REVISE
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3.25 — Histograms with unequal class widths

Mark schemes for the 3.25 question pack

Spec 4.2.20 — Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 10 questions in the corresponding revise.wales question pack (59 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

8(a) 2	B1	
8(b) 0	B1	
8(c) Selects to use 1st histogram and work with area, sight of any single area calculated is sufficient 1×2 + 0.5×6 + 0.5×8 + 0.5×10 + 0.5×4 + 1×1 (= 2 + 3 + 4 + 5 + 2 + 1) 17 (anglers last year) 51 (anglers this year)	S1 M1 A1 B1	*Note: check histogram for working* Allow one error CAO FT 3×'their 17' provided S1 previously awarded and their final answer is an integer
8(d) Number of fish caught last year 8×0.25 + 32×0.25 + 40×0.25 + 24×0.25 + 32×0.25 + 16×0.25 + 4×0.5 40 (fish caught last year) Median is the 20th or 20.5th fish Last year median fish weighed 0.75 (kg) Difference is 0.15 (kg)	M1 A1 B1 B1 B1	*Note: check histogram for working* Allow one error (= 2 + 8 + 10 + 6 + 8 + 4 + 2) CAO FT 'half their 40' or 'half their 40' + 0.5 FT 'half their 40' or 'half their 40' + 0.5, provided their answer is in the range 0.5 to 1.25 inclusive FT 0.9 – 'their 0.75' correctly evaluated, or reversed if their 0.75 > 0.9 provided M1 previously awarded
8(e)(i) (Percentage last year within 1 hour) 2/17 (×100 %) or equivalent Appropriate statement e.g. 2/17 > 1/10, 2/17 > 2/20, 11(.76… %) or 12% > 10%, or equivalent	M1 A2	FT from (c), 'their 2'/'their 17', including if not working with area OR as two A1s: A1 for 11(.76… %) or 12% A1 for an appropriate conclusion from 'their 11(.76… %) or 12%' e.g. 'this is greater than 10%', 'not quite as good as last year', 'quite similar to last year', 'proportionally about the same' OR A1 only for 2/17 > 10% *Alternative* *10% of 17 = 1.7* *M1* *1.7 < 2* *A2*
8(e)(ii) Reflection, e.g. 'no, as the number taking part is nowhere near the same'. 'no, as the competition has grown', 'no, as the conditions might not have been the same', 'no, as the weather conditions could have been very different'	E1	'No' may be stated or implied Accept 'Yes' provided their reason has reference to comparing like with like e.g. proportions, percentages

9(a)(i) 4×1 + 4×4 + 4×3 + 8×0·5 = 36	M1 A1	Allow M1 for any 3 correct products CAO
9(a)(ii)		FT for all marks from their answer to (a)(i) provided their work in (a)(ii) is of equivalent difficulty. If FT results in the median being at one the group boundaries, then award a possible S1 only if correctly found
Median is in the group 54 to 58	S1	May be implied in their answer
4x = 14 OR 4x = 2 x = 3·5 or equivalent OR x = 0·5 or equivalent	M1 A1	OR $\frac{14}{16} \times 4$ OR $\frac{2}{16} \times 4$
(Estimated median =) 57·5 (sec) or equivalent	A1	
		Alternative method: *S1 for median group of 54 to 58* *M1 for* $\frac{14{\cdot}5}{16} \times 4$ *OR* $\frac{1{\cdot}5}{16} \times 4$ *(finding the* $18{\cdot}5^{th}$ *time)* *A1 for 3·6(25) OR 0·3(75)* *A1 for 57·6(25) (sec)*
9(b) Freq densities of 1, 2·5, 8, 9, 1·5	B2	B1 for any 2 correct
Suitable uniform vertical scale	B1	Up to 'their maximum frequency density' provided correct divisions attempted i.e. frequency ÷ class width
Correct bars drawn	B1	FT provided at least B1B0 B1 awarded
9(c) Under-30s quicker AND reason e.g. 'Higher proportion for under 58 seconds compared to over 58 seconds', 'Smaller proportion for 58 to 70 seconds compared to 50 to 58' 'Higher bars for the quicker times', 'Median for 30-and-overs was 60 seconds', 'Under-30s have a quicker modal group'	E1	If values or groups are given in their reason, they need to be correct. Allow reasons e.g. 'More under 58 seconds' 'The peak for the under-30s is lower than the 30-and-overs' Do not accept reasons e.g. 'Higher frequency for 54 to 58 seconds' 'Under-30s have a lower average time' 'The frequency densities reached higher for the under 30s' 'Their histogram is more to the left'

7(a) Correct bar of height 1·6	B1	
7(b) 45 (seconds)	B1	
7(c) (5×2)+(5×5)+(10×2·4)+16+(15×1) or 10 + 25 + 24 + 16 + 15 = 90	M1 A1	Allow M1 for any 3 correct including the use of 16 CAO
7(d)(i) 10 + 25 + (3/10 × 24) = 42(·2) Statement e.g. 'This is less than 45 which is 50%' or 'Gareth came about 42nd which is in the fastest 50%'	M1 A1 A1	FT 'their 24' CAO FT 'their 90' and FT from M1A0 *Alternative methods:* *M1 for 2·4x = 10 OR 2·4x = 14* *FT 'their 90'* *A1 for (50% mark =) 19(·1666..) (sec)* *A1 for statement e.g. 'Gareth's time is in the fastest 50%'* *OR* *M1 for 90/2 – 10 – 25 (= 10 pupils)* *FT 'their 90'* *A2 for a statement e.g.* *'If fewer than 10 (pupils) took between 15 and 18 seconds (then it would be true)', or* *'Gareth needs to be in the first 10 (pupils) in the 15 to 25 group', or* *'Gareth could be one of the fastest 10 in the 15 to 25 group'* *A1 for a statement e.g.* *'If fewer than this in the group took less than 18 (seconds)', or* *'Gareth needs to be in the first 10 (pupils) in the group', or* *'Gareth could be one of the fastest in the 15 to 25 group'*
7(d)(ii) Valid explanation e.g. 'The times of the 24 pupils in the 15 to 25 second group could be closer to 15 seconds' or 'There could be more times than expected in the range 15 to 18 seconds', or 'Gareth could be one of the slowest people in the 15 to 25 second group', or 'There could be 10 pupils quicker than him in the 15 to 25 group', or 'The median could be lower than 18', or 'He could be one of the other 14 in the group 15 to 25'	E1	FT 'their 90' Do not accept e.g. 'Gareth could have been slower than the 45th person'

13(a) Appropriate bar of height 4·8	B2	B1 for sight of 24 ÷ 5 or 4·8
13(b) 10×0·6 + 10×2 + 5×6 + 5×8 (+ 24) + 20×1 = 140	M1 A1	Allow M1 for at least 4 correct products CAO *Alternative method:* *M1 for 10×0·6 + 10×2 + 5×6 + 1·75×8* *Allow M1 for 3 correct products which must include 1·75×8* *A1 for 70 CAO*
Search for height in the group 145 to 150	S1	FT 'their 140' ÷ 4, and M1 previously awarded
6x = 9 OR 6x = 21 x = 1·5 OR x = 3·5 (Lower quartile =) 146·5 (cm)	M1 A1 A1	OR $\frac{9}{30} \times 5$ OR $\frac{21}{30} \times 5$ Or equivalent

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7. (Length of side = $\frac{76{\cdot}4}{4}$ =) 19·1(m)	B1	
(diagonal^2 =) $19{\cdot}1^2 + 19{\cdot}1^2$ diagonal^2 = 729·6(2) or (diagonal =) $\sqrt{729{\cdot}6(2)}$	M1 A1	F.T. 'their derived length of side' (not 76·4) Diagonal = 729·6(2) is A0 unless corrected in further work
(diagonal =) 27·0(..)(m) or 27(m)	A1	F.T. 'their 729.6' provided M1 awarded and their answer is greater than 19·1. Award SC2 for a final answer of 108(·0…)(m) (from using 76·4(m) as side length) BUT In this case there is no credit given for sight of 19·1.
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 explanation and working in a way that is clear and logical
Accuracy of 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.

7(a) Frequency density	B1	
7(b) 'No' OR 'You cannot tell' AND e.g. 'The heaviest player could have been 140 kg and the lightest player could have been 70 kg, but we cannot tell', 'It doesn't give you the mass of any player', 'You cannot tell exact weights because it is grouped data' OR No AND e.g. 'The lightest and heaviest players could not be 70kg and 140kg because of how groups are written'	E1	Do not accept reasons e.g. 'Because it is grouped data' without further explanation about how the data could be distributed in the groups, or 'The graph is not accurate enough'
7(c) $10\times0.8 + 10\times1.1 + 20\times0.1$ $= 21$	M1 A2	Allow for $x\times0.8 + 10\times1.1 + 20\times0.1$, where $6 \leq x < 10$ May be seen on the diagram CAO A1 for 17.8, possibly rounded to 17 or 18 If no marks, SC1 for sight of $10\times1.1 + 20\times0.1$, or $11 + 2$, or 13 May be seen on the diagram

7(d) (Mid-points) 80, 95, 105, 115, 130 (Frequencies of) 8, 5, 8, 11, 2	B1 B1	May be seen on the graph May be seen on the graph or in (c) FT 'their 8, 11, 2' from (c)
80×8 + 95×5 + 105×8 + 115×11 + 130×2 or equivalent (640 + 475 + 840 + 1265 + 260 = 3480)	M1	FT their frequencies (but not use of frequency densities 0.4, 0.5, 0.8, 1.1 and 0.1) AND FT their mid-points provided they are within the groups (inclusive of the boundaries)
÷ 34	m1	Allow FT for the sum of their frequencies
= 102.3(529…) or 102.4	A1	CAO Allow an answer of 102 from correct working

5(a) (Total number of pebbles =) 40×1 + 40×1.5 + 20×3.7 + 20×1.8 + 80×0.5 (40 + 60 + 74 + 36 + 40) = 250 (pebbles) (Number of pebbles < 70g = 40×1 + ¾ of 40×1.5 =) 85 (Percentage < 70g =) $\frac{85}{250}$ (×100) = 34 (%)	M1 A1 B1 M1 A1	Allow M1 for the sum of 5 products with any 3 correct CAO FT 'their 40×1' and ¾ of 'their 40×1.5' FT 'their 85' provided > 40 and < 100 but not 70 (if not derived) AND FT 'their derived 250' On FT, the whole number part of their answer needs to be calculated correctly
5(b)(i) Uniform scale in blocks of 4	B2	Complete numbering of the scale needed up to 16 B1 for • Incomplete scale with at least 1 correct value and no incorrect values • 3 correct values and 1 incorrect • Frequency of 40 (for the 1st bar) and 80 (for the 2nd bar). May be seen on diagram. May be seen as frequency of 20 for each 5×5 block • 20 × x + 10 × 4x = 120 or equivalent (x being the height of the 1st bar) Accept use of trials for x, with minimum of 2 trials getting closer to 120 OR Evidence that x = 2 • 20 × y/2 + 10 × 2y = 120 or equivalent (y being the first value on the y-axis) Accept use of trials for y, with minimum of 2 trials getting closer to 120 OR Evidence that y = 4
5(b)(ii) 40 g	B1	

10(a) 62 000 (people)	B2	B1 for • sight of 77000 and 15000 (in workings or in the bars) • (7700 – 1500) × 10 or equivalent, with no more than 1 error in their readings from the vertical axis, and correctly evaluated
10(b) Working from the left of the graph $\frac{360\,000}{2} - 4500\times20 - 7700\times10$ OR (from the right) $300\times30 + 2200\times10 + 3200\times10 + 4000\times20 + 5000\times10 - \frac{360\,000}{2}$ =13 000 (people needed from the 30-40 bar) (Median for Cardiff =) (30 +) $\frac{13\,000}{50\,000}\times10$ or equivalent = 32.6 (years)	M1 A1 m1 A1	Allow M1 for either calculation with one error only, (not in the 360 000/2) possibly leading to calculations for the median being in the 20-30 or 40-60 groups CAO FT 'their 13 000' and the possible different calculation if their work is for the median being in the 20-30 or 40-60 groups i.e. (20 +) $\frac{\text{'their 13 000'}}{77\,000}\times10$ for the 20-30 group or (40 +) $\frac{\text{'their 13 000'}}{80\,000}\times20$ for the 40-60 group
10(b) Alternative method: *Working from the right of the graph* $\frac{360\,000}{2} - 300\times30 - 2200\times10 - 3200\times10 - 4000\times20$ *OR (from the left)* $4500\times20 + 7700\times10 + 5000\times10 - \frac{360\,000}{2}$ *= 37 000 (people needed from the 30-40 bar)* *(Median for Cardiff =)* *(40 –)* $\frac{37000}{50000}\times10$ *or equivalent* *= 32.6 (years)*	*M1* *A1* *m1* *A1*	*Allow M1 for either calculation with one error only, (not in the 360 000/2) possibly leading to calculations for the median being in the 20-30 or 40-60 groups* *CAO* *FT 'their 37 000' and the possible different calculation if their work is for the median being in the 20-30 or 40-60 groups* *i.e. (30 –)* $\frac{\text{'their 37000'}}{77\,000}\times10$ *for the 20-30 group or* *(60 –)* $\frac{\text{'their 37000'}}{80\,000}\times20$ *for the 40-60 group*

Unit 1: Higher Tier	Mark	Comments
7(a)(i) Correct method to calculate a frequency density for any 2 groups Frequency densities of 4, 1.6, 1.2, 0.2	M1 A2	 A1 for any 2 correct frequency densities
7(a)(ii) Fully correct histogram drawn	 B2	FT their frequency densities throughout provided they fit on the given scale B1 for at least 3 correct bars drawn
7(b)(i) Working from the left of the graph $\frac{120}{2} - 34$ or equivalent OR (from the right) $4 + 18 + 24 + 40 - \frac{120}{2}$ or equivalent = 26 (pupils needed from the 10-20 group) (Median =) $(10 +) \frac{26}{40} \times 10$ or equivalent = 16.5 (mins)	M1 A1 m1 A1	Allow use of $\frac{120+1}{2}$ for $\frac{120}{2}$ for M1A0, but final m1A1 still available CAO FT 'their 26' Or 16 minutes 30 seconds
7(b)(i) Alternative method: *Working from the right of the graph* $\frac{120}{2} - 4 - 18 - 24$ *or equivalent* *OR (from the left)* $34 + 40 - \frac{120}{2}$ *= 14 (people needed from the 10-20 group)* *(Median =)* $(20 -) \frac{14}{40} \times 10$ *or equivalent* *= 16.5 (mins)*	*M1* *A1* *m1* *A1*	*Allow use of* $\frac{120+1}{2}$ *for* $\frac{120}{2}$ *for M1A0, but final m1A1 still available* *CAO* *FT 'their 14'* *Or 16 minutes 30 seconds*
7(b)(ii) 20 (minutes)	B1	FT the upper limit of the group their median is in from (b)(i)

8(a)(i) (Total number of 16-year-old girls =) 0.1×10 + 0.4×5 + 1×5 + 0.8×5 + 0.4×5 + 1.2×5 + 0.4×5 + 0.2×15 1 (+) 2 (+) 5 (+) 4 (+) 2 (+) 6 (+) 2 (+) 3 = 25 or equivalent	M2 A1	Allow M2 for sight of all correct products M1 for the sight of any 3 different correct areas Possibly seen on the histogram Needs to be convincing The + signs can be implied by e.g. total = 25
8(a)(ii) (Number of 16-year-old girls > 162.5 =) ((4 ÷ 2) + 2 + 6 + 2 + 3 =) 15 (Percentage > 162.5 cm =) $\frac{15}{25}$ (×100) or equivalent = 60 (%)	 B1 M1 A1	 FT 'their 4' ÷ 2 + 'their 2 + 6 + 2 + 3' for B1 and M1 provided the total is < 25 and the values are integers FT 'their 4' ÷ 2 + 'their 2 + 6 + 2 + 3' ± 1 or the result of an omission of 1 value from their sum CAO If no marks awarded, SC1 for an answer of 40(%) from 10/25 (×100)
8(a)(ii) Alternative method: *(Number of 16-year-old girls < 162.5 =)* *(1 + 2 + 5 + (4 ÷ 2) =) 10* *(Percentage < 162.5 cm =)* $\frac{10}{25}$ *(×100) or equivalent* *(100 − 40 =) 60 (%)*	 *B1* *M1* *A1*	*If the candidate clearly attempts to calculate the % < 162.5 and then subtracts this from 100%* *FT 'their 1 + 2 + 5' + 'their 4' ÷ 2 for B1 and M1 provided the total is < 25 and the values are integers* *FT 'their 1 + 2 + 5' + 'their 4' ÷ 2 ± 1* *or* *the result of an omission of 1 value from their sum* *CAO*
8(b)(i) Frequency densities of 0.2, 0.9, 0.8, 0.25 or equivalent	B2	FT 'their integer values' from (a)(i) Mark final answer B1 for any 2 or 3 correct FT $\frac{\text{'their 1'+'their 2'}}{15}$, $\frac{\text{'their 5'+'their 4'}}{10}$, $\frac{\text{'their 2'+'their 6'}}{10}$ and $\frac{\text{'their 2'+'their 3'}}{20}$ from (a)(i)
8(b)(ii) Correct bars drawn AND a suitable uniform vertical scale	B2	FT their frequency densities from (b)(i) B1 for at least 2 correct bars AND a suitable uniform vertical scale