

GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2011

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2011 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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GCSE APPLICATIONS OF MATHEMATICS

| Applications of Mathematics June 2011 Unit 1 Foundation Tier | Mark | Comments Post conference version |
|---|----------|--|
| 1. (a) 639, 762, 574 | B1 | |
| 762, 574 | B1 | |
| Answer $= 762$ | B1 | |
| (b) $2 \times 3.20 + 3 \times 2.30$ (6.40 + 6.90) = 13.3(0) | M1 A1 | Alternative method 2 x 3.20 = 6.40 |
| $2 \times 6.40 + 3 \times 4.30$ (12.80 + 12.90) | M1 | 3 x 2 |
| = 25.70 | A1 | = 6 |
| Saved (£)12.4(0) | A1 | Total saving 12.40 Or $(3 \times 4.30) - (3 \times 2.30)$ M1 = 6.40 A1 $(2 \times 6.40) - (2 \times 3.20)$ M1 =6.00 A1 Saved $(6.40 + 6.00)$ 12.40 A1 FT for one arithmetic error for final A1, both M marks must be awarded. |
| | o | marks must be awarded. |
| 2. (a) 370 (grams) | 8 B1 | |
| (b) Arrow at 48 m.p.h. | B1 B1 | Arrow >47 and <49 |
| (c) circle drawn, r=5cm | B1 | +2 mm |
| (d) (i) 127° | B1 | $\pm 2^{\circ}$ |
| (ii) 8.3 cm | B1 | +2 mm |
| (e) Triangular prism | B1 | |
| (f) A | B1 | |
| | 7 | |
| 3. (a) $12 (cm^2)$ | B1 | |
| (b) Rectangle drawn with area of 12 (cm ²) | B2 | Either 6×2 , 12×1 or 4×3 B1 for drawing a rectangle. Or B1 for a shape of area $12(\text{cm}^2)$ FT 'Their area' if a rectangle drawn |
| | 3 | |
| 4. (a) Moscow | B1 | Accept clear abbreviations for cities such as M, |
| (b) Cape Town | B1 | CT, Ĉ, H, S |
| (c) 16° | B1 | |
| (d) Cardiff and Helsinki | B1 | Accept -16 |
| | 4 | |
| 5. (a) Suitable explanation | E1 | Eg. 5 is the most popular number |
| (b) Attepmt to add numbers (= 40) | M1 | -6. 5 to the most popular number |
| 40÷7 | ml | FT 'their total' \div 7 |
| = 5.7(14) | A1 | CAO |
| | | Accept answer of 6 from correct workings shown |
| (c) For 2 correct values that give a range of 7 AND a median of 6. | B2 | Eg 9 & 10, 10 & 10, 6 & 10, 7 & 10, 8 & 10 B1 for 2 values that either give a range of 7 or a median of 6. OR B1 for 10 shown. |
| | 6 | |
| 6. (a) $24 \times 1.80 + 3.10$ = (£)46.3(0) | M1 A1 | Multiplying and adding For $24 \times 1.80 + 3.10$ = 117.60 M0 A0 |
| (b) $(37.30 - 3.10) \div 1.80$ | M1 | For showing a subtraction then a division |
| = 19 | A1 | Accept embedded 19. |
| | 4 | · · |
| | | |

UNIT 1 - FOUNDATION TIER

| Applications of Mathematics | Mark | Comments |
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| June 2011 Unit 1 Foundation Tier | | Post conference version |
| 7. Job 2 (= 2850×12) = 34 200 | B1 | |
| Job 3 (= 1300×26) = 33 800 | B1 | If candidates correctly evaluate 24 and 48 weeks |
| Job 4 (= 652×52) = 33 904 | B1 | respectively for jobs 3 & 4 Award B0, B1. |
| Highest = $\pounds 34\ 200$ or Job 2 | B1 | FT their answers |
| | | No workings and Job 2 given as final answer |
| | | award B0 |
| | 4 | |
| 8(a)(i) Suitable entry for the table | B1 | Eg. Display/represents the data, analyses the |
| • | | data, find outcome of data, draws a graph, Adds |
| | | up results, calculates results. |
| | | B0 for Give out results |
| (ii) Suitable suggestion | B1 | Eg. Ask girls and boys or asks people in town or |
| | | asks outside a computer store |
| (iii) Suitable diagram/chart | B1 | Eg. Tally chart/bar chart/line graph |
| (b) Appropriate comment. | E1 | Eg. The sales have decreased. |
| | 4 | |
| 9.Spinner 1 | B1 | |
| Suitable explanation. | E1 | Eg. Ethan has 50% chance of a yellow & Kyle |
| | | has 25% of a red. |
| | 2 | |
| | | |
| 10. Suitable strategy used | S1 | Evidence on diagram or if at least 1 correct |
| | | coordinate |
| (6, -3) | B2 | B1 for either coordinate. If only one coordinate |
| | | correct award S1 B1 |
| | 3 | for (-3, 6) award S1 only |
| 11. (a) 13.39 | B2 | B1 for 13.3(9173312) or 13 or 13.4 |
| (b) 57000 | B1 | D110115.5(9175512) 0115 0115.4 |
| (0) 57000 | 3 | |
| 12. Lisa = $x + 3$ ISW | B1 | |
| $Julian = 2(x+3) \qquad ISW$ | B1 | Accept $2 \times x + 3$ or $x + 3 \times 2$. |
| | | FT 2 × their Lisa if Lisa $ax + b$ where $b \neq 0$ |
| | | |
| Expansion of bracket = $2x + 6$ | B1 | FT if $2(ax \pm b)$ |
| 4x + 9 | B1 | |
| | 4 | |
| 13. Graph B | B1 | |
| Reference to horizontal line representing a stop | E1 | This can be gained from graphs B, C, D |
| Reference to steeper line after stop or less steep | E1 | |
| before stop | | |
| | 3 | |
| 14. (a) $x = 76^{\circ}$ | B1 | ±2° |
| $y = 50^{\circ}$ | B1 | ±2° |
| (b)(i) 076 ° | B1 | FT from 'their x' |
| (ii) 256 ° | B1 | FT from 'their x' or FT 180 + their (i). Accept if |
| | 7.64 | re-measured $\pm 2^{\circ}$. |
| (c) $360 - (50 \pm 2^{\circ})$ | M1 | FT 360 - 'their y' |
| 310° | A1 | $\pm 2^{\circ}$ |
| | 6 | |

| Applications of Mathematics June 2011 Unit 1 Foundation Tier | Mark | Comments Post conference version |
|---|-----------|---|
| 15.(a) Completely accurate (through the centre, 30° $\pm 2^{\circ}$) with <u>lines</u> towards circumference (need not touch the circumference) | B3 | B2 for at least 6 of the sectors accurate $\pm 2^{\circ}$, towards but not necessarily touching the circumference or shown by dots, OR |
| (b) Appropriate arcs (dashes) shown on both lines Intersection arcs shown, using first set of arcs | M1 M1 | B1 for sight of $(360 \div 12 =) 30$ $\pm 2 \text{ mm}$ $\pm 2 \text{ mm}$. FT from their arcs if $\pm 3 \text{ mm}$. FT from 'holes' from where arcs should be. |
| Angle bisector drawn | A1 | FT if M0, M1 awarded SC1 if steps of process seen but slightly outside tolerance, OR SC1 if assumed lines are equal with 1 set of arcs with bisector shown |
| 16. | 6 | Watch for answers in the information table given |
| Longer diagonal 9.6cm (drawn as a diagonal or in working) | B1 | All measurements $\pm 2 \text{ mm or } \pm 2^{\circ}$ |
| Longer diagonal split 3.6cm & 6cm or calculated as 18cm & 30cm | B1 | |
| Diagonals intersect at right angles Shorter diagonal 5 cm (drawn as a diagonal or in working) | B1 B1 | |
| Correct scale drawing of the kite | B1 | |
| | Ę | SC1 for a drawing with sides 9.6cm, 9.6cm, 5cm and $5cm(\pm 2 \text{ mm})$. Candidates awarded this SC1 can also access the B1 for the diagonals <u>shown</u> intersecting at right angles. |
| 17. Appropriate choice of sketch | 5 B1 | |
| Axes labelled appropriately Appropriate reason for their choice of sketch | B1 B1 | Minimum is label for axes, not scales, or vv If no scale, the scale must be described in order to get the reason mark. Ignore extra incorrect reasoning, if appropriate |
| | <u>×2</u> | reasoning seen <u>NO marks for an inappropriate choice of sketch</u> |
| Look for • relevance • spelling • clarity/flow of text explanations | QWC 2 | QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. |
| Ignore previous errors in not labelling axes or in their reasoning For QWC2 need at least 1 statement/sentence in both parts of the question, otherwise maximum is | | QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar |
| QWC1 if the spelling and flow of text is satisfactory QWC2: Candidates will be expected to present work clearly, with words explaining choices AND | | OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. |
| • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer | | QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. |
| QWC1: Candidates will be expected to present work clearly, with words explaining choices OR | | |
| • make few if any mistakes in mathematical | | |
| form, spelling, punctuation and grammar in their answer | 8 | |

UNIT 1 - HIGHER TIER

| Applications of Mathematics | | Comments |
|--|------------|---|
| Unit 1 June 2011 Higher Tier | | Post conference version |
| 1.(a) Completing the table correctly | B1 | |
| (b)(i) 1/36 | B1 | ISW. FT for their completed table in (b) and (c) |
| (ii) 1/36 | B1 | ISW |
| (iii) 5/36 | B1 | ISW |
| (c) 2 AND 12 | B2 | B1 for each answer. Accept double 1 AND double 6 |
| (d) 1/2 | B1 | ISW |
| | 7 | |
| 2.(a)(i) 076 (°) | B2 | $\pm 2^{\circ}$. Award B1 if 0 omitted |
| (ii) 256 (°) | B1 | FT 180 + their (i). Accept if re-measured $\pm 2^{\circ}$. |
| (b) $360 - (50 \pm 2^{\circ})$ | M1 | |
| 310(°) | A1 | $\pm 2^{\circ}$ |
| | 5 | |
| 3.(a) Completely accurate (through the centre, $30^{\circ} \pm 2^{\circ}$) with | B3 | B2 for at least 6 of the sectors accurate $\pm 2^\circ$, towards but not |
| lines towards circumference (need not touch the circumference) | | necessarily touching the circumference or shown by dots, OR |
| | | B1 for sight of (360÷12 =) 30 |
| (b) Appropriate arcs (dashes) shown on both lines | M1 | <u>+</u> 2 mm |
| Intersection arcs shown, using first set of arcs | M1 | ± 2 mm. FT from their arcs if ± 3 mm. |
| | | FT from 'holes' from where arcs should be. |
| Angle bisector drawn | A1 | FT if M0, M1 awarded |
| | | SC1 if steps of process seen but slightly outside tolerance, OR |
| | | SC1 if assumed lines are equal with 1 set of arcs with bisector |
| | | shown |
| | 6 | |
| 4.(a) $2 \times (8.5 + 4.6) + 4 \times 2.2$ (+18) and no others | M1 | Or equivalent. Attempt to consider all 6 sides (+ 18) |
| = 53 (cm) | A1 | CAO. An answer of 35 implies M1 |
| (b) $2 \times l + 2 \times w + 4 \times h + 18$ (and no extras) | B2 | B1 for 1 error or 1 slip in notation. |
| | | Treat an answer of $1 + w + 4 \times h + 18$ is 1 error (omit bottom), |
| | | hence award B1. If B2 penalise extra incorrect working -1 |
| | 4 | |
| 5. | | In this question do not ignore further incorrect working, mark |
| | | final answer |
| (a) A $y = 3a + 3b - b$ | B1 | FT until second error |
| y = 3a + 2b | B1 | |
| 2 | | |
| $\mathbf{B} \qquad \mathbf{y} = \mathbf{a}^2 + (1)\mathbf{a} + \mathbf{b}$ | B1 | CAO |
| C $y = 3a + 2b$ | B1 | CAO |
| | | |
| D y = 2ab + 2b + 3a - 2ab | B2 | B1 for each bracket expanded correctly |
| y = 3a + 2b | B1 | FT from one error in 1 of the 4 terms |
| | | |
| (b) A, C and D | B1 | FT provided at least two of the three are correct |
| | 8 | |
| 6. | | Watch for answers in the information table given |
| Longer diagonal 9.6cm (drawn as a diagonal or in working) | B1 | All measurements $\pm 2 \text{ mm or } \pm 2^{\circ}$ |
| Longer diagonal split 3.6cm & 6cm or calculated as 18cm & | B1 | |
| 30cm | D 1 | |
| Diagonals intersect at right angles | B1 | |
| Shorter diagonal 5 cm (drawn as a diagonal or in working) | B1 | |
| Correct scale drawing of the kite | B1 | |
| | | SC1 for a drawing with sides 9.6cm, 9.6cm, 5cm and 5cm(± 2 |
| | | mm). Candidates awarded this SC1 can also access the B1 for |
| | 5 | the diagonals shown intersecting at right angles. |
| | 5 | |

| Applications of Mathematics Comments 0. With 1 June 2011 Higher Tier Post conference version 7. Appropriate choice of sketch B1 Axes labelled appropriately B1 Axes labelled appropriate reason for their choice of sketch B1 Axes labelled appropriate previous errors in not labelling uses or in their reasoning for QWC2 need at least 1 statement/sentence in both parts of the question, otherwise maximum is QWC1 if the spelling and flow of text is statisfactory QWC QWC2 need at least 1 statement/sentence in both parts of the question, otherwise maximum is QWC1 if the spelling and flow of text is statisfactory QWC1 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, spelling, punctuation and grammar in their answer QWC2: Candidates will be expected to 2 • present work clearly, with works explaining choices OR B1 AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer S QWC1: Candidates will be expected to B1 Any break in acale must be indicated, or labelled to the end least 700 & horizontal to at least 10 A teast 3 point pointed accuractly including times at (1 or 2) and 10 minutes B1 Any break in acale must be indicated, or labelled to the end least 700 & horizontal to at least 10 9. 22600 × 85 M1 | Unit 1 June 2011 Higher Tier7. Appropriate choice of sketchB1Axes labeled appropriatelyB1Appropriate reason for their choice of sketchB1Look forreason markLook forreason marke spellingQWC2 Pressmaner but 1statement/searcee spellingQWC1 Pressgnore previous errors in not labelling axes or in their reasoningQWC2 PressFor QWC2 nead at least 1 statement/searchence in both parts ofQWC1 Pressmaner but 1gamerostinQWC1: Candidates will be expected toevident weala present work clearly, with words explaining choicesgammarANDmake few if any mistakes in mathematical form, spelling, punctuation and grammar in their answerB1QKC1: Candidates will be expected to • present work clearly, with words explaining choices ORB1Any break in teast 70 ob & horizontal to at least 10B1At least 3 points plotted accurately including times at (1 or 2) and 10 minutesB1(b)(i) (£)590S1S1Explanation that intermediate points between whole number are invalid, or mentions 'jumps' in the graph or similarB100A11.9 ×10°B11.9 ×10°S2(ii) 10 000 + 26.6Ca.6(iii) 10 000 + 26.6 <th>Post conference version mum is label for axes, not scales, or vv scale, the scale must be described in order to get the n mark. e extra incorrect reasoning, if appropriate reasoning seen marks for an inappropriate choice of sketch C2 Presents relevant material in a coherent and logical ter, using acceptable mathematical form, and with few if rrors in spelling, punctuation and grammar. C1 Presents relevant material in a coherent and logical ter but with some errors in use of mathematical form, ng, punctuation or grammar nt weaknesses in organisation of material but using bable mathematical form, with few if any errors in ng, punctuation and grammar. C0 Evident weaknesses in organisation of material, and s in use of mathematical form, spelling, punctuation or</th> | Post conference version mum is label for axes, not scales, or vv scale, the scale must be described in order to get the n mark. e extra incorrect reasoning, if appropriate reasoning seen marks for an inappropriate choice of sketch C2 Presents relevant material in a coherent and logical ter, using acceptable mathematical form, and with few if rrors in spelling, punctuation and grammar. C1 Presents relevant material in a coherent and logical ter but with some errors in use of mathematical form, ng, punctuation or grammar nt weaknesses in organisation of material but using bable mathematical form, with few if any errors in ng, punctuation and grammar. C0 Evident weaknesses in organisation of material, and s in use of mathematical form, spelling, punctuation or |
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| 7. Appropriate choice of sketch B1 Axes labelled appropriate) B1 Axes labelled appropriate reason for their choice of sketch B1 Look for In relevance • relevance spelling • clarity/low of text explanations QWC2 Igore previous errors in not labelling axes or in their reasoning QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC2 Creachides will be expected to QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, with few if any errors in spelling, punctuation or grammar QWC1: Candidates will be expected to • present work clearly, with words explaining choices OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer 8 R(a) Suitable uniform scales on both axes with vertical to at least 10 A horizontal to at least 10 B1 At least 3 points plotted accurately including times at (1 or 2) and 10 minutes B1 (b)(i) (c)590 B1 Systantion sing stakes planing choices and a logical manner. B1 (b)(i) (c)590 B1 Explanation that intermediate points between whole number are invalld, or mentions 'jumps' in the graph or similar B1 | 7. Appropriate choice of sketchB1 Area labelled appropriately Appropriate reason for their choice of sketchB1 | mum is label for axes, not scales, or vv scale, the scale must be described in order to get the n mark. e extra incorrect reasoning, if appropriate reasoning seen narks for an inappropriate choice of sketch 22 Presents relevant material in a coherent and logical er, using acceptable mathematical form, and with few if rrors in spelling, punctuation and grammar. 21 Presents relevant material in a coherent and logical er but with some errors in use of mathematical form, ng, punctuation or grammar nt weaknesses in organisation of material but using bable mathematical form, with few if any errors in ng, punctuation and grammar. 20 Evident weaknesses in organisation of material, and s in use of mathematical form, spelling, punctuation or |
| Axe: labelled appropriate reason for their choice of sketchBit Minimum is label for axes, not scales, sor vv Hom scale, the scale must be described in order to get the reason mark. Ignore extra incorrect reasoning, if appropriate reasoning scen NO marks for an inappropriate choice of sketchLook for • relevance • spelling • clarity/flow of text explanationsWinimum is label for axes, not scales, sor vv Hom scale, the scale must be described in order to get the reason mark. Ignore previous errors in not labelling axes or in their reasoning for QWC2 need at least 1 statement/sentence in both parts of the question, otherwise maximum is QWC1 if the spelling and flow of fext is satisfactory QWC2: Candidates will be expected to • present work clearly, with words explaining choices QR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer Statis potted accurately including times at (1 or 2) and 10 minutesB1Any break in scale must be indicated, or labelled to the end least 700 & horizontal to at least 10 At least 3 points plotted accurately including times at (1 or 2) and 10 minutesB1Any break in scale must be indicated, or labelled to the end least 10.69. 22600 × 85 × 1000M1Sight of digits 19(21) implies this M1 A1 lor or extra incorrect raye and sways rounding up, OR E1 for a partial explanation79.226.6M181FT their midpoints, including bounds. Attempts Σ /s FT from M1 A0: B1 for 192(1)×10 ⁶ or 1900 00 Also FT from M1 A0: B1 for ribor. Sincluding bounds. Attempts Σ /s FT from M1 A0: B1 for ribor. Sincluding bounds. Attempts Σ /s FT from M1 A0: B1 for ribor. Sincluding bounds. Attempts Σ /s FT from Ni king. 26 gets A0 <td>Axes labelled appropriately Appropriate reason for their choice of sketchB1Minimum is If no scale, t reason mark Ignore extra any errors in not labelling axes or in their reasoning For QWC2 need at least 1 statemet/sentence in both parts of the question, otherwise maximum is QWC1 if the spelling and flow of text is satisfactory QWC2: andidates will be expected to • present work clearly, with words explaining choices ANDB1Minimum is qWC2 Press manner, usi any errors in veldent weak spelling, punctuation and grammar in their answer Selling, punctuation and grammar in their answerB1Minimum is resent work clearly, with words explaining choices or or in use grammar.8.(a) Suitable uniform scales on both axes with vertical to at least 700 & horizontal to at least 10 At least 3 points plotted accurately including times at (1 or 2) and 10 minutesB1Any break it E29.22600 \times 85 \times 1000M1 E1 for correr rounding up E1 for ment E1 for correr rounding 1.9 \times 1000B1 E2 E1 for correr rounding times at (1 or 2) and 10 minutesM1 E2 E1 for correr rounding up E1 for ment E1 for spart E1 for correr rounding up E1 for ment E1 for spart E1 for correr rounding up E1 for ment E1 for correr for ment E1 for correr for ment E1 for correr</br></td> <td> scale, the scale must be described in order to get the n mark. e extra incorrect reasoning, if appropriate reasoning seen harks for an inappropriate choice of sketch 22 Presents relevant material in a coherent and logical ter, using acceptable mathematical form, and with few if rrors in spelling, punctuation and grammar. C1 Presents relevant material in a coherent and logical ter but with some errors in use of mathematical form, ng, punctuation or grammar nt weaknesses in organisation of material but using table mathematical form, with few if any errors in ng, punctuation and grammar. C0 Evident weaknesses in organisation of material, and is in use of mathematical form, spelling, punctuation or </td> | Axes labelled appropriately Appropriate reason for their choice of sketchB1Minimum is If no scale, t reason mark | scale, the scale must be described in order to get the n mark. e extra incorrect reasoning, if appropriate reasoning seen harks for an inappropriate choice of sketch 22 Presents relevant material in a coherent and logical ter, using acceptable mathematical form, and with few if rrors in spelling, punctuation and grammar. C1 Presents relevant material in a coherent and logical ter but with some errors in use of mathematical form, ng, punctuation or grammar nt weaknesses in organisation of material but using table mathematical form, with few if any errors in ng, punctuation and grammar. C0 Evident weaknesses in organisation of material, and is in use of mathematical form, spelling, punctuation or |
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| Explanation that intermediate points between whole number are invalid, or mentions 'jumps' in the graph or similarE2E1 if explained using values rather than generalised, OR E1 for correct but includes incorrect element, e.g. mentions rounding up and down, OR E1 for a partial explanation9. 22600×85 $\times 1000$ M1Sight of digits 19(21) implies this M11.9 $\times 10^9$ A1 B2B1 for $1.92(1)\times 10^9$ or $1.900\ 000\ 000$ 1.9 $\times 10^9$ A1 B2B1 for $1.92(1)\times 10^9$ or $1.900\ 000\ 000$ 10.(a) (i) Mid points 5, 15, 25, 35, 45 100 B1 26.6 M1 M110.000 $\div 26.6$ A1 M1FT their midpoints, including bounds. Attempts Σfx FT from (i) | Explanation that intermediate points between whole number are invalid, or mentions 'jumps' in the graph or similarE2E1 if explair E1 for correct rounding up E1 for menti E1 for a part9. 22600 × 85 $\times 1000$ M1Sight of digit A11.9 ×10 ⁹ B1Sight of digit A11.9 ×10 ⁹ B2B1 for 1.92(Also FT from B1 for either 10010.(a) (i) Mid points 5, 15, 25, 35, 45 $5\times 2 + 15\times 20 + 25\times 44 + 35\times 28 + 45\times 6$ 100 B1(ii) 10 000 ÷ 26.6 Either 375 or 376M1FT their mid m1(b) (i) 486, 518, 548FT from (i) A1Accept round B2 for any 2 B1 for a corr B1 for a corr | |
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| $ \begin{array}{c c} B1 \text{ for } 1.92(1) \times 10^6 \text{ or } 190000 \\ OR \text{ from their incorrect value 2s.f and standard form, B2 both B1 for either} \\ \hline 10.(a) (i) \text{ Mid points 5, 15, 25, 35, 45} \\ \underline{5 \times 2 + 15 \times 20 + 25 \times 44 + 35 \times 28 + 45 \times 6} \\ 100 \\ \underline{26.6} \\ (ii) 10000 \div 26.6 \\ \end{array} \begin{array}{c} B1 \\ FT \text{ their midpoints, including bounds. Attempts } \Sigma \text{ fx} \\ FT \text{ their } \Sigma \text{ fx}/100 \\ OR \text{ from their incorrect value 2s.f and standard form, B2 both B1 for either} \\ \hline 10.0 \\ 26.6 \\ M1 \\ FT \text{ their midpoints, including bounds. Attempts } \Sigma \text{ fx} \\ FT \text{ their } \Sigma \text{ fx}/100 \\ Only \text{ accept } 27 \text{ from working. 26 gets } A0 \\ \hline 100 \\ FT \text{ from (i)} \\ \end{array}$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | |
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| | B1 for a corr B1 for 1 corr | |
| B2 for any 2 correct entries, | B1 for 1 con | |
| B1 for a correct method towards at least 2 of the entries seen, | | |
| B1 for 1 correct entry, or | | |
| B1 for sight of 4860, 5180 and 5480 | | |
| (ii) Explanation including implication of "smoothing out" or E1 Do not accept 'estimates number of books', nor 'rough averag | | ot accept 'estimates number of books', nor 'rough average |
| reducing impact of large or small numbers | | |

| Applications of Mathematics | | Comments |
|--|--|--|
| Unit 1 June 2011 Higher Tier | | Post conference version |
| 11.(a) 28, 68, 80 (b) Correct cumulative frequency diagram, points plotted at bounds and joined by a curve or straight line | B1 B2 | FT only if cumulative in (a) B1 for points correct but not joined, OR B1 correct apart from 0.5 translation, OR |
| (c) Median (approx. 62.5 (mm)) Intention to subtract readings from horizontal axis for vertical 60 & 20 (approx. 66 – approx. 57.5) | B1 M1 | B1 if one error in plotting but joined correctly FT from their cumulative entries. Not cumulative means no FT |
| Interquartile range (approx 8.5(mm)) (d) <u>General idea</u> of what box – whisker should be Range ends correctly indicated (46.5 and 74.5) Median line correctly indicated (approx 62.5) | A1 S1 B1 B1 | Needs to show a box and whiskers FT their median |
| UQ and LQ correctly indicated (approx 66 and 57.5) | B1 10 | FT their UQ and LQ readings |
| 12.(a) $5 \times 12 + 4$ $12 \times 14 + 3$ 64 and $171BMI = \frac{171 \times 703}{64^2}$ | M1 M1 A1 M1 | Both correct, maybe implied in later working FT their 64 and 171 provided M1 award |
| = 29.3(4887) Overweight | A1 B1 | Accept 29 from correct working FT interpretation of their BMI provided at least M2 awarded previously |
| (b) Sight of 14s + p or equivalent Sight of 12f + i or equivalent | M1 M1 | Mark final answer |
| (BMI =) $\frac{703(14s + p)}{(12f + i)^2}$ | A2 | A1 if correct formula seen before incorrect simplification, or A1 if 1 error in notation, or A1 for either numerator or denominator correct |
| | 10 | SC1 for $\frac{703(12s + p)}{(14f + i)^2}$ |
| 13. (a) Entries in frequency table: 30 and 27 Histogram: 0 to 3 f.d. 8, 9 to 15 f.d. 5 (b) Identifying that the answer is in the range >6 and <9 Realising need ½ of the entry for 6<t≤9 <ul=""> (x =) 7.5 (hours) or equivalent </t≤9> | IO B2 B2 M1 A1 7 | B1 for each correct entry B1 for each correct bar Maybe shown on the histogram Maybe shown on the histogram |
| 14. (a) Height of tide 12(m) 2 of the 3 answers to 1/12, 1/6 & 1/4 of 12 (1, 2 & 3) Graph paper axes showing upto 15(m) and 24(hrs) Suitable labels for the axes Heights of tides correct for at least 12 hours Plate correct for the 24 hour period (initial or not) | S1 B1 S1 S1 B1 | Hr0123456789101112Ht346912141514129643Or 12(m) between highest and lowest plots Or of 15 (1.25, 2.5 and 3.75)Units maybe omitted No further marks if not using the 3m low tide start or not using 12m tide Shown in working or on the graph |
| Plots correct for the 24 hour period (joined or not) (b) Method, e.g. use of graph or linear between 4 and 5 | B1 M1 | FT for M1 only if at least 3 marks awarded in (a) |
| hours An answer that rounds to13 (m) (c) 12 hours Explanation, e.g. complete cycle | A1 B1 E1 10 | CAO. If units are given they must be corrct Hours must be stated. An answer of 12 gets B0 SC1 for 'tide goes in and out twice in 24 hours' |

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WJEC 245 Western Avenue Cardiff CF5 2YX Tel No 029 2026 5000 Fax 029 2057 5994 E-mail: <u>exams@wjec.co.uk</u> website: <u>www.wjec.co.uk</u>