REVISE
.wales

3.18 — Bar charts, pie charts & line graphs

Mark schemes for the 3.18 question pack

Spec 4.2.1, 4.2.2, 4.2.3 — Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 16 questions in the corresponding revise.wales question pack (35 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

2(a) 230	B1	
2(b) 40	B1	
2(c) Reason, e.g. 'graph for 18-year olds leans towards the greater times', 'the frequency polygon for times from (the plot at) 30 minutes are greater for the 18-year olds', '**more** 18-year olds spend longer times than 16 year olds', 'more 18-year olds for 30 minutes, same at 40 minutes and more at 50 minutes', 'more 18-year olds at 50 minutes', 'more 18-year olds from 25 minutes onwards', 'many more 16-year olds than 18-year olds spend 20 (or 25) minutes or less', 'median is higher for the 18-year olds', 'more 16-year olds use less time on social media than 18-year olds'	E1	If readings are used they **must be** correct, e.g. at 50 minutes there are • 20 16-year olds and 60 18-year olds, • or 40 more 18-year olds than 16-year olds • 3 times as many 18-year olds spend 50 minutes as 16-year olds Allow e.g. 'half way through the 18-year olds frequency rises higher than for 16-year olds' Do not accept irrelevant, incorrect or incomplete statements e.g. 'more 18-year olds spend 30 minutes', 'more 16-year olds spend 20 minutes', 'because more than 60 18-year olds spend 30 to 50 minutes', 'The mode for 16-year olds using social media is the same as for 18-year olds', '16-year olds frequency is higher to start', 'not true because the frequency polygons would look roughly the same', 'not true because the shapes of the frequency polygons are very different', 'there is only one point where 16 and 18-year olds spend the same amount of time', 'because the polygons are not the same', 'the 2 polygons have different trends', 'the average time is greater for 18-year olds'

4.(a) 1/6 × 1/6 = 1/36	M1 A1	
4(b)(i) P(Caernarfon) = ¼ or equivalent P(Newtown) AND P(Ebbw Vale) = 1/8 or equivalent	B1 B1	*Penalise incorrect notation −1 once only in 4(b)* CAO. CAO. Do not allow 0·5/4 for 1/8.
4(b)(ii) ½ + 1/8 = 5/8 or equivalent.	M1 A1	FT ½ + 'their P(Eb.V.)'. Provided P(Eb.V)<1 for M1. FT answer must be < 1 for A1. Mark final answer Allow 2·5/4 for 5/8 if answer to 4(b)(i) is 0·5/4.

		Allow SC1 for sight of 18 from 3 × 6.
13.(a) 1/6 × 1/6 = 1/36	M1 A1	
13(b)(i) P(Caernarfon) = ¼ or equivalent P(Newtown) AND P(Ebbw Vale) = 1/8 or equivalent	 B1 B1	*Penalise incorrect notation −1 once only in 13(b)* C.A.O. C.A.O. Do not allow 0·5/4 for 1/8.
13(b)(ii) ½ + 1/8 =5/8 or equivalent.	M1 A1	FT ½ + 'their P(Eb.V.)'. Provided P(Eb.V)<1 for M1. FT answer must be < 1 for A1. Allow 2·5/4 for 5/8 if answer to 13(b)(i) is 0·5/4.

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 • write a conclusion that draws together their results and explains what their answer means
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
3.(a) $A \cap B$	B1	
3.(b) B'	B1	
4 Four numbers with a range of 10. Four numbers with a total of 36. Four numbers with a median of 8. Possible answers for all three marks are 5,5,11,15 or 5,6,10,15 or 5,7,9,15 or 5,8,8,15	 B1 B1 B1	B0 if all four original numbers used.
5. (number of females in Porth =) $\frac{90}{360} \times 128$ OR (number of males in Porth =) $\frac{120}{360} \times 72$ (number of females in Porth =) 32 (number of males in Porth =) 24 (Probability from Porth =) $\frac{56}{200}$ or equivalent ISW	M1 A1 A1 A1	Or equivalent *Answers may be seen on the diagram.* An answer of 32 implies M1. An answer of 24 implies M1. FT ('their 32' + 'their 24') /200 provided M1 gained. Penalise incorrect notation −1. e.g. '56 in 200'.
6. sin (QPR) = $\frac{9{\cdot}6}{16{\cdot}7}$ (QPR =) $\sin^{-1}$ (9.6/16·7) or $\sin^{-1}$ (0·57..) = 35·1(°) or 35·09(°) or 35·089(…°)	M1 m1 A1	 Implies M1. Allow any answer that rounds to 35(°)
6.*Alternative method.* ***Correct** use of 'two-step' method.* *(x)* = 35·1(°) or 35·09(°) or 35·089(…°)	 M2 A1	 *A partial trigonometric method is M0.* Allow any answer that rounds to 35(°)
7. 7x + 2y = (£)41.5(0) AND 4x + 3y = (£)29.75 Method to eliminate variable (Attempt at equal coefficients and subtraction) First variable found x =(£) 5 or y = (£)3.25. Substitute to find the 2nd variable. Second variable found.	B1 M1 A1 m1 A1	Allow use of other letters to denote variables. B0 for using 4150 and 2975. FT 'their equations' if of equal difficulty. Allow 1 error in one term, not one with equal coefficients. C.A.O. (for their equations if FT.) F.T. their '1st variable'. FT answers should be given to the nearest penny (rounded or truncated). If M0, award SC2 (with possible B1) for both answers of (£) 5 AND (£)3.25.

WJEC GCSE MATHEMATICS

AUTUMN 2021 MARK SCHEME

Unit 2: Higher Tier	Mark	Comments
1. $4(3a - 7) + 2(5a + 4)$ or equivalent. $= 12a - 28 + 10a + 8$ or equivalent. $= 22a - 20$ (cm) or $2(11a - 10)$ (cm)	B1 B1 B1	For a correct expression for the perimeter. For removal of brackets FT only from $2(3a - 7) + (5a + 4)$ or equivalent OR $2(3a - 7) + 2(5a + 4)$ or equivalent. For collection of terms FT if of equivalent difficulty. Mark final answer.
Alternative approach *$2[2(3a - 7) + (5a + 4)]$* *$= 12a - 28 + 10a + 8$ or $2(6a - 14 + 5a + 4)$* *$= 22a - 20$ (cm) or $2(11a - 10)$ (cm)*	*B1* *B1* *B1*	*For a correct expression for the perimeter.* *For removal of brackets (within 'square brackets')* *FT only from* *$2[2(3a - 7) + 2(5a + 4)]$ or equivalent.* For collection of terms *FT only from* *$2[2(3a - 7) + 2(5a + 4)]$ or equivalent.* *FT if of equivalent difficulty.* *Mark final answer*
2. (number of part-time in North Wales =) $\frac{90}{360} \times 96$ OR (number of full-time in North Wales =) $\frac{144}{360} \times 150$ (number of part-time in North Wales =) 24 (number of full-time in North Wales =) 60 (Probability from North Wales =) $\frac{84}{246}$ or equivalent ISW	M1 A1 A1 A1	Or equivalent *Answers may be seen on the diagram.* An answer (or sight) of 24 implies M1. An answer (or sight) of 60 implies M1. FT ('their 24' + 'their 60') /246 provided M1 gained and ('their 24' + 'their 60') < 246. Penalise incorrect notation −1. e.g. '84 in 246'.
3. One correct evaluation $2 \leq x \leq 3$ 2 correct evaluations $2{\cdot}25 \leq x \leq 2{\cdot}45$, one < 20, one > 20. 2 correct evaluations $2{\cdot}25 \leq x \leq 2{\cdot}35$, one < 20, one > 20. $x = 2{\cdot}3$	 B1 B1 M1 A1	*Correct evaluation regarded as enough to identify if <20 or >20. If evaluations not seen accept 'too high' or 'too low'.* *Look out for testing $x^3 + 3x - 20 = 0$* x / $x^3 + 3x$ 2 / 14 2·1 / 15·561 2·2 / 17·248 **2·3 / 19·067** **2·4 / 21·024** 2·5 / 23·125 2·6 / 25·376 2·7 / 27·783 2·8 / 30·352 2·9 / 33·089 3 / 36 2·25 / 18·140…. **2·35 / 20·027….** 2·45 / 22·056…. *Note* *Evidence for M1 must be **seen** before A1 can be awarded.*

3. (0 pets angle =) $40(°) \pm 2(°)$	B1	*Answers may be seen on diagrams*
(Year 5: 0 pets =) $\frac{40(°) \pm 2(°)}{360} \times 36$	M1	Or equivalent *FT 'their 40'*
(Year 5: 0 pets =) 4	A1	Answer must be whole number and from correct working (e.g. not from 360 ÷ 90) An answer of 4 (may be seen as 4/36) implies B1M1A1, provided not from incorrect working.
(Year 5: 1 pet =) 9	B1	May be seen as 9/36
(Probability no more than 1 pet =) $\frac{27}{61}$ or equivalent ISW	B2	FT $\frac{\text{'their derived 4'} + \text{'their derived 9'} + 6 + 8}{61}$ (no more than 1 pet) B1 for a numerator of 27 in a fraction < 1. FT 'their derived 4' + 'their derived 9' + 6 + 8 accurately evaluated as a numerator in a fraction < 1. B1 for a denominator of 61 in a fraction < 1. Penalise incorrect notation −1. e.g. '27 in 61'. If no marks awarded, award SC1 for sight of a correct 61. Special cases: If only 1 pet considered from Year 5 AND Year 6, an answer of $\frac{17}{61}$ would gain B0 or B1 M0A0B1B2 FT $\frac{\text{'their derived 9'} + 8}{61}$ for B0 or B1 M0A0B0B2 Last B1 for a numerator of 17 in a fraction < 1. FT 'their derived 9' + 8 accurately evaluated as a numerator in a fraction < 1. Last B1 for a denominator of 61 in a fraction < 1. Penalise incorrect notation −1. e.g. '17 in 61'. If only 0 pets considered from Year 5 AND Year 6, an answer of $\frac{10}{61}$ would gain B1M1A1B0B2 FT $\frac{\text{'their derived 4'} + 6}{61}$ for B1M1A0B0B2 Last B1 for a numerator of 10 in a fraction < 1. FT 'their derived 4' + 6 accurately evaluated as a numerator in a fraction < 1. Last B1 for a denominator of 61 in a fraction < 1. Penalise incorrect notation −1. e.g. '10 in 61'.

3. *Alternative method 1* *(0 + 1 pet angle =) $130(^\circ) \pm 2(^\circ)$*	*B1*	*Answers may be seen on diagrams*
(Year 5: 0 + 1 pet =) $\frac{130(^\circ) \pm 2(^\circ)}{360} \times 36$	*M1*	*Or equivalent* *FT 'their 130'*
(Year 5: 0 + 1 pet =) 13	*A2*	*May be seen as 13/36* *Award A1 for an answer not rounded.*
(Probability no more than 1 pet =) $\frac{27}{61}$ or equivalent ISW	*B2*	*FT $\frac{\text{('their derived 13' + 6 + 8)}}{61}$* *B1 for a numerator of 27 in a fraction < 1.* *FT 'their derived 13' + 6 + 8 accurately evaluated as a numerator in a fraction < 1.* *B1 for a denominator of 61 in a fraction < 1.* *Penalise incorrect notation −1. e.g. '27 in 61'.* *If no marks awarded for the whole question, award SC1 for sight of a correct 61.*

3. *Alternative method 2* *(Each child is represented by* $\frac{360(^\circ)}{36} =) \quad 10(^\circ)$	B1	*Answers may be seen on diagrams*
(Year 5: 0 pets angle = $40(^\circ) \pm 2(^\circ)$	B1	
(Year 5: 0 pets = $\frac{40(^\circ) \pm 2(^\circ)}{10(^\circ)} =) \quad 4$	B1	*FT 'their 40'* *Answer must be whole number and from correct working (e.g. not from 360 ÷ 90)* *An answer of 4 (may be seen as 4/36) implies B1B1B1, provided not from incorrect working.*
(Year 5: 1 pet =) 9	B1	*May be seen as 9/36*
(Probability no more than 1 pet =) $\frac{27}{61}$ *or equivalent ISW*	B2	*FT* $\frac{\text{('their derived 4' + 'their derived 9' + 6 + 8)}}{61}$ *B1 for a numerator of 27 in a fraction < 1.* *FT 'their derived 4' + 'their derived 9' + 6 + 8 accurately evaluated as a numerator in a fraction < 1* *B1 for a denominator of 61 in a fraction < 1.* *Penalise incorrect notation −1. e.g. '27 in 61'.* *If no marks awarded, award SC1 for sight of a correct 61.* *Special cases:* *If only 1 pet considered from Year 5 AND Year 6, an answer of* $\frac{17}{61}$ *would gain B0 or B1 M0A0B1B2* *FT* $\frac{\text{'their derived 9' + 8}}{61}$ *for B0 or B1 M0A0B0B2* *Last B1 for a numerator of 17 in a fraction < 1.* *FT 'their derived 9' + 8 accurately evaluated as a numerator in a fraction < 1.* *Last B1 for a denominator of 61 in a fraction < 1.* *Penalise incorrect notation −1. e.g. '17 in 61'.* *If only 0 pets considered from Year 5 AND Year 6, an answer of* $\frac{10}{61}$ *would gain B1M1A1B0B2* *FT* $\frac{\text{'their derived 4' + 6}}{61}$ *for B1M1A0B0B2* *Last B1 for a numerator of 10 in a fraction < 1.* *FT 'their derived 4' + 6* accurately evaluated *as a numerator in a fraction < 1.* *Last B1 for a denominator of 61 in a fraction < 1.* *Penalise incorrect notation −1. e.g. '10 in 61'.*

Unit 2: Intermediate Tier	Mark	Comments
1(a) **Use** of 1 million as 1 000 000	B1	May be seen at any stage of working or implied by a correct answer Accept from sight of 2.2 million written as 2 200 000 Allow as implied from one of the following: • sight of an appropriate stage of working, e.g. 1% as 22 000 or 10% as 220 000 or 50% as 1 100 000 • an answer of 40 000 provided not from 0.2 × 2 million
0.02 × 2.2 (× 1 000 000) or (1 000 000 ×) 2.2 ÷ 50 or equivalent	M1	The method must be for the intention of finding 2% of 2.2 million, not any other percentage May be implied, from a full method, from sight of • 0.02 × 'digits 22 with place value error' • when working not shown, only non-zero digits of 44 in their answers Award M0 for 1.02 × 2.2 or 0.98 × 2.2 or 0.2 × 2.2
(£) 44 000 or (£) 44,000	A1	CAO. Answer space takes precedence Do not accept (£)0.044 (million) or 44.000 (A0) unless 44000 seen in working (A1)
1(b)(i) $\frac{115}{360}$	B1	
1(b)(ii) Gold 20° ±2°	B1	Check the diagram
$1800 \times \frac{20\ (\pm 2)}{360}$ or $5 \times (20\ (\pm 2))$ or equivalent	M1	Also implies previous B1 FT for any value used for '20' provided ≠180° and < 360°) for M1 only (including use of 160°)
100 (gold medals)	A1	A correct answer from using 20°±2° in the inclusive range 90 to 110 (gold medals), not from premature approximation (20/360 = 0.05, then 0.05 × 1800 = 90 B1 M1 A0)

3(a) Reasonable explanation, e.g. 'no one spent longer than 80 minutes training' '1 hour 25 minutes is more than 80 minutes'	E1	Allow, e.g. 'graph only goes up to 80 (minutes)' 'only shows to 1 hour 20 minutes' 'doesn't show above 80 minutes' 'the graph doesn't extend that much' 'the bar doesn't go up to 1 hour 25 minutes' 'the bar doesn't go up to 85 minutes' 'no one spent 1 hour 25 minutes in the gym' 'the maximum he could have spent was 1 hour 20 minutes' '85 minutes was not recorded' 'goes no later than 1 hour 20 minutes' Do not accept, e.g. 'the graph only gives 20 minute time groups (slots)' 'because in a frequency graph there is no way to know who is Freddie' 'he spent 1 hour 20 minutes in the gym' 'he spent an hour in the gym' 'the graph shows he didn't spend 1 hour 25 minutes in the gym' '1 hour 25 minutes is 85 minutes'
3(b) 14	B1	
3(c) 38	B1	
3(d) (Total number of men) 14 + 22 + 48 + 16 OR (Total number of women) 12 + 26 + 54 + 22 (Total men) 100 AND (Total women) 114 Method considering proportions, e.g. sight of any of: • $\frac{48}{100}$ AND $\frac{54}{114}$ • 48% of 114 • $\frac{54}{114}$ of 100 'False' unambiguously selected or implied **and** accurate appropriate calculations to justify choice of 'False', e.g. • 48% **and** 47(.3...)% or 47.4% • 0.48 **and** 0.47(3...) • (48% of 114 =) 54.7(2) **and** 54 (women)	M1 A2 M1 A1	Check the graphs for working FT 'their 12 + 26' from (c), i.e. 'their 38' + 54 + 22 A1 for either total correct FT 'their 48, 100, 54, and 114' providing at least two of them are correct and 'their total for men 100' ≠ 'their total for women 114' Allow 'True' if justified by correct calculations from their 4 values.

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*

2(a) $\frac{90}{360} \times 540$ or ¼ × 540 or 540 ÷ 4 or equivalent	M1	
135 (people)	A1	Answer space takes precedence When repeatedly halving 540, if there are errors, award M0 A0 unless indication that the intention is to divide by 2, e.g. • 540 ÷ 2 = 220 (error) , 220 ÷ 2 = 110 is M1 A0 • 540, 220, 110 is M0 A0
2(b) Angle measured 170(°) ± 2(°)	B1	May be seen on the pie chart
0.4 × 170(° ± 2°) or equivalent	M1	FT for 'their angle, provided 90° < 'their angle' < 180° Any method of repeated addition must **clearly** be addition to 40%
68(°) or angle in the range 67(°) to 69 (°)	A1	Only allow angles in this range provided not from incorrect working Answer space takes precedence Allow A1 for labelled angle on the pie chart if no **final** answer given. On FT, using 'their 170', allow angles correctly rounded or truncated to the nearest degree
2(c) $540 - \frac{7}{10} \times 540$ or $(1 - \frac{7}{10}) \times 540$ or $\frac{3}{10} \times 540$	M1	For complete method
162 (not children)	A1	Answer space takes precedence If no marks, award SC1 for sight of $(\frac{7}{10} \times 540 =)$ 378

6(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'
6(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'
6(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'

6(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…
6(b) Alternative MS if Glanafon's last 2 points used for possible award of B1 M1 m1 only *(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*

4(a)(i) $\frac{1}{3} \times 7200 \times \frac{90}{360}$ or $\frac{1}{3} \times 7200 \div 4$ or $2400 \div 4$ or $\frac{1}{3} \times 1800$ 600 (Irish females)	M2 A1	M1 for any one of the following: • $7200 \times \frac{90}{360}$ (= 1800) • $7200 \div 4$ (= 1800) • (7200 ÷ 3 =) 2400 CAO
4(a)(ii) (Number of adult Welsh spectators) $7200 \times \frac{110}{360} \times 6 \div (6 + 5)$ 1200	M2 A2	M1 for any one of the following: • $7200 \times \frac{110}{360}$ (=2200) • $7200 \times 6 \div (6 + 5)$ (=3927.2727….) • $110 \times 6 \div (6 + 5)$ (=60) • 'their number of Welsh spectators' × 6 ÷ (6 + 5) A1 for any one of the following correctly evaluated: • $(7200 \times \frac{110}{360} =)$ 2200 • (7200 ÷ 360 =) 20 **and** (110 × 6 ÷ 11 =) 60 • 'their $7200 \times \frac{110}{360}$ ' × 6 ÷ 11 • 'their 7200 × 6 ÷ 11' × $\frac{110}{360}$ • 'their 110 × 6 ÷ 11' × 20 • 'their number of Welsh spectators' × 6 ÷ 11

Unit 1: Intermediate Tier	Mark	Comments
4(b) (Total of all entrance fees is) (Cycling entrance fees £) 2000 × 25 + (Cycling and athletics entrance fees £) 4000 × 40 + (Athletics entrance fee £) 1200 × 30 (£) 246 000	M2 A1	For the sum of the three appropriate products *(50 000 +)* *(160 000 +)* *(36 000)* M1 for any one of the following: • at least two appropriate products • one appropriate product in a sum of 3 products CAO
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.

Unit 2: Intermediate Tier	Mark	Comments
6(a)(i) 18 to 24 hours	B1	
6(a)(ii) 97	B1	
6(a)(iii) 13	B1	
6(a)(iv) States or unambiguously implies 'No' with a reason, e.g. 'no people in group 0 to 6 hours'	E1	Allow 'No' with e.g. 'the point before 6 hours is at zero' Do not allow 'Can't tell' with e.g. 'it is grouped data' Do not accept "No' with e.g. 'it is grouped data' (unless explaining why) 'there is no point at 6' '6 hours has a frequency of 0' 'it does not match a group of people' 'the first point is at 0 and the second one is at 20' 'the first plot is at 20' 'the first plot is at 9 hours' 'the first plot above 0 is at 9 hours' 'there is no information at 6 hours, it starts at 9 hours' 'the shortest time is 9 hours'
6(b) Sight of 22.5, 25.5, 29.5 and 31.5 (mm)	B1	Award B1 for sight of 4 × 0.5 in an appropriate calculation Allow 0.4999(….) for 0.5, must clearly be a recurring 9 digit
22.5 + 25.5 + 29.5 + 31.5 or 22+25+29+31 + 4 × 0.5 or equivalent	M1	If B0, FT provided unambiguously chosen: 22 < 'their 22.5' ≤ 23, 25 < 'their 25.5' ≤ 26, 29 < 'their 29.5' ≤ 30, and 31 < 'their 31.5' ≤ 32,
109 (mm)	A1	CAO. Ignore incorrect units given Ignore any working for least possible thickness also given, e.g. 21.5 + 22.5 + 28.5 + 30.5 = 105

Unit 2: Intermediate Tier	Mark	Comments
10. (Distribution = 360 – 60 – 138 =) 162(°)	B1	May be seen on diagram.
$\frac{162}{360}$ or $\frac{9}{20}$ or equivalent	M1	FT 'their stated 162', provided obtuse.
= 0·45	A1	Answer must be given as a decimal. Mark final answer. FT provided 'their fraction' < 1. If 0·45 seen, but then 45% or $\frac{45}{100}$ or equivalent award B1M1A1. Award B1 M1 A0 for 45% or equivalent (not a decimal) if 0·45 not seen. If no marks, award SC1 for the correctly evaluated decimal equivalent of an answer of 'their stated 162' 60 + 138 + 'their stated 162' e.g. $\frac{154}{352}$ = 0·4375 (angle measured in diagram) An unsupported answer of 0·45 is awarded B1M1A1.
10. Alternative method *$1 - \frac{198}{360}$ or $1 - \frac{11}{20}$ or equivalent*	*M2*	*Award M1 for $1 - \frac{\text{'their 138 + 60'}}{360}$.*
= 0·45	*A1*	*Answer must be given as a decimal.* *Mark final answer.* *FT provided 1 – 'their fraction < 1'.*

2. (Number of Year 9 pupils in Ysgol Afon =) 127 (Number of Year 9 pupils in Ysgol Twyn =) $\frac{60}{360} \times 480$ or equivalent (e.g 480 ÷ 2 ÷ 3, 240 ÷ 3…) 80 (Total number of pupils = 508 + 480 =) 988 or (Total number of pupils = 494 + 287 + 207 =) 988 (Probability from Year 9 =) $\frac{207}{988}$ ISW	B1 M1 A1 B1 B1	*Answers may be seen on diagram* Do not award B1 if 127 is clearly labelled as Year 7 Ysgol Afon. May be seen in stages. An answer of 80 implies M1A1. CAO Sight of 207 implies the first B1 M1 A1. The numerator and denominator must both be integers for B1. FT 'their 127' + 'their 80' , provided 'their 988' • fraction <1 • 'their 988' from 'total for Ysgol Afon' + 480 • 'their numerator' is a sum of two values (but NOT 90 + 60 (angles)) Penalise incorrect notation -1 e.g. '207 in 988' If no marks awarded, SC1 for engaging with the total number of pupils in Ysgol Afon. This could be sight of 508 or 254 + 254 or equivalent (seen or implied).

4(a) 20 ≤ time in minutes < 30	B1	Allow e.g. '20 to 30' '20 – 30' '20 < time < 30' '20 ≤ time ≤ 30' '20 < time ≤ 30' '12 pupils for 20 to 30 minutes' (implies the group) '12 pupils in 20 – 30 minutes' (implies the group) '12 (pupils), 20 – 30 minutes' (2 answers side by side, mark the right-hand attempt) Sight of 20 and 30 with incorrect inequality signs, e.g. '20 ≤ 30' Do not accept, e.g. '12' '25' '20 – 30 minutes, 12 (pupils)', (as a choice of answers, mark the right-hand attempt)
4(b) 15	B1	
4(c) Unambiguously indicates 'Can't tell' with a reason, e.g. 'doesn't give the raw data (for the group 0 to 10 minutes)', 'only know (frequency) for the group 0 to (less than) 10 minutes' '5 pupils spent less than 10 minutes, but the diagram doesn't show if any of these spent no time' 'it doesn't tell you exactly how many minutes each pupil spent individually'	E1	Allow 'Can't tell' with a reason such as, e.g. 'grouped data', 'data is grouped' 'it is given in a range on the diagram' 'it doesn't show specifically' 'graph is not specific' 'it doesn't given an exact time' 'the graph gives 0 to 10 minutes making it impossible to get an accurate reading' 'could be 1 minute each or 5 minutes each we don't know' (examples all within the group 0 ≤ time < 10) 'doesn't give the data for 0 minutes' 'because the group is from greater than or <u>equal to</u> 0 minutes to less than 10 minutes' 'graph does not say they did or not' 'we can't see this on the diagram' 'does not give enough data' Do not accept reasons that imply 0 minutes is not included in the diagram Do not accept, 'Can't tell' e.g. 'the groups are an estimate' 'could be 5 minutes each or 20 minutes each we don't know' (examples not all within the required group) 'because the group is from <u>greater than</u> 0 minutes to less than 10 minutes' 'doesn't tell us how many people there are'

4(d) Unambiguously indicates 'No' with a reason, e.g. 'it is the same number (both 5 pupils) but different number of Year 9 asked to Year 10', 'the totals are different', 'Year 9 percentage is lower (than Year 10)' '5/34 is not the same (percentage) as 5/33' 'there are more pupils in Year 9 (than in Year 10)' 'there are fewer pupils in Year 10 (than Year 9)'	E1	Check diagram for totals If 'totals are different' is stated or clearly implied, ignore any incorrect totals or fractions given, provided the numerator of 5 pupils is correct Alllow 'No' with a reason, e.g. 'the difference is 1' OR Allow 'No' with sight of total 34 for Year 9 and 33 for Year 10 Do not accept, e.g. 'because the results are different' 'the difference is 2' 'there are more pupils in Year 10 (than in Year 9)', unless the correct totals are seen 'there are fewer Year 9 (than Year 10)', unless the correct totals are seen

End of solutions