Countdown to your final Maths exam ... part 1

Examiners Report & Markscheme

Examiner's Report

Q1.
A well understood question with almost all students scoring at least one mark and many scoring all three. A surprising number of students incorrectly used tallies in their response to this question.

Q2.
The most successful method used was to try to reach a common multiple either by writing down the multiples of 12 and 15 or to use factor trees. Many students simplified the ratio 12 : 15 to 4 : 5 and then wrote that 4 packs of blue paint and 5 packs of white paint were needed. This did not show any real understanding of what was required.

Q3.
The majority of candidates were able to answer (a) correctly. Occasionally (11.5, 73) was not plotted or on the wrong y coordinate, otherwise very well done.

In part (b) most candidates described a dynamic relationship correctly with a minority using the words 'positive correlation'. A few though talked in terms of the gradient of the line rather than interpreting the relationship in correlation terms. Additionally a few candidates stated negative correlation or some used the phrase 'hotter' instead of hours of sunshine.

In part (c), the majority of candidates gained 2 marks. Where a line of best fit was drawn, it rarely failed to be within limits and candidates were usually successful in finding a correct answer. A substantial number did not draw a line of best fit however even then, the majority of answers were within range. Errors were often made by misreading the y-axis, common to see 67 marked with 77 on the answer line. Insufficient candidates drew the line x=10 up to the 'line' and across.

Q4.
The majority of candidates were able to draw accurate ordered stem and leaf diagrams in part (a), however the omission of a key was widespread.

In part (b), very few actually showed any method for working out Jamal's mean score; it therefore had to be correct to be of use in any comparisons made. Further credit was given for either quoting Jamal's highest and lowest scores or for calculating ranges of scores. Many candidates tried to use median, quartiles and IQR but could gain no credit for this since Gill's actual scores were not given. It must be noted that, to gain full marks, candidates must describe their comparisons in the context of the question. For example, just to say that Gill's mean was greater than Jamal's mean was not enough; mean **scores** were required. Some pupils made comparisons with no data behind them. Sometimes, statements such as 'Gill's highest was … whereas Jamal's highest was …' without actually making a comparison were seen. These gained no credit.

Q5.
This question was answered well. Well over a half of all candidates successfully expressed 48 as a product of its prime factors with candidates often giving the answer in the form $2^4 \times 3$. The most widely used and most successful method used by candidates was to construct a factor tree. The 20% of candidates who were awarded 1 mark included those who expressed their answer as a list "2, 2, 2, 2, 3" or a sum "2 + 2 + 2 + 2 + 3" together with those candidates who had not obtained a complete solution.

Some candidates listed pairs of factors of 48 but got no further. Part (b) of the question was also answered well. Nearly three quarters of candidates gave the correct time. Most candidates either listed multiples of 16 and 20 or drew up two timetables. Arithmetic errors were commonplace. Some candidates attempted to express 16 and 20 as a product of their prime factors but often did not know how to progress from there.

Q6.
This question attracted many good answers. Working seen in answers to this question on the technique of trial and improvement was generally accurate. Most students scored at least 3 marks and often all 4 marks for their answers. A high proportion of students evaluated the expression with $x = 2.65$ but failed to use their value correctly to determine an answer correct to one decimal place. They often gave an answer of 2.7 rather than 2.6. A significant number of students did not attempt to round their answer to one decimal place and wrote 2.65 on the answer line.

Q7.
Many candidates were able to give lucid answers to part (a). A common explanation was to note that there was no opportunity for the response 'never'. Others had been well coached to give the answer 'no time frame'. Many also pointed out that the response boxes were too vague or equivalently should have had some numerical values attached.

Part (b) was generally well done with many candidates specifying a time period, either in the question or in the labelling of the response boxes. The theme was about frequency of use, rather than duration of use, but some candidates did not pick this up and were clearly asking a question about length of time.

Responses to part (c) were a little less clear. Good answers explained why the manager's sample was unsatisfactory. For example, taking a sample at the sports centre biased it towards people already interested in sport; taking it on a Tuesday morning would bias it against those in full-time work. Many candidates stated correctly that the sample was too small, but those who said that the sample did not have a wide enough range of views or could all be males (or cyclists) were not awarded a mark. Responses that just said the manager's sample was biased did not score unless there was further explanation.

Q8.
 The mode was not understood by many, with an almost random array of answers from any of those shown either as a frequency or as the number of badges. In contrast in part (b) there were many attempts to calculate fx from the table. Unfortunately many solutions were spoilt when the divisor used was either 6 or 15, rather than the correct 25. It was disappointing to find Higher level candidates who thought that 0×2 was 2.

In part (c) there were very few correct answers. Although some realised they had to find the total number of older girls by calculating 15×4.4, even these failed to realise what to do with the result of this calculation.

Q9.
Candidates generally earned either no marks or four marks for part (a). The response gaining no marks was generally $\Sigma f \div 5 = 18$.

For the remaining parts (b, c and d), many candidates responded well to the teaching they had received on cumulative frequencies and were able to obtain most of the remaining six marks.

For part (c), some candidates plotted their cumulative frequencies at the mid-points of the intervals, but were still able to get most of the remaining marks if they used correct methods. Conversely, there were some candidates who plotted points correctly but then drew a 'line of best fit' through them.

For part (d)(i), a few candidates thought that the median corresponded to the 50th, rather than 45th value. Many candidates lost marks on part (d)(ii) by failing to subtract from 90 the value they had read off their cumulative frequency diagram.

Q10.
The essence of this question was the need to make comparisons of two distributions. The number of marks awarded was dependent on the quality of the answer. Candidates needed to realise that the graphs did not provide information about the actual heights, but rather a distribution, and therefore used of median, range, IQR, etc. were most appropriate. Candidates who worked out and listed these values without any comparison gained no marks. The better quality responses not only worked these out, stated which was more (or less) than the other, but was also phrased within the context of the question and made reference to heights of children.

Q11.
In part (a), candidates appeared to find this question challenging. Some scripts were blank and many had the answer of 12 but it clearly came from incorrect working usually, the calculation 47 – 35 (greatest time – upper quartile), and so scored no marks.
Some candidates calculated 75% of 48 to give 36 but then failed to subtract this from 48.

The majority of candidates attempted the box plot and usually scored full marks for part (b). The most common error was plotting 48 not 47 or omitting the median.

In part (c) many candidates concluded that journey times were longer on Tuesday than they were on Monday or that the median time was higher. However comparison of range or interquartile range was less common. Unfortunately many just listed times for Monday and times for Tuesday without making any comparison. One mark was often awarded for a correct comparison and the second mark not awarded as no context was offered for these comparisons.

Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
	<table><tr><td></td><td>A</td><td>D</td><td>M</td><td>T</td></tr><tr><td>G</td><td>8</td><td>9</td><td>13</td><td>30</td></tr><tr><td>B</td><td>0</td><td>9</td><td>2</td><td>11</td></tr><tr><td>T</td><td>8</td><td>18</td><td>15</td><td>41</td></tr></table>	Correct Table	3	B3 for fully correct table (B2 for at least 7 of their entries correct) (B1 for at least 4 of their entries correct)

Q2.

PAPER: 5MB2H_01

Question	Working	Answer	Mark	Notes
		blue paint 5 white paint 4	5	M1 attempts multiples of either 12 or 15 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 12 and 15 (at least 3 but condone errors if intention is clear) M1 (dep on M1) for a division of 60 by 12 or 15, or counts up "multiples" or answer blue : white in the ratio 5 : 4 A1 blue paint 5; white paint 4 OR M1 correct expansion of either number into factors M1 correct expansion of both number into factors M1 (dep on M1) demonstrates two expansions that include 3 oe A1 blue paint 5; white paint 4

Q3.

Question	Working	Answer	Mark	Notes
(a)		Point at (11.5, 73)	1	B1 Point plotted ±½ small square
(b)			1	B1 for description of dynamic relationship eg "the more hours of sunshine, the more ice creams sold" or positive correlation]Note: 'sunnier' implies 'more hours of sunshine']
(c)		62 - 70	2	B2 for answer in the range 62-70 OR M1 for a single straight line of best fit with positive gradient, passing between (6.5, 45), (6.5, 59) and (12, 70), (12, 80) or a vertical line drawn from 10 A1 for answer in range 62-70 or ft from single straight "line of best fit" with positive gradient

Q4.

Question		Working	Answer	Mark	Notes
(a)			5 | 9 6 | 3 5 6 6 7 | 1 2 5 5 6 7 9 9 8 | 3 9 Key: eg, 7/2 represents 72	3	M1 for at least 2 correct 'rows' with correct stem and correct ordered or unordered leaf Note: stem could be 5,6,7,8 or 50,60,70,80 A1 for a fully correct ordered stem and leaf diagram B1 for a key [Ignore spacing on leaves provided the order is` correct]
(*b)		Gill | Jamal HV 95 > | HV 89 LV 75 > | LV 59 Mean 80 > | Mean 73 Range 20 < | Range 30	Comparison	5	M1 for '72+59+76+...'÷15 or 1095 ÷ 15 (= 73) M1 for 95 – 75 (=20**) or** '89' – '59' (= 30) or '89' and '59' seen ft from their stem and leaf diagram in (a) A1 for mean of Jamal's scores is 73 cao or for ranges of 20 and 30 cao C1 (dep on first M1) ft for a correct comparison of mean scores, e.g. Gill's mean score > Jamal's mean score oe C1 ft for a correct comparison of ranges, (dep on M1 awarded for correct method to find range) e.g. The range of Gill's scores < The range of Jamal's scores **or** a correct comparison of both end values (dep on M1 awarded for '89' and '59' seen) , e.g. Gill's lowest score > Jamal's lowest score and Gill's highest score > Jamal's highest score. oe [For the award of C2, the word 'score' must be explicitly stated. If not deduct 1 mark]

Q5.

Question	Working	Answer	Mark	Notes
(a)	48 =2 × 24 = 2 × 2 × 12 = 2 × 2 × 2 × 6 =2 × 2 × 2× 2 × 3 **OR** Use of factor trees	2 × 2 × 2 × 2 × 3	2	M1 for a systematic method that isolates 2 correct prime numbers correct divisions by a prime number **OR** an equivalent factor tree A1 for 2 × 2 × 2 × 2 × 3 or 2^4 × 3
(b)	Exeter coach after 20, 40, 60, 80, 100... Plymouth coach after 16, 32, 48, 64, 80, 96, ... **OR** Timetable schedule for the coaches Exeter coach at 8.00, 8.20, 8.40, 9.00, 9.20... Plymouth coach at 8.00, 8.16, 8.32, 8.48, 9.04, 9.20... **OR** LCM of 16 and 20 is 80	9:20(am)	3	M1 for attempt to list multiples of 16 and 20 (at least first 3 of each, condone 1 addition error) M1(dep) for identifying their LCM A1 9:20 am (accept 9:20) **OR** M1 for attempt to draw up a timetable showing when the coaches will run (at least 3 extra times for each, condone 1 addition error) M1(dep) for identifying the first time common to both timetables A1 9:20 oe (do not accept 9:20pm) **OR** M1 attempt to find the LCM M1 for 2 × 2 × 2 × 2 × 5 oe seen A1 9:20 oe (do not accept 9:20pm)

Q6.

PAPER: 5MB3H_01

Question		Working		Answer	Mark	Notes
	2	62		2.6	4	B2 for a correct trial $2.6 \leq x \leq 2.7$ evaluated
	2.1	65(.961)				(B1 for a correct trial $2 \leq x \leq 3$ evaluated)
	2.2	70(.048)				B1 for a different correct trial $2.6 < x < 2.7$ evaluated
	2.3	74(.267)				
	2.4	78(.624)				B1 (dep on at least one previous B1) for 2.6
	2.5	83(.125)				
	2.6	87(.776)				
	2.7	92(.583)				
	2.8	97(.552)				Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1 dp (rounded or truncated) if the value of x is to 2 dp
	2.9	102.689				
	3	108				
	2.61	88.2(49...)				
	2.62	88.7(24...)				
	2.63	89.2(01...)				
	2.64	89.6(79...)				
	2.65	90.1(59...)				NB: no working scores no marks even if answer is correct
	2.66	90.6(41...)				
	2.67	91.1(24...)				
	2.68	91.6(08...)				
	2.69	92.0(95...)				

Q7.

		Working	Answer	Mark	Notes
	(a)		Two different reasons	2	B2 for TWO aspects from No time frame given Non-exhaustive responses Responses not specific (B1 ONE correct aspect)
	(b)		Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (nonoverlapping, need not be exhaustive) OR for a set of response boxes that are exhaustive (could be overlapping)
	(c)		Two different reasons	2	[Do not allow inequalities in response boxes] B2 for TWO different aspects (B1 for ONE aspect) Too small a sample, time of day, specific day, place, same type of people, not random

Q8.

Question	Working	Answer	Mark	Notes
(a)		1	1	B1 cao
(b)		2.4	3	M1 for Σ(number of books × frequency) (=60) M1 for "60" ÷ "25" A1 cao SC B2 for an answer of 2.48
(c)		3.15	3	M1 for 15 × 4.4 (=66) M1 for a complete method eg ("60" + "66") ÷ (15 + "25") A1 cao

Q9.

		Working	Answer	Mark	Notes
	(a)	20×12 + 30×27+40×18 + 50× 23+60×10 3520 ÷ 90	39(.11111)	4	M1 for finding at least 4 products *fx* consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints M1 for Σ*fx* ÷ 90 A1 39.(1...)
	(b)		12,39,57,80,90	1	
	(c)			2	B1 cao
	(d)(i)		36-39	3	B1 for at least 4 of "5 points" plotted correctly ± 0.5 full square B1 (dep) for points joined by curve or line segments providing no gradient is negative. (SC: B1 if 4 or 5 points plotted not at end but consistent within each interval and joined) B1 answer within the range 36-39 or ft cf graph
	(ii)		19-23		B2 answer within 19-23 Or M1 for reading off from 50 on a cf graph A1 ft (± 0.5 square)

Q10.

5MB1H_01				
Question	Working	Answer	Mark	Notes
		two comparisons	2	B1 for one correct complex comparison which summaries the data, with supporting correct numerical values B1 for a different correct complex comparison which summarises the data, with supporting correct numerical values and given in context

Q11.

Question	Working	Answer	Mark	Notes
(a)	48 ÷ 4	12	2	M1 48 ÷ 4 or 49 ÷ 4 or 48 − 36 A1 for 12
(b)		Box plot drawn	2	B2 fully correct box plot (B1 for the box plot drawn with one plotting error)
(c)		On Tuesday: Median higher (IQ) Range higher.	2	B1 for median higher on Tuesday or journeys took longer on Tuesday B1 for (IQ) range higher on Tuesday or more variation in journey length on Tuesday. (NB: For B2 at least one comparison must be in context)