GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 1: Foundation Tier	Mark	Comments
1. (a) (3, 1)	B1	Answer line takes precedence Allow (03, 01) Do not accept (3X, 1Y)
1 (b) (-2, -3)	B1	Answer line takes precedence Do not accept (-2X, -3Y)
2(a) 8 (loaves of bread) 200 (grams of butter) 12 (tins of tuna) 56 (tomatoes)	B2	Award B1 for 2 or 3 correct Lines for answers take precedence over working space. If no marks, award SC1 for all values evaluated accurately using a consistent multiplier which is >2.
2(b) Cylinder	B1	
2(c) (Hall hire charge = 5 × 10 =) (£)50	B2	Award B1 for • 5 (hours) • 'their hours >1' × 10 evaluated correctly • Multiple of 10 (but not 10) which is then used in their total costs (and is extra to the given £60) B1 or B2 marks may be seen in the total costs.
(Total costs) (£)50 + (£)250 + (£)60 + (£)400 (£)760	M1 A1	FT 'their (£)50'
(Number of tickets need to sell) (£)760 ÷ (£)8	M1	FT 'their (£)760' including (£)710 (without hall costs)
95	A1	On FT their answer must be a whole number rounded up if necessary
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.

3(a) 20×(£)3 OR 19×(£)3 OR 20× (£)2.98 (£)60 OR (£)57 OR (£)59.60	M1 A1	Allow 20 ×(£)2.95 OR 20 × (£)2.90 (£)59 OR (£)58 Ignore Subsequent working if an estimate is seen
3(b) Overestimate indicated and correct suitable reason given e.g. 'Because 20 is more than 19 and (£)3 is more than (£)2.98' 'Because I rounded 2.98 up to 3' 'Because I rounded it up' 'Rounded 98p to £1' 'Rounded it up to the nearest whole number' 'Because I rounded both numbers up' 'Because the real numbers are less than the ones I used' 'Because my bags are 2p more than the party bags' 'There are only 19 bags and I used 20'	E1	Allow 'because you estimate to nearest 10' FT appropriate judgement based on **their estimate** seen in (a) e.g., 20 × (£)2.50 and underestimate given with reason as '2.50 is less than 2.98', award M0 A0 in (a) and E1 in (b) Allow statements that only refer to one value being estimated where both values have been rounded up. Do not accept 'Because I am over the real price' FT from **allowed** estimates in part (a) with 'can't tell' and a suitable reason given e.g., 'one is rounded up and the other rounded down.' If (a) is not attempted but a correct estimate for (a) is seen in (b) with appropriate judgement indicated and correct reason award E1

4(a)(i) Wednesday AND 10:00	B2	Allow Wednesday AND 10:00 – 11:00 or Wednesday AND 10:00 – 12:00 Award B1 for: • Wednesday • Friday AND 09:00 (-10:00 or – 11:00) • Tuesday AND 14:00 (-15:00 or – 16:00)
4(a)(ii) ((19 + 2 – 15) × 8 =) OR ((21 – 15) × 8=) 48	B2	Award B1 for: • ('their 19' + 2 – 15) × 8 correctly evaluated provided 'their 19' > 13 and 'their 19' is seen on the diagram or clearly stated as the hours completed without the extra 2 hours • ((19 – 15) × 8 =) 32 • ((19 + 1 – 15) × 8 =) 40 • ('their 21' – 15) × 8 correctly evaluated provided 'their 21' > 15 and 'their 21' is seen on the diagram or clearly stated as the hours completed with the extra 2 hours
4(b) 4·5 × 7 + 6 37·5 (litres)	M1 A1	
4(c) 4500	B1	
4(d) 6(cm) (±2mm) 6 × 0·4 (m) No AND 2·4 (metres) shown	B1 M1 A1	(5·8 (cm) to 6·2(cm)) May be seen or indicated on the diagram or from workings. FT 'their 6' seen or indicated × 0·4 (m) where 'their 6' is between 3 and 9 inclusive. FT their **correctly evaluated** 2·4 metres compared with 2·3 metres provided M1 awarded eg 5 × 0·4 (m) = 2(m) and Yes indicated Answer only of 2.4 (m) and any of the measurements below with No indicated gets B1 M1 A1 Measurement of: 5·8 cm gives 2·32 m 5·9 cm gives 2·36 m 6 cm gives 2·4 m 6·1 cm gives 2·44 m 6·2 cm gives 2·48 m **If no workings shown** and answer not from the list above, award SC1 for: • 2m, 2.04m, 2.08m, 2.12m, 2.16m, 2.2m, 2.24m, 2.28m and YES OR • 2.52m, 2.56m, 2.6m, 2.64m, 2.68m, 2.72m, 2.76m, 2.8 and NO (These values come from 5cm to 5.7cm and 6.3cm to 7cm) OR • 2.5m and NO

5(a) Gayle	B1	Do not accept 8·46 but accept Gayle and 8.46
5(b) 7·03	B1	Check the scoreboard
5(c) 7·95 – 6·31 or 795 - 631 1·64(m) or 164 (cm)	M1 A1	Allow any indication of attempting to find the difference between 7.95 and 6.31 If units are given they must be correct
5(d) Position / Name 1st – Gayle 2nd – Henderson 3rd – Echevarria	B1	Ignore any measurements given with the names
6(a) £3.80	B1	
6(b) 4 hours 20 minutes	B3	For B2 or B1, allow costs seen within repeated additions linked with the appropriate time B2 for sight of any of the following: • 260 minutes • £5.40 for 4 hours or for 240 minutes • ((£5.80 - £3) ÷ 40p =) 7 seen or implied **with** 7 lots of 20 minutes considered • 140 (minutes) (= 2 hours 20 minutes) • a final answer of 2 hours 20 minutes in the answer space B1 for sight of any of the following: • £4.20 for 3 hours or 2 hours 60 minutes, allow for 2.60 • (£5.80 - £3 =) £2.80 • (£5.80 - £3) ÷ 40p (= 7) • ((£5.80 - £3) ÷ 40p =) 7 allow for 7 provided it is **not** from incorrect working, it should be derived from 7 lots of 40p on to the £3, e.g. 7 lots of 40p. Ignore further incorrect working once awarded, such as an answer of 7 hours
7(a) 130 ≤ energy < 140	B1	Accept unambiguous indication, e.g. 130 – 140 Allow e.g.'130,140', '130 140' Do not accept the values 130, 140, 18 or a choice between the group and the frequency
7(b) Total of 37 (energy bars) $\frac{1 + 4 + 12}{37}$ $\frac{17}{37}$	B1 M1 A1	FT 'their 37' provided > 'their 1+4+12' Also allow **one** error in misreading 1 frequency, which impacts consistently on 'their denominator' and possibly 'their numerator' Only FT 'their 37' provided • 'their 37' is 36 or 38 or 39 or • 'their 37' is clearly from an addition error in calculating 1 + 4 + 12 + 18 + 2 ISW for incorrectly simplifying their fraction

7(c) (100 ×) $\frac{2}{18+2}$ or (100 ×) 1 – (100 ×) $\frac{18}{18+2}$ 10 (%)	M1 A1	FT any repeated misread of the scale from (b) Award 2 marks for an answer of 10(%) unless from incorrect working
8(a) 100 × 720 ÷ 360 or 260 × 720 ÷ 360 or for sight of 1° is 2 bags	M1	
200 (large bags sold) and 520 (small bags sold)	A2	A1 for 200 (large bags) or 520 (small bags) or for 'their number of large bags' + 'their number of small bags' = 720
(Total sales) 200 × (£)1(.)80 + 520 × 80(p) (= £360 + £416)	M1	Ignore incorrect units stated, mark intention Or equivalents all in p or all in £ Accept equivalent 720 × 80p + 200 × (£)1 FT for 'their 200 large bags' × (£)1.80 and 'their 520 small bags' × 80p, provided 'their 200' ≥ 50 and 'their 520' ≥ 130, 'their 520' ≠ 'their 200' and both are whole numbers
(£) 776	A2	CAO A1 for either • a correctly evaluated sum with one correct evaluation of a product or • on **FT** for the correct evaluation of 'their smaller value'×(£)1.80 + 'their larger value'×80p For example 100 × (£)1.80 + 260 × 80p = £388 is awarded M0 A0 M1 A1 If initial M1, A2 awarded also award SC1 for one of the following seen: • 200 × 80(p) + 520 × (£)1.80 = (£)1096 • £360 **and** £416 (no method mark as not added) If no marks, award SC1 for sight of 260(°)
8(b) Method to compare, e.g. • (Small bag per kg) 2.5 × 80 or 80×1000÷400 • (Per 100g) small 80p ÷ 4 and large £1.80÷ 10 • (g per penny) 400 ÷ 80 and 1000 ÷ 180 • (Per 200g) 80p ÷ 2 and £1.80 ÷ 5 • (Per 2000g) 5 × 80p and 2 × £1.80 • (Large bag per 400g) £1.80 × 0.4	M1	Needs to show comparing like quantity with like
Accurate comparison calculation, e.g. • (Small bag per kg) £2 • (Per 100g) small 20p and large18p • (g per penny) small 5g and large 5.5(5...) or 5.6g • (Per 200g) small 40p and large 36p • (Per 2000g) small £4 and large £3.60 • (Large bag per 400g) 72p **AND** Conclusion, Large bag (better value)	A1	If units are given they must be correct

9(a) 18 (g)	B1	
9(b) 15 – 12.5 or 5 × 0.5 2.5 (cm)	M1 A1	
9(c) Sight of 20 (cm) (Wingspan in inches is) 12 × 20 ÷ 30 or 20 × 0.4 8 (inches)	B1 M1 A1	 Allow 20 ÷ 2.5 or equivalent CAO
9(d) Positive (correlation)	B1	Do not accept a description
9(e) An answer in the inclusive range 18.5 (cm) to 22.5 (cm)	B1	
10. 420 - 420 × 35 ÷ 100 (= 420 – 147) or (100 – 35) × 420 ÷ 100 or equivalent 273 (people)	M2 A1	M1 for any one of • 420 × 35 ÷ 100 • sight of 42 + 42 + 42 + ½ of 42 • sight of 147

GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 2: Foundation Tier	Mark	Comments
1(a) (£)9.30 ÷ 5 (£)1.86 or 186(p)	M1 A1	Sight of the digits 186 gains M1 If units are given they must be correct
1(b) ((£)13.80 – (£)9.30) ÷ 2 (£)2.25 or 225 (p)	M1 A1	Sight of the digits 225 gains M1 FT use of 5 × 'their (£)1.86' stated in (a) instead of (£)9.30 If units are given they must be correct
2(a) 6 (˚C)	B1	Accept -6 (˚C) Answer may be embedded within a sentence
2(b) 4-star	B1	
2(c) **No** and suitable reason given relating to time of 3 star and 4 star freezers being different e.g. 'For 6 months, she needs a 4-star freezer'. 'because the 4 star means you can store food for longer (than 3 months)' 'because June to December is more than 3 months' 'because 3 stars is not long enough' 'need longer than 3 months' 'needs 3 months or longer' 'need from June to December which is 6 months' 'because the food won't last until December'	E1	Allow: 'No because from June to December is 7 months' 'No because from June to December is 5 months' Do not allow: 'No, because they are the same temperature' 'No because June to December is 4 months' i.e., reference to the incorrect number of months. 'No because the food will go off and you will have to throw it away'
3(a) Cuddly toy	B1	Allow cuddly toy and 12 given together B0 for 12 alone
3(b) **No** and reason given e.g. 'The frequencies would all need to be the same for an equal chance' 'no as it seems that there are more cuddly toys than anything else' 'There aren't equal numbers of each prize' 'more of some prizes than others' 'numbers are not equal' 'different number of prizes' 'not equal to each other' 'different amounts of different prizes' 'cuddly toy is most common' 'more of one thing than another' 'more likely to win a cuddly toy or box of chocolates' 'less chance to win a book or photo frame' 'less of certain prizes'	E1	Ignore additional spurious or incorrect statements for accepted and allowed responses Allow 'different amounts available' 'different amount of stock for the prizes' 'there's only 5 books, 9 boxes of chocolates and there are 12 cuddly toys' 'there's 12 cuddly toys and 2 photo frames' (comparison of any 2 or more) 'more prizes than others' Do not allow 'there are only 2 photo frames' (with nothing else said – no comparison with any other prize) 'different prizes'

3(c) (Cost of prizes without discount) $9 \times 1.80 + 12 \times 2.30 + 5 \times 3.20 + 2 \times 4.70$ (16.20 + 27.60 + 16 + 9.40)	M2	May be seen in stages Award M1 for: • the sum of 3 correct products • sight of all 4 correct products (even if not added)
(£)69.2(0)	A1	CAO
(Discount) (£)6.92	B1	Allow (£)6.9(0) if 6.92 seen FT 10% of 'their (£)69.2(0)' including 10% of (£)12 This may be implied in their final answer.
(Cost of prizes with discount) (£)69.2(0) – (£)6.92	M1	FT 'their (£)69.2(0)' – 'their (£)6.92' provided there has been an attempt at finding 10% and 10 or 0.10 is not used as their value of 10%
(£)62.28	A1	
3(c) Alternative method 1 *(10% discount for each prize) (£)0.18 or (£)0.23 or (£)0.32 or (£)0.47*	*B1*	*Accept 18(p) or 23(p) or 32(p) or 47(p).* *If units stated, they must be correct*
Correct cost of all reductions 1.62 AND 2.07 AND 2.88 AND 4.23	*B2*	*Award B1 for any one correct reduction*
9 × 1.62 + 12 × 2.07 + 5 × 2.88 + 2 × 4.23 *(£14.58 + £24.84 + £14.40 + £8.46)*	*M2*	*FT from B1, B1* *Award M1 for the sum of 3 correct products*
(£)62.28	*A1*	
3(c) Alternative method 2 *(10% discount for each prize) (£)0.18 or (£)0.23 or (£)0.32 or (£)0.47*	*B1*	*Accept 18(p) or 23(p) or 32(p) or 47(p).* *If units stated, they must be correct*
(Total discount) *9×(£)0.18 + 12×(£)0.23 + 5×(£)0.32 + 2×(£)0.47* *(£1.62 + £2.76 + £1.60 + £0.94)*	*M2*	*FT 'their (£)0.18 or (£)0.23 or (£)0.32 or (£)0.47'* *Award M1 for the sum of 3 correct products*
(Total discount) (£)6.92	*A1*	*CAO*
(Cost of prizes with discount) (£)69.2(0) – (£)6.92 *(£)62.28*	*M1* *A1*	*FT 'their (£)69.2(0)' – 'their (£)6.92*
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.

4. Evidence of counting squares Number of squares 11 – 16 (squares or cm^2) (Area = 'Their number of squares' × 0·5 m^2 =) 5.5 – 8 (m^2) (Cost of glass=) 'their area' × (£)290 Correct answer	M1 A1 B1 M1 A1	Look at diagram If 'their number of squares' is within the range and no evidence of counting squares award M1 A1 If count squares of whole grid (70) then M0A0. FT with this FT 'Their number of squares' × 0·5 (m^2) or 'Their number of squares' ÷ 2 (m^2) This B1 may be seen at the end eg 12 × 290 ÷ 2 Award M1A1B1 when no evidence of number of squares counted and a value between 5.5 and 8 is multiplied by 290. This would then get final M1 and a possible A1 FT 'their area' × (£)290 provided M1 or B1 previously awarded Allow rounded value of (£)300 used for (£)290 Note: check if 290 has been ÷ 2 rather than number of squares ÷ 2 Check 145 × number of squares
5. Showing (47%), **<u>20%,</u>** (5%), **<u>3%</u>** and **<u>25%</u>** OR **<u>0·47</u>**, (0·2), **<u>0·05</u>**, (0·03) and **<u>0·25</u>** OR 47/100, 20/100, 5/100, 3/100 and 25/100 OR five correct calculations for a common amount **Largest** ↓ **Smallest** **Ocean** **Pacific (47%)** Atlantic (¼) Indian (0.2) Southern (5%) Arctic (0.03)	B2 B1	Look at the given table for some equivalent values B2 for all correct % OR all correct decimals OR all correct fractions <u>with a common denominator</u> OR correct work using a common amount OR a valid combination that allows full comparison Award B1 for any 2 correct conversions Allow any unambiguous indication (e.g. 'converted values'). **Strict FT** of 'their work' if at least B1 gained. Correct answer (either oceans or proportions) with <u>no</u> other marks awarded, gains final B1.

6(a). $(5 \times 30 + 4) \times 4$ or $20 \times 30 + 4 \times 4$ (154×4) or $(600 + 16)$	M2	Look at diagram May be seen in stages Award M1 for sight of: • $(5 \times 30) \times 4$ (=600) • $5 \times 30 + 4$ (=154) • $(5 \times 30) \times 4$ + multiple 4 (≤ 20)
616 (cm)	A1	FT for 'their perimeter' provided at least M1 awarded AND 4 sides considered • 600 • 600 + multiple 4 (≤ 20) correctly evaluated Eg $(5 \times 30) \times 4 = 600$ gains M1 A1
6·16 (metres)	A1	FT 'their perimeter' for correct conversion to metres provided at least M1 awarded Eg A final answer of 6(m) gains M1 A1 A1 If no marks awarded, award SC1 for sight of • 16(cm) or 0.16(m) • 150(cm) or 1.5(m)
6(b) $1{\cdot}3 \times 0{\cdot}4$ or 130×40	M1	Must be only the correct method but allow if x/÷ by power of 10
0·52 or 5200	A1	Mark final answer Allow 0·5 provided no incorrect working seen
m^2 or cm^2	U1	Correct units for 'their area' Eg $1.3 \times 0{\cdot}4 = 0.52$ $0.52 \times 100 = 52\ cm^2$ Award M1 A0 U1 (attempt to change to cm^2)
7(a) 1 (km)	B1	
7(b) 7½ hours	B1	
7(c) 5 (km)	B1	
8(a) (Breakfast recommendation is) 0.35×2400 or $240 + 240 + 240 + ½$ of 240 or $2400 - 0.65 \times 2400$ or equivalent	M1	(= 840) May be seen in stages 35% of 2400 without further working is awarded M0 Sight of 240 + 240 + 240 + 24 is awarded M0
(Difference in calories) $860 - 0.35 \times 2400$	M1	Allow $0.35 \times 2400 - 860$ for M1 FT 860 – 'their derived 840' irrespective of how 'their 840' was derived
20 (calories)	A1	CAO. Answer of -20 (calories) is A0 Allow incorrect units seen, e.g. 20%
8(a) <u>Alternative method</u> *(Difference in calories) (860 ÷ 2400 – 0.35) × 2400* *20 (calories)*	*M2* *A1*	*M1 for 860 ÷ 2400 – 0.35* *CAO. Allow incorrect units seen, e.g. 20%*
8(b) 23 : 5	B1	Must be whole numbers, mark final answer Allow 23g : 5g

9.		If an answer space blank, check working below the table to mark any unambiguous intention
Number of units 520	B1	Answer shown in the space in the row with the meter readings takes precedence If the space in the row with meter reading is blank, allow if 520 seen in the charge for electricity row
Charge for units 520 × (0.)21	M1	FT 'their 520', the number of units used must be given or clear from the units row Award for sight of digits 1092(0) or equivalent on FT
(£) 109.2(0)	A1	Must be in pounds.
(Standing charge) (3 months) (£) 21(.00)	B1	
Total charges (£) 130.2(0)	B1	FT 'their 109.2(0)' + 'their 21(.00)' correctly evaluated, provided neither amount = 0
VAT at 5% (£) 6.51	B1	FT 5% of 'their 130.2(0)' correctly evaluated, allow rounding or truncation to a penny (2 d.p.)
Amount to pay (£) 136.71	B1	CAO
10(a) (Circumference) π × 140	M1	Do not accept embedded within an incorrect calculation for the circumference
Answer in the range 439 (cm) to 440 (cm)	A1	May be implied in later working
π × 140 – 176 – 128 – 60 or π × 140 – 364 or equivalent	M1	FT 'their derived circumference' from a calculation involving π (including use of πr or πr^2), including from previous truncation or rounding errors
Answer in the range 75.6 (cm) to 76 (cm)	A1	CAO, answer must be in the range stated. If no final answer given, check if an answer has been inserted in the statement in the question
10(b) (Area =) ½ × (4.3 + 5.6) × 2.5 or 2.5 × 4.3 + ½ × 2.5 × (5.6 – 4.3) or equivalent	M1	
12.375 (m^2)	A1	Allow 12.37(m^2), 12.38(m^2) or 12.4 (m^2) provided not from incorrect working (e.g. 4.3 + 2.5 + 5.6 = 12.4) May be implied in further working
(Number of bags) 12.375 ÷ 0.9 or 13.75	M1	FT 'their 12.375' including the use of 12.375 rounded or truncated Allow for a trial and improvement method provided the final trial gives 14 bags, e.g. for sight of $0.9 \times 14 = 12.6$
14 (bags)	A1	**Must be** rounded up to a whole number of bags Allow for an embedded answer of 14 (e.g. from within a multiplication)
(Cost of fertilizer is 14 × £1.15) (£) 16.1(0)	B1	FT provided a whole number of bags considered and at least 1 mark (M1) previously awarded

11(a) Every 15 minutes	B1	
11(b) 14(:)00 or 2 p.m.	B1	Allow an answer of 2 or 14(:)00p.m. Do not accept an answer of 2 a.m.
11(c) 11 (°C)	B1	
11(d)(i) 5 points plotted accurately: (12:00, 100), (13:00, 105), (14:00, 110), (15:00, 109), (16:00, 109)	B1	Plotting of 100 and 110 should be intention of being on the appropriate line Tolerance for plotting 105 and 109 is within the appropriate small square Ignore any joining of plotted points
11(d)(ii) Appropriate reason, e.g. 'the rise in temperature doesn't look very much', 'it is only temperatures from 100°C that are needed', 'not showing the warning light was on as often as it was', 'it doesn't show the fluctuating temperature', 'doesn't show the number of warnings given (when over 110°C)', 'more details are required to show the warnings',	E1	Ignore additional spurious or incorrect statements for accepted and allowed responses Allow, e.g. 'misleading' **with** a suitable reason given 'doesn't give the same detail (as the first graph)', 'doesn't give the details of temperature changes', 'it doesn't show all the temperature changes', 'doesn't give the same accuracy (as the first graph)', 'doesn't give the accurate temperature changes', 'only shows specific times', 'only recording once an hour', 'there is no data to fill the gaps', 'the temperatures between are not shown', It doesn't give all the information', 'not all the points plotted from the previous graph', 'small scale', 'the temperature goes up in 2's rather than 0.5', 'lost loads of the data', 'there are not many points', 'it doesn't change much to show when something went wrong', 'there are no temperatures recorded below 100°C' Do not accept, e.g. 'misleading', 'not accurate', 'it doesn't give the accurate temperatures', 'the temperatures aren't the same as the first graph', 'most points are not over 110°C', 'the temperature goes higher on the axis than the other graph'

GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 1: Intermediate Tier	Mark	Comments
1(a) £3.80	B1	
1(b) 4 hours 20 minutes	B3	For B2 or B1, allow costs seen within repeated additions linked with the appropriate time B2 for sight of any of the following: • 260 minutes • £5.40 for 4 hours or for 240 minutes • ((£5.80 - £3) ÷ 40p =) 7 seen or implied **with** 7 lots of 20 minutes considered • 140 (minutes) (= 2 hours 20 minutes) • a final answer of 2 hours 20 minutes in the answer space B1 for sight of any of the following: • £4.20 for 3 hours or 2 hours 60 minutes, allow for 2.60 • (£5.80 - £3 =) £2.80 • (£5.80 - £3) ÷ 40p (= 7) • ((£5.80 - £3) ÷ 40p =) 7 allow for 7 provided it is **not** from incorrect working, it should be derived from 7 lots of 40p on to the £3, e.g. 7 lots of 40p. Ignore further incorrect working once awarded, such as an answer of 7 hours
2.(Total rainfall for 10 days is 10 × 1.8 =) 18 (Mean rainfall for 1st 11 days of April) (10 × 1.8 + 4) ÷ 11 (=) 2 (cm)	B1 M1 A1	May be implied in further working (e.g. from sight of 22 (cm) total rainfall) FT 'their incorrectly evaluated 10 × 1.8'
2. <u>Alternative method</u> *(Additional rainfall per day) (4 – 1.8) ÷ 11* *(=) 0.2 (cm)* *(Mean rainfall for 1st 11 days of April)* *(1.8 + 0.2 =) 2 (cm)*	*M1* *A1* *B1*	*FT 'their incorrectly evaluated (4 – 1.8) ÷ 11'*
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.

3. Partial method, to find the cost of 200g of apples, e.g. 30p for 100g, 3p for 10g, 3 ÷ 5, 3/5, 300 ÷ 5, 3(00) × 200 ÷ 1000 (Cost of 200g of apples) 60(p) or (£)0.60 (Change is) (£)9.40 or 940(p)	M1 A1 A1	Must engage with 1 kg = 1000 g conversion and the cost If units are given they must be correct CAO. Allow £9.40p
4(a) 130 ≤ energy < 140	B1	Accept unambiguous indication, e.g. 130 – 140 Allow e.g.'130,140', '130 140' Do not accept the values 130, 140, 18 or a choice between the group and the frequency
4(b) Total of 37 (energy bars) $\frac{1 + 4 + 12}{37}$ $\frac{17}{37}$	B1 M1 A1	 FT 'their 37' provided > 'their 1+4+12' Also allow **one** error in misreading 1 frequency, which impacts consistently on 'their denominator' and possibly 'their numerator' Only FT 'their 37' provided • 'their 37' is 36 or 38 or 39 or • 'their 37' is clearly from an addition error in calculating 1 + 4 + 12 + 18 + 2 ISW for incorrectly simplifying their fraction
4(c) (100 ×) $\frac{2}{18 + 2}$ or (100 ×) 1 – (100 ×) $\frac{18}{18 + 2}$ 10 (%)	M1 A1	FT any repeated misread of the scale from (b) Award 2 marks for an answer of 10(%) unless from incorrect working

5(a) 100 × 720 ÷ 360 or 260 × 720 ÷ 360 or for sight of 1° is 2 bags	M1	
200 (large bags sold) and 520 (small bags sold)	A2	A1 for 200 (large bags) or 520 (small bags) or for 'their number of large bags' + 'their number of small bags' = 720
(Total sales) 200 × (£)1(.)80 + 520 × 80(p) (= £360 + £416)	M1	Ignore incorrect units stated, mark intention Or equivalents all in p or all in £ Accept equivalent 720 × 80p + 200 × (£)1 FT for 'their 200 large bags' × (£)1.80 and 'their 520 small bags' × 80p, provided 'their 200' ≥ 50 and 'their 520' ≥ 130, 'their 520' ≠ 'their 200' and both are whole numbers
(£) 776	A2	CAO A1 for either • a correctly evaluated sum with one correct evaluation of a product or • on **FT** for the correct evaluation of 'their smaller value'×(£)1.80 + 'their larger value'×80p For example 100 × (£)1.80 + 260 × 80p = £388 is awarded M0 A0 M1 A1 If initial M1, A2 awarded also award SC1 for one of the following seen: • 200 × 80(p) + 520 × (£)1.80 = (£)1096 • £360 **and** £416 (no method mark as not added) If no marks, award SC1 for sight of 260(°)
5(b) Method to compare, e.g. • (Small bag per kg) 2.5 × 80 or 80×1000÷400 • (Per 100g) small 80p ÷ 4 and large £1.80÷ 10 • (g per penny) 400 ÷ 80 and 1000 ÷ 180 • (Per 200g) 80p ÷ 2 and £1.80 ÷ 5 • (Per 2000g) 5 × 80p and 2 × £1.80 • (Large bag per 400g) £1.80 × 0.4 Accurate comparison calculation, e.g. • (Small bag per kg) £2 • (Per 100g) small 20p and large18p • (g per penny) small 5g and large 5.5(5...) or 5.6g • (Per 200g) small 40p and large 36p • (Per 2000g) small £4 and large £3.60 • (Large bag per 400g) 72p **AND** Conclusion, Large bag (better value)	M1 A1	Needs to show comparing like quantity with like If units are given they must be correct
6. (a =) 32(°) (b =) 148(°) (c =) 122(°)	B1 B1 B1	 FT 180 – 'their a' provided a ≠ 90 FT 90 + 'their a' provided a ≠ 90 or 270 – 'their b' provided b ≠ 90

7(a) 18 (g)	B1	
7(b) 15 – 12.5 or 5 × 0.5 2.5 (cm)	M1 A1	
7(c) Sight of 20 (cm) (Wingspan in inches is) 12 × 20 ÷ 30 8 (inches)	B1 M1 A1	 Allow 20 ÷ 2.5 or 20 × 0.4 or equivalent CAO
7(d) Positive (correlation)	B1	Do not accept a description
7(e) An answer in the inclusive range 18.5 (cm) to 22.5 (cm)	B1	
8(a) 420 - 420 × 35 ÷ 100 (= 420 – 147) or (100 – 35) × 420 ÷ 100 or equivalent 273 (people)	M2 A1	M1 for any one of • 420 × 35 ÷ 100 • sight of 42 + 42 + 42 + ½ of 42 • sight of 147
8(b) 420 ÷ 20 × 17 357 (people)	M2 A1	M1 for any of the following: • 420 ÷ 20 (= 21) • sight of 21 CAO. Allow embedded as 420 : 357 Award A0 for 357 : 420
8(b) <u>Alternative method 1</u> *(420 ÷ 20) × (20 + 17) – 420 (= 777 – 420)* *357 (people)*	*M2* *A1*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 777* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
8(b) <u>Alternative method 2</u> *420 – (20 – 17) × (420 ÷ 20) (=420 – 63)* *357 (people)*	*M2* *A1*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 63* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
8(b) <u>Alternative method 3</u> *Full ratio method to find 357 people, e.g.* *(20 ×) <u>420</u> : 17 × <u>420</u>* *(20) 20* *357 (people)*	*M2* *A1*	*Allow seen in stages, including written as an appropriate sum of equivalent ratios, e.g. attempting 17 + 340 (from 20 : 17 and 400 : 340)* *M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*

<table>
<tr>
<td>9(a) Lowest common multiple of 2 × 3 × 5 × 5 or 150 seen or implied, e.g.
listing multiples to 150 for nuts and washers and sight of 30 boxes of bolts,
sight of 5 × 30 = 150, 6 × 25 = 150 and sight of 30 boxes of bolts,

Table completed correctly, or sight of correct number of boxes in working, e.g.
<table><tr><td>Nuts</td><td>5 boxes</td></tr><tr><td>Bolts</td><td>30 boxes</td></tr><tr><td>Washers</td><td>6 boxes</td></tr></table></td>
<td>M2

A1</td>
<td>M1 for a method looking at factors or multiples, e.g.
• sight of 2 × 3 × 5 and 5 × 5
• sight of 6 × 5 and 5 × 5
• 30 with factors 5, 6 and 25 with factors 5, 5
• listing 30, 60, 90 and 25, 50, 75
• a common multiple of 150 (not the lowest) seen or implied, e.g. 300, 450, 600, ...

Answers in the table take precedence, e.g. if correct number of boxes 5 for nuts, 30 for bolts and 6 for washers in working but table incorrect, award M2 A0

If no marks, award SC1 for an answer with whole numbers of nuts, bolts and washers in the ratio 5:30:6, e.g. answers of 10, 60 and 12 respectively</td>
</tr>
<tr>
<td>9(b) 13.5(0 mm)</td>
<td>B2</td>
<td>B1 for sight of any one of:
• 6 × (2 + 0.25)
• 6 × 2 + 6 × 0.25
• sight of 2.25 (mm)
• correct evaluation of ‘6 × (2 + their 0.25)’ provided 0 < ‘their 0.25’ ≤ 0.5</td>
</tr>
</table>

10. 5.1×10^8	B2	Allow $5.10(00....) \times 10^8$ B1 for the correct value written in index form, e.g. 51×10^7 or 510×10^6 or B1 for the sight of either of the following • 51 000 000 and 5.1×10^7 • 5 100 000 000 and 5.1×10^9 • 5×10^8
11(a) Suitable uniform scales on both axes, costs to £110 and number of bottles from 0 to 100 Correct representation of costs for 0 to 100 bottles	B1 B2	Allow for cost axis • starting from £10 • final label is £100 (rather than £110 or £120) • suitable for 'their plotted points' with increasing costs for increasing number of bottles With no incorrect points plotted Joined with dotted or solid straight line Ignore any additional 'correct' points plotted for more than 100 bottles Examples of points: Bottles 0 20 40 60 80 100 Costs £ 10 30 50 70 90 110 B1 for any one of: • One incorrect plot, that is not (0, 10), on an otherwise correct graph. (0,10) must be plotted and joined • correct graph for an inclusive range of 50 bottles • at least 2 correct points plotted, with no incorrect points plotted, ignore vertical lines or 'line of best fit'. Allow for points not joined Note: the drawing of a bar chart should only be awarded B1 maximum for the uniform scales
11(b) 1750 ÷ 1.75 or 1750 × 4/7 or 1750 ÷ 7/4 + 10 £1010	M1 m1 A1	Allow sight of 1000 provided not from incorrect working (not for 1 litre = 1000 ml) If no marks, award SC1 for sight of '÷ 1.75' or '÷ 7/4' or '× 4/7' or equivalent
12. (Width of small sticker is) 42 ÷ 14 3 (cm) (Length or width of large sticker) 4 × 14 OR 4 × 3 56 (cm) AND 12 (cm)	M1 A1 M1 A1	Must be for the small label (check the diagram) FT 'their 42 ÷ 14' (Note: Incorrect logic 42 × 4 = 168 with 168 ÷ 56 = 3 does not give the width of the small label! M0 A0)
12. Alternative method: *(Area of large sticker) 42×4^2 (= 672cm²)* *(Length of large sticker) 14×4 (= 56cm)* *(Width of large sticker)* $\frac{42 \times 4^2}{14 \times 4}$ *or* $\frac{672}{56}$ *(Length and width of large sticker)* *56 (cm) AND 12 (cm)*	*M1* *M1* *M1* *A1*	

13(a)(i) Answer in the range 46 to 48 (cm)	B1	
13(a)(ii) 5 (ray fish)	B1	
13(b)(i) Correct format of a box-and-whisker with at least one of minimum, LQ, median, UQ or maximum correct Showing: Minimum: 1.6 (cm); LQ: 2.4 (cm); Median: 3.2 (cm) UQ at 5.8 (cm) Maximum at 6.8 (cm)	B1 B1 B1 B1	Do not ignore additional lines drawn Do not accept minimum of 0cm or maximum of 7cm End vertical stopper lines omitted can be ignored Must all be shown on the diagram/graph Do not accept plotted points for LQ and median, must be intention to draw lines Must be intention of the minimum, LQ and median, for the median ignore 1 spurious line also drawn Must be shown on the diagram/graph Must be shown on the diagram/graph If no marks for both UQ and maximum, allow SC1 for sight of UQ as 5.8 (cm) or maximum 6.8 (cm) in working
13(b)(ii) 0.75×60 or equivalent 45 (guppies)	M1 A1	 If no marks, award SC1 for an answer of 15 (guppies) or for sight of 75% or ¾
13(c) $100 \times 9.9 \div (100 + 10)$ or $9.9 \div 1.1$ or equivalent 9 (kg)	M1 A1	Allow 9.9 – 0.9 provided 0.9 is not from incorrect working CAO. Must be from a correct method Allow unsupported 9 (kg) for M1, A1

GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 2: Intermediate Tier	Mark	Comments
1(a) 1 (km)	B1	
1(b) 7½ hours	B1	
1(c) 5 (km)	B1	
1(d) 6 (km)	B2	B1 for any of the following: • 7 – 5 + 7 – 3 • Appropriate sight of 2 **and** 4 (in working or on the graph)
2(a) (Breakfast recommendation is) 0.35 × 2400 or 240 + 240 + 240 + ½ of 240 or 2400 - 0.65 × 2400 or equivalent	M1	(= 840) May be seen in stages 35% of 2400 without further working is awarded M0 Sight of 240 + 240 + 240 + 24 is awarded M0
(Difference in calories) 860 - 0.35 × 2400	M1	Allow 0.35 × 2400 – 860 for M1 FT 860 – 'their derived 840' irrespective of how 'their 840' was derived
20 (calories)	A1	CAO. Answer of -20 (calories) is A0 Allow incorrect units seen, e.g. 20%
2(a) <u>Alternative method</u> *(Difference in calories) (860 ÷ 2400 – 0.35) × 2400* *20 (calories)*	*M2* *A1*	*M1 for 860 ÷ 2400 – 0.35* *CAO. Allow incorrect units seen, e.g. 20%*
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(b)(i) 23 : 5	B1	Must be whole numbers, mark final answer Allow 23g : 5g
2(b)(ii) 30 × 69 ÷ 100 or 69 ÷ (100 ÷ 30) or 69 × 3 ÷ 10 or equivalent	M1	May be shown in stages
20.7 (g)	A1	Allow • 21(g) provided not from incorrect working • Answers in the range 20.68(g) to 21(g) from premature approximation of 100/30 or 100/69

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

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

5(a) Every 15 minutes	B1	
5(b) 14(:)00 or 2 p.m.	B1	Allow an answer of 2 or 14(:)00p.m. Do not accept an answer of 2 a.m.
5(c) 11 (°C)	B1	
5(d)(i) 5 points plotted accurately: (12:00, 100), (13:00, 105), (14:00, 110), (15:00, 109), (16:00, 109)	B1	Plotting of 100 and 110 should be intention of being on the appropriate line Tolerance for plotting 105 and 109 is within the appropriate small square Ignore any joining of plotted points
5(d)(ii) Appropriate reason, e.g. 'the rise in temperature doesn't look very much', 'it is only temperatures from 100°C that are needed', 'not showing the warning light was on as often as it was', 'it doesn't show the fluctuating temperature', 'doesn't show the number of warnings given (when over 110°C)', 'more details are required to show the warnings',	E1	Ignore additional spurious or incorrect statements for accepted and allowed responses Allow, e.g. 'misleading' **with** a suitable reason given 'doesn't give the same detail (as the first graph)', 'doesn't give the details of temperature changes', 'it doesn't show all the temperature changes', 'doesn't give the same accuracy (as the first graph)', 'doesn't give the accurate temperature changes', 'only shows specific times', 'only recording once an hour', 'there is no data to fill the gaps', 'the temperatures between are not shown', It doesn't give all the information', 'not all the points plotted from the previous graph', 'small scale', 'the temperature goes up in 2's rather than 0.5', 'lost loads of the data', 'there are not many points', 'it doesn't change much to show when something went wrong', 'there are no temperatures recorded below 100°C' Do not accept, e.g. 'misleading', 'not accurate', 'it doesn't give the accurate temperatures', 'the temperatures aren't the same as the first graph', 'most points are not over 110°C', 'the temperature goes higher on the axis than the other graph'
6(a)(i) $100 \leq x < 150$	B1	
6(a)(ii) Midpoints 40, 70, 90, 125, 175 $40\times4 + 70\times8 + 90\times11 + 125\times12 + 175\times17$ (= 160 + 560 + 990 + 1500 + 2975 = 6185) ÷ 52 118.9(4..miles) or 119 (miles)	B1 M1 m1 A1	Check the table FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout

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

7(a) 219(°) (± 2°)	B1	
7(b) $\frac{114}{1.45}$ or $114 \div (87/60)$ or $114 \times \frac{60}{87}$ or equivalent	M2	M1 for one of the following: • idea of distance/time, e.g. 114/1.27, 114/87, 114/5220, 114/1hr 27 minutes, including approximated as 114/1.5, may be implied by answers to these calculations (see note) provided not from incorrect working • sight of 1.45 (hours)
78.6(2…) (km/h)	A1	Accept 79 (km/h) provided not from incorrect working Do not FT from M1
7(c) (Conversion to Japanese yen) 800 × 135.72	M1	
108 576 (Japanese yen)	A1	
(Can buy) 108 000 (Japanese yen)	B1	Allow for an equivalent amount given using the notes available, e.g. 21 5000 (yen) **and** 3 1000 (yen), or equivalent using only 5000 and 1000 yen notes FT 'their derived 108 576' provided evidence of rounding down to nearest 1000
(Cost in pounds is) 108 000 ÷ 135.72 or (800 –) 576 ÷ 135.72	M1	FT 'their derived 108 576' and 'their derived 108 000' provided 'their 108 000' in whole number of 1000s (including from rounding 108 576 up)
(£) 795.76	A1	ISW. Allow (£)795.75 Allow on FT rounded or truncated to a penny

7(d) (Number of 0-to-64-year olds) 0.75 × 270400 or 270400 – 0.25 × 270400 202800	M1 A1	 May be implied in further working
(Number of 0-to-14-year olds) 9 × 202800 ÷ (9+41) or 9 × 4056 36504	M1 A1	FT 'their derived 202800', not 270400
7(d) <u>Alternative method 1</u> *(Proportion) 9 × 270400 ÷ (9+41)* *48672*	*M1* *A1*	 *May be implied in further working*
(Number of 0-to 14-year olds) 0.75 × 48672 *or 48672 – 0.25 × 48672* *or 48672 – 12168* *36504*	*M1* *A1*	*FT 'their derived 48672', not 270400*
7(d) <u>Alternative method 2</u> *(Overall ratio) (9 : 41 :) <u>9 + 41</u>* *3* *(9 : 41 :) 16.66666....*	*M1* *A1*	 *Allow 16.6(...) or 16.7* *May be implied in further working*
(Number of 0-to 14-year olds) 9 × 270400 ÷ (9+41 + ⅓(9 + 41)) *36504*	*M1* *A1*	*FT 'their ⅓(9 + 41)'* *Do not FT from rounding or truncation of 50/3*

8. (Let x be the initial angle of lean) (Let y be the final angle of lean) sin x = 30/110 sin y = 60/110 (x =) $\sin^{-1}(30/110)$ or (x =) $\sin^{-1}$ 0.2727... OR (y =) $\sin^{-1}(60/110)$ or (y =) $\sin^{-1}$ 0.5454... 15.8266...(°) **AND** 33.0557....(°) (and statement or calculation to show 33.0557....(°) > 2 × 15.8266...(°))	 M1 M1 M1 A2	 Allow M marks for • same variable is used for both angles of lean • an appropriate statement of the sine rule, e.g. 30/sin x = 110/sin 90 or sin y/60 = sin 90/110 Also implies appropriate previous M1 Accept rounded or truncated angles for A2 or A1 A1 for 15.8266...(°) or 33.0557....(°)
8. Alternative method 1 *(To find initial angle of lean)* *Sin x = 30/110* *(x =) $\sin^{-1}(30/110)$ or (x =) $\sin^{-1}$ 0.2727...* *(x =) 15.8266...(°)* *(To find horizontal lean if angle of lean was doubled)* *sin ((2 × 15.8266...(°)) =horizontal lean/110 or* *(Horizontal lean =) 110 × Sin (2 × 15.8266...(°))* *57.725 (cm) (and statement that < 60 cm)*	 *M1* *M1* *A1* *M1* *A1*	 *Allow for an appropriate statement of the sine rule, 30/sin x = 110/sin 90 or sin x/30 = sin 90/110* *Also implies previous M1* *Accept rounded or truncated angles* *FT rounded or truncated double 'their derived 15.8266...(°)'* *FT answer must be < 60 (cm)*
8. Alternative method 2 *(To find final angle of lean)* *Sin y = 60/110* *(y =) $\sin^{-1}(60/110)$ or (y =) $\sin^{-1}$0.5454…* *(y =) 33.0557...(°)* *(To find horizontal lean if angle of lean was halved)* *sin (1/2 × 33.0557...(°)) = horizontal lean/110 or* *(Horizontal lean =) 110 × Sin(1/2 × 33.0557...(°))* *31.29…(cm) (and statement that > 30 cm)*	 *M1* *M1* *A1* *M1* *A1*	 *Allow for an appropriate statement of the sine rule, 60/sin y = 110/sin 90 or sin y/60 = sin 90/110* *Also implies previous M1* *Accept rounded or truncated angles* *FT rounded or truncated ½ 'their derived 33.0557...(°)* *FT answer must be > 30 (cm)*

9. (80 litres = 80 000 cm^3) 80 000 = $\pi \times 36^2 \times$ height or equivalent	M2	May be shown in stages, but place value must be correct for the award of M2 M1 for sight of any 1 of the following: • (80 litres =) 80 000 (cm^3) • $\pi \times 36^2$ ($\times$ height) • sight of $\pi \times 36^2$ ($\approx$ 4069 to 4072) • sight of ($\pi \times 36^2 \approx$) 4069 to 4072 or 1296π • 80 000 = $\pi \times 36^2 \times$ height with place value errors with digits 8 and/or 36 Allow for sight of $\pi \times 36^2$ or 80 000 (cm^3) even if embedded, contradicted in further working or not used
(Height =) $\frac{80\,000}{\pi \times 36^2}$ or equivalent	m1	For a correct rearrangement, provided the denominator is a multiple of π Allow if the intended calculation includes a place value error with digits 8 and/or 36 Also possible FT from M1
Answers in the range 19.6 to 19.7 (cm)	A1	CAO, must be in centimetres Accept 20(cm) from correct working
10. (Income taxed at Basic rate) 2400 × 100 ÷ 20 or 2400 ÷ 0.2 or 2400 × 5 or equivalent	M1	May be seen in stages Allow for sight of, e.g. • 10% of 12000 • 12000 × 0.8 = 9600
12000 (dollars)	A1	Allow an embedded answer e.g.12000 × 0.2 = 2400 Accept if found by trial and improvement or reverse working for M1 A1, e.g. • 10% of 12000 = 1200 with an answer 12000 • 12000 × 0.8 = 9600 with an embedded answer 12000 – 9600 = 2400 Allow M1 A1 for a final answer of 12000, provided not from incorrect working.
(Khalida's income) 12000 + 5000	M1	FT their derived 12000' provided 2400 < 'their 12000' < 20000, i.e. 'their income taxed at Basic rate' + 5000
17000 (dollars)	A1	Mark final answer. The answer given in the answer space takes precedence.

GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 1: Higher Tier	Mark	Comments
1(a) 420 ÷ 20 × 17 357 (people)	M2 A1	M1 for any of the following: • 420 ÷ 20 (= 21) • sight of 21 CAO. Allow embedded as 420 : 357 Award A0 for 357 : 420
1(a) Alternative method 1 *(420 ÷ 20) × (20 + 17) – 420 (= 777 – 420)* *357 (people)*	*M2* *A1*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 777* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(a) Alternative method 2 *420 – (20 – 17) × (420 ÷ 20) (=420 – 63)* *357 (people)*	*M2* *A1*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 63* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(a) Alternative method 3 *Full ratio method to find 357 people, e.g.* *(20 ×) 420 : 17 × 420* *(20) 20* *357 (people)*	*M2* *A1*	*Allow seen in stages, including written as an appropriate sum of equivalent ratios, e.g. attempting 17 + 340 (from 20 : 17 and 400 : 340)* *M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* *CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(b) (Price last year =) (£)4.2(0) (Price now =) 4.2(0) + 0.05 × 4.2(0) = (£)4.41	B1 M1 A1	FT 'their 4.20' A final answer of (£)4.4(0) (from 4 + 2 × 0.2) implies B1 M0 A0 If no marks awarded SC2 for sight of 4 × 1.1025 SC1 for sight of 4 × 1.05^2

<table>
<tr>
<td>2(a) Lowest common multiple of 2 × 3 × 5 × 5 or 150 seen or implied, e.g.
listing multiples to 150 for nuts and washers and sight of 30 boxes of bolts,
sight of 5 × 30 = 150, 6 × 25 = 150 and sight of 30 boxes of bolts,

Table completed correctly, or sight of correct number of boxes in working, e.g.
<table><tr><td>Nuts</td><td>5 boxes</td></tr><tr><td>Bolts</td><td>30 boxes</td></tr><tr><td>Washers</td><td>6 boxes</td></tr></table></td>
<td>M2

A1</td>
<td>M1 for a method looking at factors or multiples, e.g.
• sight of 2 × 3 × 5 and 5 × 5
• sight of 6 × 5 and 5 × 5
• 30 with factors 5, 6 and 25 with factors 5, 5
• listing 30, 60, 90 and 25, 50, 75
• a common multiple of 150 (not the lowest) seen or implied, e.g. 300, 450, 600, ...

Answers in the table take precedence, e.g. if correct number of boxes 5 for nuts, 30 for bolts and 6 for washers in working but table incorrect, award M2 A0

If no marks, award SC1 for an answer with whole numbers of nuts, bolts and washers in the ratio 5:30:6, e.g. answers of 10, 60 and 12 respectively</td>
</tr>
<tr>
<td>2(b) 13.5(0 mm)</td>
<td>B2</td>
<td>B1 for sight of any one of:
• 6 × (2 + 0.25)
• 6 × 2 + 6 × 0.25
• sight of 2.25 (mm)
• correct evaluation of ‘6 × (2 + their 0.25)’ provided 0 < ‘their 0.25’ ≤ 0.5</td>
</tr>
<tr>
<td>3(a) Suitable uniform scales on both axes, costs to £110 and number of bottles from 0 to 100

Correct representation of costs for 0 to 100 bottles</td>
<td>B1

B2</td>
<td>Allow for cost axis
• starting from £10
• final label is £100 (rather than £110 or £120)
• suitable for ‘their plotted points’ with increasing costs for increasing number of bottles

With no incorrect points plotted
Joined with dotted or solid straight line
Ignore any additional ‘correct’ points plotted for more than 100 bottles
Examples of points:
<table><tr><td>Bottles</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>100</td></tr><tr><td>Costs £</td><td>10</td><td>30</td><td>50</td><td>70</td><td>90</td><td>110</td></tr></table>
B1 for any one of:
• One incorrect plot, that is not (0, 10), on an otherwise correct graph. (0,10) must be plotted and joined
• correct graph for an inclusive range of 50 bottles
• at least 2 correct points plotted, with no incorrect points plotted, ignore vertical lines or ‘line of best fit’. Allow for points not joined

Note: the drawing of a bar chart should only be awarded B1 maximum for the uniform scales</td>
</tr>
<tr>
<td>3(b) 1750 ÷ 1.75 or 1750 × 4/7 or 1750 ÷ 7/4

+ 10
£1010</td>
<td>M1

m1
A1</td>
<td>Allow sight of 1000 provided not from incorrect working (not for 1 litre = 1000 ml)

If no marks, award SC1 for sight of ‘÷ 1.75’ or ‘÷ 7/4’ or ‘× 4/7’ or equivalent</td>
</tr>
</table>

4. (Width of small sticker is) 42 ÷ 14 3 (cm) (Length or width of large sticker) 4 × 14 OR 4 × 3 56 (cm) AND 12 (cm)	M1 A1 M1 A1	Must be for the small label (check the diagram) FT 'their 42 ÷ 14' (Note: Incorrect logic 42 × 4 = 168 with 168 ÷ 56 = 3 does not give the width of the small label! M0 A0)
4. Alternative method: *(Area of large sticker) 42×4^2 (= 672cm^2)* *(Length of large sticker) 14 × 4 (= 56cm)* *(Width of large sticker)* $\frac{42 \times 4^2}{14 \times 4}$ *or* $\frac{672}{56}$ *(Length and width of large sticker)* *56 (cm) AND 12 (cm)*	*M1* *M1* *M1* *A1*	
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.
5(a)(i) Answer in the range 46 to 48 (cm)	B1	
5(a)(ii) 5 (ray fish)	B1	
5(b)(i) Correct format of a box-and-whisker with at least one of minimum, LQ, median, UQ or maximum correct Showing: Minimum: 1.6 (cm); LQ: 2.4 (cm); Median: 3.2 (cm) UQ at 5.8 (cm) Maximum at 6.8 (cm)	B1 B1 B1 B1	Do not ignore additional lines drawn Do not accept minimum of 0cm or maximum of 7cm End vertical stopper lines omitted can be ignored Must all be shown on the diagram/graph Do not accept plotted points for LQ and median, must be intention to draw lines Must be intention of the minimum, LQ and median, for the median ignore 1 spurious line also drawn Must be shown on the diagram/graph Must be shown on the diagram/graph If no marks for both UQ and maximum, allow SC1 for sight of UQ as 5.8 (cm) or maximum 6.8 (cm) in working
5(b)(ii) 0.75 × 60 or equivalent 45 (guppies)	M1 A1	If no marks, award SC1 for an answer of 15 (guppies) or for sight of 75% or ¾
5(c) 100 × 9.9 ÷ (100 + 10) or 9.9 ÷ 1.1 or equivalent 9 (kg)	M1 A1	Allow 9.9 – 0.9 provided 0.9 is not from incorrect working CAO. Must be from a correct method. Allow unsupported 9 (kg) for M1, A1

6. 5.1×10^8	B2	Allow $5.10(00....) \times 10^8$ B1 for the correct value written in index form, e.g. 51×10^7 or 510×10^6 or B1 for the sight of either of the following • 51 000 000 and 5.1×10^7 • 5 100 000 000 and 5.1×10^9 • 5×10^8
7. (Capacity of original enclosure =) $5 \times 8 \times 3 + \frac{1}{3} \times 5 \times 8 \times 1.5$ (120) (20) $= 140\ (m^3)$	M2 A1	M1 for $5 \times 8 \times 3 + n \times 5 \times 8 \times 1.5$ where $0 < n \leq 1$ CAO
(Volume of wooden cuboid = $4 \times 3.5 \times 0.5$ =) 7 (m^3)	B1	May be implied by 'their original capacity' – 7
(Percentage =) $\frac{140 - 7}{140}$ (× 100) OR $100 - \frac{7}{140} \times 100$ = 95 (%)	M1 A1	FT 'their derived 140' and 'their $4 \times 3.5 \times 0.5$' On FT, their answer needs to be correctly calculated with any slips only being allowed in the decimal part of the percentage, provided it would round to the appropriate whole number. If their division not seen, their rounded answer needs to be correct for their division.
8(a) $40 \times 0.3 + 10 \times 1$ OR $80 - (10 \times 1.8 + 15 \times 1.6 + 20 \times 0.8)$ = 22 (trees)	M1 A1	12 + 10 OR 80 – (18 + 24 + 16) If no marks awarded, SC1 for sight of 58 (trees greater than 50cm) from $10 \times 1.8 + 15 \times 1.6 + 20 \times 0.8$
8(b)(i) 60 cm	B1	
8(b)(ii) Search for the lower quartile *(Working fwds from 40)* *(Working bwds from 50)* $1x = 20 - 40 \times 0.3$ OR $1x = 10 - 10 \times 0.8$ $x = 8$ OR $x = 2$ Search for the upper quartile *(Working fwds from 60)* *(Working bwds from 75)* $1.6y = 20$ OR $1.6y = 20 - 20 \times 0.8$ $y = 12.5$ OR $y = 2.5$ (Inter-quartile range =) (60 + 12.5) – (40 + 8) or equivalent OR (75 − 2.5) – (50 − 2) or equivalent = 24.5 (cm)	M1 A1 M1 A1 M1 A1	OR $\frac{8}{10} \times 10$ OR $\frac{2}{10} \times 10$ Needs to be unambiguous work leading towards their lower quartile Lower quartile of 48 implies M1A1 OR $\frac{20}{15 \times 1.6} \times 15$ $\left(= \frac{20}{24} \times 15\right)$ OR $\frac{20 - 20 \times 0.8}{15 \times 1.6} \times 15$ $\left(= \frac{4}{24} \times 15\right)$ Needs to be unambiguous work leading towards their upper quartile Allow improper fractions Upper quartile of 72.5 implies M1A1 72.5 – 48 FT 'their 12.5' or 'their 2.5' AND FT 'their 8' or 'their 2' in an appropriate calculation provided one of the quartiles is correct and the other quartile is in the correct group (40-50 or 60-75) CAO

9(a) $\frac{4}{3} \times \boldsymbol{\pi} \times \text{radius}^3 = 128\boldsymbol{\pi}$ or equivalent	M1	If an equation is not seen, only award if appropriate calculations with 128, 4 and 3 seen Note: simplifying the cube root of 128 alone does not imply M1
$(\text{radius}^3 =) \frac{128\boldsymbol{\pi} \times 3}{4 \times \boldsymbol{\pi}}$ or equivalent	m1	
$\text{radius}^3 = 96$ OR $(\text{radius} =) \sqrt[3]{96}$	A1	
$(\text{radius} =) 2\sqrt[3]{12}$ (mm)	B1	Must be from correct working FT 'their derived 96' provided their answer can be written the form $a\sqrt[3]{12}$ An unsupported $2\sqrt[3]{12}$ (mm) is awarded M0m0A0B0
9(b) (Total surface area =) $\boldsymbol{\pi} \times 8 \times 12 + 2 \times \frac{4 \times \boldsymbol{\pi} \times 4^2}{2}$ or equivalent	M2	M1 for sight of • $\boldsymbol{\pi} \times 8 \times 12$ ($96\boldsymbol{\pi}$) or • $2 \times \frac{4 \times \boldsymbol{\pi} \times 4^2}{2}$ ($64\boldsymbol{\pi}$)
$= 160\boldsymbol{\pi}$ (mm^2)	A1	CAO
10(a) Appropriate tangent drawn at a time between t=5.7 and t=5.9 seconds	M2	Note: A tangent that follows the curve between t=6 and t=7 is not appropriate i.e. it should not pass through (7, 10) or below M1 for a tangent drawn at any other time
Difference in y ÷ difference in x	m1	FT from M1 previously awarded Award m1A0 if only 1 correct difference in the division
Correctly evaluated gradient from a tangent drawn at a time between t=5.7 and t=5.9 seconds, given in its simplest form	A1	FT for a tangent drawn at any time from t=5.6 onwards Mark final answer Accept a correct improper fraction (unless it gives a whole number), mixed number or decimal If a decimal answer is given, it needs to be correctly evaluated to at least 1 decimal place, rounded or truncated If no marks awarded, SC1 for a final answer of 3/2 or $1\frac{1}{2}$ or 1.5 from convincing work that they are calculating the average acceleration (12/8) over the 8 seconds

10(b) e.g. x = 0.72727… and 100x = 72.72727… or equivalent AND an attempt to subtract	M1	
(x =) $\frac{72}{99}$ or $\frac{7272}{9999}$ or $\frac{8}{11}$ or equivalent	A1	ISW
10(c) $\frac{1}{2} \times 2 \times (0 + 12 + 2(1.5 + 3 + 6))$ or equivalent	M2	Allow use of 5.7 ≤ speed ≤ 6.3 for 6, leading to e.g. : use of 5.7 leads to 32.4(m) use of 5.8 leads to 32.6 (m) use of 5.9 leads to 32.8 (m) use of 6.1 leads to 33.2 (m) use of 6.2 leads to 33.4 (m) use of 6.3 leads to 33.6 (m) M1 only if 1 reading incorrect
= 33 (m)	A1	FT from M1
10(c) Alternative method: $\frac{0 + 1.5}{2} \times 2 + \frac{1.5 + 3}{2} \times 2 + \frac{3 + 6}{2} \times 2 + \frac{6 + 12}{2} \times 2$ *[1.5 + 4.5 + 9 + 18]*	*M2*	*Allow use of 5.7 ≤ speed ≤ 6.3 for 6 leading to e.g.:* *use of 5.7 leads to (1.5 + 4.5 + 8.7 + 17.7 =) 32.4 (m)* *use of 5.8 leads to (1.5 + 4.5 + 8.8 + 17.8 =) 32.6 (m)* *use of 5.9 leads to (1.5 + 4.5 + 8.9 + 17.9 =) 32.8 (m)* *use of 6.1 leads to (1.5 + 4.5 + 9.1 + 18.1 =) 33.2 (m)* *use of 6.2 leads to (1.5 + 4.5 + 9.2 + 18.2 =) 33.4 (m)* *use of 6.3 leads to (1.5 + 4.5 + 9.3 + 18.3 =) 33.6 (m)* *M1 for the sum of these 4 areas with one error (possibly repeated) in reading the scale OR* *M1 for 3 of the 4 areas (1.5, 4.5, 9, 18) shown in a sum where not all calculations shown*
= 33 (m)	*A1*	*FT from M1*
10(d) $\frac{1}{2} \times (12 + v) \times (16 - 8) + \frac{1}{2} \times (v + v + 1) \times (48 - 16) = 550$ or equivalent	M2	Accept any letter or symbol for v v is speed at t = 16 seconds M1 for • ½×(12 + v)×8 (+ ….) = 550 OR • (…. +) ½×(v + v + 1)×32 = 550 OR • ½×(12 + v)×8 + ½×(v + v + 1)×32
48 + 4v + 16v + 16v + 16 = 550 or equivalent	m1	e.g. 96 + 8v + 32v + 32v + 32 = 1100 FT from M1 For appropriately expanding the brackets, and dealing with the fractions
(Speed at t = 16 seconds is) 13.5 or $13^1/_2$ (m/s)	A1	CAO. An unsupported answer of 13.5 (m/s) is awarded M0m0A0

GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 2: Higher Tier	Mark	Comments
1(a)(i) $100 \leq x < 150$	B1	
1(a)(ii) Midpoints 40, 70, 90, 125, 175	B1	Check the table
40×4 + 70×8 + 90×11 + 125×12 + 175×17 (= 160 + 560 + 990 + 1500 + 2975 = 6185)	M1	FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout
÷ 52	m1	
118.9(4..miles) or 119 (miles)	A1	
1(b) (Number of miles next month is) 440 × 1.12	M1	Or equivalent, e.g. 440 + 440 × 12 ÷ 100 (=440 + 52.80 = 492.80)
(Increased cost of fuel is) 1.3(0) × 1.1(0)	M1	
(Number of miles next month is) 492.8 (miles) **AND** (Increased cost per litre of fuel is) (£) 1.43	A1	Penalise, A0, if prematurely approximated in further working, but FT for possible final A1 Penalise any premature approximation in the 1st A0
(Cost of fuel next month is) $\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)$ or $\frac{492.8}{11} \times 1.43$	m1	FT provided M1, M1 previously awarded
(£) 64.06(4)	A1	ISW. *Allow an answer of (£)64.1(0) or (£)65* *Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)64 to (£)64.10, (£)64.35*
1(b) Alternative method 1 *(Cost of fuel last month) 1.3(0) × 440 ÷ 11* *or 1.3(0) × 40*	*M1*	
(£) 52	*A1*	*May be implied in further working* *Penalise, A0, if prematurely approximated in further working, but FT for possible final A1*
(Cost of fuel next month) 52 × 1.1(0) × 1.12	*m2*	*FT 'their 1.3(0) × 440 ÷ 11'* *m1 for one of the following:* • *52 × 1.1(0) (= 57.20)* • *52 × 1.12 (= 58.24)*
(£) 64.06(4)	*A1*	*ISW. Allow an answer of (£)64.1(0) or (£)65* *FT only m2, no FT from m1.* *Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)63.84, (£)64.02*

1(b) Alternative method 2 *(Fuel next month) 1.12 × 440 ÷ 11* *or 1.12 × 40* *44.8 (litres)*	*M1* *A1*	*May be implied in further working* *Penalise, A0, if prematurely approximated in further working, but FT for possible final A1*
(Cost of fuel next month) 44.8 × 1.3(0) × 1.1(0) *(£) 64.06(4)*	*m2* *A1*	*FT 'their 1.12 × 440 ÷ 11'* *m1 for one of the following:* • *44.8 × 1.3(0) (= 58.24)* • *44.8 × 1.1(0) (= 49.28)* *ISW. Allow an answer of (£)64.1(0) or (£)65* *FT only m2, no FT from m1.* *Allow correctly evaluated answers from correct working which may include premature rounding or truncation, e.g. (£)63.84, (£)64.02*
1(b) Alternative method 3 *(Cost of fuel next month) $\frac{440 \times 1.12}{11} \times 1.3(0) \times 1.1(0)$* *(£) 64.06(4)*	*M4* *A1*	***Must be** shown as one complete calculation to be followed by a final answer* *ISW. Allow an answer of (£)64.1(0) or (£)65*
2(a) $\frac{114}{1.45}$ or $114 \div (87/60)$ or $114 \times \frac{60}{87}$ or equivalent 78.6(2…) (km/h)	M2 A1	M1 for one of the following: • idea of distance/time, e.g. 114/1.27, 114/87, 114/5220, 114/1hr 27 minutes, including approximated as 114/1.5, may be implied by answers to these calculations (see note) provided not from incorrect working • sight of 1.45 (hours) Accept 79 (km/h) provided not from incorrect working Do not FT from M1
2(b) (Conversion to Japanese yen) 800 × 135.72 108 576 (Japanese yen) (Can buy) 108 000 (Japanese yen) (Cost in pounds is) 108 000 ÷ 135.72 or (800 –) 576 ÷ 135.72 (£) 795.76	M1 A1 B1 M1 A1	Allow for an equivalent amount given using the notes available, e.g. 21 5000 (yen) **and** 3 1000 (yen), or equivalent using only 5000 and 1000 yen notes FT 'their derived 108 576' provided evidence of rounding down to nearest 1000 FT 'their derived 108 576' and 'their derived 108 000' provided 'their 108 000' in whole number of 1000s (including from rounding 108 576 up) ISW. Allow (£)795.75 Allow on FT rounded or truncated to a penny

2(c) (Number of 0-to-64-year olds) 0.75 × 270400 or 270400 – 0.25 × 270400 202800	M1 A1	 May be implied in further working
(Number of 0-to-14-year olds) 9 × 202800 ÷ (9+41) or 9 × 4056 36504	M1 A1	FT 'their derived 202800', not 270400
2(c) <u>Alternative method 1</u> *(Proportion) 9 × 270400 ÷ (9+41)* *48672*	*M1* *A1*	 *May be implied in further working*
(Number of 0-to 14-year olds) 0.75 × 48672 *or 48672 – 0.25 × 48672* *or 48672 – 12168* *36504*	*M1* *A1*	*FT 'their derived 48672', not 270400*
2(c) <u>Alternative method 2</u> *(Overall ratio) (9 : 41 :) <u>9 + 41</u>* *3* *(9 : 41 :) 16.66666....*	*M1* *A1*	 *Allow 16.6(...) or 16.7* *May be implied in further working*
(Number of 0-to 14-year olds) 9 × 270400 ÷ (9+41 + ⅓(9 + 41)) *36504*	*M1* *A1*	*FT 'their ⅓(9 + 41)'* *Do not FT from rounding or truncation of 50/3*

3. (Let x be the initial angle of lean) (Let y be the final angle of lean) sin x = 30/110 sin y = 60/110 (x =) $\sin^{-1}(30/110)$ or (x =) $\sin^{-1}$ 0.2727... OR (y =) $\sin^{-1}(60/110)$ or (y =) $\sin^{-1}$ 0.5454... 15.8266...(°) **AND** 33.0557....(°) (and statement or calculation to show 33.0557....(°) > 2 × 15.8266...(°))	 M1 M1 M1 A2	 Allow M marks for • same variable is used for both angles of lean • an appropriate statement of the sine rule, e.g. 30/sin x = 110/sin 90 or sin y/60 = sin 90/110 Also implies appropriate previous M1 Accept rounded or truncated angles for A2 or A1 A1 for 15.8266...(°) or 33.0557....(°)
<u>3. Alternative method 1</u> *(To find initial angle of lean)* *Sin x = 30/110* *(x =) $\sin^{-1}(30/110)$ or (x =) $\sin^{-1}$ 0.2727...* *(x =) 15.8266...(°)* *(To find horizontal lean if angle of lean was doubled)* *sin ((2 × 15.8266...(°)) = horizontal lean/110 or* *(Horizontal lean =) 110 × Sin (2 × 15.8266...(°))* *57.725 (cm) (and statement that < 60 cm)*	 *M1* *M1* *A1* *M1* *A1*	 *Allow for an appropriate statement of the sine rule, 30/sin x = 110/sin 90 or sin x/30 = sin 90/110* *Also implies previous M1* *Accept rounded or truncated angles* *FT rounded or truncated double 'their derived 15.8266...(°)'* *FT answer must be < 60 (cm)*
<u>3. Alternative method 2</u> *(To find final angle of lean)* *Sin y = 60/110* *(y =) $\sin^{-1}(60/110)$ or (y =) $\sin^{-1}$0.5454…* *(y =) 33.0557...(°)* *(To find horizontal lean if angle of lean was halved)* *sin (1/2 × 33.0557...(°)) = horizontal lean/110 or* *(Horizontal lean =) 110 × Sin(1/2 × 33.0557...(°))* *31.29…(cm) (and statement that > 30 cm)*	 *M1* *M1* *A1* *M1* *A1*	 *Allow for an appropriate statement of the sine rule, 60/sin y = 110/sin 90 or sin y/60 = sin 90/110* *Also implies previous M1* *Accept rounded or truncated angles* *FT rounded or truncated ½ 'their derived 33.0557...(°)* *FT answer must be > 30 (cm)*
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.

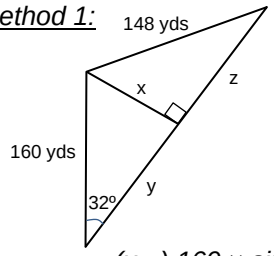
4. (80 litres = 80 000 cm^3) 80 000 = $\pi \times 36^2 \times$ height or equivalent	M2	May be shown in stages, but place value must be correct for the award of M2 M1 for sight of any 1 of the following: • (80 litres =) 80 000 (cm^3) • $\pi \times 36^2$ ($\times$ height) • sight of $\pi \times 36^2$ ($\approx$ 4069 to 4072) • sight of ($\pi \times 36^2 \approx$) 4069 to 4072 • 80 000 = $\pi \times 36^2 \times$ height with place value errors with digits 8 and/or 36 Allow for sight of $\pi \times 36^2$ or 80 000 (cm^3) even if embedded, contradicted in further working or not used
(Height =) $\frac{80\,000}{\pi \times 36^2}$ or equivalent	m1	For a correct rearrangement, provided the denominator is a multiple of π Allow if the intended calculation includes a place value error with digits 8 and/or 36 Also possible FT from M1
Answers in the range 19.6 to 19.7 (cm)	A1	CAO, must be in centimetres Accept 20(cm) from correct working
5. (Income taxed at Basic rate) 2400 × 100 ÷ 20 or 2400 ÷ 0.2 or 2400 × 5 or equivalent	M1	May be seen in stages Allow for sight of, e.g. • 10% of 12000 • 12000 × 0.8 = 9600
12000 (dollars)	A1	Allow an embedded answer e.g.12000 × 0.2 = 2400 Accept if found by trial and improvement or reverse working for M1 A1, e.g. • 10% of 12000 = 1200 with an answer 12000 • 12000 × 0.8 = 9600 with an embedded answer 12000 – 9600 = 2400 Allow M1 A1 for a final answer of 12000, provided not from incorrect working.
(Khalida's income) 12000 + 5000	M1	FT their derived 12000' provided 2400 < 'their 12000' < 20000, i.e. 'their income taxed at Basic rate' + 5000
17000 (dollars)	A1	Mark final answer. The answer given in the answer space takes precedence.

6.		<u>M marks may be awarded from working with multiples of e.g. 77.5 and/or 97.5 to reach e.g. 5750</u>
$\frac{5750}{97.5-20}$ or $\frac{5750}{77.5}$	M3	M2 for <u>length</u>, where $5700 < \text{length} \leq 5800$ and $95 \leq \text{width} < 100$ M1 for $\frac{5750}{97.5}$
$-\frac{97.5}{97.5-20}$ or $-\frac{97.5}{77.5}$ $\left(May\ be\ seen\ as\ \frac{5750-97.5}{97.5-20}\ \ or\ \ \frac{5652.5}{77.5}\right)$	m1	FT from M2 for 'their 97.5'
= 72.9(3…) or 73	A1	FT is possible from m0 provided M3 or M2 previously awarded From M3, 5750 ÷ 77.5 = 74.19(3…) rounded down to 74 (boards) is awarded M3m0A1 unless further correct working seen
(Number of boards needed =) 74 (boards)	A1	FT from M2m1A1 for a correct evaluation using their bounds, rounded up and +1 If no marks awarded, and from a misinterpretation of the question, SC4 for an **answer of 69 boards** from $\frac{5650}{102.5-20} - \frac{102.5}{102.5-20} + 1$ or $\frac{5547.5}{82.5} + 1$ OR SC3 for an **answer of 67(.242…) or 68** from $\frac{5650}{102.5-20} - \frac{102.5}{102.5-20}$ or $\frac{5547.5}{82.5}$ OR SC2 for a correct evaluation (rounded, truncated or unrounded) of the calculation <u>length – width</u>, where $5600 \leq \text{length} < 5700$ and $100 < \text{width} \leq 105$ OR SC1 for an **answer of 68(.484…) or 69 boards** from $\frac{5650}{102.5-20}$ or $\frac{5650}{82.5}$ OR If no marks awarded, SC1 for sight of 97.5 and 5750

6. Alternative method:		*M marks may be awarded from working with multiples of e.g. 77.5 and/or 97.5 to reach e.g. 5750*
$\frac{5750}{97.5-20}$ *or* $\frac{5750}{77.5}$	*M3*	*M2 for length, where 5700 < length ≤ 5800 and width – 20, 95 ≤ width < 100* *M1 for* $\frac{5750}{97.5}$
$-\frac{20}{97.5-20}$ *or* $-\frac{20}{77.5}$	*m1*	*FT from M2 for 'their 97.5'*
$\left(May\ be\ seen\ as\ \frac{5750-20}{97.5-20}\ or\ \frac{5730}{77.5}\right)$		
(Number of boards needed =) 74 (boards)	*A2*	*FT from M2m1 for a correct evaluation using their bounds, rounded up* *A1 for 73(.9354…)* *OR* *A1 on FT from M3m0 for 74.19(3…) or 75* *An answer of 74.19(3…) rounded down to 74 (boards) is awarded M3m0A1 unless further correct working seen* *OR* *A1 on FT from M2m1 for an unrounded correct evaluation using their bounds* *If no marks awarded, and from a misinterpretation of the question* *SC4 for an **answer of 69 boards** from* $\frac{5650}{102.5-20} - \frac{20}{102.5-20}$ *or* $\frac{5630}{82.5}$ *OR* *SC3 for an **answer of 68(.2424…) boards** from* $\frac{5650}{102.5-20} - \frac{20}{102.5-20}$ *or* $\frac{5630}{82.5}$ *OR* *SC2 for a correct evaluation (rounded, truncated or unrounded) of the calculation* $\frac{length-20}{width-20}$, *where 5600 ≤ length < 5700 and 100 < width ≤ 105* *OR* *SC1 for an **answer of 68(.484…) or 69 boards** from* $\frac{5650}{102.5-20}$ *or* $\frac{5650}{82.5}$ *OR* *If no marks awarded,* *SC1 for sight of 97.5 AND 5750*

7. Strategy of using trigonometry to find DB (or DC) followed by Pythagoras to find AB (or AC)	S1	Or equivalent full method
(DB =) $\frac{3.5}{\cos 65}$ OR (DB =) $\frac{7 \times \sin 65}{\sin 50}$	M2	Or a complete method to find DB using the vertical height of the triangle and Pythagoras M1 for $\cos 65 = \frac{3.5}{DB}$ OR $\frac{DB}{\sin 65} = \frac{7}{\sin 50}$ or equivalent
= 8.28(1…) or 8.3 (cm)	A1	CAO Award A0 but FT if e.g. 8 or 8.2 used in next step
$(AB^2 =) 13^2 + 8.28(1\ldots)^2$	M1	FT 'their 8.28(1…)' provided trigonometry attempted to find DB
AB^2 = 237.58(6…) or 237.6 OR (AB =) $\sqrt{237.58(6\ldots)}$ or $\sqrt{237.6}$ or 15.4(138…) (cm)	A1	FT for similar accuracy Note: use of DB = 8.2 leads to AB^2 = 236.24 OR AB = $\sqrt{236.24}$ or 15.37(01…) use of DB = 8.3 leads to AB^2 = 237.89 OR AB = $\sqrt{237.89}$ or 15.4(236…)
(Length of tear strip needed =) 37.8(2…) or 37.83 or 38 (cm)	B1	FT the correct evaluation of 'their $\sqrt{237.58(6\ldots)}$' × 2 + 7 provided previous M1 awarded Note: use of DB = 8.2 leads to an answer of 37.7(40…cm) use of DB = 8.3 leads to an answer of 37.8(47…cm)
7. Alternative method: *Strategy of using trigonometry to find the vertical height of the triangle followed by 3-D Pythagoras*	*S1*	*Or equivalent full method*
(h =) 3.5 × tan65 OR (h =) $\frac{3.5 \times \sin 65}{\sin 25}$	*M2*	*M1 for $\tan 65 = \frac{h}{3.5}$ OR $\frac{h}{\sin 65} = \frac{3.5}{\sin 25}$ or equivalent*
= 7.5(057…) (cm)	*A1*	*CAO* *Award A0 but FT if e.g. 7 or 8 used in next step*
$(AB^2 =) 7.5(057\ldots)^2 + 3.5^2 + 13^2$	*M1*	*FT 'their 7.5(057…)' provided trigonometry attempted to find h*
AB^2 = 237.58(6…) or 237.6 OR *(AB =) $\sqrt{237.58(6\ldots)}$ or $\sqrt{237.6}$* or 15.4(138…) (cm)	*A1*	*FT for similar accuracy*
(Length of tear strip needed =) *37.8(2…) or 37.83 or 38 (cm)*	*B1*	*FT the correct evaluation of* 'their $\sqrt{237.58(6\ldots)}$' × 2 + 7 provided previous M1 awarded

8. (£)850 × 1.0048^n	B1	e.g. 850 × 1.0048 = (£)854.08
850 × 1.0048^{34} (= (£)1000.(29…) OR 1.0048^{34} (=1.1768…)	M1	
34 (months) OR 2 years 10 months	A1	CAO May be implied by (850 × 1.0048^{34} =) (£)1000.(29…)
(Date =) 31st October or 1st November 2024	A1	Allow 30th October A correct answer of 31st October or 1st November 2024 implies the previous A1 If no marks awarded, SC1 for a date of 31st March or 1st April 2050 from using a multiplier of 1.00048
9(a) Sight of $\sqrt{2.25}$ OR Area scale factor = 1.5^2 OR Area scale factor = 2.25 AND scale factor = 1.5	M1	
(Height =) 12 ÷ $\sqrt{2.25}$ or 12 ÷ 1.5 or 12 × 2/3	m1	
= 8 (cm)	A1	Must be from convincing working
9(b) (Base area of large can =) 144 ÷ 8 × 2.25 or 18 × 2.25	M1	Note: 2.25 could be written as 1.5^2
= 40.5 (cm^2)	A1	
9(b) Alternative method 1: *(Base area of large can =)* *144 × $\sqrt{2.25}^3$ ÷ 12 or 144 × 1.5^3 ÷ 12*	*M1*	
= 40.5 (cm^2)	*A1*	
9(b) Alternative method 2: *(Radius of large can =)* $\sqrt{\frac{144}{8\times\pi}}$ × $\sqrt{2.25}$ *or* $\sqrt{\frac{18}{\pi}}$ × *1.5 (=3.59 to 3.592)*	*M1*	
(Base area of large can =) 40.5 (cm^2)	*A1*	*From* **π** × $(\sqrt{\frac{18}{\pi}} \times 1.5)^2$
10(a) Sight of (2 ×) $\frac{x}{360}$ × 2 × **π** × 160 or equivalent	B1	
(x =) $\frac{65 \div 2 \times 360}{2 \times \pi \times 160}$ or equivalent	M1	Allow for sight of $\frac{65 \times 360}{2 \times \pi \times 160}$ or equivalent
= 11.6 (º)	A2	CAO A1 for 11.6366… to 11.6441… or 585/16**π** OR A1 for a final answer of 23.3(º) from failing to halve their sector angle If no marks awarded, SC1 for a final answer of 23.3(º) from use of diameter 160 cm and halving their sector angle

10(b) (Angle at hole =) $\sin^{-1}\left(\frac{\sin 32}{148} \times 160\right)$	M2	M1 for $\frac{\sin(\text{Angle at hole})}{160} = \frac{\sin 32}{148}$ or equivalent
(Angle at hole =) 34.9(5…) or 35 (º)	A1	CAO
(3rd Angle = 180–32–34.9(5…) =) 113(.048…) (º)	B1	FT 180 – 32 – 'their 34.9(5…)' provided sine rule attempted
(Length of single shot =) $\frac{148}{\sin 32} \times \sin 113(.048\ldots)$ OR	M2	FT 'their derived 113.04(8…)' provided it is clearly their 3rd angle for any of the 3 possible methods M1 for $\frac{\text{single shot}}{\sin 113(.048\ldots)} = \frac{148}{\sin 32}$ or equivalent OR
$\frac{160}{\sin 34.9(5\ldots)} \times \sin 113(.048\ldots)$ OR		FT 'their derived 34.9(5…)' provided it is clearly their angle at the hole M1 for $\frac{\text{single shot}}{\sin 113(.048\ldots)} = \frac{160}{\sin 34.9(5\ldots)}$ or equivalent OR
$\sqrt{148^2 + 160^2 - 2 \times 148 \times 160 \times \cos 113(.048\ldots)}$ $(= \sqrt{66045(.770\ldots)})$ = 256.7 to 257.1 (yards)	A1	M1 for shot^2 = 148^2+160^2−2×148×160×cos113(.048…)
10(b) Alternative method 1:  *(x =) 160 × sin 32* *= 84.7(787…) or 84.8 (m)*	*M1* *A1*	*Only award these marks if a clear intention made to split the triangle this way, and a full method attempted to find the length of the single shot* *Allow answers to be suitably rounded* *Only penalise the final A1 mark if their answer from using rounded values does not lie in the range given*
(y =) 160 × cos 32 OR $\sqrt{160^2 - 84.7(787\ldots)^2}$ *= 135.6(876…) or 135.7 (m)*	*M1* *A1*	*FT 'their 84.7(787…)' provided 1st M1 awarded*
(z =) $\sqrt{148^2 - 84.7(787\ldots)^2}$ *= 121.3(060…) (m)*	*M1* *A1*	*Or a full alternative method* *FT 'their 84.7(787…)' provided 1st M1 awarded*
(Length of shot = 135.6(876..) + 121.3(060…)=) *256.8 to 257.15 (yards)*	*A1*	*FT 'their 135.6(876…)' and 'their 121.3(060…)' provided M1M1M1 previously awarded and at least one A1 previously awarded*

10(b) Alternative method 2: *Strategy to form a quadratic equation and solve*	*S1*	
$148^2 = 160^2 + shot^2 - 2\times160\times shot\times\cos32$	*M1*	
$Shot^2 - 320\cos32 \times shot + 3696 = 0$	*A1*	*Note: 320cos32 = 271.375…*
$(Shot =) \frac{271.375\ldots \pm \sqrt{271.375^2 - 4\times1\times3696}}{2\times1}$	*M1*	*FT 'their 320cos32'* *Must be seen*
$(Shot =) \frac{271.375\ldots \pm \sqrt{58860.60272}}{2}$	*A1*	
(Shot =) 256.99… or 257 (m) (or 14.38… (m))	*A2*	*Implies previous A1* *A1 if 256.99… clearly not identified as being their answer*