REVISE
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3.26 — Misleading graphs & drawing conclusions

Mark schemes for the 3.26 question pack

Spec 4.2.21 — Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 14 questions in the corresponding revise.wales question pack (23 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

3(a) 605 cm	B1	
3(b) 249.5 cm	B1	
3(c) Consistent use of units for comparison, e.g. desk 200cm if another measure is given in cm	B1	Penalise -1 only the use of the 'their desk' ≠ 200 Accept comparison with one other length, e.g. sight of 2000mm = 200cm is sufficient if any other working seen in cm (irrespective of use of bounds)
Use of 147.5 (cm) or 250.5 (cm) or 595(cm)	B2	'Use of' can be any of these values used within a length calculation (including the bookcase, the wardrobe and either the wall or the desk), or 595(cm) used in the interpretation within a conclusion Allow 147.49*(cm) or 250.49*(cm) respectively throughout (Otherwise award:) B1 for sight of 147.5 (cm), 250.5 (cm) or 595(cm)
Correctly evaluated calculation which could be interpreted to show the desk (200cm) would not fit, i.e. a counter example showing the desk can not fit	B1	Interpretation is not required for this B1, it is a calculation (showing that the wall or the gap is of insufficient length, i.e.) with an answer >595(cm) or <200(cm) as appropriate Examples (In cm, but working in m or mm is also accepted) *Giving an answer >595:* 147.5 + 250.5 + 200 = 598, or 147 + 250 + 200 = 597, or 146.5 + 249.5 + 200 = 596 OR *Giving an answer <200:* 595 – 250.5 – 147.5 = 197, or 595 – 250 – 147 = 198, or 595 – 249.5 – 146.5 = 199 i.e. working with lengths in the inclusive ranges 146.5 to 147.5 and 249.5 to 250.5 is accepted, condoning mix of upper and lower bounds provided the calculation leads to >595 or <200 appropriately
Conclusion from a correct interpretation of a correctly evaluated calculation, e.g. 'no, not certain as greater than the least length of the wall which is 595(cm)', 'no, 197(cm) is less than the length of the desk which is 200(cm)', 'no, 598(cm) > 595(cm)'	E1	This E1 depends on the award of the previous B1 Sight of 200(cm) or 595(cm) as appropriate for the comparison is required, i.e. 'no, not certain as greater than the least length of the wall' or 'no, 197 cm is less than the length of the desk' would only be awarded E1 if 595(cm) or 200(cm) respectively, has been seen previously

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

4(a) 8	B1	
4.(b) States or implies 'No' with a reason, e.g. 'all Josef's patterns have an odd number of squares', 'same number on each branch from the one top square makes it an odd number', 'one square left over', 'one square short', 'one more needed', 'the arms would be unequal (in length)', '22 is even', 'P10 is (made using) 21 (squares), P11 is (made using) 23 (squares)', 'he would only be able to make a pattern with 21 squares'	E1	Do not accept 'No' with, e.g. 'too many squares', '22 is not part of the pattern', 'it is unequal'
4(c) P4	B2	Allow P = 4 B1 for sight of 10÷0.5 or 20 (small square edges) or shows 5 squares on each side (stated or diagram in the answer space for (c)) B0 for P20 unless sight of 10÷0.5 (which is awarded B1)

5(a)(i) Orange pippin and 57 (mm)	B1	Accept 'orange' or 'pippin' as indication of the correct tree
5(a)(ii) 41 (mm)	B1	
5(a)(iii) Pink Lady and 33 (mm)	B2	B1 for any of the following: • Gala with 30 (mm) • Orange pippin 29 (mm) • Pink Lady with 79 – 46 • No apple indicated but IQR answer 33 (mm)
5(b) Gala selected with a reason e.g. '(highest) upper quartile', '25% over 80 mm' **OR** Pink Lady selected with a reason e.g. '(highest) median', 'half are over 63 mm'	 B1	Ignore units throughout Do not accept reasons based on range or IQR Do not ignore any additional statements of range, IQR, lower quartile Ignore an incorrect median stated for Pink Lady, e.g. 66mm, provided it is >61 and <67(mm)

6(a) 20 to 25 minutes	B1	
6(b) 'No' indicated or unambiguously implied, with a reason, e.g. 'only shows data for groups', 'it was in the group 40 to 45 minutes', 'doesn't show how many runners finished in 45 minutes', 'the last 2 runners took between 40 and 45 minutes'	E1	Do not accept any reason implying 'Yes' Allow 'No' with, e.g. 'the graph shows the cumulative frequency not the actual times', 'doesn't show the actual times' Do not accept, e.g. 'it goes to the nearest 5 minutes', 'it shows frequency not times of results', 'it doesn't show how many runners finished between 40 and 45 minutes'. 'because it can be an average'
6(c) **70%** (within 30 minutes)' (80% within) **35** (minutes)'	B1 B1	
6(d) Difference 26 - 24.5 to 24.8 Answer in the range • 1.2 to 1.5 (minutes), or • 1 minute 12 seconds to 1 minute 30 seconds	M1 A1	Do not accept an answer in the correct range from incorrect working Mark final answer If units are given they must be correct

7(a) 25% of 3000 or 0.25 × 3000 or equivalent 750 (people)	M1 A1	 *If no marks, award SC1 for an answer of 2250 (people)*
7(b) Idea to consider fraction or decimal part between the median & UQ ⅔ × 0.25 × 3000 or equivalent 500 (people)	M1 m1 A1	For example, sight of 10/15 (= ⅔) or 5/15 (= ⅓) FT 'their 750' from (a)'
7(c) Indicates or unambiguously implies 'North Entrance' with a suitable reason, e.g. 'upper quartile is less than for the South Entrance', '3/4 took less than 44 minutes to queue at the North entrance', North as ¾ took less than 60 minutes at the South Entrance', OR Indicates or unambiguously implies 'South Entrance' with a suitable reason, e.g. '25% people in 20 minutes at South entrance compared with 24 minutes at the North entrance'	 E1	Do not ignore additional incorrect statements Implies that the majority of people got through quicker at the North Entrance Allow, e.g. 'North Entrance, most people 44 minutes whilst South it was 60 minutes' Do not accept indication of 'South Entrance' with a reason based on the team being slower, e.g. 'time was taken to search of handbags'

3(a) 'No' selected or unambiguously implied with a reason, e.g. 'insufficient data', 'only asked 14 people', 'a biased group of friends', 'she only asked her friends' 'because she has not asked a random sample (of people in Wales).'	E1	Do not accept, e.g. 'No' with 'most people own less than 12 pairs of shoes', 'she only asked 12 people' 'she has not asked which age group', 'because she could have asked a particular sex or age' Allow, e.g. 'only x people were asked' where x = 13 or x = 15 only
3(b) Shows more than 3 groups between 1 and 18, which are: • non-overlapping • exhaustive groups	B2	Allow if the final groups goes to beyond 18 pairs Do not count 'none' or '0' as a group Groups do not need to be of equal width B1 for more than 3 groups between 1 and 18 meeting 1 of the 2 bullet point conditions Do not accept, e.g. • 'men, women, children' or • sizes listed without groups for the number of pairs Ignore inclusion of number of people shown in their groups

5(a)(i) $1800 \leq x < 2000$	B1	Accept '(£)1800 to (£)2000', or '(£)1800 – (£)2000'
5(a)(ii) Reason based on agreement due to the 4 people earning £5800 to £7800 per month or the majority of lower wages, e.g. 'the data is skewed', 'only a few of the employees will earn more than the mean wage', 'because most people employed are in the lowest 2 groups of the monthly wage' 'as the majority earn between 1800 and 2100'	E1	Allow, e.g. 'because there is a great difference between the monthly wages', 'the big numbers would affect the mean', 'more than half are in the first group' Do not accept, e.g. 'she doesn't know the exact values', 'using the median would be better', 'because there are no employees that have between 2400 and 5800 monthly wage', 'there are 64 in the first group'
5(b)(i) (2200, 48) joined to (2400, 72) joined to (3000, 80)	B2	Joined with a curve or a straight line B1 for a cumulative graph with either of the following: • correct plots but not joined, • 'their 2 plots' joined provided 1 plot 'correct' including FT plot at (3000, $48 < y \leq 80$)
5(b)(ii) £2160	B1	
5(b)(iii) 22.5(%) OR answer from correct working in the range 21(.25%) to 23.75(%) or 24(%)	B2	Working $\frac{17}{80} \times 100$ to $\frac{19}{80} \times 100$ B1 for sight of $\frac{17}{80}$ to $\frac{19}{80}$

	= 480 A1	C.A.O. Allow 483 2 if 30 2 used.
6.(a) 0·32	B1	
6.(b) Sample number from Anglesey on 2nd day = 3000 × 0·42 = 1260 (Rel.Fqu. for two days =) $\frac{640 + 1260}{2000 + 3000}$ = 0·38	 M1 A1 M1 A1	 Allow M1A1 for sight of 1260 e.g. 1260/3000 FT 'their 1260'.
6.(c) 'Answer to part (b)' noted AND Valid explanation e.g. 'more people sampled'	E1	Explanation must refer to the sample being the largest. Allow e.g 'from both days', 'number of people added', 'frequencies are added'. Do not accept 'relative frequencies are added'.

14.(a) x = 0·4757575.....100x = 47·5757575..... with an attempt to subtract	M1	Or correct values 1000x and 10x, or equivalent. M0 for use of x = 0·475475475.....
471/990 or 157/330 ISW	A1	An answer of 47·1/99 gains M1 only.
Alternative method *(0·4 + 0·07575....=) 4/10 + 75/990 or equivalent* *471/990 or equivalent ISW*	*M1* *A1*	
14.(b) $\frac{1}{8}$	B1	
15. 9 + 4√5	B2	If not B2, award B1 for 3 or 4 correct terms within 4 + 2√5 + 2√5 + 5 or 4 + 2√5 + 2√5 + √25 (without subsequent correct collection of terms) (4√5 is equivalent to 'two correct terms')
(–) 2	B2	B1 for (numerator of) 10√5 or B1 for (denominator of) 5√5 or √125 or B1 for appropriate factorisation of both numerator and denominator e.g. $\frac{\sqrt{5}\times\sqrt{100}}{\sqrt{5}\times\sqrt{25}}$ or $\frac{\sqrt{5}\times\sqrt{5}\times\sqrt{5}\times\sqrt{4}}{\sqrt{5}\times\sqrt{5}\times\sqrt{5}}$
7 + 4√5 AND irrational	B1	Mark final answer. FT for equivalent difficulty (requiring collection of terms) AND either B2 awarded AND final answer is irrational.
16.(a) (Area=) ½×1×[16+0+2(15+12+7)] or equivalent	M2	Award M1 if only one y-value incorrect.
= 42	A1	F.T. from M1. If no marks, SC1 for an answer of 420 (from mis-reading horizontal scale).
Alternative method *$\frac{(16+15)}{2}$ + $\frac{(15+12)}{2}$ + $\frac{(12+7)}{2}$ + $\frac{(7+0)}{2}$*	*M2*	*Individual areas are: 15·5, 13·5, 9·5, 3·5.* *M1 if only one y-value incorrect* *or* *M1 for any 2 (out of 4) correctly evaluated areas (of a complete 'strip').* *(Each area of a trapezium may be seen as the sum of the area of a rectangle and a triangle.)*
= 42	*A1*	*F.T. from M1 (provided 4 'strips' considered).* If no marks, SC1 for an answer of 420 (from mis-reading horizontal scale).
16.(b) 'Greater than' WITH valid reason e.g. trapezium rule gives an underestimate in this case and increasing the number of strips improves accuracy; less (shaded area) left out; more of the area (under curve) included; tops of strips are closer to the curve.	E1	Allow e.g. increasing the number of strips improves accuracy.

3(a) Whiskers at 3 m and 22 m	B1	Ignore if lines omitted from the ends of the whiskers Must be the least and greatest values shown
Unambiguous values or box with LQ 5 m and UQ 20 m	B1	May be seen in working, must be clearly LQ and UQ Check cumulative frequency diagram If not clearly labelled in working or on the graph, they must be no other values given between • the least and the LQ, and • the greatest and the UQ
Median at 15 m	B1	May be seen in working, must be clearly the median Check cumulative frequency diagram If not an unambiguous unique line or point, i.e. not clearly labelled in working or on the graph, allow for a line (or point) indicated that is not the least or greatest value shown Only if B1 B1 B1 awarded, <u>penalise -1</u> if a correct format for a box-and-whisker diagram is not shown
3(b)(i) 0.75 × 68 or equivalent 51 (yachts)	M1 A1	Answer space takes precedence If no marks, award SC1 for sight of 17 (from 0.25 × 68)
3(b)(ii) Conclusion 'Eog' with sight of (Eog IQR 20 – 5 =) 15 (m) AND (Clwyd IQR 18 – 10 =) 8 (m)	B2	FT 'their UQ – LQ' from (a) box-and–whisker diagram B1 for either IQR correct
3(b)(iii) Conclusion 'Can't tell' with reason, e.g. 'only know that 25% of yachts in Clwyd Marina are greater than 18m' 'we don't know if any of the yachts in Clwyd Marina are greater than 22(metres, the longest in Eog Marina)' 'we don't know if a yacht in Clwyd Marina is greater than 22(metres)' 'it doesn't say maximum length of Clwyd Marina's results'	E1	Ignore any additional incorrect or spurious statements Allow 'Can't tell' with a reason, e.g. 'no raw data' 'don't know this information' 'doesn't show anywhere the biggest yacht in Clwyd Marina' 'we are only given some of the lengths of the yachts in the marinas' 'doesn't show Clwyd Marina's results' 'not specified' 'not specific' 'range not given for the Clwyd Marina (so can't identify the longest yacht)' Do not accept, e.g. 'don't know how many yachts in the marinas' 'not mentioned for either marina'

2(a)(i) Unambiguously indicates or states 'Yes' with a reason, e.g. 'both 25 kg to 35 kg', 'the highest frequencies at the same mass'	E1	*Ignore any additional spurious or contradictory statements provided 'Yes' selected* Allow 'Yes' with a reason, e.g. 'both at 30 kg', 'both at the same mass', 'both have the same mass', 'tallest (highest frequency) is 30 kg for both polygons' Do not accept 'Yes' with a reason, e.g. 'don't know', 'both in the same place', 'the groups have the same width', 'the graph tells us this'
2(a)(ii) Unambiguously indicates or states 'Can't tell' with a reason, e.g. 'there were 30 dogs with a masses between 15 kg and 25 kg', 'no raw data is given', 'the actual mass of each dog is not given', 'the data is grouped'	E1	*Ignore any additional spurious or contradictory statements provided 'Can't tell' selected* Allow 'Can't tell' with a reason, e.g. 'doesn't show this', 'you can't tell the exact number of dogs' 'doesn't give the amount of dogs' Do not accept 'Can't tell' with a reason, e.g. 'don't know', 'it is an estimate', 'it isn't accurate', 'because they can be anywhere from 10 kg to 20 kg'
2(a)(iii) Unambiguously indicates or states 'Correct' with a reason, e.g. 'Pencwm polygon shows a greater drop for greater masses', 'fewer dogs but more large dogs in Glanafon', 'more dogs in Pencwm, but fewer large dogs', 'about the same number of large dogs, with fewer dogs in Glanafon', 'about the same number of large dogs, with more dogs in Pencwm',	E1	*Ignore any additional spurious or contradictory statements provided 'Correct' selected* **Do not** allow a reason based on calculations of proportions **alone**, e.g. Pencwm 27.5%, Glanafon 41.6% Allow 'Correct' with a reason, e.g. 'Pencwm (polygon) shows a steeper drop from 30 kg', 'line for Pencwm is steeper (drop)' 'Glanafon (polygon) has a less steep drop for larger dogs', 'the greater masses are more frequent (in Glanafon)', '2 of the 3 points for Glanafon are above Pencwm', 'Pencwm line drops below Glanafon after 40 (kg)', Do not accept 'Correct' with a reason, e.g. '36 dogs in Pencwm and 37 dogs in Glanafon' alone without considering proportion, 'the greatest is 45 kg', 'higher frequency in Glanafon', 'Pencwm is bigger but doesn't have higher proportion' 'as seen by the skew in (the) Glanafon (polygon)', 'seen by the shape (of the polygon) for Glanafon'

2(b) (Total number of dogs 20 + 30 + 45 + 25 + 7 + 4 =) 131	B1	May be implied by the sight of ((20 + 30 + 45 + 25 + 7 + 4) ÷ 6 =) 21.8(33….)
10×20 + 20×30 + 30×45 + 40×25 + 50×7 + 60×4 (= 200 + 600 + 1350 + 1000 + 350 + 240) (= 3740)	M1	Ignore any additional products seen FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups e.g. use of • lower bounds of each group gives 3085 • upper bounds of each group gives 4395
÷ 131	m1	FT an error in summing 20, 30, 45, 25, 7 and 4
(28.5(496.... kg) so) 3.95 (kg) (less)	A2	CAO ISW further rounding or truncation Allow 4 (kg) from correct working Accept (29 (kg) and) 3.5 (kg) from correct working Award A1 for any of the following as the final answer • 28.5(496.... kg) • 29 (kg) (from correct working) OR Award A1 on FT from M1 m1 previously awarded for a correct evaluation of 'their estimate mean' e.g. use of lower bounds gives (3085/131 =) 23.54…
2(b) <u>Alternative MS if Glanafon's last 2 points used for possible award of B1 M1 m1 only</u>		
(Sight of 20 + 30 + 45 + 25 + 10 +7 =) 137	*B1*	*May be implied by the sight of* *((20 + 30 + 45 + 25 + 10 + 7) ÷ 6 =) 22.8(33….)*
10×20 + 20×30 + 30×45 + 40×25 + 50×10 + 60×7 *(= 200 + 600 + 1350 + 1000 + 500 + 420)* *(= 4070)*	*M1*	*Ignore any additional products seen* *FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups* *e.g. use of* • *lower bounds of each group gives 3385* • *upper bounds of each group gives 4755*
÷ 137	*m1*	*FT an error in summing 20, 30, 45, 25, 10 and 7*

Unit 1: Higher Tier	Mark	Comments
4(a)(i) 200 – 80 or 90 + 30 120 (customers)	M1 A1	
4(a)(ii) 32 seconds	B1	
4(a)(iii) $\frac{200-170}{200}$ or $\frac{30}{200}$ or $\frac{15}{100}$ $\frac{3}{20}$	M1 A1	Award M1 for 0.15 or 15% Only ignore further working if written as 0.15 or 15% If no marks, award SC1 for an answer of $\frac{17}{20}$ (from 40 seconds or less)
4(b)(i) 36	B1	
4(b)(ii) 46 – 20 26	M1 A1	Allow 20 – 46
4(c) 'No' unambiguously stated or implied AND a reason, e.g. 'upper quartile is higher this year' '75% reading higher this year' 'interval was 37 (or 38) to 50 seconds last year, this year it is 46 to 50 seconds'	E1	Do not ignore incorrect values for the upper quartiles given, E0 if 'upper quartile' or '75%' stated with incorrect upper quartile readings Allow 'No' with a reason, e.g. '(last year) 38, (this year) 46' '(last year) 37.(…), (this year) 46' Do not accept, e.g. 'range greater this year' 'lower quartile is lower this year' 'median higher this year' 'customers still waiting at 50 seconds'

11(a)(i) (Area =) $\frac{1}{2} \times 1 \times (14 + 0 + 2(7 + 2 + 1 + 0.4))$ or equivalent = 17.4 (m)	M2 A1	M1 for at most 1 slip in substitution of values from the velocity axis OR M1 for 1 of the vertical readings omitted with all others correct FT from M1
11(a)(i) Alternative method: *(Area =)* $\frac{(14 + 7)}{2} \times 1 + \frac{(7 + 2)}{2} \times 1 + \frac{(2 + 1)}{2} \times 1 + \frac{(1 + 0.4)}{2} \times 1$ $+ \frac{(0.4 + 0)}{2} \times 1$ *[10.5 + 4.5 + 1.5 + 0.7 + 0.2]* *= 17.4 (m)*	*M2* *A1*	*M1 for the sum of these 5 areas with at most one error (may be repeated) in the substitution of values from the velocity axis OR* *M1 for the sight of 5 correct areas with the intention to add them (possibly omitting one)* *FT from M1*
11(a)(ii) Overestimate AND valid reason e.g. 'The trapeziums all extend above the curve', or 'The curve is below the area calculated', or 'The area of each trapezium is greater than the area under the curve', or 'The area of the 2nd trapezium is greater than the area under the curve'	E1	Allow Overestimate AND e.g. 'Does not take into account the curvature of the graph', or 'The lines I have drawn are above the curve' Do not accept e.g. 'Parts of the graph haven't been used'
11(b) Suitable tangent drawn at time 2 seconds Idea of difference in y ÷ difference in x Correct deceleration from difference in y ÷ difference in x in its simplest form	M1 m1 A1	Tangent needs to go through (2, 2) with no 'daylight' between their tangent and the curve If only 1 correct difference seen, then award m1 followed by A0 Allow a negative value Accept a fully simplified improper fraction (unless it gives a whole number), mixed number or decimal. If they give a decimal, it needs to be correctly evaluated to at least 1 decimal place, rounded or truncated Mark final answer