Mark scheme for 1MA1 Higher themed papers: Statistical diagrams: Scatter Graphs and Frequency Polygons

GCSE Mathematics (1MA1)

Themed papers – Statistical diagrams: Scatter Graphs and Frequency Polygons

Compiled from student-friendly mark schemes

Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

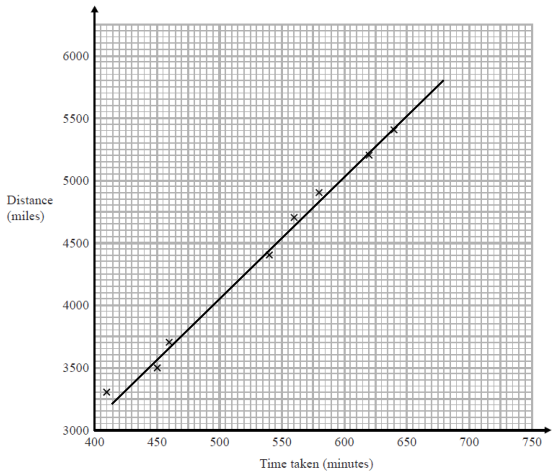
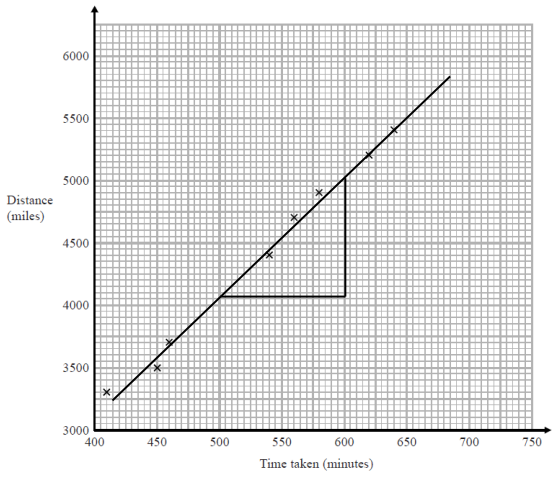
NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme
M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect. P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question. A1 – accuracy mark. This mark is generally given for a correct answer following correct working. B1 – working mark. This mark is usually given when working and the answer cannot easily be separated. C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working. Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

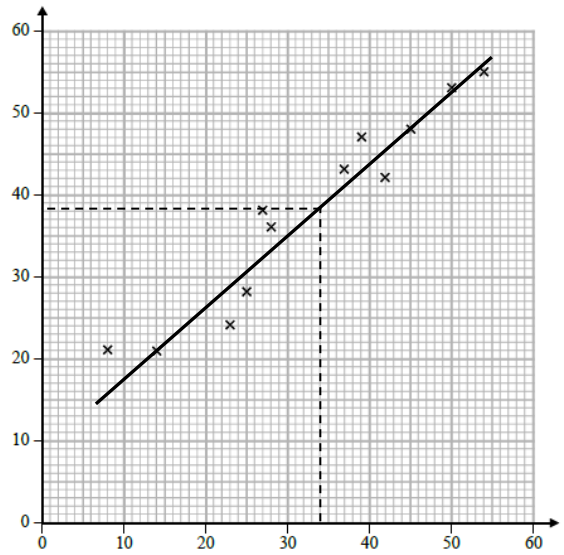
Question 1 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	(10, 19)	B1	This mark is given for the correct answer only
(b)	Positive (correlation)	C1	This mark is given for a correct comment
(c)	Line drawn from 16.4 up to (16.4, *y*)	M1	This mark is given for an appropriate line of best fit drawn, or a point marked at (16.4, *y*) or a vertical line
	Answer in the range 12 – 13	A1	This mark is given for an answer of hours in the range 12 to 13
(d)	Yes, the graph appears to justify this since the majority of points for high temperature appear when there are more hours of sunshine (positive correlation)	C1	This mark is given for a correct explanation

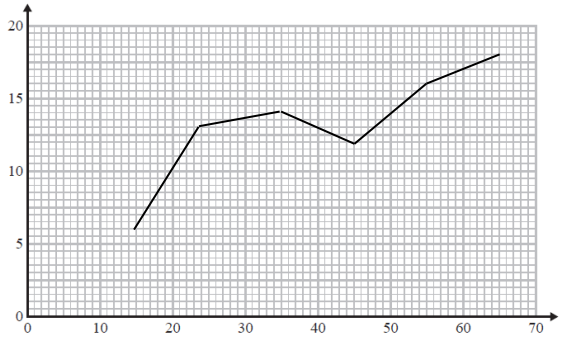
Question 2 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)(i)		B1	This mark is given for a line of best fit drawn on the scatter diagram
	490 minutes	B1	This mark is given for an answer in the range 480 – 500
(a)(ii)	Data is only a sample Line of best fit can vary Scale cannot be read exactly	C1	This mark is given for one of the possible reasons shown
(b)(i)		M1	This mark is given for a method to find the gradient of the line of best fit
	$\frac{5000-4050}{100} = 9.5$	A1	This mark is given for an answer in the range 9.4 – 9.8
(b)(ii)	Speed in miles per minute	C1	This mark is given for a correct interpretation of the line of best fit

Question 3 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		M1	This mark is given for drawing a suitable line of best fit
		A1	This mark is given for an answer in the range 30 to 40

Question 4 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$40 < h \leq 50$	B1	This mark is given for the correct answer only
(b)		B2	This mark is given for a correct polygon with points plotted at midpoints (B1 is given for one point incorrect)

Question 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	e.g. rain, school day, measurement error	C1	This mark is given for a correct reason for low attendance in hot weather
(b)	Positive	B1	This mark is given for the correct answer only
(c)		B1	This mark is given for answer in range 15 – 25
(d)	e.g. data out of range, number of children will be negative	C1	This mark is given for a correct explanation of why it would not be sensible to use the scatter graph

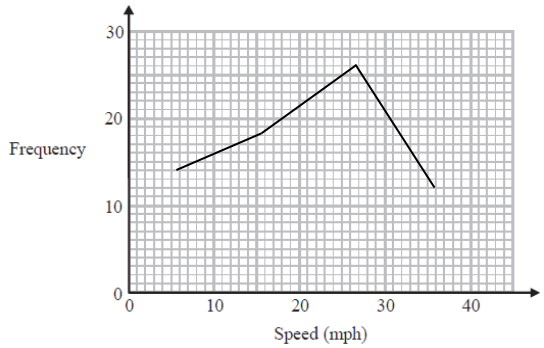
Question 6 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$20 < t \leq 30$	B1	This mark is given for a correct answer only
(b)	Points plotted at (5,10), (15,26), (25,23), (35,19), (45,14), (55,8) and joined with line segments	B2 (B1	This mark is given for correct plotting of 6 points and joining with line segments 1 mark is given for points plotted at midpoints of intervals **or** joining points with line segments at the correct heights and consistent within the class interval (including end values) **or** correct frequency polygon with one point incorrect **or** correct frequency polygon with first and last points joined))

Question 7 (Total 2 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	Points are joined with a curve, not with line segments	C1	This mark is given for a correct statement
	Points should be plotted at mid-points of the intervals, not end points	C1	This mark is given for a correct statement

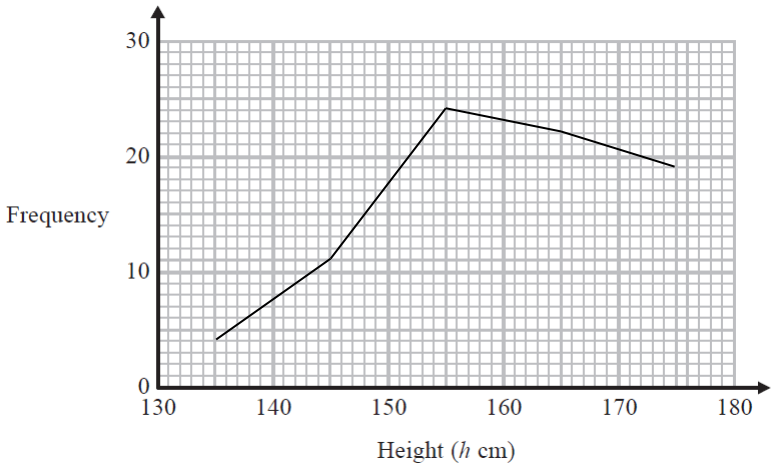
Question 8 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		B2	These marks are given for a correct frequency polygon with points plotted at (5, 14), (15, 18), (25, 26) and (35, 12) (B1 is given for a frequency polygon with one point incorrect or a frequency polygon with first and last points joined)

Question 9 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$2 \div 40 \times 100$	B1	This mark is given for reading 2 students from the 20 to 24 bar
	5	A1	This mark is given for a correct answer only
(b)	11, 8, 13, 6 and 2	M1	This mark is given for frequencies of 11, 8, 13, 6 and 2 used
	$11 \times 2 + 8 \times 7 + 13 \times 12 + 6 \times 17 + 2 \times 22$ $= 380$	M1	This mark is given for totalling frequencies multiplied by correct mid-interval terms 2, 7, 12, 17 and 22
	$\frac{380}{40}$	M1	This mark is for dividing by the number of students
	9.5	C1	This mark is given for a correct estimate supported by correct working

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$160 < h \leq 170$	1	This mark is given for the correct answer only
(b)		2	These marks are given for a fully correct frequency polygon with line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19) (1 mark is given if any points are incorrect)

Question 11 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	Negative	B1	This mark is given for the correct answer only
(b)	The point is far away from the line of best fit	C1	This mark is given for a correct explanation
(c)	Debbie's conclusion is unreliable because the point is outside the range of the scatter diagram	C1	This mark is given for a correct explanation

Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		M1	This mark is given for a single line segment with a positive gradient that could be used as a line of best fit or a horizontal line from 740 or a point plotted at (x, 740) where x is in the range 72 – 80
	72 – 80 (cm)	A1	This mark is given for an answer in range 72 – 80
	110 cm is outside of the range of the data, the line of best fit cannot be extended that far	B1	This mark is given for a correct explanation

Mark scheme for 1MA1 Higher themed papers: Statistical diagrams: Scatter Graphs and Frequency Polygons

Performance data:

Q	Taken from			Total Marks available	TOPIC	Spec Ref	AO	% Mean marks	Edexcel mean averages Marks of candidates who achieved grade:										
	Q	Series	Paper						ALL	9	8	7	6	5	4	3	2	1	U
1a	1a	June 2017	1H	1	Statistics	S4	2	98	0.98	0.99	0.99	0.99	0.98	0.98	0.96	0.92	-	-	0.80
1b	1b	June 2017	1H	1	Statistics	S6	1	96	0.96	0.99	0.99	0.99	0.98	0.96	0.93	0.84	-	-	0.68
1c	1c	June 2017	1H	2	Statistics	S6	2	96	1.91	1.96	1.95	1.93	1.91	1.90	1.86	1.77	-	-	1.57
1d	1d	June 2017	1H	1	Statistics	S6	2	93	0.93	0.94	0.94	0.94	0.94	0.93	0.91	0.86	-	-	0.79
2ai	1ai	Mock Set 3	2H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2aii	1aii	Mock Set 3	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2bi	1bi	Mock Set 3	2H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2bii	1bii	Mock Set 3	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	3	Nov 2019	3H	2	Statistics	S6	2	89	1.78	1.89	1.97	1.99	1.92	1.86	1.79	1.67	-	-	1.30
4a	3a	June 2019	3H	1	Statistics	S2	2	70	0.70	0.95	0.90	0.83	0.73	0.59	0.42	0.25	-	-	0.17
4b	3b	June 2019	3H	2	Statistics	S2	2	69	1.38	1.81	1.68	1.55	1.41	1.22	0.99	0.73	-	-	0.46
5a	3a	Mock Set 1	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b	3b	Mock Set 1	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5c	3c	Mock Set 1	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5d	3d	Mock Set 1	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	3a	Mock Set 4	3H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6b	3b	Mock Set 4	3H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	4	Mock Set 1	3H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	7	Nov 2018	3H	2	Statistics	S4	2	49	0.98	1.90	1.24	1.38	1.16	1.03	0.96	0.84	-	-	0.59
9a	4a	Nov 2018	3H	2	Ratio	R9	2	70	1.40	2.00	2.00	1.80	1.80	1.75	1.47	0.94	-	-	0.49
9b	4b	Nov 2018	3H	4	Statistics	S2, S4	2	33	1.30	4.00	3.76	2.74	2.16	1.51	1.12	0.61	-	-	0.39
10a	1a	Nov 2017	3H	1	Statistics	S2, S4	2	24	0.24	0.75	0.88	0.80	0.58	0.44	0.23	0.11			0.05
10b	1b	Nov 2017	3H	2	Statistics	S4	2	47	0.94	1.25	1.21	1.14	1.28	1.03	1.02	0.90			0.63

11a	1a	June 2018	3H	1	Statistics	S6	1	93	0.93	0.97	0.96	0.95	0.94	0.93	0.90	0.83	-	-	0.69
11b	1b	June 2018	3H	1	Statistics	S6	2	68	0.68	0.87	0.81	0.75	0.69	0.63	0.56	0.44	-	-	0.33
11c	1c	June 2018	3H	1	Statistics	S6	2	21	0.21	0.54	0.36	0.25	0.18	0.13	0.09	0.06	-	-	0.05
12a	10a	Mock Set 2	2H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12b	10b	Mock Set 2	2H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				42					**15.32**	**21.81**	**20.64**	**19.03**	**17.66**	**15.89**	**14.21**	**11.77**	**-**	**-**	**8.99**