REVISE
.wales

1.13 — Rounding & bounds in context

Mark schemes for the 1.13 question pack

Spec 1.1.5, 1.6.1 — Unit 1

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 20 questions in the corresponding revise.wales question pack (80 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

7(a) 14:30 to 14:45	B1	Accept any ¼ hour period within 14:27 to 14:57 inclusive Allow e.g. 2:30(p.m.) to 2:45(p.m.)
7(b) Answer in the range 15:09 to 15:15 inclusive	B1	Allow e.g. 3:09(p.m.) to 3:15(p.m.) inclusive
7(c) $\frac{18 \times 1000}{60 \times 60}$ 5 (metres per second)	M1 A1	Or equivalent e.g. 18 × 5 ÷ 18
7(d) ½ × 18 + ½ × 1 × (18 + 14) (= 9 + 16) 25 (km)	 M2 A1	Do not penalise a more accurate estimate that uses the velocities at 14:00, 15:00 and 16:00, e.g. using ½-hour intervals. M1 for one of the two areas correct in the sum, OR M1 for 1 slip in reading If a more accurate estimate used, M2 for a full correct method M1 for a full method with at least 1 correct area calculation A1 is dependent on M2 being awarded No FT from M1 *Alternative method:* *M2 for ½×1×((0+)14+2(18))* *Award M1 if 1 error made* *A1 for 25 (km) No FT from M1*

GCSE Mathematics – Numeracy Unit 1:Higher Tier Autumn 2016	Mark	Comment
7(e) Shows the distance travelled from the graph, e.g. ½ × 1 × 14 (= 7 km) or ½ × ½ × (14 + 12) + ½ × ½ × 12 (= 9.5 km)	M1	
Distance from the graph 7 (km) to 12 (km)	A1	If units are given they must be correct Must follow their working correctly
Shows use of 5 miles ≈ 8 km with a comparison conclusion, e.g. '7 km is reasonably close 8 km which is 5 miles', 'not really as 5 miles ≈ 8 km, so 9.5 km is a greater distance'	E1	Depends on M1 previously awarded Need sight of conversion 5 miles ≈ 8 km, or equivalent For this question, accept use of 3 miles is approximately 5 km
Organisation and communication	OC 1	*Organisation and communication* 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
Accuracy of writing	W1	*Accuracy of writing* 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.

			factor in incorrect position.
11. Sight of 37.5 × 25.5= 956.25 (cm^2)		M1 A1	CAO. Mark final answer. If no marks gained award SC1 for 956, 956.2 or 956.3
12.(a) $(x-7)(x-5)$		B2	B1 for $(x-7)(x-7+2)$ or $(x-7)(x+k)$ with $k \neq 0$ OR $(x \ldots 7)(x \ldots 5)$

2. Sight of any 2 of: 25.5, 36.5, 47.5 OR sight of 25 + 36 + 47 + 1.5 or equivalent	B1	Do not accept '.49' instead of '.5', but allow '.49 recurring'
Greatest 109.5 (cm) or 109.499999... (cm)	B1	CAO, must be from correct working, or unsupported Allow an answer of 110(cm) from sight of 109.5(cm) Do not accept 109.49 (cm)

12.(a) Sight of 805 (cm) or 405 (cm) (805 × 405) + (405 × 400) OR a consistent attempt at converting these into metres = 488 025 (cm^2)	B1 M2 A1	Do not accept 804·9 or 404·9, but allow 804·9 recurring or 404·9 recurring FT their upper bounds M1 for 805×405 + (400<n≤405 × 405) (Note: use of 805×405 + 405×405 leads to 490 050) OR 48·8(025) m^2. Allow 488 000 (cm^2) CAO. Ignore attempts to convert into m^2. *Alternative method:* *M2 for $805^2 - 400^2$* *Allow M1 for $805^2 - (395 \leq n < 400)^2$* *A1 for 488 025 ($cm^2$)* *CAO. Ignore attempts to convert into m^2.*
12.(b) Conversion 48·8(025) (m^2) OR 0·00325 (g/cm^2) 32·5 × 48·8(025) OR 0·00325 × 488 025 = 1586(·08125) (g) AND Statement e.g. 'No, more than 1·5 kg (could be) needed'	B1 M1 A1	FT 'their 488 025' OR 'their 32·5' (805 × 405 + 405 × 405 = 490 050 (cm^2) or 49(·0050) m^2) FT 'their 32·5' provided it is greater than 30 and ≤35, and FT their area provided an attempt made at converting into g/cm^2 or m^2 Accept 1·6 kg from correct working FT 32·5 × 'their area' correctly converted into m^2 *Alternative method:* *M1 for* *0·0325×48·8(025) OR $3·25×10^{-6}×488\,025$* *(kg/m^2 × m^2) (kg/cm^2 × cm^2)* *FT 'their 32·5' provided it is greater than 30 and ≤35, and FT their area* *A1 for 1·58(60…) or 1·6 (kg) AND* *Statement e.g.* *'No, more than 1·5 kg (could be) needed'* *FT 32·5 × 'their area' correctly converted into m^2* *OR* *For candidates **clearly** considering the smallest area that could be seeded* *B1 for 1500 (g) OR 0·0325 (kg)* *FT 'their 32·5'* *M1 for 1500 ÷ 32·5 OR 1·5 ÷ 0·0325* *FT 'their 32·5' provided it is greater than 30 and ≤35 for M1 only* *A1 for 46(·15…) (m^2) AND* *Statement e.g.* *'No, more than 1·5 kg (could be) needed'* *FT their area,* *Only award A1 if their area has been correctly converted into m^2 for comparison*

			lead to a proof before any marks are awarded.
13(a) Any two of the three lines correct. (x + y = 6 y = x/2 + 3 x = −2) Correct region identified.		B2 B1	B1 for any one line correct. CAO.
13.(b) (i) (x =) 2		B1	FT 'their region', if possible, for both B1 marks,

GCSE MATHEMATICS Unit 2 : Higher tier Summer 2017	✓	Mark	MARK SCHEME Comments
14 (Greatest area =) 31.5 x 23.5 – 20.5 x 12.5 (= 740.25 – 256.25)		M2	Award M1 for correct use of values $31 < l \leq 31.5$, $23 < w \leq 23.5$, $20.5 \leq l < 21$, $12.5 \leq w < 13$. OR M1 for 31.5 x 23.5 – 'area of inner rectangle' OR M1 for 'area of outer rectangle' – 20.5 x 12.5
= 484 (cm^2)		A1	CAO *Alternative examples for method marks* *(adding up split areas of the shaded region).* *1. Horizontal split* *2 x 31.5 x 5.5 + 2 x 12.5 x 5.5 ,* *M2* *OR* *2. Vertical split* *2 x 23.5 x 5.5 + 2 x 20.5 x 5.5 ,* *M2* *Award M1 for correct use of values $31 < l \leq 31.5$, $23 < w \leq 23.5$, $20.5 \leq l < 21$, $12.5 \leq w < 13$ and 'their 5.5' adjusted accordingly to their values.* *Note that the 'shaded width' need not be consistent around the inner rectangle.*

9(a) False True False False	B2	B1 for 3 correct
9(b) • Number the engineers from 01 to 50 • Consider successive 2-digit numbers • Use numbers in the range 1 to 50 • Ignore repeats (The engineers chosen would be) 29, 45, 07, 24, 39, 17, 03, ~~24~~, 49, 12 ISW	E2 B1	All 4 needed for E2 Allow an equivalent numbering system e.g. 00 to 49. E1 for any 2 or 3 correct statements. Needs to be written in this order *Alternative method:* • *Number the engineers from 01 to 50* • *Consider successive 2-digit numbers* • *Divide each number by 50 and use the remainder to choose an engineer* • *Ignore repeats. When the remainder is 0, engineer 50 is selected* *E2 for all 4 statements* *E1 for any 2 or 3 statements* *B1 for* *29, 47, 45, 04, ~~29~~, 07, 24, 33, 39, 49 ISW*

9(c) Sight of 24·5 or 12·25 AND 43·5	B1	Accept use of ·49 repeated and 12·249 repeated throughout, but not ·49 and 12·249
(S.area of half-hemisphere =) $(4 \times \pi \times 12{\cdot}25^2) \div 4$ or equivalent	B1	(= 471 to 471·6… (m^2)) FT 'their 12·25' provided it is $\geq$ 11·5 and $\leq$ 12·5
(Curved surface area of cylinder =) $(\pi \times 24{\cdot}5 \times 43{\cdot}5) \div 2$ or equivalent	B1	(= 1673 to 1674·75 (m^2)) FT 'their 24·5' or 'their 12·25' and 'their 43·5' including use of 24 or 12, 43 and their lower bounds.
(Total surface area =) $(4\times\pi\times12{\cdot}25^2)\div4 + (\pi\times24{\cdot}5\times43{\cdot}5)\div2 + (\pi\times12{\cdot}25^2)\div2$	M2	*(Area of semicircle 235·5 to 235·8…)* Upper bounds need to be correct. M1 for summing 3 terms, with 2 being correct.
= 2379·5 to 2382 (m^2)	A1	CAO
(Number of tins needed =) (2379·5 to 2382) ÷ 39·5	M1	(= 60·2… to 60·3) FT their total area provided at least M1 awarded.
= 61	A1	FT a correctly rounded up answer to their calculation.

Unit 2 : Higher Tier Summer 2018			
1.(a)	8·27	B2	Mark final answer. B1 for sight of 8·26(……) or for sight of 8·270 or for sight of 8·30 or for sight of 8·3
1.(b)	0·0213	B2	Mark final answer. B1 for sight of 0·0212(…….)

			• use appropriate terminology, units, etc.
4.(a)	225	B2	Mark final answer. Allow $\sqrt{225}$ (= 15) as an indication of correct answer and award B2. B1 for unambiguous indication that HCF is 15. B1 only for 15^2 if not shown to be 225.
4.(b)	9·6	B2	Mark final answer. B1 for sight of 3·2.

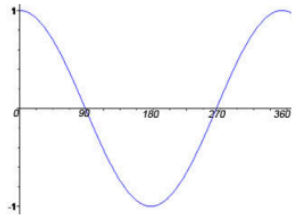
5. (Maximum cup height)12.5 (cm) **AND** (Maximum gap) 4.5 (cm) OR For **use** of 12.43 to 12.499... **AND** 4.43 to 4.499...	B1	For sight of 12.5 and 4.5 (ignoring any least measures given)
(Maximum height of 7 coffee mugs is) 12.5 + 6 × 4.5	M2	FT 'their 12.5' and 'their 4.5' provided in ranges >12 to 12.5 and >4 to 4.5 respectively Award M1 **only** (A0) for 12.5 + 7× 4.5 (A0)
(=) 39.5 (cm)	A1	
Conclusion or reason, e.g. '(as 39.5 cm > 39 cm) Michelle cannot be certain the mugs will fit'	E1	Depends on at least 2 marks previously awarded FT 'their 39.5' irrespective if <39 or >39 **An unsupported 39.5 is no marks as no working shown**

11(a) Use of 192·5 Use of 5·5 and 14·5 $\frac{2 \times 192{\cdot}5}{5{\cdot}5 + 14{\cdot}5}$ (= 385) (20) = 19·25 (s)	B1 B1 M1 A1	In their final calculation In their final calculation FT 'their 192·5' provided $190 \leq s < 195$, and 'their 5·5' provided $5 < u \leq 6$, and 'their 14·5' provided $14 < v \leq 15$ CAO
11(b) Use of 14·5, 8·5 and 21·5 Use or sight of t(u + v) $14{\cdot}5 \times \frac{(8{\cdot}5 + 21{\cdot}5)}{2}$ = 217·5 (m)	B1 B1 M1 A1	In their final calculation In their final calculation **Use of t = 14, u=8, v=21, 'their upper bounds' of t, u and v OR 'their lower bounds of u, v and t in this expression implies this B1 mark** FT 'their 14·5' provided $14 < t \leq 15$ and 'their 8·5' provided $8 < u \leq 9$, and 'their 21·5' provided $21 < v \leq 22$ CAO

7.(a)(i)	425 kg	B1	
7.(a)(ii)	21·5 s	B1	
7.(a)(iii)	83 people	B1	
7.(b)	$2{\cdot}38 \times 10^{-2}$	B2	B1 for sight of a correct answer but not in standard form

	– 6 14 ISW	A1	
9.(a)	5n < 3n + 7 or equivalent ISW	B2	2n < 7 OR n < 7/2 implies B2. Ignore use of a different letter e.g. 5x < 3x + 7. Use of '≤' is B1. B1 for sight of 3n + 7 in an inequality.
9.(b)	2n < 7 OR n < 7/2	B1	FT 'their inequality' if of equivalent difficulty. May be seen in part (a).
	(Greatest amount =) (£)3	B1	FT 'their n < k'. B0 if they have 'n>k'. B0 if it leads to n<1. An answer of (£)3 gains B1B1 (unless from incorrect algebra work).

6.(a) 0·3 shown for 'Does not visit '*Erddig Gardens*'. Use of 0·7 × …… = 0·28 P(goes to '*Bersham Heritage Centre*') = 0.4 Second set of branches 0·4, 0·6, 0·4, 0·6	B1 M1 A1 A1	 Implied by sight of 0·4 (on 'top branch' of the four on the right) F.T. 'their 0·4' BUT **dependent** on M1 gained. (i.e. M0A0A0 for 0·28 and 0·72 on branches.)
6.(b) 0·7 × 0·6 = 0·42 ISW	M1 A1	F.T. 0·7 × 'their 0·6' only if 0 < 'their 0·6' < 1 0·42 gains M1A1.
7. (area) Volume Length Volume None Area	B3	*Must use the terminology given in the question.* B3 for all 5 correct. B2 for 3 or 4 correct. B1 for 2 correct. B0 otherwise.
8.(a) $(x + 7)(x - 3)$ $(x =) -7$ AND $(x =) 3$	B2 B1	B1 for $(x \ldots 7)(x \ldots 3)$. Strict F.T. from their brackets. Allow the following. B2 for x + 7 (=0) AND x − 3 (=0) (B1) (x =) −7 AND (x =) 3 (B1) B1 for x − 7 (=0) AND x + 3 (=0) (B0) (x =) 7 AND (x =) −3 (B1) FT B1 if only (x =) −7 AND (x =) 3 seen. (B1)
8.(b) Correct method for clearing all three fractions. Accurate clearing of fractions AND expansion of brackets on lhs. 24x = 36 or equivalent. x = 36/24 or equivalent	M1 A1 A1 A1	FT until 2nd error. May be seen in stages. Allow if all over a common denominator. May be seen in stages For collection of terms. FT from 'their ax = b' ONLY if M1 gained AND no more than one previous error. If no marks, allow SC1 for sight of 2(2x – 3) + 5(4x + 5) or equivalent. (10) If FT answer is a whole number then it must be shown as an integer. Allow a correct embedded answer of 1·5 or 1½ BUT penalise −1 if followed by x ≠ 1·5 or 1½. Note : An answer of 1·5 that is found without gaining M1 OR that is not embedded is zero marks.
9.(a) 40·5	B1	
9.(b) (25·5 + 25·5 =) 51	B1	
9.(c) (11·5 + 11·5=) 23	B1	

16. Use of 7175 AND (1)·2345 or (1)23·45(÷100) $7175 \times 1{\cdot}2345$ = (£)8858	B1 M1 A1	Or equivalent complete method. FT for 'their 7175' provided $7170 \leq x < 7180$ and 'their 1·2345' provided $1{\cdot}234 \leq y < 1{\cdot}235$ Sight of (£)8857·53(75) or (£)8857·54 implies B1M1. CAO.
17.(a) General cosine curve with appropriate orientation and position. Correct sketch with curve passing through (0°,1), (90°,0) and (270°,0) and approximately (180°,-1) and (360°,1) AND 90(°), 180(°), 270(°), 360(°) indicated on the x-axis AND -1 and 1 indicated on the y-axis.  	M1 A1	Ignore curve shown for values x< 0° or x> 360°. Accept 180° as mid-way between 0° and 360° if unlabelled. Accept 360° as unlabelled provided the sketch does not exceed 360°.
17.(b) 46(°) AND 314(°) OR 45·6(°) AND 314·4(°) OR 45·57(29…°) AND 314·4(27…°).	B2	B1 for sight of one correct angle. Allow embedded answers. If more than two answers offered award B1 for sight of one correct angle. If no marks, awarded SC1 for truncated answers 45(°) AND 315(°) OR 45·5(°) AND 314·5(°).
18. $0{\cdot}7 \times 0{\cdot}2 \times 0{\cdot}1 \times 6$ = 0·084 or equivalent	M2 A1	M1 for sight of $0{\cdot}7 \times 0{\cdot}2 \times 0{\cdot}1$ OR 0·014 OR 7/500 or equivalent. Fractional answer: 21/250 or equivalent. (ISW)
19. Sight of $25x^2 + 15x - 15x - 9$ $25x^2 - 19x - 9 = 0$ $x = \dfrac{-(-19) \pm \sqrt{(-19)^2 - 4 \times 25 \times (-9)}}{2 \times 25}$ $x = \dfrac{19 \pm \sqrt{1261}}{50}$ x = 1·09 with x = –0· 33 (answers to 2dp)	B1 B1 M1 A1 A1	Or equivalent. '= 0' required, but may be implied by an attempt to use the quadratic formula or if $a = 25, b = -19,$ $c = -9$ used in the quadratic formula. **This substitution into the formula must be seen for M1, otherwise award M0A0A0.** FT 'their derived quadratic equation' of equivalent difficulty (a, b and c must be non-zero). Allow one slip in substitution **for M1 only**, but must be correct formula. Can be implied from at least one correct value of x evaluated, provided M1 awarded. CAO for their quadratic equation.

6. 25·55 (seconds) – 12·35 (seconds) OR 25·5 (seconds) – 12·4 (seconds) + 2 × 0·05 (sec)	M2	Award M2 for **USE** of the correct bounds. If many attempts are offered without a method/answer being identified, then mark the final attempt. If M2 not gained, award M1 A0 for correct **USE** of values $12{\cdot}3 \leq t < 12.4$ and $25.5 < t \leq 25{\cdot}6$. [Note: $25{\cdot}54\dot{9}$ is equivalent to 25·55 and with an answer of 13.2 (seconds) gains all 3 marks]
= 13·2 (seconds)	A1	CAO. Mark final answer. Unsupported 13·2 is awarded M2 A1.

3(a)(i) (2.5, 42) stated with a suitable line of best fit drawn through this point	B2	For B2 do not ignore the answer space stating an incorrect point, or giving reverse coordinates
		
		Conditions of a suitable line of best fit:
		• The straight line (accept intention if a ruler is not used) must have points above and below it
		• The line must be of sufficient length, to illustrate trend for at least 6 points
		• The trend shows that there are points above and below the line towards each end of the line
		
		For B2 the point (2.5, 42) **must** be stated or plotted with a suitable line of best fit through this point.
		If (2.5, 42) is not stated or plotted, then it is only possible to award a maximum of B1
		
		Allow B2 for one of the following:
		• a blank answer space with (2.5, 42) plotted with a suitable line of best fit through (2.5, 42)
		• (2.5, 42) stated in the answer space, but not plotted, with suitable line of best fit passing through (2.5, 42)
		
		B1 for sight of any one of the following:
		• (2.5, 42) stated in the answer space
		• blank answer space with (2.5, 42) indicated by a correct plot
		• A suitable line of best fit for the given points:
		  ○ with no additional point plotted
		  ○ passing through 'their additional incorrect point' (plotted)
		  ○ suitable if 'their additional incorrect point' plotted is ignored

3(a)(ii) Reading from line of best fit for number of cups (tolerance to the nearest gridline) for rainfall of 2.0 mm	B1	Answer space takes precedence **STRICT FT** from (a)(i) 'their line of best fit' which must be drawn for negative correlation No mark is awarded if no line of best fit drawn in (a)(i)
3(b) $5 \times 18 + 5 \times 0.5$ or 18.5×5 92.5 (cm)	M1 A1	Allow for $18 <$ 'their 18.5' ≤ 19 CAO If no marks, award SC1 for sight of 18.5 (cm) or 18.4999(... cm) provided clearly a recurring 9 digit
3(c) Selects or unambiguously implies 'No' with a reason, e.g. '(Space) minimum 97.25 (cm) (which is less than 97.3 cm)'	E1	Allow 'No' with a reason, e.g. '97.25 (cm)' '(least) 97.25 and (greatest) 97.75' Do not accept 'No' with the reason, e.g. '97.75 (cm)'

7(a) (Monthly payments =) $\frac{\frac{0.033}{12} \times 18000}{1-\left(1+\frac{0.033}{12}\right)^{-4\times12}}$ OR $\frac{0.00275 \times 18000}{1-(1+0.00275)^{-48}}$ or equivalent = (£)400.81	M2 A1	<u>The correct answer alone, without any workings is awarded M0A0, since it is given in the question</u> M1 for an expression with only 1 (possibly repeated) incorrect substitution, but do not allow use of r = 3.3 Accept (£)400.80(89843…) Convincing working must be seen
7(b) (Saving =) 362.05×5×12 − 400.81×4×12 (− 2000) or 362.05×60 − 400.81×48 (− 2000) = (£)484.12	M1 A2	Use of accurate values of (£)362.05 and/or (£)400.81 can be accepted FT if more accurate values used e.g. • (£)484.17 or (£)484.16(8755) from use of accurate Option B monthly payment • (£)483.95 or (£)484.94(84006) from use of both accurate monthly payments A1 for sight of any one of the following: • an answer of (£)484 to (£)485 as a result of premature rounding • (£) 2484.12 • (£)2484.17 or (£)2484.16(8755) from use of accurate Option B monthly payment • (£)2483.95 or (£)2484.94(84006) from use of both accurate monthly payments

8. Working in mm: $60{\cdot}5 \times 7$ **OR** $420 + 0{\cdot}5 \times 7$ Working in cm: $6{\cdot}05 \times 7$ **OR** $42 + 0{\cdot}05 \times 7$ 423·5 (mm) ISW	M1 A1	Allow 60 < 'their 60·5' ≤ 61. Allow 6 cm < 'their 6·05' cm ≤ 6·1 cm. Allow 42·35 cm, provided units are given and correct. CAO. If no marks, award SC1 for sight of 60·5 OR 6·05.

10.(a) All three lines correct $(y - x = 1,\quad y = \frac{x}{2},\quad x = 3)$	B2	B1 for any two correct lines If $y = 3$ and any other vertical or horizontal line shown e.g. y = ± 3 or x = -3, do not award a mark unless $x = 3$ is selected for the region or clearly labelled.
Correct region identified	B1	Strict FT provided B1 awarded. Accept indication by 'shading out'.
10.(b) (i) (x =) –2	B1	FT from their graph, where possible. Allow tolerance of ½ a small square.

10.(b) (ii) (y =) 4	B1	FT from their graph, where possible. Allow tolerance of ½ a small square.

End of solutions