REVISE
.wales

# F3.12 — Mean, modal class & median group from grouped data

*Mark schemes for the F3.12 question pack*

*Spec 4.2.9, 4.2.11, 4.2.13, 4.2.14, 4.2.15, 4.2.16 — Unit 3*

SOLUTIONS · 2025 SPECIFICATION

*Mark schemes for the 12 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.*

11.(a)

| Throws | 20 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|
| Heads | 11 | 18 | 24 | 30 | **37** |
| Rel. Fq. | 0·55 | 0·45 | **0·4** | 0·375 | 0·37 |

B1

B1

11.(b) (Mid-points are) 4·5, 14·5 and 24·5. B1

(Estimated total =) F.T. 'their mid-points' if within group.

$3 \times 4{\cdot}5 + 5 \times 14{\cdot}5 + 2 \times 24{\cdot}5$ (= 135) M1

$\div 10$ m1

(Estimated mean =) $= 13{\cdot}5$ A1 C.A.O.

(Difference = 15·2 – 13·5 = ) 1·7 B1 F.T. for difference between 15·2 and 'their derived estimated mean (≠15·2)'. Allow –1·7

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| 10.(a) $\frac{1}{6} \times \frac{1}{4}$ or equivalent<br>$= \frac{1}{24}$ ISW | M1<br>A1 | Accept 0·0416... or 0·0417 or 0·042 for M1A1<br>M1A0 for '1 in 24', '1:24'. |
| 10.(b) $\frac{1}{5} + \frac{1}{10}$ or equivalent.<br>$= \frac{3}{10}$ or equivalent. ISW | M1<br>A1 | |
| 11. $(AC^2 =)\ 10{\cdot}8^2 + 14{\cdot}4^2$<br>$AC^2 = 324$ or $(AC =)\ \sqrt{324}$<br>$(AC =)$ 18(cm)<br><br>(Area ACD =) $\frac{24 \times 18}{2}$<br>$= 216\ (cm^2)$ | M1<br>A1<br>A1<br><br>M1<br><br>A1 | Accept equivalent of using cos rule (as cos 90 = 0).<br>F.T. √'their 324' provided M1 gained.<br>Final answer of AC = 324 is M1A0A0.<br>*Alternative method to find AC*<br>*A correct and complete method (using two trigonometric relationships)* *M2*<br>*AC = 18(cm)* *A1*<br>FT 'their stated AC'. (May be shown on the diagram)<br>Accept equivalent of using ½ × 24 × 18 × sin 90 (as sin 90 = 1). |
| 12.<br>One correct evaluation $7{\cdot}2 \le x \le 7{\cdot}3$<br>2 correct evaluations $7{\cdot}275 \le x \le 7{\cdot}295$, one < 0, one > 0.<br>2 correct evaluations $7{\cdot}275 \le x \le 7{\cdot}285$, one < 0, one > 0.<br>$x = 7{\cdot}28$ | <br>B1<br>B1<br>M1<br>A1 | *Correct evaluation regarded as enough to identify if negative or positive. If evaluations not seen accept 'too high' or 'too low'.*<br>*Look out for equating $x^3 - 5x = 350$*<br>$x$ $x^3 - 5x - 350$<br>7·2 −12·75(2)<br>7·21 −11(·2.. )<br>7·22 − 9(·7...)<br>7·23 − 8(·2...)<br>7·24 − 6(·6...)<br>7·25 −5(·1...)<br>7·26 − 3(·6...) 7·275 −1(·3....)<br>7·27 − 2(·1...) 7·284 0(·04..)<br>**7·28** **−0·5(7..)** **7·285** **0·1(9..)**<br>**7·29** **0·9(7..)** 7·295 1(·7....)<br>7·3 2·5(17) |
| 13.(a) an expression | B1 | |
| 13.(b) an equation | B1 | |
| 14. (Mid-points) 2·5, (7·5), 12·5 and 17·5.<br>$8 \times 2{\cdot}5 + (0 \times 7{\cdot}5) + 7 \times 12{\cdot}5 + 5 \times 17{\cdot}5$<br>( 20 + 0 + 87·5 + 87·5 = 195)<br>÷ 20<br>= 9.75 | B1<br>M1<br><br>m1<br>A1 | Allow for sight of mid-points.<br>F.T. 'their mid-points' including bounds, provided they fall within the classes (including lower and upper bounds and used consistently).<br><br>C.A.O. |
| 15. ( x =) $\frac{360}{15}$ or $180 - \frac{(15-2) \times 180}{15}$<br>or equivalent<br>= 24(°)<br><br>(BR =) 8 × cos 24 or 8 × sin (90 – 24)<br><br>= 7·3(0...)(cm) or 7·31(cm) | M1<br><br>A1<br><br>M2<br><br>A1 | May be seen in parts.<br><br>FT 'their stated value for x' ( x < 90°)<br>M1 for $\frac{BR}{8}$ = cos 24 or $\frac{BR}{8}$ = sin (90 – 24)<br>Accept equivalent of using sin rule (as sin 90 = 1).<br><br>*Alternative method to find BR*<br>*A correct and complete method (using two trigonometric relationships and possibly Pythagoras's theorem)* *M2*<br>*BR = 7·3(0...)(cm) or 7·31(cm)* *A1* |

**WJEC GCSE MATHEMATICS**

**AUTUMN 2021 MARK SCHEME**

| **Unit 2: Intermediate Tier** | | Mark | Comments |
|---|---|---|---|
| 1.(a) | $7x = 14$<br>$x = 2$ | B1<br>B1 | <br>FT from $7x = k$.<br>Accept $x = k/7$ (but, if on FT k is a multiple of 7, final answer must be given as a whole number.)<br>B1B0 for '$x = 14/7$'<br><br>An evaluated FT for $k \div 7$ must be rounded or truncated to at least 2dp.<br>e.g. $7x = 8$ (B0) followed by, $x = 8 \div 7$ (B0)<br>$x = 8/7$ (B1), $x = 1\frac{1}{7}$ (B1), $x = 1{\cdot}14$ (B1), $x = 1{\cdot}1$ (B0)<br><br>Mark final answer.<br>Allow 2 marks for embedded answer BUT only 1 mark if contradicted by $x \neq 2$. |
| 1.(b) | 10 | B2 | C.A.O.<br>B1 for sight of $17{\cdot}4$ OR $-7{\cdot}4$<br>Do not accept $17{\cdot}4f$ nor $-7{\cdot}4g$<br>Do not treat the use of $3{\cdot}7$ for $-3{\cdot}7$ as a misread. |
| 2.(a) | $\frac{24}{54}$ | B1 | |
| 2.(b) | 23 | B1 | |
| 2.(c) | 1853 | B1 | |
| 3. | (Total number of paper clips =) $200 \times 440 \times n$ where $320 \leq n \leq 330$. | M2 | M1 for $200 \times n$ OR $440 \times n$<br>where $320 \leq n \leq 330$.<br>Allow use of 400 or 450 for 440.<br>*Note*<br>*If n taken to be 225 or 425 treat as a misread and allow M2 but penalise −1 from any further A1, B1 marks gained.* |
| | Correct evaluation. | A1 | CAO from their numbers if M2 gained.<br>(n=320 gives 28 160 000, n=325 gives 28 600 000, n=330 gives 29 040 000.) |
| | (To the nearest ten million) 30 000 000 (paper clips) | B1 | FT 'their evaluation' if greater than 5 million.<br>A final answer of 30 million implies M2A1B1.<br>Allow M2A0B0 for an unsupported final answer of 28 000 000 or 29 000 000. |
| OCW | Organisation and Communication. | OC1 | For OC1, candidates will be expected to:<br>• present their response in a structured way<br>• explain to the reader what they are doing at each step of their response<br>• lay out their explanation and working in a way that is clear and logical<br>• 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:<br>• show all their working<br>• make few, if any, errors in spelling, punctuation and grammar<br>• use correct mathematical form in their working<br>• use appropriate terminology, units, etc |
| 4.(a) | 3 | B1 | If no answer seen, check table. |
| 4.(b) | 15 | B1 | If no answer seen, check table. |

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| 10. (-2, 1) | B2 | B1 for:<br>• one correct coordinate, or<br>• a clear indication of the correct position of the midpoint, or<br>• the correct coordinates reversed. |
| 11.(a) $7x = 14$<br>$x = 2$ | B1<br>B1 | FT from $7x = k$.<br>Accept $x = k/7$ (but, if on FT k is a multiple of 7, final answer must be given as a whole number.)<br>B1B0 for '$x = 14/7$'<br><br>An evaluated FT for $k \div 7$ must be rounded or truncated to at least 2dp.<br>e.g. $7x = 8$ (B0) followed by, $x = 8 \div 7$ (B0)<br>$x = 8/7$ (B1), $x = 1^{1}/_{7}$ (B1), $x = 1{\cdot}14$ (B1), $x = 1{\cdot}1$ (B0)<br><br>Mark final answer.<br>Allow 2 marks for embedded answer BUT only 1 mark if contradicted by $x \neq 2$. |
| W Accuracy of writing. | W1 | For W1, candidates will be expected to:<br>• show all their working<br>• make few, if any, errors in spelling, punctuation and grammar<br>• use correct mathematical form in their working<br>• use appropriate terminology, units, etc |
| 11.(b) 10 | B2 | C.A.O.<br>B1 for sight of 17·4 OR −7·4<br>Do not accept 17·4f nor −7·4g<br>Do not treat the use of 3·7 for −3·7 as a misread. |
| 12. (Total number of paper clips =) $200 \times 440 \times n$ where $320 \leq n \leq 330$. | M2 | M1 for $200 \times n$ OR $440 \times n$<br>where $320 \leq n \leq 330$.<br>Allow use of 400 or 450 for 440.<br>*Note*<br>*If n taken to be 225 or 425 treat as a misread and allow M2 but penalise −1 from any further A1, B1 marks gained.* |
| Correct evaluation. | A1 | CAO from their numbers if M2 gained.<br>(n=320 gives 28 160 000, n=325 gives 28 600 000, n=330 gives 29 040 000.) |
| (To the nearest ten million) 30 000 000 (paper clips) | B1 | FT 'their evaluation' if greater than 5 million.<br>A final answer of 30 million implies M2A1B1.<br>Allow M2A0B0 for an unsupported final answer of 28 000 000 or 29 000 000. |
| 13.(a) 3 | B1 | If no answer seen, check table. |
| 13.(b) 15 | B1 | If no answer seen, check table. |
| 14.(a) (0)7:45 23 (March) | B2 | B1 for each.<br>B0 for (0)7:45 p.m. |
| 14.(b) Sight of 5 miles ≡ 8 km or equivalent. | B1 | Allow a more accurate conversion<br>(5 miles ≡ 8 to 8·05 km).<br>Do not accept 3 miles ≡ 5 km |
| Shows 15 miles to be 24 km AND a valid statement e.g.<br>'yes (it's nearly 25 km'), 'no (it's only 24 km'). | B1 | '15 miles is 24 km' with no statement is B1B0.<br>Accept a one word decision of 'Yes' or 'No' as a statement. |
| *Alternative method*<br>*Sight of 8 km ≡ 5 miles or equivalent.* | *B1* | *Allow a more accurate conversion*<br>*(8 km ≡ 4·97 to 5 miles).*<br>*Do not accept 5 km ≡ 3 miles* |
| *Shows 25 km to be 15·625 miles AND a valid statement e.g.*<br>*'yes (it's just over 15 miles'), 'no (it's over 15 miles)'.* | *B1* | *'25 km is 15·625 miles' with no statement is B1B0.*<br>*Accept a one word decision of 'Yes' or 'No' as a statement.* |

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| 6(a) (Direct$^2$ =) $200^2 + 350^2$<br>Direct$^2$ = 162500 or (Direct =) $\sqrt{162500}$ | M1<br>A1 | |
| (Direct =) 403(.11... m) or $50\sqrt{65}$ (m) or $\sqrt{162500}$ (m) | A1 | FT from M1 for the correctly evaluated square root of 'their 162500' provided 'their answer' > 350 (m)<br>May be implied in further working<br>Mark final answer or the answer they go on to use, but then FT |
| (Extra distance =) 200 + 350 – 403(.1...)<br>or 200 + 350 – $50\sqrt{65}$ or 200 + 350 – $\sqrt{162500}$ | M1 | FT 'their derived 403(.11…)' > 350 and from an attempt to use Pythagoras' Theorem |
| 146.8(87....m) or 146.9(m) or 147(m) | A1 | |

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| 6(b)(i) Selects or unambiguously implies 'No' with a reason, e.g.<br>'the median is in group >200m to 1000m (and he lives 200m away)',<br>'median is more than 200m away (but Ronnie is 200m away)' | E1 | Needs to compare 200(m) with median >200(m)<br>The 200(m) can be implied from selecting 'No'<br><br>Ignore additional spurious statements<br><br>Allow 'No' with a reason, e.g.<br>'Ronnie's distance is in the first group, the median is in the second group'<br>'Ronnie only travels 200m which is less than the median (distance)'<br>'because the median distance travelled is between 200m and 1000m'<br>'Ronnie doesn't travel the distance of the 17.5(th) person'<br>'Ronnie doesn't travel the distance of the 17(th) (or 18$^{th}$) person'<br>'the median 17.5(th)'<br>'the median 17(th) (or 18(th))'<br>'he only walks 200m when the (median) distance is higher'<br>'he only walks 200m which is less than the median'<br>'can't estimate exact number from the group 200< d ≤ 1000'<br>'the median **could** be 880'<br>'9 less than half of 35'<br>'26 students walk further than him'<br><br>Do not accept 'No' with a reason e.g.<br>'Ronnie's distance is in the first group'<br>'the median **is** 250m' |
| 6(b)(ii) Midpoints 150, 600, 2000, 5000<br><br>150×9 + 600×10 + 2000×15 + 5000×1<br>(= 1350 + 6000 + 30000 + 5000 = 42350 m)<br>÷ 35<br><br>1210 (m) | B1<br><br>M1<br><br>m1<br><br>A1 | Check the table<br>Sight of 7750 implies correct midpoints<br><br>FT 'their midpoints' provided at least 3 are within or at the bounds of the appropriate groups<br><br>Answer space takes precedence |
| 6(c) (140 ÷ 7 =) 20<br>or 140 ÷ 20 = 7 or 7 × 20 = 140<br><br>1 2 3 4 5 6 7<br>**2 22 42 62 82 102 122** | B1<br><br>B1 | May be implied by any of the following:<br>• consistent position patterns + 20 indicated for at least 4 consecutive positions<br>e.g. (2,) 20, 40, 60, 80, 100, 120<br>• sight of 22 for student 2 with no further working or entries<br>CAO |

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| 6(a)(i) Unambiguously indicates or states 'Yes' with a reason, e.g.<br>'both 25 kg to 35 kg',<br>'the highest frequencies at the same mass' | E1 | *Ignore any additional spurious or contradictory statements provided 'Yes' selected*<br><br>Allow 'Yes' with a reason, e.g.<br>'both at 30 kg',<br>'both at the same mass',<br>'both have the same mass',<br>'tallest (highest frequency) is 30 kg for both polygons'<br><br>Do not accept 'Yes' with a reason, e.g.<br>'don't know',<br>'both in the same place',<br>'the groups have the same width',<br>'the graph tells us this' |
| 6(a)(ii) Unambiguously indicates or states 'Can't tell' with a reason, e.g.<br>'there were 30 dogs with a masses between 15 kg and 25 kg',<br>'no raw data is given',<br>'the actual mass of each dog is not given',<br>'the data is grouped' | E1 | *Ignore any additional spurious or contradictory statements provided 'Can't tell' selected*<br><br>Allow 'Can't tell' with a reason, e.g.<br>'doesn't show this',<br>'you can't tell the exact number of dogs'<br>'doesn't give the amount of dogs'<br><br>Do not accept 'Can't tell' with a reason, e.g.<br>'don't know',<br>'it is an estimate',<br>'it isn't accurate',<br>'because they can be anywhere from 10 kg to 20 kg' |
| 6(a)(iii) Unambiguously indicates or states 'Correct' with a reason, e.g.<br>'Pencwm polygon shows a greater drop for greater masses',<br>'fewer dogs but more large dogs in Glanafon',<br>'more dogs in Pencwm, but fewer large dogs',<br>'about the same number of large dogs, with fewer dogs in Glanafon',<br>'about the same number of large dogs, with more dogs in Pencwm', | E1 | *Ignore any additional spurious or contradictory statements provided 'Correct' selected*<br><br>**Do not** allow a reason based on calculations of proportions **alone**, e.g. Pencwm 27.5%, Glanafon 41.6%<br><br>Allow 'Correct' with a reason, e.g.<br>'Pencwm (polygon) shows a steeper drop from 30 kg',<br>'line for Pencwm is steeper (drop)',<br>'Glanafon (polygon) has a less steep drop for larger dogs',<br>'the greater masses are more frequent (in Glanafon)'<br>'2 of the 3 points for Glanafon are above Pencwm',<br>'Pencwm line drops below Glanafon after 40 (kg)'<br><br>Do not accept 'Correct' with a reason, e.g.<br>'36 dogs in Pencwm and 37 dogs in Glanafon' alone without considering proportion,<br>'the greatest is 45 kg',<br>'higher frequency in Glanafon',<br>'Pencwm is bigger but doesn't have higher proportion'<br>'as seen by the skew in (the) Glanafon (polygon)',<br>'seen by the shape (of the polygon) for Glanafon' |

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

| 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.<br>'no people in group 0 to 6 hours' | E1 | Allow 'No' with e.g.<br>'the point before 6 hours is at zero'<br><br>Do not allow 'Can't tell' with e.g. 'it is grouped data'<br><br>Do not accept "No' with e.g.<br>'it is grouped data' (unless explaining why)<br>'there is no point at 6'<br>'6 hours has a frequency of 0'<br>'it does not match a group of people'<br>'the first point is at 0 and the second one is at 20'<br>'the first plot is at 20'<br>'the first plot is at 9 hours'<br>'the first plot above 0 is at 9 hours'<br>'there is no information at 6 hours, it starts at 9 hours'<br>'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<br>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:<br>22 < 'their 22.5' ≤ 23, 25 < 'their 25.5' ≤ 26,<br>29 < 'their 29.5' ≤ 30, and 31 < 'their 31.5' ≤ 32, |
| 109 (mm) | A1 | CAO. Ignore incorrect units given<br>Ignore any working for least possible thickness also given, e.g. 21.5 + 22.5 + 28.5 + 30.5 = 105 |

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| 8(a) Midpoints 1, 4, 7, 11, 16 | B1 | |
| $1 \times 8 + 4 \times 12 + 7 \times 20 + 11 \times 4 + 16 \times 6$<br>$(= 8 + 48 + 140 + 44 + 96)$<br>$(= 336)$ | M1 | FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout<br>Use of lower bounds gives 276<br>Use of upper bounds gives 396 |
| $\div 50$ | m1 | |
| 6.72 or 6.7 (walks) | A1 | Allow rounded to 7 (walks) from appropriate working<br>Use of lower bounds gives 5.5(2 walks) or 6 (walks)<br>Use of upper bounds gives 7.9(2 walks) or 8 (walks) |
| 8(b) 06(:)53 or 6(:)53 a.m. | B1 | Allow 06(:)53 a.m. or 6(:)53<br>Do not accept (0)6(:)53 p.m. |

| Unit 2: Intermediate Tier | Mark | Comments |
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| 8(c) $(\text{Height})^2 = 7.6^2 - (18.8 - 12.6)^2$<br>or $(\text{Height})^2 = 7.6^2 - 6.2^2$<br><br>or $\cos^{-1}(\frac{18.8-12.6}{7.6}) = 35(.3345\ldots)°$ and<br>$\sin 35(.33\ldots)° = \frac{\text{Height}}{7.6}$ or $\tan 35(.33\ldots)° = \frac{\text{Height}}{6.2}$ | M2 | M1 for sight of 18.8 – 12.6 with<br>• any attempt to use Pythagoras' Theorem (including summing rather than subtraction)<br>• $\cos^{-1}(\frac{18.8-12.6}{7.6}) = 35(.33\ldots)°$ and an attempt to use sine or tan |
| $\text{Height}^2 = 19.32$ or (Height = ) $\sqrt{19.32}$<br>or (Height =) $7.6 \times \sin 35(.33\ldots)°$<br>or (Height =) $6.2 \times \tan 35(.33\ldots)°$ | A1 | |
| (Height =) 4.39(54... m) or 4.4(m) | A1 | Do not allow 4.3(m) from premature rounding of 35.3345…°<br>May be implied in further working<br>Provided at least M2 previously awarded, FT from √'their 19.32' provided < 7.6 (m) |
| (Volume of concrete) ½ × (12.6 + 18.8) × 4.4 × 50<br>or ½ × 31.4 × 4.4 × 50<br>or<br>½ × (18.8 – 12.6) × 4.4 × 50 + 12.6 × 4.4 × 50<br>or ½ × 6.2 × 4.4 × 50 + 12.6 × 4.4 × 50 | M2 | FT 'their derived 4.4' provided<br>• 'their derived 4.4' < 7.6<br>• 'their derived 4.4' ≠ 6.2<br>• 'their derived 4.4' ≠ 'their 18.8 – 12.6'<br><br>May be seen in stages, e.g. with '× 50' in further working<br><br>M1 for any one of the following:<br>(Area of cross-section)<br>• ½ × (12.6 + 18.8) × 4.4 (= 69.08 or 69.1$m^2$)<br>• ½ × (18.8 – 12.6) × 4.4 + 12.6 × 4.4 (= 13.64$m^2$ + 55.44$m^2$)<br>(Volume cuboid)<br>• 12.6 × 4.4 × 50 (= 55.44 × 50 = 2772 $m^3$)<br>(Volume triangular prism)<br>• ½ × (18.8 – 12.6) × 4.4 × 50 (= 13.64 × 50 = 682 $m^3$) |
| (Volume of concrete)<br>Answer in the range 3450 ($m^3$) to 3455 ($m^3$) | A1 | FT from previous M2 only and 'their derived 4.4' from an attempt to use Pythagoras' Theorem or cosine followed by sine or tan<br><br>On FT from M2, allow a similar range from rounding or truncation<br><br>If previous M0 A0, award SC1 for an answer of 4867 ($m^3$) from 'their 4.4' = 6.2 |

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

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

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| 7(a) 20 ≤ time in minutes < 30 | B1 | Allow e.g.<br>'20 to 30'<br>'20 – 30'<br>'20 < time < 30'<br>'20 ≤ time ≤ 30'<br>'20 < time ≤ 30'<br>'12 pupils for 20 to 30 minutes' (implies the group)<br>'12 pupils in 20 – 30 minutes' (implies the group)<br>'12 (pupils), 20 – 30 minutes' (2 answers side by side, mark the right-hand attempt)<br>Sight of 20 and 30 with incorrect inequality signs, e.g.<br>'20 ≤ 30'<br><br>Do not accept, e.g.<br>'12'<br>'25'<br>'20 – 30 minutes, 12 (pupils)', (as a choice of answers, mark the right-hand attempt) |
| 7(b) 15 | B1 | |

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| 7(c) Unambiguously indicates 'Can't tell' with a reason, e.g.<br>'doesn't give the raw data (for the group 0 to 10 minutes)',<br>'only know (frequency ) for the group 0 to (less than) 10 minutes'<br>'5 pupils spent less than 10 minutes, but the diagram doesn't show if any of these spent no time'<br>'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.<br>'grouped data',<br>'data is grouped'<br>'it is given in a range on the diagram'<br>'it doesn't show specifically'<br>'graph is not specific'<br>'it doesn't given an exact time'<br>'the graph gives 0 to 10 minutes making it impossible to get an accurate reading'<br>'could be 1 minute each or 5 minutes each we don't know' (examples all within the group $0 \leq \text{time} < 10$)<br>'doesn't give the data for 0 minutes'<br>'because the group is from greater than or equal to 0 minutes to less than 10 minutes'<br>'graph does not say they did or not'<br>'we can't see this on the diagram'<br>'does not give enough data'<br><br>Do not accept reasons that imply 0 minutes is not included in the diagram<br><br>Do not accept, 'Can't tell' e.g.<br>'the groups are an estimate'<br>'could be 5 minutes each or 20 minutes each we don't know' (examples not all within the required group)<br>'because the group is from greater than 0 minutes to less than 10 minutes'<br>'doesn't tell us how many people there are' |
| 7(d) Unambiguously indicates 'No' with a reason, e.g.<br>'it is the same number (both 5 pupils) but different number of Year 9 asked to Year 10',<br>'the totals are different',<br>'Year 9 percentage is lower (than Year 10)'<br>'5/34 is not the same (percentage) as 5/33'<br>'there are more pupils in Year 9 (than in Year 10)'<br>'there are fewer pupils in Year 10 (than Year 9)' | E1 | Check diagram for totals<br><br>If 'totals are different' is stated or clearly implied, ignore any incorrect totals or fractions given, provided the numerator of 5 pupils is correct<br><br>Alllow 'No' with a reason, e.g.<br>'the difference is 1'<br>OR<br>Allow 'No' with sight of total 34 for Year 9 and 33 for Year 10<br><br>Do not accept, e.g.<br>'because the results are different'<br>'the difference is 2'<br>'there are more pupils in Year 10 (than in Year 9)', unless the correct totals are seen<br>'there are fewer Year 9 (than Year 10)', unless the correct totals are seen |

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| 9(a) (Length of the flagpole below the rod =)<br>$3.8 \times \sin 55°$ or $3.8 \times \cos(90° - 55°)$<br>or $380 \times \sin 55°$ or $380 \times \cos(90° - 55°)$ | M2 | Or alternative full method<br>M1 for correct working without isolating 'length'<br>$\sin 55° = \frac{\text{length}}{3.8}$ or $\cos(90° - 55°) = \frac{\text{length}}{3.8}$<br>or $\sin 55° = \frac{\text{length}}{380}$ or $\cos(90° - 55°) = \frac{\text{length}}{380}$ |
| 3.11(2…m) or 311(.2.. cm) | A1 | Allow 3.1 (m) or 310 (cm) |
| (Total length 1.5 + 3.11 =) 4.61 (m) or 461 (cm) | A1 | Must be to the nearest cm<br>FT provided at least M1 previously awarded, i.e. for 1.5 + 'their 3(.)11' correctly evaluated, to nearest cm, and 'their 3.11' is to at least 2 decimal places<br><br>If units are given they must be correct |
| 9(b)(i) $120 \times 64 \div 80$ or $64 \times 1.5$ or $120 \times 0.8$<br>or $120 \div 1.25$ or $64 \div \frac{2}{3}$ or equivalent | M1 | |
| 96 (cm) | A1 | Answer space takes precedence |
| 9(b)(ii) $75 \times 80 \div 120$ or $75 \div 1.5$ or $75 \times \frac{2}{3}$<br>or $80 \div 1.6$ or $80 \times 0.625$ or $64 \times 75 \div 96$<br>or equivalent | M1 | FT from (b)(i) $64 \times 75 \div$ 'their 96' or equivalent |
| 50 (cm) | A1 | Answer space takes precedence |

*End of solutions*