^2 \times 20 \times (\frac{3}{4})^3</math> or equivalent A1 for <math>180\pi</math> (cm<sup>3</sup>)</p> <p>OR</p> <p><i>FT 'their 35' throughout</i> B1 for <math>\frac{15}{35}</math> or <math>\frac{35}{15}</math> or equivalent B1 for <math>(\frac{15}{35})^3</math> or <math>(\frac{35}{15})^3</math> or equivalent M1 for <math>\frac{1}{3} \times \pi \times 14^2 \times 35 \times (\frac{15}{35})^3</math> or equivalent A1 for <math>180\pi</math> (cm<sup>3</sup>)</p>
<p>11(a) <math>200\pi = \frac{40}{360} \times \pi \times \text{radius}^2</math></p> <p style="text-align: center;"><math>\text{radius}^2 = \frac{200\pi \times 360}{40\pi}</math> or equivalent</p> <p style="text-align: center;">(radius =) <math>\sqrt{1800}</math></p> <p>Writing 1800 or as a product of 2 or more factors</p> <p style="text-align: center;"><math>30\sqrt{2}</math> (m)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>CAO</p> <p>e.g. <math>\sqrt{1800} = \sqrt{18} \times \sqrt{100}</math>, or <math>\sqrt{1800} = \sqrt{3} \times \sqrt{6} \times \sqrt{100}</math>, or <math>1800 = 900 \times 2</math></p> <p>FT 'their 1800' provided previous M1 awarded</p> <p>Needs to be in the form <math>a\sqrt{b}</math> where b is a prime number</p>
<p>11(b) <math>(10 + 30\sqrt{2})^2</math></p> <p style="text-align: center;"><math>100 + 300\sqrt{2} + 300\sqrt{2} + 1800</math> <math>= 1900 + 600\sqrt{2}</math> (m<sup>2</sup>)</p>	<p>M1</p> <p>A1</p> <p>A1</p>	<p>FT for all marks 'their <math>30\sqrt{2}</math>' provided of equivalent difficulty i.e <math>a\sqrt{b}</math>, where b does <u>not</u> need to be a prime number</p> <p>Allow A1 for any 3 correct terms Accept e.g. <math>100(19 + 6\sqrt{2})</math> (m<sup>2</sup>) Mark final answer</p>