GCSE MARKING SCHEME

AUTUMN 2020

GCSE
MATHEMATICS - NUMERACY
UNIT 1 – FOUNDATION TIER
3310U10-1

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: Foundation Tier**	Mark	Comments
1(a) (i) an even chance	B1	
1(a) (ii) 18	B1	
1(a) (iii) 16	B1	
1(b) 8007	B1	
1(c) No and a suitable explanation given indicating that the length of a pool cannot be 25 miles long. Eg No because 25 miles is far too long for a swimming pool No because he means 25 metres for the length of a pool 'No, the pool cannot be 25 miles long' 'No because it's metres not miles' 'No because the pool is 25 metres not miles'	E1	Allow Eg 'No, the pool is not 25 miles long' 'No, because 1 length doesn't equal 25 miles' 'No because the length of a swimming po0l is not 25 miles' 'No because 25 miles would be far too big to swim' Do not accept 'No because we were not given the distance for a length' 'No because we don't know the length of a pool' 'No because there are 15 miles in a length.'
1(d) cylinder	B1	
1(e) (13:30) (13:55) **14:20 14:45** (15:10) **15:35**	B2	Accept times given in 12 hour and/or 24 hour format Award B2 for all 3 times correct Award B1 for 1 or 2 times correct For B1, FT 'their 14:20' + 25 minutes correctly evaluated provided both times lie between 13:55 and 15:10
2(a) 11	B1	
2(b) (size) 8	B1	
2(c) (size) 12	B1	
2(d) No and suitable reason given Eg 'No because you increase by 2 each time' 'No because 5 isn't double 3' 'No, the rule is +2 (not × 2)' 'No, because if you double the circles in size 2 you get 10 which isn't 7 circles in size 3.' 'No because you just add on 2 to the number of circles before it.' 'No because you add the size number + size number + 1' 'No because to get size 3 you add 3 and 4'	E1	Allow 'No because size 1 is 3, size 2 is 5 then size 3 is 7 so it isn't doubling' 'No because it goes up by 2'

3. (Money for national children's charity) 1200 ÷ 3 (£)400 (Money for national animal charity) 20/100 × 1200 (£)240 (Money for each of the 4 charities) 1200 – 400 – 240 (=560) ÷ 4 = (£)140	 M1 A1 M1 A1 M1 m1 A1	 FT 'their stated 400' and 'their derived 240' for possible M1m1A1
Organisation and communication Writing	OC1 W1	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 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.
4(a) 1140 (calories)	B1	
4(b) Yes and suitable reason given Eg Yes because 5.02 and 5.07 are 5 when rounded to the nearest whole number. Yes because 5.02 and 5.07 are only just over 5 Yes because all runs are about 5km or just over 'Yes, they are all about 5km'.	E1	Allow 'Yes, because they are all under 0.5 and all start with 5' Do not accept the information in the question just repeated, with no inference made. Do not accept: 'No because she ran 3 different routes' 'No because there are no distances higher than the number' 'Yes because it's 5.07, then 5, then 5.02' 'Yes because they are all somewhere in 5km'
4(c) No and suitable reason given Eg 'No because it took her longer to run 5(km) than it did to run 5.02 (km)' 'No, the 5.02km run took the least time' 'No, the shortest run took longer than the 5.02km run' 'No, the shortest run was on Wednesday but the least time was on Friday'	E1	Allow 'No, on Friday she ran for longer and took less time' 'No, 33:46 is the middle time' 'No, 5.02 km is the middle distance'
4(d) 34:03 – 32:52 or equivalent (e.g. 8 seconds + 1 minute + 3 seconds) 1 minute and 11 seconds or 71 seconds	M1 A1	Answers of 1:51, 2:51, 1:49 and 2:49 imply M1 Allow 1:11

5(a) 35˚	B1	
5(b) 53˚ drawn (±2˚) in correct place 78˚ drawn (±2˚) in correct place	B1 B1	If B0, B0 but 53˚ (±2˚) and 78˚ (±2˚) swapped, award SC1
Triangle completed	B1	Award this B1 provided at least one previous B1 or SC1 awarded
Two sides measured correctly (9.5 cm and 11.7 cm)	B2	B1 for each line. Allow ±2 mm. (Range is: 9.3cm to 9.7cm and 11.5cm to 11.9cm) FT their completed triangle **This may be implied by their final answers**
95 (m) and 117 (m)	B1	(Range is 93m to 97m and 115m to 117m) FT 'their measurements' provided a triangle drawn If previous B2 is awarded B0 or B1 then FT for the final B1 for at least one of 'their measurements' × 10 or at least one of 'their measurements rounded to the nearest whole number of cms' × 10 eg for 8.4cm award final B1 for 80 or 82 to 86 *Note: the 2 answers given must correspond in size to the sides of the triangle.*
6. (Cost of strawberries) 20 – 6.8(0) − 1.5 × 4 (£) 7.2(0)	M2 A1	M1 for (Blueberries cost) 1.5 × 4 (=6) Award M2, A1 for appropriate sight of (£)7.2(0) irrespective of any further inappropriate working
(Mass of strawberries) (20 – 6.8(0) − 1.5 × 4) ÷ 3.6 or 7.2(0) ÷ 3.6	M1	In FT allow sight of 14.2(0) as indication of 20 – 6.8(0) attempted Allow convincing appropriate repeated addition FT provided there has been an attempt at a subtraction of the cost of blueberries from 20 – 6.8(0) (=13.2(0)), 20 or 6.8(0) and provided M1 previously awarded, e.g. • (20 – 1.5 × 4) ÷ 3.6 • (6.8(0) – 1.5 × 4) ÷ 3.6 OR FT (20 – 6.8(0) – 'their cost of blueberries') ÷ 3.6 provided 'their cost of blueberries' > (£)4
2 (kg)	A1	CAO. Must be from correct working If no marks, award SC1 for an answer of 3.6(6kg) or 3.67(kg) or 3.7(kg) (from (20 – 6.80) ÷ 3.6) An answer only of 2 kg is awarded all 5 marks (strictly provided no incorrect working seen - this is answer only). Any other answer only, such as '2 bags', is awarded no marks.

7(a) (Total of first year cost is purchase + insurance + food) 450 + 12 × 18 + 7 × 52 (450 + 216 + 364) (£) 1030	M2 A2	Allow food cost of 365 or 366 (from £1 per day) M1 for any one of: • a sum of 2 or 3 of amounts including any two of 450, 12 × 18 and 7 × 52 • 12 × 18 + 7 × n, where n = 48 to 51 inclusive • 450 + 7 × n, where n = 48 to 51 inclusive • sight of 216 **and** 364 or 365 or 366 Use of 365 days leads to (450 + 216 + 365 = £)1031 Use of 366 days leads to (450 + 216 + 366 = £)1032 A1 for sight of 450 + 216 + 364 or sum using 365 or 366 days FT from M1 for possible A2 (summing all 3 costs) with use of food costs for 48 to 51 weeks inclusive: • 48 weeks leads to (450 + 216 + 336 = £)1002 • 49 weeks leads to (450 + 216 + 343 = £)1009 • 50 weeks leads to (450 + 216 + 350 = £)1016 • 51 weeks leads to (450 + 216 + 357 = £)1023 or A1 for sight of the sum of 3 appropriate amounts (as given above), with products correctly evaluated OR FT from M2 or M1 for A1 for their final answer from a correctly evaluated sum in which at least 2 of the 3 amounts are correct. *Strict FT for adding their 3 amounts correctly or if they only have 2 amounts, adding their 2 amounts correctly*
7(b)(i) 25 ÷ 2.5 or 30 ÷ 2.5 OR for sight of 2.5 × 10 or 2.5 × 12 10 (inches) 12 (inches)	M1 A1 A1	Allow for sight of repeated addition, 10 or 12 lots of 2.5 to be added Either of the correct responses implies M1 If M1, A0, A0 also award SC1 if 'their 12' - 'their 10' = 2 Answer line takes precedence. An answer needs to be selected for A marks to be awarded, however if M1, A0, A0 awarded, also award SC1 for sight of 2.5 × 10 = 25 **and** 2.5 × 12 = 30
7(b)(ii) 6 × 2.2 or 8 × 2.2 13.2 (pounds) 17.6 (pounds)	M1 A1 A1	Either of the correct responses implies M1 If M1, A0, A0 also award SC1 if 'their 17.6' - 'their 13.2' = 4.4 Answer line takes precedence.
8. (x =) 110(°) (y =) 115(°) (z =) 73(°)	 B1 B1 B1	Mark answer space if completed, otherwise check diagram FT 'their 115(°)' – 42(°) correctly evaluated, i.e. check 'their y' - 'their z' = 42
9.(a) 1	B1	
9.(b) 2	B1	

10(a) (Cost of flags 4 × 40 =) 160(p) (Cost of muffin cases) (12 × 4 ÷ 16) × 22 or 3 × 22 (=) 66 (p) (Cost of ingredients) (12 × 4 ÷ 6) × 25 or 8 × 25 (=) 200 (p) (Money taken in selling 12 × 4 × 30 =) 1440(p) (Profit) 1440 – 160 – 66 – 200 (= 1440 – 4.26) 1014(p) or (£)10.14	 B1 M1 A1 M1 A1 B1 M1 A1	Shown in pence, accept in £. However, if units are incorrect penalise – 1 once only, unless corrected in further work *Mark final answers at each stage (then possible FT)* Accept use of 'their derived number of flags' as 'their 48 (4×12) flags' FT their consistent number of flags for all marks, then penalise -1 if 'their derived number of flags' ≠ 48 If previous M0, M0 award SC1 here for sight of any one of the following: • (number of packs of muffin cases) 12×4÷16 **and** (number of multiples of ingredients) 12×4÷6 • (number of packs of muffin cases =) 3 • (number of multiples of ingredients =) 8 FT the following: • 'their 160', provided from an attempt at 4×40, • 'their 1440', provided from an attempt at 12×4×30, • 'their 66' and 'their 200' provided at least 1 M1 mark has previously been awarded If units are given they must be correct
10(b) $\frac{400 - 80}{80}$ (× 100) or equivalent 400 (%)	M1 A1	
11(a) Unambiguously stating or implying 'No' with a reason, e.g. 'all scattered' 'no relationship',	E1	If a satisfactory reason is given ignore any further spurious comments Allow, e.g. 'no pattern', 'no trend', 'no steady plotted points', 'you can't draw a line of best fit', 'no steady line', 'they are not in a line', 'random points', 'points all over the place', 'plots are everywhere', 'no link' Do not accept, e.g. 'no correlation' 'there were lots of birds in the garden when the wind speed was low and high', 'too many outliers', 'spread far apart'
11(b) 7 (birds)	B1	

GCSE MARKING SCHEME

AUTUMN 2020

GCSE
MATHEMATICS - NUMERACY
UNIT 2 – FOUNDATION TIER
3310U20-1

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

<table>
<tr><th>GCSE Mathematics Numeracy
Unit 2: Foundation Tier</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1.(a) 197 (years)</td><td>B1</td><td></td></tr>
<tr><td>1.(b) (Abergwyn =) $6 \times 5 + 4 \times 2 + 2 \times 3$
44 (points)

(Llanbro =) $7 \times 5 + 3 \times 2 + (1 \times) 3 + (1 \times) 3$
47 (points)

(Ysgol) Llanbro (won the game by) 3 (points)</td><td>M1
A1

M1
A1

B1</td><td>M1 for sight of the values 30, 8 and 6, together with the intention to add
CAO

M1 for sight of at least three of the values 35, 6, 3 and 3, together with the intention to add
CAO

FT correct conclusion using their scores.
FT ‘their 47’ – ‘their 44’

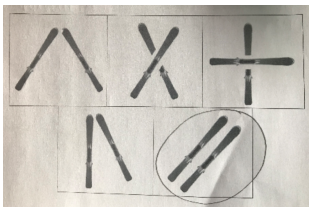
If no marks awarded, award SC1 for sight of 30,8, 6 and 35, 6, 3, 3</td></tr>
<tr><td>2.(a)(i) 7 (months)</td><td>B1</td><td></td></tr>
<tr><td>2.(a)(ii)
Bar at February drawn at -2°C
Bar for July drawn at 15°C</td><td>B1
B1</td><td>If no marks award SC1 for indication of correct heights for both bars</td></tr>
<tr><td>2.(a)(iii) (Total of temperatures =) 66 (°C)

(Mean = 66) ÷ 12
5·5 (°C)</td><td>M1

m1
A1</td><td>Attempt to add at least 10 temperatures.
Allow M1 for total between 50 and 88 as evidence of attempting to add the temperatures
FT ‘their 66’ ÷ 12
CAO</td></tr>
<tr><td>2.(b)(i) £43.15</td><td>B1</td><td></td></tr>
<tr><td>2.(b)(ii)
<table><tr><td colspan="2">Return flight from Grenoble to Cardiff</td></tr><tr><td>Date</td><td>Saturday 4 January</td></tr><tr><td>Departing time</td><td>10:50</td></tr><tr><td>Arrival time</td><td>11:25</td></tr><tr><td>Cost</td><td>£59.51</td></tr></table></td><td>B2</td><td>B2 for all 3 correct entries
B1 for sight of 10:50 OR 11:25 OR £59.51</td></tr>
</table>

2.(c) (Cost for 26kg bags =) 4×29.61 (=(£)**118.44**) OR $4 \times 29.61 \times 2$ (=(£)**236.88**)	M1	
(Cost for skis =) ((£)37×2 =) (£)**74**	B1	May be implied in later working
(Cost for snowboards =) $3 \times$ (£)39 (=(£)**117**) OR $3 \times$ (£)39×2 (= (£)**234**)	M1	Award M1B0M1 for unsupported (£)272.44 (B1 may be awarded later) Award M1B1M1 for unsupported (£)544.88 ISW
(Cost of 4 flights) = $4 \times$ (£)122.73 (= (£)**490.92**)	M1	
(Total for **both** journeys =) (£)236.88 + (£)74 + (£)234 + (£)490.92 OR $2 \times$ [(£)118.44 + (£)37 + (£)117] +(£)490.92	M1	For M1 the total must include the flight costs and the 3 additional charges for **both** flights. Allow only one of the costs to be for a single flight M0 if any additional costs added FT 'their (£)236.88' + 'their (£)74' + 'their (£)234' + 'their (£)490.92' provided at least M1 awarded previously
(£) 1035.8(0)	A1	CAO A final answer of (**£)763.36** (return flights but only one journey for the additional charges) implies M1B0M1M1M0A0 A final answer of (**£)1526.72** (return flights counted twice) implies M1B1M1M1M0A0. If no marks awarded, SC1 for (**£)525.32** (outward flight only and £63.22 used for flight cost) Or SC1 for (**£)510.48** (return flight and (£)59.51 used for flight cost)
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.

<table>
<tr><td>2.(d) No and full explanation including appropriate calculation referring to cm ↔ mm conversion
e.g.
“55cm by 44cm by 25cm are all within the required dimensions”
“560mm by 450mm by 250mm, so Tomos’s rucksack are all within the required dimensions”
“550mm is less than 560mm AND 440mm is less than 450mm”
“55cm is less than 56cm AND 44cm is less than 45cm”</td><td>E2</td><td>Allow E1 for partial explanation
e.g.No and at least one correct conversion seen
• E2 explanation with one conversion error
• for sight of 55cm by 44cm by 25cm
• for sight of 560mm by 450mm by 250mm
• “the dimensions of Tomos’s rucksack are all within the required dimensions”
• “all Tomos’s dimensions are less”
• “550mm is less than 560mm”
• “440mm is less than 450mm”
• “55cm is less than 56cm”
• “44cm is less than 45cm”

Award E2 if Yes ticked and full explanation including appropriate calculation referring to cm ↔ mm conversion and that Tomos that would not have to pay, otherwise
E1 for Yes ticked but explanation clearly implying that the dimensions are within the requirements.</td></tr>
<tr><td>2.(e)
  </td><td>B1</td><td></td></tr>
<tr><td>3. ✓
Evidence of counting area
Area in range 39 – 45 (cm^2 or m^2)

Area ÷ 5(m^2)

Correct whole number of tins

(Cost of tins =) number of tins × (£)32.7(0)

Correct answer</td><td>M1
A1

M1

A1

M1

A1</td><td>Look at diagram

FT ‘their area’ ÷ 5(m^2)

Must be rounded up
<table><tr><th>Area</th><th>Tins</th><th>Cost</th></tr><tr><td>39, 40</td><td>8</td><td>(£) 261.6(0)</td></tr><tr><td>41, 42, 43, 44, 45</td><td>9</td><td>(£) 294.3(0)</td></tr></table>FT ‘their area’ ÷ 5(m^2) rounded up to a whole number

FT ‘their derived number of tins’ × (£)32.7(0)

FT only if whole numbers of tins × (£)32.7(0)

If no marks or only 1st M1 awarded, award
SC1 for sight of unsupported 8 or 9 tins
SC2 for 8 tins and (£) 261.6(0) OR
9 tins and (£) 294.3(0)</td></tr>
</table>

<table>
<tr><td>4(a)(i) 4/7 × 4.97 or 4.97 - 3/7 × 4.97

(£)2.84</td><td>M1

A1</td><td>Or equivalent (4.97 – 2.13).
Allow, for M1 only, use of
• 0.57 × 4.97
• 4.97 - 0.428 × 4.97
• 4.97 - 0.43 × 4.97
Do not allow use of 0.6 × 4.97 or 4.97 - 0.42 × 4.97

CAO</td></tr>
<tr><td>4(a)(ii) 2×8.5(0)×0.74 or 2×8.5(0) – 2×8.5(0)×0.26

(£)12.58</td><td>M1

A1</td><td>Or equivalent (17 –4.42)

If no marks, award SC1 for an answer of either
• (£)6.29 (one flag bought)
• (£)14.79 (only one of the 2 flags reduced by 26%)

If no marks in (i) and (ii), award SC1 in (ii) for answers of (£)2.13 and (£)4.42 respectively</td></tr>
<tr><td>4(b) $\frac{1}{3}$</td><td>B1</td><td></td></tr>
<tr><td>5. <u>Consistent</u> method to find cost per kg or quantity per £ or p, e.g.

<table><tr><td>Bird Feast</td><td>16(.)20 ÷ 12.55</td><td>12.55 ÷ 16(.)20</td></tr><tr><td>Cheep Feed</td><td>32(.)00 ÷ 25</td><td>25 ÷ 32(.)00</td></tr><tr><td>Kind to birds</td><td>15(.)60 ÷ 12</td><td>12 ÷ 15(.)60</td></tr></table>
<u>Consistent</u> accurate evaluation pence or £ per kg or quantity per £ or p, e.g.

<table><tr><td></td><td>£ (p) / kg</td><td>£ / 25kg</td><td>kg / p</td><td>kg / £</td></tr><tr><td>Bird Feast</td><td>1(.)29(08..)</td><td>32.27...</td><td>0.0077..</td><td>0.77...</td></tr><tr><td>Cheep Feed</td><td>1(.)28</td><td>32</td><td>0.0078 ...</td><td>0.78...</td></tr><tr><td>Kind to birds</td><td>1(.) 3(0)</td><td>32.50</td><td>0.00769 …</td><td>0.769…</td></tr></table>
Conclusion ‘Cheep Feed’</td><td>M2

A2

E1</td><td>A valid method is comparison in pairs, when cheaper of first pair used in further comparison
M1 for any 2 consistent calculations
M0 for any 1 calculation shown

Consistent place value and any multiple of these

A1 for any 2 consistent evaluations

ISW
Consistent place value and any multiple of these

Do not accept Bird Feast truncated to (£)1.30 per kg unless (£)1.29(08...) seen previously

Allow 0.76 (kg / £) or 0.77 kg / £ for Kind to birds

FT provided at least M1, A1 previously awarded for appropriate conclusion based on all 3 being considered</td></tr>
<tr><td>6(a) 4</td><td>B1</td><td></td></tr>
<tr><td>6(b) 21</td><td>B1</td><td></td></tr>
<tr><td>6(c) 24</td><td>B1</td><td></td></tr>
<tr><td>6(d) $100 \times \frac{4}{34}$ or $100 \times 4 \div 34$

11.8 (%)</td><td>M2

A2</td><td>M1 for 100 multiplied by a fraction with either the correct numerator, or the correct denominator, except
M0 for 100 × 4 ÷ 100
OR
M1 for sight of $\frac{4}{34}$ or 4 ÷ 34
CAO. Must be correct to1 decimal place
A1 for 11.7(...%)</td></tr>
</table>

7(a)(i) Angle 55° (±2°) or 15.277...(%) (±0.55...%)	B1	Sight of 55 ignoring any incorrect units is B1 only, until used in a relevant calculation
1080 × 55 (±4) ÷ 360 or 3 × 55 (±4) or 1080 × 15.277... (±1.11..)	M1	FT for M1 only if the angle is out of tolerance but within ±4° or equivalent working with percentage ±1.11...%
165 (people)	A1	Ignore incorrect units given OR a whole number in the inclusive range 159 to 171 (people) only as FT from working with 55° ± 2° or 15.277..% ±0.55..% Do not FT beyond tolerance of ± 2° or ±0.55..% *Check diagram for angles or percentages*
7(a)(ii) Carrots 100° ±2° **and** Sprouts 35° ±2° or 27.77..% ±0.55% **and** 9.722..% ±0.55% or appropriate sight of 65° (±4)	B1	Both angles within tolerance
1080 × 100 (±2) ÷ 360 - 1080 × 35 (±2) ÷ 360, or 1080 × 65 (±4) ÷ 360 or 3 × 65 (±4) or 3 ×100 (±2) – 3 × 35 (±2) or $\frac{(100\ (\pm2) - 35\ (\pm2))}{360} \times 1080$ or equivalent	M1	FT 65 (±4) × 'their number of people per degree' FT for M1 only if one angle is out of tolerance but this one angle is within ±4° or equivalent working with percentage ±1.11...%
195 (people)	A1	OR a whole number in the inclusive range 183 to 207 (people) only as FT tolerance in angles or percentages *Check diagram for angles or percentages*
7(b) 420 - 420 × 3 ÷ 14 or 420 × (14 – 3) ÷ 14 (= 420 – 90)	M1	Allow use of × 0.21 as indication of 3 ÷ 14
330 (people)	A1	CAO
330 × 2 ÷ 3	M1	FT 'their derived 330', including use of 90
220 (people)	A1	(FT use of 90 gives an answer of 60) Allow FT answer not being a whole number
7(b) Alternative method *(Fraction who preferred frozen peas)* $\frac{11}{14} \times \frac{2}{3}$	*M1*	
$\frac{22}{42}$ *or equivalent*	*A1*	*ISW*
(Number who preferred frozen peas) $\frac{22}{42} \times 420$	*m1*	*FT from incorrect cancelling of 22/42 for m1 only (A0)*
220 (people)	*A1*	
8(a) Appropriate sight of (€) 6000	B1	Ignore £ for €
(Tax at 15%) 0.15× 6000 (= €900)	B1	If (a) is not attempted, accept calculations seen in (b)
8(b) (Tax at 22%) 0.22 × 20000 or 0.22 × (30000 – 10000) or equivalent	M2	Ignore £ for € M1 for 30000 – 10000 (= €20000)
(€) 4400	A1	CAO, not FT
Total tax due (€) 5300	A1	ISW FT 900 + 'their 4400' provided M2 previously awarded

GCSE MARKING SCHEME

AUTUMN 2020

GCSE
MATHEMATICS - NUMERACY
UNIT 1 – INTERMEDIATE TIER
3310U30-1

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: *Intermediate* Tier**	Mark	Comments
1. (Cost of strawberries) 20 – 6.8(0) − 1.5 × 4 (£) 7.2(0)	M2 A1	M1 for (Blueberries cost) 1.5 × 4 (=6) Award M2, A1 for appropriate sight of (£)7.2(0) irrespective of any further inappropriate working
(Mass of strawberries) (20 – 6.8(0) − 1.5 × 4) ÷ 3.6 or 7.2(0) ÷ 3.6	M1	In FT allow sight of 14.2(0) as indication of 20 – 6.8(0) attempted Allow convincing appropriate repeated addition FT provided there has been an attempt at a subtraction of the cost of blueberries from 20 – 6.8(0) (=13.2(0)), 20 or 6.8(0) and provided M1 previously awarded, e.g. • (20 – 1.5 × 4) ÷ 3.6 • (6.8(0) – 1.5 × 4) ÷ 3.6 OR FT (20 – 6.8(0) – 'their cost of blueberries') ÷ 3.6 provided 'their cost of blueberries' > (£)4
2 (kg)	A1	CAO. Must be from correct working If no marks, award SC1 for an answer of 3.6(6kg) or 3.67(kg) or 3.7(kg) (from (20 – 6.80) ÷ 3.6) An answer only of 2 kg is awarded all 5 marks (strictly provided no incorrect working seen - this is answer only). Any other answer only, such as '2 bags', is awarded no marks.

2(a) (Total of first year cost is purchase + insurance + food) 450 + 12 × 18 + 7 × 52 (450 + 216 + 364) (£) 1030	M2 A2	Allow food cost of 365 or 366 (from £1 per day) M1 for any one of: • a sum of 2 or 3 of amounts including any two of 450, 12 × 18 and 7 × 52 • 12 × 18 + 7 × n, where n = 48 to 51 inclusive • 450 + 7 × n, where n = 48 to 51 inclusive • sight of 216 **and** 364 or 365 or 366 Use of 365 days leads to (450 + 216 + 365 = £)1031 Use of 366 days leads to (450 + 216 + 366 = £)1032 A1 for sight of 450 + 216 + 364 or sum using 365 or 366 days FT from M1 for possible A2 (summing all 3 costs) with use of food costs for 48 to 51 weeks inclusive: • 48 weeks leads to (450 + 216 + 336 = £)1002 • 49 weeks leads to (450 + 216 + 343 = £)1009 • 50 weeks leads to (450 + 216 + 350 = £)1016 • 51 weeks leads to (450 + 216 + 357 = £)1023 or A1 for sight of the sum of 3 appropriate amounts (as given above), with products correctly evaluated OR FT from M2 or M1 for A1 for their final answer from a correctly evaluated sum in which at least 2 of the 3 amounts are correct. *Strict FT for adding their 3 amounts correctly or if they only have 2 amounts, adding their 2 amounts correctly*
Organisation and communication Writing	OC1 W1	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 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(b)(i) 25 ÷ 2.5 or 30 ÷ 2.5 OR for sight of 2.5 × 10 or 2.5 × 12 10 (inches) 12 (inches)	M1 A1 A1	Allow for sight of repeated addition, 10 or 12 lots of 2.5 to be added Either of the correct responses implies M1 If M1, A0, A0 also award SC1 if 'their 12' - 'their 10' = 2 Answer line takes precedence. An answer needs to be selected for A marks to be awarded, however if M1, A0, A0 awarded, also award SC1 for sight of 2.5 × 10 = 25 **and** 2.5 × 12 = 30
2(b)(ii) 6 × 2.2 or 8 × 2.2 13.2 (pounds) 17.6 (pounds)	M1 A1 A1	Either of the correct responses implies M1 If M1, A0, A0 also award SC1 if 'their 17.6' - 'their 13.2' = 4.4 Answer line takes precedence.

3(a)(i) 070(°) ± 3(°)	B1	
3(a)(ii) Corwen	B2	B1 for Llangollen or Llanrhaeadr or Llanfyllin
3(b) 3·5 cm represents 3·5 × 20 000 ÷ 100 m or 3·5 : 3·5 × 20 000 ÷ 100 or 3·5 × 200 700 (m)	M2 A1	Award M1 for any of the following: • 1 cm represents 200 m • 3·5 × 20 000 or 70 000 • 3·5 × 'their 20 000' where 'their 20 000' is from a place value error in conversion • a number with significant digit 7, any other digits are all zeros CAO
4. (x =) 110(°) (y =) 115(°) (z =) 73(°)	 B1 B1 B1	Mark answer space if completed, otherwise check diagram FT 'their 115(°)' – 42(°) correctly evaluated, i.e. check 'their y' - 'their z' = 42
5(a) 1	B1	
5(b) 2	B1	
5(c) Unambiguously stating or implying 'No' with working, e.g. shows any of: • 34 + 8 = 42 people with 1 or 2 attempts • the median is the 43rd person	E1	Allow for sight of 42 or 42.5 or 43 with indication of 'No'
6(a) (Cost of flags 4 × 40 =) 160(p) (Cost of muffin cases) (12 × 4 ÷ 16) × 22 or 3 × 22 (=) 66 (p) (Cost of ingredients) (12 × 4 ÷ 6) × 25 or 8 × 25 (=) 200 (p) (Money taken in selling 12 × 4 × 30 =) 1440(p) (Profit) 1440 – 160 – 66 – 200 (= 1440 – 4.26) 1014(p) or (£)10.14	 B1 M1 A1 M1 A1 B1 M1 A1	Shown in pence, accept in £. However, if units are incorrect penalise – 1 once only, unless corrected in further work *Mark final answers at each stage (then possible FT)* Accept use of 'their derived number of flags' as 'their 48 (4×12) flags' FT their consistent number of flags for all marks, then penalise -1 if 'their derived number of flags' ≠ 48 If previous M0, M0 award SC1 here for sight of any one of the following: • (number of packs of muffin cases) 12×4÷16 **and** (number of multiples of ingredients) 12×4÷6 • (number of packs of muffin cases =) 3 • (number of multiples of ingredients =) 8 FT the following: • 'their 160', provided from an attempt at 4×40, • 'their 1440', provided from an attempt at 12×4×30, • 'their 66' and 'their 200' provided at least 1 M1 mark has previously been awarded If units are given they must be correct

6(b) $\frac{400 - 80}{80}$ (× 100) or equivalent 400 (%)	M1 A1	
6(c) 78p	B1	
7(a)(i) Can't tell	B1	
7(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)'
7(b)(i) Unambiguously stating or implying 'No' with a reason, e.g. 'all scattered' 'no relationship',	E1	If a satisfactory reason is given ignore any further spurious comments Allow, e.g. 'no pattern', 'no trend', 'no steady plotted points', 'you can't draw a line of best fit', 'no steady line', 'they are not in a line', 'random points', 'points all over the place', 'plots are everywhere', 'no link' Do not accept, e.g. 'no correlation' 'there were lots of birds in the garden when the wind speed was low and high', 'too many outliers', 'spread far apart'
7(b)(ii) 7 (birds)	B1	
7(b)(iii) 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

8(a) 66.36 ÷ 6 × 11 or 66.36 ÷ 6 × (1 + 4 + 6) or 66.36 ÷ 6 + 4 × 66.36 ÷ 6 + 66.36 (= 11.06 + 44.24 + 66.36) or equivalent	M2	M1 for sight of 66.36 ÷ 6 or 11.06, or for sight of '11.6(0)' (*Note if ×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)*
(£) 121.66	A1	CAO If no marks, award SC1 for an answer of (£)182.49 (from 11 × 66.36 ÷ 4)
8(b) (First year increased charge) 24 × 0.05 + 24 or 24 + 24 ÷ 10 ÷ 2 or equivalent	M1	
(£) 25.2(0)	A1	Accept 2520(p). Ignore units given
(Second year increased charge) 25.2(0) × 0.05 + 25.2(0) or 25.2(0) + 25.2(0) ÷ 10 ÷ 2 or equivalent	M1	FT 'their 25.2(0)'
(Increased charge after 2 years is) (£) 26.46	A1	Accept 2646(p). If units are given they must be correct An answer of (£)26.4(0) (from 24 + 2 × 1.20) implies M1, A1, m0, A0 Sight of 24 × 1.05^2 implies M2, also award A1 for 24 × 1.1025
8(c) ½ ×(2.2 + 1.8) × height trapezium + 2.2 × 2 = 6.8	M2	M1 only if brackets omitted for sum of parallel sides in the overall calculation unless dealt with correctly in further working, OR M1 for ½ ×(2.2 + 1.8) × height trapezium (brackets must be given or any 'missing brackets' implied by correct interpretation)
2 × height trapezium = 2.4 or height trapezium = 1.2	A1	
(Overall length =) 3.2 (m)	A1	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 × 2 = 2.4 is SC1
8(c) Alternative method 1: *(2+ht trap)×2.2 – 2×½×[(2.2 – 1.8) ÷ 2] ×ht trap = 6.8*	*M2*	*M1 for ½×[(2.2 – 1.8) ÷ 2] ×height trapezium or* *2×½×[(2.2 – 1.8) ÷ 2] × height trapezium*
Height of trapezium = 1.2	*A1*	
(Overall length =) 3.2 (m)	*A1*	*FT 'their 1.2' + 2 provided at least M1 previously awarded*
8(c) Alternative method 2: *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]* *+ overall length×1.8 =6.8*	*M2*	*M1 for ½×(2+overall length)× [(2.2 – 1.8) ÷ 2] or* *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]*
(Overall length =) 3.2 (m)	*A2*	*A1 for 2 × Overall length = 6.4 or correct simplified equation in terms of overall length*
9.Unambiguous vertical line 5 cm ± 2 mm from fence	B1	
Angle bisector between house and fence ± 2°	B1	Accept a horizontal line drawn from the fence, 5cm (± 2 mm) away from the house
Correct intersection, position of the tree	B1	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

10(a) (600 ÷ 8 =) 75 1st 25; 2nd 100; 3rd 175; 4th 250; 5th 325; 6th 400; 7th 475; 8th 550	B1 B1	May be seen amongst other inappropriate working, but not from 75 written in the table FT 'their 600 ÷ 8' incorrectly evaluated
10(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,
11(a) (280 – 100 + 500) ÷ 50 or (280 – 100) ÷ 50 + 500 ÷ 50 (Sell each ticket for) (£) 13.6(0)	M2 A1	M1 for sight of any one of the following: • (280 + 500) ÷ 50 (= £15.60) • (280 – 100) ÷ 50 (= £3.60) • (– 100 + 500) ÷ 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 ÷ 50 correctly evaluated as (£)10, allow if embedded within other calculation
11(a) Alternative method: *(1000 – 100) ÷ 250 + 500 ÷ 50* *or equivalent using any two points on the line, e.g.* *(460 -100) ÷ 100 + 500 ÷ 50* *(640 -100) ÷ 150 + 500 ÷ 50* *(£) 13.6(0)*	*M2* *A1*	*M1 for sight of any one of the following, or equivalent:* • *(1000 – 100) ÷ 250 (= £3.60)* • *(460 -100) ÷ 100 (= £3.60)* • *(640 -100) ÷ 150 (= £3.60)* • *'an overall cost' - 100 / 'number of people for that overall cost'* • *1000 ÷ 250 + 500 ÷ 50 (= £14)* • *460 ÷ 100 + 500 ÷ 50 (= £14.60)* • *640 ÷ 150 + 500 ÷ 50 (= £ 14.26 or £14.27)* • *'an overall cost' / 'number of people for that overall cost' + 500 / 50* *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 ÷ 50 correctly evaluated as (£)10, allow if embedded within other calculation*

11(b) Considering a factor of 400 (200, 100 or 50) people or other suitable point, excluding £500 for charity, e.g. • 'an overall cost' - 100 / 'number of people for that overall cost' • (200 people) (820 – 100) ÷ 200, • (100 people) (460 – 100) ÷ 100, • (50 people) (280 – 100) ÷ 50 (Charity contribution) 500 ÷ 400 (Total) (£) 4.85	M1 M1 A1	FT 'their 'an overall cost' - 100 / '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 ÷ 200 + 1.25 = £) 5.35 • (460 ÷ 100 + 1.25 = £) 5.85 • (280 ÷ 50 + 1.25 = £) 6.85 • correctly evaluated 'an overall cost' / 'number of people for that overall cost' + 1.25
11(b) Alternative method: *Considering total cost for 400 people, e.g.* *(400 ÷ 50) × (280–100) + 500 or 8 × 180 + 500* *or 1440 + 500* *or (400 ÷ 100) × (460–100) + 500 or 4 × 360 + 500* *or (400 ÷ 200) × (820–100) + 500 or 2 × 720 + 500* *or equivalent* *÷ 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 × 280 + 500) ÷ 400* *or SC2 for answer (£)6.85* *or SC1 for (4 × 460 + 500) ÷ 400* *or SC2 for answer (£)5.85* *or SC1 for (2 × 820 + 500) ÷ 400* *or SC2 for answer (£)5.35*
12(a) 1×10^6 (mm^2)	B2	Allow 10^6 (mm^2) B1 for any one of the following • a calculated area 1 000 000 (mm^2), 1000^2, $(10^3)^2$ or equivalent • 'their clearly written number' written correctly in standard form
12(b) 2700 ÷ (0.)9(0) or equivalent ÷ (0.)75 or equivalent 4000 (cm^2)	 M1 M1 A2	M marks can be awarded in either order Sight of 2700 ÷ (0.9 × 0.75) is awarded M2 A1 for 2700 ÷ 0.9 = 3000 or 2700 ÷ 0.75 = 3600 or for 2700 ÷ 0.675 or for an appropriate FT division correctly evaluated *(Note: sight of 2700 ÷ 0.675 is awarded M2 A1)*

13.		<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>
(Area of cross-section) $6 \times ½ \times 30 \times (52 \div 2)$	M3	M2 for $½ \times 30 \times (52 \div 2)$ (= 390) M1 for any **use of** $52 \div 2$ (= 26) (May be embedded)
$2340\ (mm^2)$	A1	
(Volume of the box) $234000\ (mm^3)$ OR for a comparison $2340\ (mm^2) > 2300\ (mm^2)$	A1	FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded
13. Alternative method (trapezia) *(Area of cross-section) $2 \times ½ \times (52 \div 2) \times (30 + 2 \times 30)$*	*M3*	*M2 for $½ \times (52 \div 2) \times (30 + 2 \times 30)$ (= 1170)* *M1 for use of $52 \div 2$ (= 26)*
$2340\ (mm^2)$	*A1*	
(Volume of the box) $234000\ (mm^3)$ *OR* *for a comparison $2340\ (mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
13. Alternative method (½absinC) *(Area of cross-section) $6 \times ½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$*	*M3*	*M2 for $½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$* *M1 for (6 ×) $½ \times 30 \times 30 \times \sin 60°$*
$1350\sqrt{3}$ or $2338(.2\ mm^2)$ or $2340\ (mm^2)$	*A1*	
(Volume of box) $233820\ mm^3$ or $234000\ (mm^3)$ *OR* *for a comparison $2338(.2\ mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
13. Alternative method (triangle area) *(Area of triangle) $½ \times 30 \times (52 \div 2)$*	*M2*	*(= 390)*
(Minimum area of triangle required) $2300 \div 6$	*M1*	
$383(.33...)$	*A1*	
Comparison $390 > 383(.33...)$	*A1*	

GCSE MARKING SCHEME

AUTUMN 2020

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

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

<table>
<tr><th>GCSE Mathematics Numeracy
Unit 2: Intermediate Tier</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1(a)(i) 4/7 × 4.97 or 4.97 - 3/7 × 4.97

(£)2.84</td><td>M1

A1</td><td>Or equivalent (4.97 – 2.13).
Allow, for M1 only, use of
• 0.57 × 4.97
• 4.97 - 0.428 × 4.97
• 4.97 - 0.43 × 4.97
Do not allow use of 0.6 × 4.97 or 4.97 - 0.42 × 4.97

CAO</td></tr>
<tr><td>1(a)(ii) 2×8.5(0)×0.74 or 2×8.5(0) – 2×8.5(0)×0.26

(£)12.58</td><td>M1

A1</td><td>Or equivalent (17 –4.42)

If no marks, award SC1 for an answer of either
• (£)6.29 (one flag bought)
• (£)14.79 (only one of the 2 flags reduced by 26%)

If no marks in (i) and (ii), award SC1 in (ii) for answers of (£)2.13 and (£)4.42 respectively</td></tr>
<tr><td>1(b) $\frac{1}{3}$</td><td>B1</td><td></td></tr>
<tr><td>2. <u>Consistent</u> method to find cost per kg or quantity per £ or p, e.g.

<table><tr><td>Bird Feast</td><td>16(.)20 ÷ 12.55</td><td>12.55 ÷ 16(.)20</td></tr><tr><td>Cheep Feed</td><td>32(.)00 ÷ 25</td><td>25 ÷ 32(.)00</td></tr><tr><td>Kind to birds</td><td>15(.)60 ÷ 12</td><td>12 ÷ 15(.)60</td></tr></table>
<u>Consistent</u> accurate evaluation pence or £ per kg or quantity per £ or p, e.g.

<table><tr><td></td><td>£ (p) / kg</td><td>£ / 25kg</td><td>kg / p</td><td>kg / £</td></tr><tr><td>Bird Feast</td><td>1(.)29(08..)</td><td>32.27...</td><td>0.0077..</td><td>0.77...</td></tr><tr><td>Cheep Feed</td><td>1(.)28</td><td>32</td><td>0.0078 ...</td><td>0.78...</td></tr><tr><td>Kind to birds</td><td>1(.) 3(0)</td><td>32.50</td><td>0.00769 …</td><td>0.769…</td></tr></table>
Conclusion ‘Cheep Feed’</td><td>M2

A2

E1</td><td>A valid method is comparison in pairs, when cheaper of first pair used in further comparison
M1 for any 2 consistent calculations
M0 for any 1 calculation shown

Consistent place value and any multiple of these

A1 for any 2 consistent evaluations

ISW
Consistent place value and any multiple of these

Do not accept Bird Feast truncated to (£)1.30 per kg unless (£)1.29(08...) seen previously

Allow 0.76 (kg / £) or 0.77 kg / £ for Kind to birds

FT provided at least M1, A1 previously awarded for appropriate conclusion based on all 3 being considered</td></tr>
<tr><td>Organisation and communication

Writing</td><td>OC1

W1</td><td>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

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.</td></tr>
</table>

3(a) 4	B1	
3(b) 21	B1	
3(c) 24	B1	
3(d) $100 \times \frac{4}{34}$ or $100 \times 4 \div 34$ 11.8 (%)	M2 A2	M1 for 100 multiplied by a fraction with either the correct numerator, or the correct denominator, except M0 for $100 \times 4 \div 100$ OR M1 for sight of $\frac{4}{34}$ or $4 \div 34$ CAO. Must be correct to1 decimal place A1 for 11.7(...%)
4(a)(i) Angle 55° (±2°) or 15.277...(%) (±0.55...%) 1080 × 55 (±4) ÷ 360 or 3 × 55 (±4) or 1080 × 15.277... (±1.11..) 165 (people)	B1 M1 A1	Sight of 55 ignoring any incorrect units is B1 only, until used in a relevant calculation FT for M1 only if the angle is out of tolerance but within ±4° or equivalent working with percentage ±1.11...% Ignore incorrect units given OR a whole number in the inclusive range 159 to 171 (people) only as FT from working with 55° ± 2° or 15.277..% ±0.55..% Do not FT beyond tolerance of ± 2° or ±0.55..% *Check diagram for angles or percentages*
4(a)(ii) Carrots 100° ±2° **and** Sprouts 35° ±2° or 27.77..% ±0.55% **and** 9.722..% ±0.55% or appropriate sight of 65° (±4) 1080 × 100 (±2) ÷ 360 - 1080 × 35 (±2) ÷ 360, or 1080 × 65 (±4) ÷ 360 or 3 × 65 (±4) or 3 ×100 (±2) – 3 × 35 (±2) or $\frac{(100\ (\pm2) - 35\ (\pm2))}{360} \times 1080$ or equivalent 195 (people)	B1 M1 A1	Both angles within tolerance FT 65 (±4) × 'their number of people per degree' FT for M1 only if one angle is out of tolerance but this one angle is within ±4° or equivalent working with percentage ±1.11...% OR a whole number in the inclusive range 183 to 207 (people) only as FT tolerance in angles or percentages *Check diagram for angles or percentages*
4(b) 420 - 420 × 3 ÷ 14 or 420 × (14 – 3) ÷ 14 (= 420 – 90) 330 (people) 330 × 2 ÷ 3 220 (people)	M1 A1 M1 A1	Allow use of × 0.21 as indication of 3 ÷ 14 CAO FT 'their derived 330', including use of 90 (FT use of 90 gives an answer of 60) Allow FT answer not being a whole number
4(b) Alternative method *(Fraction who preferred frozen peas)* $\frac{11}{14} \times \frac{2}{3}$ $\frac{22}{42}$ *or equivalent* *(Number who preferred frozen peas)* $\frac{22}{42} \times 420$ *220 (people)*	*M1* *A1* *m1* *A1*	*ISW* *FT from incorrect cancelling of 22/42 for m1 only (A0)*

5. Total number of half-days 185, 304 and 165 AND total number of pupils in Year 11 is 140 (238 + 185 + 304 + 270 + 165) ÷ 140 or 1162 ÷ 140 8.3 (half-days)	B1 M1 A1	 FT ' their total of number of half days' ÷ 'their 140' Must be from a correct evaluated total for 'their entries for the number of half days' ISW
6(a) Appropriate sight of (€) 6000 (Tax at 15%) 0.15× 6000 (= €900)	B1 B1	Ignore £ for € If (a) is not attempted, accept calculations seen in (b)
6(b) (Tax at 22%) 0.22 × 20000 or 0.22 × (30000 – 10000) or equivalent (€) 4400 Total tax due (€) 5300	 M2 A1 A1	Ignore £ for € M1 for 30000 – 10000 (= €20000) CAO, not FT ISW FT 900 + 'their 4400' provided M2 previously awarded

7(a) 3 150 000 - 0.85 × 3 150 000 (=3 150 000 - 2 677 500) or 0.15 × 3 150 000 472 500 (people)	M1 A1	
7(b) (Aged 75 or over who used internet) (0.4 × 286 500 =) 114 600 (Population who used the internet) (0.85 × 3 150 000 =) 2 677 500 $\frac{114\,600}{2\,677\,500}$ (× 100) 4.3 (%)	B1 B1 M1 A2	May be implied in further working. May be implied in further working. FT 3 150 000 – 'their 472 500' (from (a)) FT provided both 0.4 × 286 500 and 0.85 × 3 150 000 attempted Must be correct to 2 significant figures. A1 for 4.28(0...%) or from correct working 4(%) or 4.2(%) If no marks, award SC1 for an answer of 9.1(%) from $\frac{286\,500}{3\,150\,000} \times 100$ If B1 awarded, also award SC1 for *3.638...(%) or 10.7...(%) or with appropriate rounding or truncation OR SC2 for 3.6 (%) or 11 (%),* *from:* $\frac{114600}{3150000} \times 100 = 3.638...(\%) = 3.6\ (\%)$ *or* $\frac{286500}{2677500} \times 100 = 10.7...(\%) = 11\ (\%)$

8. (35000 acres ≈) 35000 × 0.00405 141.75 (km^2) (Food per km^2) 3 400 000 ÷ 141.75 Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)	 M1 A1 M1 A1	*Sight of, for example, 3500 or 0.0405 are treated as MR-1 (from first accuracy mark) in addition to any place value error in 'their 3.4 million'* Allow 141.8 May be implied by further working Allow 3.4 (million) ÷ 141.75 Allow place value error in 'their 3.4 million' FT 'their 141.75', provided derived from a calculation involving 35000 and 0.00405 (Actual answer is 23985.89… tonnes) Do not FT from place value error in 'their 3.4 million' FT for equivalent range, e.g. use of 141.8 gives 23977(.433 tonnes)) so accept answers in the range 23977 to 24000 tonnes
8. Alternative method 1: *(tonnes / acre) 3 400 000 ÷ 35000* *97.1(428….)* *(per km^2) 97.1(428….) ÷ 0.00405* *Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)*	*M1* *A1* *M1* *A1*	*Allow 3.4 (million) ÷ 35000* Allow place value error in 'their 3.4 million' *Do not FT from place value error in 'their 3.4 million'* *May be implied by further working* *FT from place value error in 'their 3.4 million'* *FT 'their 97.1(428….)' provided derived from a calculation involving 3 400 000 and 35 000* *(Actual answer is 23985.89… tonnes)* *Note: Accuracy for place value error in 'their 3.4 million' must be penalised once only on first occurrence*
8. Alternative method 2: *3 400 000 ÷ 0.00405* *839506172.8(….)* *839506172.8(….) ÷ 35000* *Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)*	*M1* *A1* *M1* *A1*	*Allow 3.4 (million) ÷ 0.00405* *Allow place value error in 'their 3.4 million'* *Do not FT from place value error in 'their 3.4 million'* *May be implied by further working* *FT from place value error in 'their 3.4 million'* *FT 'their 839506172.8(….)' provided derived from a calculation involving 3 400 000 and 0.00405* *(Actual answer is 23985.89… tonnes)* *Note: Accuracy for place value error in 'their 3.4 million' must be penalised once only on first occurrence*

9(a) 375 ÷ 1.6 or 375 × 5 ÷ 8 or equivalent 234(.375 mph)	M1 A1	Allow use of ÷1.6 to ÷1.613, ×0.62 to ×0.625 Accept 234.4 (mph) Allow 234.3(... mph)
9(b) 260.5 ÷ 78 ÷ 155.552 × 60 1.288(.... minutes)	 M1 M1 M1 A1	<u>Method marks can be awarded in any order but the operation must be unique (not contradicted or repeated in the working)</u> (Lap distance km) (Average lap time in hours) (Average lap time in minutes) Award M3 for sight of $\frac{260.5 \times 60}{78 \times 155.552}$ CAO, accept rounded to 1.29 (minutes) or 1.3 (minutes) or 1 minute 17(.29...) seconds If no marks, award SC1 for equivalent operations used without 260.5 or with use of an incorrect 260.5, i.e. $\frac{60}{78 \times 155.552}$, 60 ÷ 78 ÷ 155.552 or equivalent
9(c) 250	B1	
9(d) 250 ÷ 1.38 × 1.14 ÷ 12 17(.21... million €)	 M1 M1 M1 A1	<u>Method marks can be awarded in any order but the operation must be unique (not contradicted or repeated in the working)</u> Ignore place value errors in working with ‘millions’ for M marks (= £181.1594... million) (= €206.5217... million) Award M3 for sight of $\frac{250 \times 1.14}{1.38 \times 12}$ CAO. Allow final answer written in full. Allow ‘millions’ not written in the answer If no marks, award SC1 for equivalent operations used without 250, i.e. $\frac{1.14}{1.38 \times 12}$ or 1.14 ÷ 1.38 ÷ 12 or equivalent

10. (Greatest total length of pictures) 21.5 + 22.5 + 23.5 + 24.5 + 26.5 or 21 + 22 + 23 + 24 + 26 + 5 × 0.5 (=) 118.5 (cm) (Lower bound of shelf) 117.5(cm) Difference of 1 cm stated or sight of 118.5 – 117.5 = 1(cm)	 M1 A1 B1 B1	Allow 0.4999(....) for 0.5 throughout, must clearly be a recurring 9 digit Allow for **sight** of upper bounds of pictures: 21.5(cm), 22.5(cm), 23.5(cm), 24.5(cm), 26.5(cm) CAO from use of appropriate correct upper bounds and lower bound Accept FT from clearly **recurring** 9s, as 0.9999999…. is considered as equivalent to 1 Accept 117.5 – 118.5 = -1(cm) Allow 117.5 – 118.5 = 1(cm difference) If no marks, award SC1 for correct **sum** of 'their upper bounds' provided they are all increased but less than 0.5cm greater than the measurements given in the question
11(a) 6 550 000 000 × 0.02 or 6 550 000 000 ÷ 50 (£) 1.31×10^8	M1 A2	A1 for (£)131 million or (£)131 000 000 or equivalent (e.g. 131×10^6) If no marks, award SC1 for sight of (£)1.31×10^{10} (from 6 550 000 000 × 2)
11(b) $\pi \times (25.9 \div 2)^2 \times 2.03$ Answer in the range 1068 (mm^3) to 1070 (mm^3)	M2 A1	Allow M1 for sight of any of the following: • $\pi \times 25.9^2 \times 2.03$ • 4275.8 to 4279 • 1361.7(...) π • $\pi \times ((25.9)^2 \div 2) \times 2.03$ • 2137.9(...) to 2139.(...) • 680.8π to 680.9π CAO. ISW Accept an answer of 340.4(….)π

12(a) $\tan x = \frac{3.9}{56.7}$ (x =) $\tan^{-1}$ 3.9/56.7 or (x =) $\tan^{-1}$ 0.06878.... (x =) 3.93(°)	M1 m1 A2	A1 for (x =) 3.9(3...°) from correct working An unsupported answer of 3.9 is M0, m0, A0
12(a) Alternative method *(slant height^2 = 3.9^2 + 56.7^2, s = √3230.1, leading to) slant height 56.8(33... m)* ***and*** *either sin x = $\frac{3.9}{56.8(33...)}$ or cos x = $\frac{56.7}{56.8(33...)}$* *(x =) $\sin^{-1}$(3.9/56.8(33...)) or $\cos^{-1}$(56.7/56.8(33...))* *(x =) 3.93(°)*	*M1* *m1* *A2*	*A1 for (x =) 3.9(3...°) to 3.9(7...°) from correct working* *An unsupported answer of 3.9 is M0, m0, A0*
12(b) 56.7 × 9.36 ÷ 3.9 or 56.7 × 2.4 or equivalent 136(.08 cm)	M1 A1	Ignore place value errors due to change of units for M1 only If units are given they must be correct, accept answer in metres Allow answers from premature approximation in the range 136 (cm) to 136.1 (cm)
12(b) Alternative method *(Height of poster =) $\frac{9.36}{\tan 3.9(.....°)}$* *Answer in the range 136 (cm) to 137.3 (cm)*	*M1* *A1*	*FT from (a)* *M0 for tan 3.9(.....°) = $\frac{9.36}{\text{Height of poster}}$* *If units are given they must be correct, accept answer in metres*
13(a) 45 (cars)	B1	
13(b) Range correct (07:21 and 07:44) UQ and LQ correct (07:22.5 and 07:35) Median correct (07:25)	B1 B1 B1	Allow 07:21 to 07:22 and 07:44 to 07.45 Accept seen in working if not given on the box-and-whisker Accept seen in working if not given on the box-and-whisker Penalise -1 if the structure of the box-and-whisker plot is not correct, ignore if end vertical lines not shown for whiskers

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) Day: Wednesday — Wind speed (m.p.h.): **1.5** Day: Friday — Wind speed (m.p.h.): **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
2(a) 66.36 ÷ 6 × 11 or 66.36 ÷ 6 × (1 + 4 + 6) or 66.36 ÷ 6 + 4 × 66.36 ÷ 6 + 66.36 (= 11.06 + 44.24 + 66.36) or equivalent	M2	M1 for sight of 66.36 ÷ 6 or 11.06, or for sight of '11.6(0)' (*Note if ×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)*
(£) 121.66	A1	CAO If no marks, award SC1 for an answer of (£)182.49 (from 11 × 66.36 ÷ 4)
2(b) (First year increased charge) 24 × 0.05 + 24 or 24 + 24 ÷ 10 ÷ 2 or equivalent	M1	
(£) 25.2(0)	A1	Accept 2520(p). Ignore units given
(Second year increased charge) 25.2(0) × 0.05 + 25.2(0) or 25.2(0) + 25.2(0) ÷ 10 ÷ 2 or equivalent	M1	FT 'their 25.2(0)'
(Increased charge after 2 years is) (£) 26.46	A1	Accept 2646(p). If units are given they must be correct An answer of (£)26.4(0) (from 24 + 2 × 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.

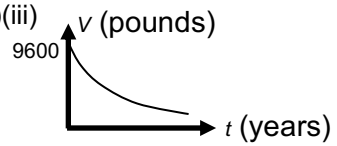
2(c) ½ ×(2.2 + 1.8) × height trapezium + 2.2 × 2 = 6.8	M2	M1 only if brackets omitted for sum of parallel sides in the overall calculation unless dealt with correctly in further working, OR M1 for ½ ×(2.2 + 1.8) × height trapezium (brackets must be given or any 'missing brackets' implied by correct interpretation)
2 × height trapezium = 2.4 or height trapezium = 1.2	A1	
(Overall length =) 3.2 (m)	A1	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 × 2 = 2.4 is SC1
2(c) Alternative method 1: *(2+ht trap)×2.2 – 2×½×[(2.2 – 1.8) ÷ 2] ×ht trap = 6.8*	*M2*	*M1 for ½×[(2.2 – 1.8) ÷ 2] ×height trapezium or* *2×½×[(2.2 – 1.8) ÷ 2] × height trapezium*
Height of trapezium = 1.2	*A1*	
(Overall length =) 3.2 (m)	*A1*	*FT 'their 1.2' + 2 provided at least M1 previously awarded*
2(c) Alternative method 2: *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]* *+ overall length×1.8 =6.8*	*M2*	*M1 for ½×(2+overall length)× [(2.2 – 1.8) ÷ 2] or* *2×½×(2+overall length)× [(2.2 – 1.8) ÷ 2]*
(Overall length =) 3.2 (m)	*A2*	*A1 for 2 × Overall length = 6.4 or correct simplified equation in terms of overall length*
3.Unambiguous vertical line 5 cm ± 2 mm from fence	B1	
Angle bisector between house and fence ± 2°	B1	Accept a horizontal line drawn from the fence, 5cm (± 2 mm) away from the house
Correct intersection, position of the tree	B1	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 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
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) ÷ 50 or (280 – 100) ÷ 50 + 500 ÷ 50 (Sell each ticket for) (£) 13.6(0)	M2 A1	M1 for sight of any one of the following: • (280 + 500) ÷ 50 (= £15.60) • (280 – 100) ÷ 50 (= £3.60) • (– 100 + 500) ÷ 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 ÷ 50 correctly evaluated as (£)10, allow if embedded within other calculation
5(a) Alternative method: *(1000 – 100) ÷ 250 + 500 ÷ 50* *or equivalent using any two points on the line, e.g.* *(460 -100) ÷ 100 + 500 ÷ 50* *(640 -100) ÷ 150 + 500 ÷ 50* *(£) 13.6(0)*	*M2* *A1*	*M1 for sight of any one of the following, or equivalent:* • *(1000 – 100) ÷ 250 (= £3.60)* • *(460 -100) ÷ 100 (= £3.60)* • *(640 -100) ÷ 150 (= £3.60)* • *'an overall cost' - 100* *'number of people for that overall cost'* • *1000 ÷ 250 + 500 ÷ 50 (= £14)* • *460 ÷ 100 + 500 ÷ 50 (= £14.60)* • *640 ÷ 150 + 500 ÷ 50 (= £ 14.26 or £14.27)* • *'an overall cost'* + *500* *'number of people for that overall cost'* *50* *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 ÷ 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. • $\frac{\text{'an overall cost'} - 100}{\text{'number of people for that overall cost'}}$ • (200 people) (820 – 100) ÷ 200, • (100 people) (460 – 100) ÷ 100, • (50 people) (280 – 100) ÷ 50 (Charity contribution) 500 ÷ 400 (Total) (£) 4.85	M1 M1 A1	FT 'their $\frac{\text{'an overall cost'} - 100}{\text{'number of people for that overall cost'}}$' 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 ÷ 200 + 1.25 = £) 5.35 • (460 ÷ 100 + 1.25 = £) 5.85 • (280 ÷ 50 + 1.25 = £) 6.85 • correctly evaluated $\frac{\text{'an overall cost'}}{\text{'number of people for that overall cost'}}$ + 1.25
5(b) Alternative method: *Considering total cost for 400 people, e.g.* *(400 ÷ 50) × (280–100) + 500 or 8 × 180 + 500* *or 1440 + 500* *or (400 ÷ 100) × (460–100) + 500 or 4 × 360 + 500* *or (400 ÷ 200) × (820–100) + 500 or 2 × 720 + 500* *or equivalent* *÷ 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 × 280 + 500) ÷ 400* *or SC2 for answer (£)6.85* *or SC1 for (4 × 460 + 500) ÷ 400* *or SC2 for answer (£)5.85* *or SC1 for (2 × 820 + 500) ÷ 400* *or SC2 for answer (£)5.35*
6(a) 1×10^6 (mm^2)	B2	Allow 10^6 (mm^2) B1 for any one of the following • a calculated area 1 000 000 (mm^2), 1000^2, $(10^3)^2$ or equivalent • 'their clearly written number' written correctly in standard form
6(b) 2700 ÷ (0.)9(0) or equivalent ÷ (0.)75 or equivalent 4000 (cm^2)	 M1 M1 A2	M marks can be awarded in either order Sight of 2700 ÷ (0.9 × 0.75) is awarded M2 A1 for 2700 ÷ 0.9 = 3000 or 2700 ÷ 0.75 = 3600 or for 2700 ÷ 0.675 or for an appropriate FT division correctly evaluated *(Note: sight of 2700 ÷ 0.675 is awarded M2 A1)*

7.		<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>
(Area of cross-section) $6 \times ½ \times 30 \times (52 \div 2)$	M3	M2 for $½ \times 30 \times (52 \div 2)$ (= 390) M1 for any **use of** $52 \div 2$ (= 26) (May be embedded)
$2340\ (mm^2)$	A1	
(Volume of the box) $234000\ (mm^3)$ OR for a comparison $2340\ (mm^2) > 2300\ (mm^2)$	A1	FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded
7. Alternative method (trapezia) *(Area of cross-section) $2 \times ½ \times (52 \div 2) \times (30 + 2 \times 30)$*	*M3*	*M2 for $½ \times (52 \div 2) \times (30 + 2 \times 30)$ (= 1170)* *M1 for use of $52 \div 2$ (= 26)*
$2340\ (mm^2)$	*A1*	
(Volume of the box) $234000\ (mm^3)$ *OR* *for a comparison $2340\ (mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
7. Alternative method (½absinC) *(Area of cross-section) $6 \times ½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$*	*M3*	*M2 for $½ \times 30 \times 30 \times \frac{\sqrt{3}}{2}$* *M1 for (6 ×) $½ \times 30 \times 30 \times \sin 60°$*
$1350\sqrt{3}$ or $2338(.2...\ mm^2)$ or $2340\ (mm^2)$	*A1*	
(Volume of box) $233820\ mm^3$ or $234000\ (mm^3)$ *OR* *for a comparison $2338(.2\ mm^2) > 2300\ (mm^2)$*	*A1*	*FT 'their 2340' × 100 correctly evaluated provided at least M2 previously awarded*
7. Alternative method (triangle area) *(Area of triangle) $½ \times 30 \times (52 \div 2)$*	*M2*	*(= 390)*
(Minimum area of triangle required) $2300 \div 6$	*M1*	
$383(.33...)$	*A1*	
Comparison $390 > 383(.33...)$	*A1*	

8(a) $4 \times \frac{8}{10} \times \frac{9000}{2000}$ or $4 \times 0.8 \times 4.5$ or equivalent $= 14.4$ or equivalent $= 15$ (needed)	 M2 A1 A1	A table method altering all 3 in the same manner at the same time is M0 M1 for correct use of 4 with either 8/10 or 9000/2000 e.g. Bricklayers Time Bricks 3.2 10 2000 OR 18 8 9000 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
Alternative method: *$\frac{2000}{8\times4}$ (=62.5 (bricks per hour per bricklayer))* *$\frac{9000}{2000\div(8\times4)\times10}$* *= 14.4 or equivalent* *= 15 (needed)*	*M1* *m1* *A1* *A1*	*Accept multiples of $2000\div(8\times4)\times10$ (= 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. $100x = 13.888\ldots$ and $1000x = 138.888\ldots$ or equivalent AND an attempt to subtract both sides $(x =) \frac{125}{900}$ or $\frac{1375}{9900}$ or $\frac{13875}{99900}$ 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 4/5 × 4/5', or 'It should be × 0.8^{2}', or 'Each year it would be valued at 4/5 of the previous year's value', or 'Each year he should be taking 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) $V = 9600 \times 0{\cdot}8^t$ or $V = 9600 \times (4/5)^t$ or equivalent	B3	Allow pound signs in their formula B2 for $9600 \times 0{\cdot}8^t$ or $9600 \times (4/5)^t$ or $V = 9600 \times \frac{4^t}{5}$ or V = initial price × $0{\cdot}8^t$ or V = initial price × $(4/5)^t$ B1 for sight of $0{\cdot}8^t$ or $(4/5)^t$ or $9600 \times \frac{4^t}{5}$ or $V = (9600 \times 0{\cdot}8)^t$ or initial price × $0{\cdot}8^t$ or initial price × $(4/5)^t$ or V = initial price × $\frac{4^t}{5}$ If no marks awarded: SC1 for $V = 9600 \times 0{\cdot}2^t$ or $V = 9600 \times (1/5)^t$ *or* SC1 for $V = 9600 \times a^t$, where $0{\cdot}5 < a < 1$
9(b)(iii)  	B1	
10(a) Uniform scale using intervals of 0.5	B2	B1 for sight of 15 ÷ 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 +) 10×2 + 10×2.5 + 20×0.85 + 30×0.1 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 75th percentile =) 40 (min) (Lower quartile = time for 25th percentile) 2x = 5 or (20 +) ¼ × 10 x = 2.5 or 5/2 or (20 +) 2.5 or 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÷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 × (number of a type of buoy made) ÷ 72 or (number of a type of buoy made) ÷ 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) $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times h = 10\pi$ or equivalent	M2	M1 for summing 2 terms and equating to 10π, with 1 term being correct
$\frac{4\pi h}{3} = 10\pi - \frac{16\pi}{3}$ or equivalent	m1	For isolating the h term FT from M1 All terms may have been multiplied by 3, or π cancelled
(h =) 3.5 or $\frac{7}{2}$ (m)	A1	CAO
(Height of buoy =) 5.5 or $\frac{11}{2}$ (m)	A1	FT for 'their h' + 2 provided M1m1 or M2m1 awarded
Alternative method 1: $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times(H-2) = 10\pi$ *or equivalent*	*M2*	*M1 for summing 2 terms and equating to 10π, with 1 term being correct*
$\frac{16\pi}{3} + \frac{4\pi H}{3} - \frac{8\pi}{3} = 10\pi$ *or equivalent*	*m1*	*FT from M1*
$\frac{4\pi H}{3} = 10\pi - \frac{16\pi}{3} + \frac{8\pi}{3}$ *or equivalent*	*m1*	*For isolating the H term* *FT from M1m1* *All terms may have been multiplied by 3, or π cancelled*
(Height of buoy =) 5.5 or $\frac{11}{2}$ *(m)*	*A1*	*CAO*
Alternative method 2: $\frac{2}{3}\times\pi\times2^3 + \frac{1}{3}\times\pi\times2^2\times(H-2) = 10\pi$ *or equivalent*	*M2*	*M1 for summing 2 terms and equating to 10π, with 1 term being correct*
$\frac{4\pi(H-2)}{3} = 10\pi - \frac{16\pi}{3}$ *or equivalent*	*m1*	*For isolating the (H – 2) term* *FT from M1* *All terms may have been multiplied by 3, or π cancelled*
(H – 2 =) 3.5 or $\frac{7}{2}$	*A1*	CAO
(Height of buoy =) 5.5 or $\frac{11}{2}$ *(m)*	*A1*	FT for 'their h' + 2 provided M1m1 or M2m1 awarded
12(a) (Area =) $\frac{1}{2}\times10\times(0+8+2(3+4.6+6.4))$ OR $\frac{1}{2}\times10\times(8+6+9.2+12.8)$	M2	Award M1 if only one value incorrect
= 180 (m)	A1	FT from M1
Alternative method: $\frac{(0+3)}{2}\times10 + \frac{(3+4.6)}{2}\times10 + \frac{(4.6+6.4)}{2}\times10 + \frac{(6.4+8)}{2}\times10$ *[15 + 38 + 55 + 72]*	*M2*	*M1 for the sum of these 4 areas with only 1 value (possibly repeated) incorrect*
= 180 (m)	*A1*	*FT from M1*

12(b) (Total distance =) 180 + 20×8 = 340 (m) (Average speed =) 340 ÷ 60 = 5.7 (ms^{-1})	M1 A1 m1 A2	FT 'their 180' from (a) FT 'their 340' A1 for 5.6(66…) or $5^4/_6$ 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

GCSE MARKING SCHEME

AUTUMN 2020

GCSE
MATHEMATICS - NUMERACY
UNIT 2 – HIGHER TIER
3310U60-1

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 2: Higher Tier**	Mark	Comments
1.		*Sight of, for example, 3500 or 0.0405 are treated as MR-1 (from first accuracy mark) in addition to any place value error in 'their 3.4 million'*
(35000 acres ≈) 35000 × 0.00405	M1	
141.75 (km^2)	A1	Allow 141.8 May be implied by further working
(Food per km^2) 3 400 000 ÷ 141.75	M1	Allow 3.4 (million) ÷ 141.75 Allow place value error in 'their 3.4 million' FT 'their 141.75', provided derived from a calculation involving 35000 and 0.00405
Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)	A1	(Actual answer is 23985.89… tonnes) Do not FT from place value error in 'their 3.4 million' FT for equivalent range, e.g. use of 141.8 gives 23977(.433 tonnes)) so accept answers in the range 23977 to 24000 tonnes
1. Alternative method 1: *(tonnes / acre) 3 400 000 ÷ 35000*	*M1*	*Allow 3.4 (million) ÷ 35000* Allow place value error in 'their 3.4 million'
97.1(428….)	*A1*	*Do not FT from place value error in 'their 3.4 million'* *May be implied by further working*
(per km^2) 97.1(428….) ÷ 0.00405	*M1*	*FT from place value error in 'their 3.4 million'* *FT 'their 97.1(428….)' provided derived from a calculation involving 3 400 000 and 35 000*
Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)	*A1*	*(Actual answer is 23985.89… tonnes)* *Note: Accuracy for place value error in 'their 3.4 million' must be penalised once only on first occurrence*
1. Alternative method 2: *3 400 000 ÷ 0.00405*	*M1*	*Allow 3.4 (million) ÷ 0.00405* *Allow place value error in 'their 3.4 million'*
839506172.8(….)	*A1*	*Do not FT from place value error in 'their 3.4 million'* *May be implied by further working*
839506172.8(….) ÷ 35000	*M1*	*FT from place value error in 'their 3.4 million'* *FT 'their 839506172.8(….)' provided derived from a calculation involving 3 400 000 and 0.00405*
Following correct working, answers in the range 23975 (tonnes) to 24 000 (tonnes)	*A1*	*(Actual answer is 23985.89… tonnes)* *Note: Accuracy for place value error in 'their 3.4 million' must be penalised once only on first occurrence*

Organisation & 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. (Aged 75 or over who used internet) (0.4 × 286 500 =) 114 600 (Population who used the internet) (0.85 × 3 150 000 =) 2 677 500 $\frac{114\,600}{2\,677\,500}$ (× 100) 4.3 (%)	B1 B1 M1 A2	May be implied in further working. May be implied in further working. FT provided both 0.4 × 286 500 and 0.85 × 3 150 000 attempted Must be correct to 2 significant figures. A1 for 4.28(0...%) or from correct working 4(%) or 4.2(%) If no marks, award SC1 for an answer of 9.1(%) from $\frac{286\,500}{3\,150\,000} \times 100$ If B1 awarded, also award SC1 for *3.638...(%) or 10.7...(%) or with appropriate rounding or truncation OR SC2 for 3.6 (%) or 11 (%),* *from:* $\frac{114600}{3150000} \times 100 = 3.638...(\%) = 3.6\ (\%)$ *or* $\frac{286500}{2677500} \times 100 = 10.7...(\%) = 11\ (\%)$
3(a) 375 ÷ 1.6 or 375 × 5 ÷ 8 or equivalent 234(.375 mph)	M1 A1	Allow use of ÷1.6 to ÷1.613, ×0.62 to ×0.625 Accept 234.4 (mph) Allow 234.3(…mph)
3(b) 260.5 ÷ 78 ÷ 155.552 × 60 1.288(.... minutes)	 M1 M1 M1 A1	<u>Method marks can be awarded in any order but the operation must be unique (not contradicted or repeated in the working)</u> (Lap distance km) (Average lap time in hours) (Average lap time in minutes) Award M3 for sight of $\frac{260.5 \times 60}{78 \times 155.552}$ CAO, accept rounded to 1.29 (minutes) or 1.3 (minutes) or 1 minute 17(.29...) seconds If no marks, award SC1 for equivalent operations used without 260.5 or with use of an incorrect 260.5, i.e. $\frac{60}{78 \times 155.552}$, 60 ÷ 78 ÷ 155.552 or equivalent
3(c) 250	B1	

3(d) 250 ÷ 1.38 × 1.14 ÷ 12 17(.21... million €)	 M1 M1 M1 A1	Method marks can be awarded in any order but the operation must be unique (not contradicted or repeated in the working) Ignore place value errors in working with 'millions' for M marks (= £181.1594... million) (= €206.5217... million) Award M3 for sight of $\frac{250 \times 1.14}{1.38 \times 12}$ CAO. Allow final answer written in full. Allow 'millions' not written in the answer If no marks, award SC1 for equivalent operations used without 250, i.e. $\frac{1.14}{1.38 \times 12}$ or 1.14 ÷ 1.38 ÷ 12 or equivalent
4. (Greatest total length of pictures) 21.5 + 22.5 + 23.5 + 24.5 + 26.5 or 21 + 22 + 23 + 24 + 26 + 5 × 0.5 (=) 118.5 (cm) (Lower bound of shelf) 117.5(cm) Difference of 1 cm stated or sight of 118.5 – 117.5 = 1(cm)	 M1 A1 B1 B1	Allow 0.4999(....) for 0.5 throughout, must clearly be a recurring 9 digit Allow for **sight** of upper bounds of pictures: 21.5(cm), 22.5(cm), 23.5(cm), 24.5(cm), 26.5(cm) CAO from use of appropriate correct upper bounds and lower bound Accept FT from clearly **recurring** 9s, as 0.9999999…. is considered as equivalent to 1 Accept 117.5 – 118.5 = -1(cm) Allow 117.5 – 118.5 = 1(cm difference) If no marks, award SC1 for correct **sum** of 'their upper bounds' provided they are all increased but less than 0.5cm greater than the measurements given in the question
5(a) 6 550 000 000 × 0.02 or 6 550 000 000 ÷ 50 (£) 1.31×10^8	M1 A2	 A1 for (£)131 million or (£)131 000 000 or equivalent (e.g. 131×10^6) If no marks, award SC1 for sight of (£)1.31×10^{10} (from 6 550 000 000 × 2)
5(b) $\pi \times (25.9 \div 2)^2 \times 2.03$ Answer in the range 1068 (mm^3) to 1070 (mm^3)	M2 A1	Allow M1 for sight of any of the following: • $\pi \times 25.9^2 \times 2.03$ • 4275.8 to 4279 • 1361.7(...) π • $\pi \times ((25.9)^2 \div 2) \times 2.03$ • 2137.9(...) to 2139.(...) • 680.8π to 680.9π CAO. ISW Accept an answer of 340.4(….)π

6(a) $\tan x = \frac{3.9}{56.7}$ $(x =)$ $\tan^{-1} 3.9/56.7$ or $(x =)$ $\tan^{-1} 0.06878....$ $(x =)$ 3.93(°)	M1 m1 A2	 A1 for $(x =)$ 3.9(3...°) from correct working An unsupported answer of 3.9 is M0, m0, A0
6(a) Alternative method *(slant height^2 = 3.9^2 + 56.7^2, s = √3230.1,* *leading to) slant height 56.8(33... m)* ***and*** *either* $\sin x = \frac{3.9}{56.8(33...)}$ *or* $\cos x = \frac{56.7}{56.8(33...)}$ *(x =)* $\sin^{-1}(3.9/56.8(33...))$ *or* $\cos^{-1}(56.7/56.8(33...))$ *(x =) 3.93(°)*	*M1* *m1* *A2*	 *A1 for (x =) 3.9(3...°) to 3.9(7...°) from correct working* *An unsupported answer of 3.9 is M0, m0, A0*
6(b) 56.7 × 9.36 ÷ 3.9 or 56.7 × 2.4 or equivalent 136(.08 cm)	M1 A1	Ignore place value errors due to change of units for M1 only If units are given they must be correct, accept answer in metres Allow answers from premature approximation in the range 136 (cm) to 136.1 (cm)
6(b) Alternative method *(Height of poster =)* $\frac{9.36}{\tan 3.9(.....°)}$ *Answer in the range 136 (cm) to 137.3 (cm)*	*M1* *A1*	*FT from (a)* *M0 for* $\tan 3.9(.....°) = \frac{9.36}{\text{Height of poster}}$ *If units are given they must be correct, accept answer in metres*
7(a) 45 (cars)	B1	
7(b) Range correct (07:21 and 07:44) UQ and LQ correct (07:22.5 and 07:35) Median correct (07:25)	B1 B1 B1	Allow 07:21 to 07:22 and 07:44 to 07.45 Accept seen in working if not given on the box-and-whisker Accept seen in working if not given on the box-and-whisker Penalise -1 if the structure of the box-and-whisker plot is not correct, ignore if end vertical lines not shown for whiskers

8(a) (Amount in account =) $2000 \times (1 + 0.0438/365)^{30}$ OR 2000×1.00012^{30}	M2	Allow use of 365.25 or 366 Use of 365.25 leads to 1.0001199… Use of 366 leads to 1.00011967… M1 for 1 error (not omission) e.g. • a place value error e.g. 4.38 instead of 0.0438, or M1 for $(1 + 0.0438/365)^{30}$ Note: Use of 12 with a power of 1, instead of 365 with a power of 30, would not be considered as 1 error as it is not of equivalent difficulty, and is M0
= (£) 2007.21(…)	A1	CAO Use of 365.25 leads to (£) 2007.20(7…) Use of 366 leads to (£) 2007.19(…) If no marks awarded, SC1 for answers of: • (£)2007.41(…) from use of 4.5%, 365 or • (£)2007.40(5…) from use of 4.5%, 365.25 or • (£)2007.39(…) from use of 4.5%, 366
8(b) (AER =) $\left(1 + \frac{0.045}{12}\right)^{12} - 1$	M1	
= 4.59 (%)	A2	A1 for 0.0459(39…%) or 4.59(39…)%, or A1 for 0.046 or 4.6% or 5% from correct working If no marks awarded, SC1 for 4.47 (%) (from use of nominal annual rate of 4.38%. Must be to 2d.p.)
9(a) (Width of rectangle/Base of triangle =) 1.3 (m)	B1	May be implied by use of 0.65 in further work
(Sloping length^2 =) $1.5^2 + 0.65^2$	M1	FT 'their 1.3/2'
Sloping length^2 = 2.6725 or (Sloping length =) $\sqrt{2.6725}$	A1	
(Sloping length =) 1.63(…) (m)	A1	FT from M1 for the correctly evaluated square root of 'their 2.6725' provided their answer > 1.5 If trigonometry used to calculate the sloping length, M1 for base angle = $\tan^{-1}(1.5/(1.3\div2))$ (= 66.5(71…°)) or apex angle = $\tan^{-1}((1.3\div2)/1.5)$ (= 23.4(28…°)) m1 for correct rearrangement of a sin or cos equation using their base or apex angle with 1.5 or 1.3÷2 A1 for (Sloping length =) 1.63(…) (m)
(Cost of wire mesh =) (2×0.5×1.3×1.5 + 2×1.63(…)×4.2) (× 5.6(0)) 1.95 m^2 13.69 to 13.73(…) m^2 (£) 10.92 (£) 76.66(…) to (£) 76.91	M2	FT 'their 1.63(…)' provided Pythagoras or trigonometry attempted and 'their 1.3' M1 for • 0.5×1.3×1.5 + 1.63(…)×4.2 or • …… + 2×1.63(…)×4.2 or • 2×1.63(…)×4.2 × 5.6(0) OR M1 for • 2×0.5×1.3×1.5 + …… or • 2×0.5×1.3×1.5 × 5.6(0) where Pythagoras or trigonometry may not have been attempted
= (£) 87.58 to (£) 87.83	A1	FT from previous M2 only Note: A sloping length of 1.6 (m) leads to an answer of (£)86.18(4)

9(b) $\sqrt[3]{\frac{27}{8}}$ or $\sqrt[3]{\frac{8}{27}}$ OR $\left(\frac{27}{8}\right)^2$ or $\left(\frac{8}{27}\right)^2$ or 3:2 or 2:3 or equivalent	B1	(= 1.5 or 0.666… OR 11.3(9…) or 0.08(7…))
$\left(\sqrt[3]{\frac{27}{8}}\right)^2$ OR $\left(\sqrt[3]{\frac{8}{27}}\right)^2$ or $3^2:2^2$ or $2^2:3^2$ or equivalent	B1	(= 2.25 OR 0.444…)
(Area of wire mesh =) $3 \times \left(\sqrt[3]{\frac{27}{8}}\right)^2$ or equivalent	M1	
= 6.75 (m^2)	A1	Accept 6.8 (m^2)
10. (Remaining balance =) $18000(1 + 0.0025)^{60} - 237.84\left(\frac{(1+0.0025)^{60}-1}{0.0025}\right)$	M2	(= (£)20 909.10(…) – (£)15 375.57(…)) Each expression may be seen in stages M1 for a subtraction involving 1 correct expression, OR for a subtraction with only one consistently substituted incorrect value
= (£)5533.52(7…) AND e.g. 'No, Dafydd would not have enough to pay off the loan'	A2	CAO Accept rounded answers e.g. (£)5533 or (£)5534 A1 for (£)5533.52(7…) or rounded answers without a correct conclusion, OR A1 for a correct calculation of (£)15 375.57(…)
11(a) (Distance travelled =) $\frac{85}{360} \times 2 \times \pi \times 110$	M1	
= 163 to 163.21 (cm)	A1	Or $\frac{935\pi}{18}$ or equivalent
11(b) (Length of rod =) $\sqrt{(110^2 + (110 - 16)^2 - 2\times110\times(110 - 16)\times\cos85(°))}$ $(=\sqrt{19133.6(192…)})$	M2	M1 for length^2 = $110^2+(110–16)^2 -2\times110\times(110–16)\times\cos85(°)$
= 138(.324…) (cm)	A1	
(Angle =) $\sin^{-1}\left(\frac{\sin 85(°)}{138(.324…)} \times (110 - 16)\right)$ OR	M2	FT 'their derived 138(.324…)' M1 for • $\frac{\sin(\text{angle})}{(110 – 16)} = \frac{\sin 85(°)}{138(.324…)}$ or equivalent or • $\sin(\text{angle}) = \frac{\sin 85(°)}{138(.324…)} \times (110 – 16)$
(Angle =) $\cos^{-1}\left(\frac{110^2+138(.324…)^2-(110-16)^2}{2\times110\times138(.324…)}\right)$ OR		OR M1 for • $(110−16)^2 = 110^2+138(.324…)^2 –2\times110\times138(.324…)\times\cos(\text{angle})$ or • $\cos(\text{angle}) = \frac{110^2 + 138(.324…)^2 – (110–16)^2}{2 \times 110 \times 138(.324…)}$
full complete method using the sine rule to find the angle at the top of the triangle and then use of angles in a triangle		OR M1 for finding the angle at the top of the triangle (52·2(6…) to 53 (°))
= 42·6 to 42·7(3…) (°)	A1	Accept 43 (°) from correct working

12(a) (Area of triangle AOB =) $\frac{1}{2} \times 30.9^2 \times \sin 150(^\circ)$ or equivalent full method = 238.7(025) or 239 (cm^2)	M1 A1	
12(b) Adding two equal sectors to the area of the triangle (Area of 2 sectors =) $(2 \times) \frac{(180 - 150)/2}{360} \times \pi \times 30.9^2$ = 249.8 to 250(.00…) (cm^2) (Number of litres that can be added =) (249.9(686…) + 238.7(025)) × 600 (÷1000) or (488.5 to 489) × 600 (÷1000) = 293 to 293.4 (litres)	S1 M1 A1 M2 A2	 May be embedded in a volume calculation i.e.× 600 Or $31827\pi/400$ (cm^2) May be implied by 488.5 to 489 (cm^2) (total area) May be implied by volume of 149800 to 150001 (cm^3) FT 'their 238.7(025)' and 'their 249.9(686…)' provided M1 previously awarded M1 (may be embedded within incorrect work) for • (249.9(686…) + 238.7(025)) or • (249.9(686…) + ……) × 600 OR M1 (may be embedded within incorrect work) for • (…… + 238.7(025)) × 600 where previous M1 may not have been awarded FT from M2 only A1 for 293 000 to 293 400 (cm^3)
Alternative method: *Area of semicircle subtract (area of the large sector – area of triangle)* *(Area of large sector =) $\frac{150}{360} \times \pi \times 30.9^2$ or equivalent* *= 1249 to 1250 (cm^2)* *(Number of litres that can be added =)* *($\pi \times 30.9^2 \div 2 - (1249.8(\ldots) - 238.7(025))) \times 600$ (÷1000)* *or ((1499 to 1500.01) – (1010…to 1011.3)) × 600 (÷1000)* *= 293 to 293.4 (litres)*	*S1* *M1* *A1* *M2* *A2*	 *May be embedded in a volume calculation i.e.× 600* *Or $31827\pi/80$ (cm^2)* *749 400 to 750 000 (cm^3) if volumes considered* *FT 'their 238.7(025)' and 'their 1249.8(…)' provided M1 previously awarded* *M1 (may be embedded within incorrect work) for* • *$\pi \times 30.9^2 \div 2 - (1249.8(\ldots) - 238.7(025))$ or* • *(1249.8(…) – 238.7(025)) × 600 or* • *($\pi \times 30.9^2 \div 2 - (1249.8(\ldots) - \ldots)) \times 600$* *OR* *M1 (may be embedded within incorrect work) for* • *($\pi \times 30.9^2 \div 2 - (\ldots - 238.7(025))) \times 600$* *where previous M1 may not have been awarded* *FT from M2 only* *A1 for 293 000 to 293 400 (cm^3)*