OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics B (Linear)

General Certificate of Secondary Education

Component **J567/03:** Mathematics Paper 3 (Higher)

Mark Scheme for June 2013

Oxford Cambridge and RSA Examinations

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations used in the detailed Mark Scheme.

Annotation	Meaning
	Correct
	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

   Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – $\sqrt{}$(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
   - **soi** means **seen or implied**.

6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

   (ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

   (iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

8. In questions with a final answer line:

   (i) If one answer is provided on the answer line, mark the method that leads to that answer.

   (ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

   (iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer line:

   (i) If a single response is provided, mark as usual.

   (ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

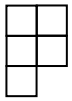
13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

14. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		4 points correctly plotted	2	**B1** for at least 2 points correctly plotted	Use overlay to check Tolerance up to half square horizontally and vertically Ignore extra points
	(b)	(i)	Ruled line of best fit	1	Line must pass through or between (5, 23) and (5, 31) AND (26, 76) and (26, 84)	Use overlay Line must be at least as long as limits of overlay and be on or inside lines of overlay
		(ii)	62 - 66	1	Or **FT** *their* straight line tolerance ±1 goal	Condone non-integer values
2	(a)	(i)	10	1		
		(ii)	28	2	**M1** for 16 **seen** or $^-12$ from $3x$ **soi** or for $(^-4)^2 - 3 \times {}^-4$	
	(b)		$y^2 + 5y$ final answer	1		Must be y^2 not $y \times y$ Condone $y \times 5$ or $y5$ for $5y$ [not y^5]
	(c)		$4p(p - 2)$ final answer	2	**M1** for $4p(p...)$ or $4(p^2 - 2p)$ or $p(4p - 8)$ or $2p(2p - 4)$ **seen**	Condone missing final bracket Condone $(4p + 0)(p - 2)$
3			Perpendicular bisector of AB with two correct pairs of arcs Arc centre B, radius 7cm ± 2mm Correct region shaded	2 1 1	**B1** for bisector without correct arcs or for two pairs of correct arcs crossing with no line drawn **FT** *their* bisector and arc	Use overlay and mark intention Condone solid/dashed lines for both arc and bisector Allow any length bisector and arc if intention clear Their bisector must be a straight line and intersect arc twice and their arc intention centre B Clear intention of correct region indicated

Question			Answer	Marks	Part Marks and Guidance	
4	(a)		[£]16.90	3	**M2** for 8.45 or 3.90 **seen** or **figs** 169 **seen** or for complete attempt at 130% of (2 × 6.5) OR **M1** for attempt at 30% of 6.50 or attempt at 30% of (2 × 6.5) **seen** OR **B1** for 0.65 or 65p or 1.3[0] or 130 **seen** or for **figs** 845 or 39 **seen**	M2 only for answer 16.9 Condone 845 or 390 if clearly working in pence Eg for 0.3 × 6.50 or 0.3 × 13 or [£]1.95 **seen** 13 × 30% is not sufficient for M1
	(b)		15 [boys] 25 [girls]	2	Both correct **M1** for 40 ÷ (3 + 5) or 40 ÷ 8 **seen** or for 15 or 25 **seen**	
	(c)	(i)	Suitable question with at least 4 response boxes with non-overlapping categories covering all eventualities	2	**B1** for suitable question (condone suitable instruction) with 3 appropriate response boxes including 'other' or 'none' OR **B1** for suitable question with at least 4 response boxes with overlap and/or not covering all eventualities and/or vague categories OR **B1** for at least 4 appropriate response boxes with non-overlapping categories covering all eventualities and no question	In general, for 2 marks must include 'other' or 'none' and question or responses must refer to visits per month Condone consistent unconventional notation for groups if intention clear Ignore extra questions
		(ii)	Refers to time limiting population	1		See exemplars
		(iii)	Use random number generator to select members from a numbered list of all members	1		See exemplars Any method of randomly selecting from whole population

Question			Answer	Marks	Part Marks and Guidance	
5			48	4	**M1** for $\frac{2}{8}+\frac{5}{8}$ **oe soi** AND **M1** for 1 – *their* $\frac{7}{8}$ **soi** AND **M1** *their* $\frac{1}{8}$ (total) = 6 **soi** After **M0**, **SC1** for attempt to use diagram to find fraction for accounts	Adding showing use of common denominator Calculating fraction for accounts Equating fraction with accounts hours $\frac{1}{8}$ = 6 hours seen implies M3
6	(a)		Ruled straight line passing at least between ($^-$1, 6) and (5, $^-$3)	3	**B2** for correct short line or if no line drawn two correct points plotted OR **B1** for one correct pair of values **soi**	Tolerance 2mm for plots for correct line B1 implied by one correct plot or *their* line clearly going through a correct point for integer *x* or *y* *x* $^-$1 0 1 2 3 4 5 *y* 6 4.5 3 1.5 0 $^-$1.5 $^-$3
	(b)		1.5 **oe**	3	**M2** for $\frac{4.5}{3}$ **oe** or for [*y* =] 1.5*x* [+ *k*] or for $^-$1.5 **oe** or for correct gradient of any line drawn OR **M1** for reflection of *their* line drawn or attempt at rise/run for any line drawn or [*y* =] $^-$1.5*x* [+ *k*]	Not follow through as can be done from equation For 3 marks equivalent of 1.5 must be correct fraction or decimal ie not 4.5/3 For M2 gradient must be correct fraction or decimal eg accept 6/8 or $^-$2/1 etc

Question			Answer	Marks	Part Marks and Guidance	
7	(a)		 Plan Front view	2	**B1** for each OR **SC1** for two correct shapes incorrect size	Use overlay for guidance, accept clear intention of correct shape Allow any rotation for plan but front view must be correct orientation Condone unruled and omission of internal lines
	(b)		6000	1		Condone 6×10^3
	(c)	(i)	D	1		
		(ii)	(0, 2, 2)	1		
		(iii)	(0, 3, 3)	1FT	**FT** (c)(ii)	FT answer is (*their* 0, (*their* 2) + 1, (*their* 2) + 1)
8	(a)		$\frac{2}{3}$ **oe isw**	3	**M1** for removing bracket $12x + 20$ **seen** or $3x + 5 = 7$ AND **M1 FT** for $12x = 28 - 20$ or $3x = 7 - 5$ AND **M1** for $x = \frac{b}{a}$ after $ax = b$ **seen** **max 2 marks if answer incorrect** OR **SC2** for $4(3 \times \frac{2}{3} + 5) = 28$ as answer	3 marks for $0.\dot{6}$ but not 0.7 **isw** for incorrect simplification of 8/12 etc $12x = 8$ implies M2 FT for correct rearrangement of *their* $ax + m = n$ to $ax = n - m$ $a \neq 1$, $b \neq 0$, $\frac{b}{a}$ must be written as fraction or correctly converted to decimal (to at least 3 sf) for this M1 Trial and improvement methods can only score for correct answer or correct embedded answer

Question			Answer	Marks	Part Marks and Guidance	
	(b)		$^{-}3$, $^{-}2$, $^{-}1$, 0, 1	2	All correct **B1** for one omission or extra or for number line with just these 5 numbers	For example B1 for $^{-}3$, $^{-}2$, $^{-}1$, 0, 1, 2 and B1 for $^{-}3$, $^{-}2$, $^{-}1$, 1 But B0 for $^{-}3$, $^{-}2$, $^{-}1$, 1, 2 Condone eg $x = ^{-}3$, $x = ^{-}2$, … etc
	(c)		$x < 8$ final answer	2	**M1** for $2x < 9 + 7$ AND **M1** for $x < \frac{b}{a}$ after $ax < b$ **seen** **max 1 marks if answer incorrect** OR **SC1** for answer 8 or x …. 8 with any incorrect equality or inequality symbol or answer $2 \times 8 - 7 < 9$	Condone use of = or incorrect inequality symbol in place of < for all method marks $a \neq 1$, $b \neq 0$ Trial and improvement methods can only score for correct answer or correct embedded answer
	(d)		$r = [\pm]\sqrt{\frac{A}{2\pi}}$ final answer	2	**M1** for one correct step seen After **M0**, **SC1** for final answer correct but involving double decker fractions or for omission of $r =$	Square root must clearly extend below division line and over entire expression if more than one term but condone $r = \sqrt{A \div 2\pi}$ for 2 marks Examples of one correct step $[r^2 =]A - 2\pi$ then $[r =]\sqrt{A - 2\pi}$ Or $[r^2] = \frac{A}{2\pi}$

Question			Answer	Marks	Part Marks and Guidance	
9	(a)		$4\frac{1}{2}$ final answer	3	**M1** for $\frac{15}{4}$ from $3\frac{3}{4}$ or $\frac{6}{5}$ from $1\frac{1}{5}$ **seen** or equivalent improper fractions AND **M1** for correct evaluation of *their* $\frac{15\times6}{4\times5}$ AND **M1** for *their* improper fraction correctly converted to mixed number in lowest terms **max 2 marks if answer incorrect**	Answer $\frac{90}{20}$ **oe** implies M2 For multiplication of improper fractions, not eg $\frac{3}{4}\times\frac{1}{5}$ *Their* improper fraction converted to integer scores M0
	(b)		$0.1\dot{6}$ or 0.1666[…]	1	Mark at most accurate	Do not accept 0.166 Condone poor notation eg $0.1\dot{6}\dot{6}$ Not 0.1667 etc or $0.\dot{1}\dot{6}$
	(c)		$\frac{58}{99}$	2	**M1** for 100[*r*] = 58.58[58…] **soi** Or for $\frac{5}{9}+\frac{3}{99}$	Implied by 99*r* = 58

Question			Answer	Marks	Part Marks and Guidance	
10			$3n + 2$ **oe** **and** linking difference of 3 with $3n$ or correct use of $a + (n – 1)d$ **seen** or showing table of results to at least $n = 4$ with differences or diagrams showing patterns building up or for at least two correct substitutions of values of n to show validity of expression	4	**B3** for $3n + 2$ **oe** without sufficient explanation or for $3n + k$ **oe** with explanation showing table of results and differences or diagrams showing patterns building up or use of $a + (n – 1)d$ **seen** OR **B2** for $3n + k$ **oe seen** or correct table of values up to pattern 5 or clear working showing how matchsticks are added to develop pattern OR **B1** for stating pattern goes up in 3s **oe** or pattern 4 drawn or 5, 8, 11 **seen**	$n = 3n + 2$ scores B3 only Accept $k = 0$ 1 2 3 4 5 5 8 11 14 17 $n + 3$ alone is not sufficient
11	**(a)**		8.46×10^6 final answer	1		
	(b)		Mongolia India	1 1		
	(c)		300 or 3×10^2 or 400 or 4×10^2 or 333 or 3.33×10^2	2	**M1** for 1×10^9 **and** 3×10^6 **oe** or 1.2×10^9 **and** 3×10^6 **oe** or any clear attempt at pop/area **seen**	Condone $3.\dot{3} \times 10^2$ for 2 marks Answer in poor notation scores M1 only eg 0.4×10^3 Rounded values not required in division

Question			Answer	Marks	Part Marks and Guidance	
12	(a)		Tree diagram complete To work: 0.2, 0.8 Home from work: 0.4, 0.6, 0.4, 0.6	2	**B1** for one correct placement of 0.8 or 0.6	Accept use of equivalent fractions throughout (a) and (b)
	(b)		0.44 **oe**	3FT	**FT** *their* tree diagram **M2 FT** for 0.2 × 0.6 + 0.8 × 0.4 **oe** Or **M1 FT** for 0.2 × 0.6 or 0.8 × 0.4 **oe seen** After **M0**, **SC1** for answer 0.52	Working may be on tree diagram For 3 marks FT answer must be between 0 and 1 FT values between 0 and 1 only for method Method marks for calculations, results need not be correct although M1 may be implied by 0.12 or 0.32 **oe seen** Allow equivalent fractions or %
13	(a)		Triangle with vertices at (⁻1, 4), (1, 4), (1, 5)	3	**B2** for triangle correct size and orientation in wrong position OR **B1** for enlargement centre (⁻4, 6) incorrect scale factor < 1 or for triangle with two vertices correct or for three rays from (⁻4, 6) to triangle A	Use overlay clear intention for position

Question			Answer	Marks	Part Marks and Guidance	
	(b)		Rotation 180° centre (0, ⁻1) or Enlargement scale factor ⁻1 centre (0, ⁻1)	3	**B1** for correct single transformation **B1** for centre (0, ⁻1) **B1** for 180° or half turn or scale factor ⁻1 **FT** *their* transformation Award **B0** if second transformation mentioned After **B0**, **SC1** for triangle with vertices (⁻2, ⁻4), (⁻6, ⁻4), (⁻6, ⁻6) or (⁻1, ⁻6), (1, ⁻6), (⁻1, ⁻7) **seen** OR **SC1** for answer of translation by $\begin{pmatrix}2\\0\end{pmatrix}$ or translation by $\begin{pmatrix}0\\2\end{pmatrix}$	These marks are only available if single transformation only mentioned Condone missing brackets in coordinates Use of word vector implies translation SC1 can be awarded if more than one transformation stated See overlay for SC First translation is from using $x = ⁻1$ instead of $y = ⁻1$, second is for using *x*-axis instead of *y*-axis
14	**(a)**		Correct histogram drawn	3	**B2** for at least four bars correct height OR **B1** for at least four correct frequency densities or at least four bars correct height **FT** *their* frequency densities AND **B1** for bars correct width and position **Max 2 marks if histogram not completely correct**	Use overlay Tolerance ±1mm for heights and widths Correct f.d. 5, 3.2, 1.6, 0.75, 0.4

Question			Answer	Marks	Part Marks and Guidance	
	(b)		Two valid, worthwhile comparisons Eg positive skew shown in afternoon but evening more symmetrical Similar proportion of over 60s in both groups Modal group 20 to 30 for afternoon, but 30 to 40 for evening More 15 to 20 year olds go in the afternoon than in the evening	2	**B1 for each** If no explicit comparison between afternoon and evening, then **one** must be mentioned to imply comparison with the other unless eg 'similar in both afternoon and evening'	Accept comparisons either **both** correct or **both** FT their histogram: must be consistent Mark best part of each comment, ignore incorrect frequencies Comments must refer to number of people not frequency density Comments must refer to age ranges not older/younger See exemplars Note same total number in afternoon and evening with no FT from their histogram for comment about total number of people
15	**(a)**		∠XCD = 48º, angles in segment [∠CDX =] 22º with angles in triangle **or** triangle = 180°	B1 B1	48 may be indicated on diagram After 48 **seen**	Accept 'angles on same arc', 'same chord' Do not accept eg 'bow theorem' or 'opposite segment', 'other segment'
	(b)		∠BDA = ∠CAD equal angles in isosceles triangle ∠BAD = ∠CDA angle sum of triangle and AD is common Hence congruent ASA or AAS	B1 B1 B1	Alternative **B1** for **two** from ∠BDA = ∠CAD, ∠BAD = ∠CDA, ∠ABD = ∠DCA, AD is common (AD = AD) stated AND **B1** for two correct angle reasons **seen** AND **B1** for ASA or AAS After **B0**, **SC1** for 6 angles correctly marked on diagram **Max 2 marks if full correct reasoning not seen**	Condone ∠B and ∠C for ∠ABD and ∠DCA but other angles must be defined completely Isosceles triangle counts as angle reason Or two angles and a side the same

Question			Answer	Marks	Part Marks and Guidance	
16			$(x + 5)^2 - 16$	3	**M2** for $(x + 5)^2 - 25$ [+ 9] or for $x^2 + 5x + 5x + 25 - 25$ [+ 9] OR **M1** for $(x + 5)^2$ or -16 **seen** OR **SC2** for $(x - 5)^2 - 16$	Condone $(x + 5)^2 + {}^-16$ for 3 marks
17			$C = 13d^2$	3	**M2** for $52 = 4k$ or $k = 13$ **soi** OR **M1** for $C = kd^2$ or 52 α 4 or C α d^2	Condone units given in formula Condone α in place of = for both M1 and M2 For M1 k can be any letter or number except 0
18	**(a)**		$\frac{1}{3}$ or $0.\dot{3}$ final answer	2	**M1** for $\frac{\sqrt{2}}{\sqrt{2}\sqrt{9}}$ or $\frac{\sqrt{2}\times\sqrt{18}}{\sqrt{18}\times\sqrt{18}}$ or better	Eg M1 for $\frac{6}{18}$, $\sqrt{\frac{1}{9}}$, $\frac{1}{\sqrt{9}}$, $\frac{\sqrt{2}}{3\sqrt{2}}$, $\frac{\sqrt{2\times18}}{18}$
	(b)		$\frac{2x+3}{x}$ or $2+\frac{3}{x}$ final answer	3	**nfww** **M1** for $(2x + 3)(2x - 3)$ **seen** AND **M1** for $x(2x - 3)$ **seen** AND **M1** for correct simplification of *their* algebraic fraction **Max 2 marks if answer incorrect**	Condone $(x + 0)(2x - 3)$ for M1

Question			Answer	Marks	Guidance
19			Equates correct expressions for volumes of cylinder and sphere, shows clear working and simplification to reach $h = 9r$	5	Volume of cylinder = $\pi \times (2r)^2 \times h$ Volume of sphere = $\frac{4}{3}\pi \times (3r)^3$ Leading to $36\pi r^3 = 4\pi r^2 h$ then shows cancelling to reach $h = 9r$
			$h = 9r$ without clear working OR Correct expressions used, with clear working maximum one error leading to incorrect final answer	4-3	For lower mark: Finds and equates correct expressions for both volumes OR Correctly rearranges *their* equated volume formulae to $h = \ldots$
			Correctly states either volume of cylinder = $4\pi r^2 h$ or volume of sphere = $36\pi r^3$ OR Attempts to substitute in both correct **volume** formulae OR Equates **volume** of sphere with **volume** of cylinder	2-1	Attempts to use one correct **volume** formula Eg stating formula and substituting a (possibly incorrect) value into it
			No relevant working seen	0	

APPENDIX 1

Exemplar responses for Q.4cii

Response	Mark
Because she is only choosing one day	**1**
It does not include people who may attend at other times like full time employed or school children	**1**
Because some members will never go on a Friday	**1**
Because it will not include members who come on weekends only	**1**
She is only asking people who are there on Friday	**1**
Because she is only surveying people on a Friday morning	**1**
As she has specified a time so it is not random	**1**
People may have a routine and go on a different day	**1**
It may give a bias result as members who visit on a Friday morning may not be of different ages	**1**
Because she only did it one time [*bod one time means at one time*]	**1**
Because not a range of people will be at the club on a weekday morning	**1**
Because the members attending on Friday are not representative of all the Meadway members	**1**
Because all the members taking the test would have visited the club on the same day	**1**
Not everyone will have an equal chance of being selected out of the population that go to the Meadway tennis club	**1**
It near the weekend not many people go in the morning	**1**
Because most people will be at work at this time.	**1**
Because there won't be enough people with different answers on one day	**1**
The same people might go every Friday morning	**1**
Because the majority will be unemployed if they aren't at work [*implies an effect of the limiting time – very borderline*]	**1 bod**
Because the member can tell Rosie how many times they've already visited because the weekdays have already passed	**0**
Some of the members may not turn up. Also random sample should be done randomly	**0**
This does not include people who never go	**0**
Because it will be biast. [*not enough*]	**0**
These people will be daily visitors for the morning	**0**
It doesn't include every member of the tennis club so it isn't representable	**0**

Exemplar responses for Q.4ciii

Response	Mark
She could do a draw out of a hat with names	1
In no coherent pattern ask random members from the club maybe using a computer to do this to answer the survey	1
She would place the names of all the members in a top hat and randomly select a certain number of names	1
She could put the names of the member in a computer to pick at random or on a calculator or draw from a hat	1
Pull names out of a hat	1
Go down the membership list and pick 50 or more at random [*does not explain how the random sample is picked*]	0
Get a list of members and randomly select a sample of people from it [*does not explain how the random sample is picked*]	0
Go at the same time of day each day for a week	0
Pick about 30 names random from the club records	0
She could ask a random selection of people each day of the week and combine all her results to give a wider result	0
Just select people from members list by random [*does not explain how the random sample is picked*]	0
Survey each tenth person on the membership list [*systematic, not random*]	0
Systematically	0
Do the survey every day for a week	0
She can turn up and pick 10 people at random	0
Sample a few more days at different times	0
By doing a stratified sample of the members	0
She could choose 5 members from each age group	0
Picking randomly days of the week	0
By selecting people from each age group that attend the club	0
By sampling members that attend the club at different times and different days	0
She could select a specific amount of people from each gender/age group to achieve wide variations and more accuracy	0
On the day known to be most busy pick every 5^{th} male and 5^{th} female.	0
She could go on a Saturday afternoon so people aren't in work and there's a variety	0
Go every other day and stay all day	0
Do her survey three times during different time periods on different days	0

Exemplar responses for Q.14b

For all responses below, assume that histogram in 14a was drawn correctly
Must check candidates comments against *their* histogram for possible FT

Response	Mark
More people aged 30-40 came in the evening than the afternoon. There were more younger people going to the afternoon. [*younger is not specific enough*]	**1** **0**
The median is higher in the evening and so the audience are generally older The range is still the same so they are both not very consistent	**1** **0**
The cinema on a Saturday evening had a higher frequency density of older people than in the afternoon Those aged between 60 and 90 who visited the cinema during the afternoon had a higher frequency of those of the same age range in the evening [*does not ft*]	**0** **0**
Saturday evening was more popular with ages 15-20 and 30-40 and 40-60. Saturday afternoon was the least consistent meaning there were a lot more spaced between ages	**0** **0**
Higher frequency density for age 60 < a < 90 [*frequency density scores 0, also doesn't specify a comparison]* Age 15 < a < 20 had a higher frequency density in the afternoon	**0** **0**
Less people ages 20-30 came in the afternoon [*implication is less than in evening*] In both there are not many people aged 60-90 who go to the cinema	**0** **1 bod**
There was a similar amount of people between the ages of 60 and 90 in both the afternoon and evening There were 11 less people between the ages of 20 and 30 in the evening compared to the afternoon [*ignore incorrect '11'*]	**1** **1**
Less 30-40 year olds came during the afternoon [*implication is less than in evening*] More 60-90 year olds came during the afternoon [*implication is more than in evening*]	**1** **0**
Both afternoon and evening the biggest (widest) most popular category is 60-90 year olds The smallest age group is 15-20 year olds in both evening/afternoon	**0** **0**
Older people come to the cinema more often in the evening. [*older is not specific enough*] Younger people under age 40 come to cinema more often on Saturday afternoon [*younger acceptable as age mentioned bod for more often rather than more people*]	**0** **1 bod**
Young people go more to afternoon films than evening films on Saturday [*young is not specific enough*] Middle aged people go to evening films more than they go to afternoon films on this Saturday [*middle aged not specific enough*]	**0** **0**
No one under 15 goes on both Saturday morning and evening [***always** interpret morning to mean afternoon*] The highest frequency was the same but for different ages [*not relevant*]	**1** **0**
There is a more even distribution of ages in the afternoon There are less people in the evening than in the afternoon	**0** **0**
More older people came at the afternoon than in the evening [*older is not specific enough*]	**0**

The modal class is greater in the afternoon – 5 [*unclear*]	**0**
There is a greater range of frequency density in the afternoon The modal group was people ages 20-30 in the afternoon but was people aged 30-40 in the evening	**0** **1**
More people between the ages 40-60 visited in the evening [*implication is more than in afternoon*] Least amount of people in age group was 60-90 in afternoon and evening [*least is 15-20 in evening*]	**1** **0**
Less people aged between 15<a<20 went to the cinema in the evening than in the afternoon More people aged 40<a<60 went to the cinema in the evening than in the afternoon	**1** **1**
In the afternoon there was more younger people aged 15-20 than in the evening At the evening there was less people aged 15-20 than in the afternoon [*repeats previous comment*]	**1** **0**
There are no people under 15 in either histogram graph results There are a similar amount of people in the 60<a<90 group	**1** **1**
More people went on an afternoon than in an evening The number of people aged 40-60 stayed the same on each histogram	**0** **0**
The afternoon had overall more people going In the evening less people between the ages of 60 and 90 went	**0** **0**
There are more people at a younger age in the afternoon than evening [*younger is not specific enough*] 40<a<60 age more popular in the evening than in the afternoon	**0** **1 bod**

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