Countdown to your final Maths exam … part 8 (2018)

Examiners Report & Markscheme

Mark Scheme

Q1.

5MB1H/01 June 2015				
Question	Working	Answer	Mark	Notes
(a)		Description	1	B1 description eg Taller trees are older. Accept positive correlation.
(b)		20	1	B1 19 – 21
(c)		2	2	M1 for evidence of taking readings at two points from Sandy line, or increase excluding start eg 24÷10, 14÷5 A1 for answer 1.8 to 2.2
(d)		Comparison	2	B2 for a complete explanation e.g. Trees grow at approximately twice the rate on sandy soil (B1 for a partial explanation e.g. Trees grow faster on sandy soil)

Q2.

5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)	eg 60/30 =	2	2	M1 for method shown to work out the gradient for train A eg right-angled triangle drawn, 60÷30, etc. A1 cao Ignore units. SC B1 $y=2x+k$
	(b)	40÷30=1.3(3…..)	Train A and explanation	1	B1 Train A and slope is greater oe or accept a calculated speed, or distances for consistent time period or times for consistent distance
	(c)		15	1	B1 cao

Q3.

Question		Working	Answer	Mark	Notes
	(a)	9×6	54	2	M1 for a method to find the speed e.g 9 ÷ 10, 9 ÷ 0.16 A1 cao
	(b)		Graph completed	3	B1 horizontal line from (30,21) to (45,21) M1 for a complete method to show the return journey is 30 mins or ½ hour evidenced by the line on the graph or by calculation A1 Correct line drawn from Luscoe (x,21) to (x + 30,0)

Q4.

Question		Working	Answer	Mark	Notes
		25 + 2 × 40	105	3	M2 for a complete method that uses both rates (M1 for method to find cost of first 100 units or £25 seen or £10 per 100 units for 2nd rate or for complete method to find the cost of 800 extra units) A1 cao

Q5.

5MB2H/01 June 2015				
Question	Working	Answer	Mark	Notes
	−2 −1 0 1 2 3 7 5 3 1 −1 −3	Correct graph	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between $x = -2$ and $x = 3$ **(Use of $y = mx + c$)** M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of −2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$

Q6.

Question		Working	Answer	Mark	Notes
		Lisa = 4½ miles in 30 min = 9 mph Martin = 16 × 5 ÷ 8 = 10 mph Or Lisa = 9 × 8 ÷ 5 = 14.4 km/h Martin = 16 km/h Or For 5miles Lisa took 33 minutes 10 miles is 66 minutes Martin = 16 × 5 ÷ 8 = 10 miles in 1 hour Or Martin 16 km/h = 10 mph = 5 miles in 30 minutes Draw travel graph for Martin Martin's graph steeper (or Lisa = 4.5 miles in 30 minutes)	Martin faster + calculation or graph	4	M1 for Lisa's speed or distance × 8 ÷ 5 or Martin's 16 × 5 ÷ 8 A1 for one correct conversion from metric to imperial or imperial to metric for their speed or distance (units should be seen) M1 for using the same time period or same distance C1 (dep on M2) concluding statement + both answers correct with units OR M1 for plotting (30, 5) on the graph A1 for a correct line to show Martin's speed M1 for converting 16 km/h to 10 mph oe C1(dep on M2) for concluding statement fully supported by working ie Martin is faster because his graph is steeper oe

Q7.

		Working	Answer	Mark	Notes
			A and $y = x^2+4$ B and $y = x^3$ C and $y = 2^x$	3	B3 for all correct (B2 for 2 correct) (B1 for 1 correct)

Q8.

Question		Working	Answer	Mark	Notes
	(a)		positive	1	B1 Accept with 'positive' valid extra words eg strong positive
	(b)		46 – 54	2	B2 46 – 54 Or M1 for a single line segment with positive gradient that could be used as a line of best fit or a vertical line from 44 A1 for given answer in the range 46 – 54

Q9.

Question	Working	Answer	Mark	Notes
(a)		1, 5	1	B1 cao
(b)		Point D marked	1	B1 cao

Q10.

Paper_ 5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)		14	1	B1 cao
	(b)		1.20	2	M1 for attempt to find the gradient oe of the line eg drawing a right angled triangle with base & height shown, or $\frac{y_2 - y_1}{x_2 - x_1}$, values shown A1 for 1.20 (accept 1.2)

Q11.

5MB2H_01 November 2015					
Question		Working	Answer	Mark	Notes
			$y = \frac{3}{2}x - \frac{5}{2}$	4	M1 for attempt to find gradient of AB M1 (dep) for attempt to find gradient of perpendicular line eg use of $-\frac{1}{m}$ M1 for substituting $x = 3, y = 2$ into $y =$ "m" $x + c$ A1 for complete correct equation $y = \frac{3}{2}x - \frac{5}{2}$ oe

Q12.

PAPER: 1MA0 1H				
Question	Working	Answer	Mark	Notes
(a)		(3, 6.5)	2	M1 for a method to find either the x coordinate or the y coordinate of the midpoint or $x = 3$ or $y = 6.5$ oe A1 cao [SC: B1 for (6.5, 3)]
*(b)		No and correct working	3	M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1(dep) for a method to work out the gradient between another pair of points which can be used for comparison; one gradient must be through D. C1 for "no" and a correct explanation based on two correct gradients OR M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1 (dep) for using their gradient to work out an equation of a straight line in the form $y = mx + c$ and substituting in an appropriate point C1 for "no" and a correct explanation based on correct working OR M2 for (100, 55) or (102, 56) C1 for "no" and a correct explanation based on correct coordinates.

Q13.

PAPER: 1MA0/2F				
Question	Working	Answer	Mark	Notes
(a)		10, 8, (6), 4, 2, (0)	2	B2 for fully correct table (B1 for 2 or 3 entries correct)
(b)		line drawn	2	B2 for correct straight line between $x = -1$ and $x = 4$ (B1 for a single straight line which passes through (0, 8) or for a single straight line with negative gradient –2 or for at least 5 points from their table plotted correctly)

Q14.

Question	Working	Answer	Mark	Notes
(a)	(–2,7), (–1,1), (0,–1), (1,1), (2,7)	1, –1, 7	2	B2 all 3 correct (B1 for 1 or 2 correct) OR M1 for attempt to plot x^2 M1 for attempt to draw x^2
(b)		Curve drawn	2	M1 at least 4 points plotted from their table, all points ±1 small square A1 cao for correct curve drawn OR M1 for curve $2x^2$ seen, or parabolic curve drawn through (0,–1) A1 cao for correct curve drawn
(c)		0.6 to 0.8 –0.6 to –0.8	2	M1 for identification of intersection of their curve with x axis, or one solution stated. A1 for both solutions. Accept solutions as 0.6 to 0.8 or –0.6 to –0.8 OR ft from any drawn curve crossing the x-axis (±½ square)

Q15.

PAPER: 1MA0_2F					
Question		Working	Answer	Mark	Notes
			Graph completed	2	B1 for line from (2.5, 45) to (3.5, 45) B1 ft line of correct gradient to axis (after 1½ hour)

Q16.

Question		Working	Answer	Mark	Notes
	(a)		0.27	2	M1 for method to work out the gradient for train A A1 for 0.26 – 0.28
	*(b)		Comparison	1	C1 for speed of train B is constant, speed of train A is increasing. oe

Examiner's Report

Q1. There were some accurate descriptions in part (a). Although "positive correlation" was accepted, most preferred to give the relationship in words, though not all of these gave a description of the dynamic relationship between the two variables.
Part (b) was also well answered, though a significant minority lost the marks when they used the line for sandy soil rather than clay soil.

In part (c) candidates needed to work out the gradient of the line for sandy soil. They did so in a variety of ways, the most prevalent to take two readings and divide to find the increase over one year. Some candidates though they could do this by taking one reading and dividing by the time, which would have worked but the fact that the line did not start at the origin. Again some candidates lost the marks by using the wrong line. In part (d) nearly all candidates gained some credit for their comparative statements, but the best answers provided some additional evidence for their comparisons, usually quoting the rates of increase, or directly comparing them, for example finding one was double the other. These quality statements gained the full 2 marks.

Q2. In part (a), many pupils were able to give the correct gradient for this question. However there are still some candidates who do not know which way round to divide and obtained an answer of $^1/_2$ instead of 2. Many responses contained a right angled triangle drawn on the line. However some who had drawn a right angled triangle on the line scored a method mark but lost the accuracy mark because they made the assumption that for both axes a scale of 1cm = 1 unit was used.

In part (b), nearly all candidates gave the correct answer of 'Train A' but there were a variety of reasons of which some were right and some were wrong. The right answers mainly came from those who compared the distances travelled in the same time. Some said that the gradient was steeper and a few attempted to calculate the speeds and compare those. Among the wrong answers were Train A went further but omitted to mention that it was in the same space of time or wrong speeds being compared. Literacy skills were an issue for some candidates in this part of the question.

Q3. The first part of the question involved abstracting some information from the given travel graph and then using it to calculate the speed. Most students saw that the distance was 9 (km) but then wrote that down on the answer line. A sizeable number used the 9 (km) and the 10 (minutes) to work out a correct value of the speed as 0.9 (km/minute) but did not go on to convert this to km/hour as they thought they had found the answer. A few used the 9 and the 10 to find 10 ÷ 9 = 1.1. Some did have a better understanding that speed can be thought of as how far you go in a unit time so were able to scale up from 9 km in 10 minutes to 6 × 9 = 54 km in one hour. The second part of the question was not well answered as most students did not appreciate the implication of the 21 km. Most students were able to draw the 15 minutes at the rest part of the journey but then went astray on the sloping part. Often they joined (45, 21) to (70, 0). It is tempting to think that some of these students thought the time of return was the same as the time of approach without the stop. Another common error was to join to (80, 0). A few students had the last part of the journey still pointing upwards on the grid, so moving away from home.
Q4. The fact there were two different rates was lost on many candidates. Sometimes the first 100 units was shown at £25 but the problem for most was in deciding what to do with the remaining units. These were either costs at the rate of £25, or some multiple of amounts which included the £25 from reading off values from the graph. Some build up methods failed to include the first rare (such as adding readings of 300 and 600 taken from the graph). A very successful approach was to list the cumulative amounts from 100, 200, 300, 400, etc. units, setting up a series that eventually led to the correct answer.
Q5. This was a standard straight line question. The majority of candidates drew up their own table to record values. The most common error was to miscalculate with the negative value of x. A few candidates were unable to address the question in any real sense because they could not evaluate the expression 3 −2x correctly. For example, when x = 3, y was evaluated as 3 −2 (×) 3 = 1 × 3 = 3
Q6. This proved to be a challenging question. However, candidates were resourceful in their methods. These included every means of comparison possible, many of which were correctly executed. The most common was Lisa – 9mph from the graph and Martin – 10mph converted from the 16kmph. The majority who gained marks for conversion did so using Martin's information and only a few candidates obtained it for Lisa – 14.4 kmph. There seems to be a wider knowledge of 5 miles = 8 km and 1 mile=1.6 km than in previous years although some candidates did not know what to do with it. Where calculations were faulty candidates often got a mark for using the same units of time or distance. Some missed the obvious conversions and opted for calculations that were far more taxing arithmetically. Division caused a problem with many writing speed and time calculations upside down, misusing the triangle they had memorised.
A few candidates used the diagram to draw a line for Martin, usually correctly; however, most did not mention the line being steeper in their final statement hence a full method was not seen. Too many candidates only wrote m for units which could have meant miles or minutes or even metres. Some candidates did not write a concluding statement; just a name or a squiggle and this cannot be classified as good communication.
The majority of candidates did score at least part marks on this question.
Q7. This question was not well answered. The majority of candidates had little idea of the general shapes of the curves detailed in the specification. Curve **A**, $y = x^2 + 4$, was the most successful match. Some candidates did not seem to recognise the equation of the exponential curve and wrote $y = 2x$ instead of $y = 2^x$. Commonly, there were attempts to plot graphs of the given equations, but this approach was not generally successful.

Q8. Part (a) was generally well answered.

There were problems for candidates with part (b) because the scale on the Judge A axis went up in 2s so many looked above 48 rather than 44. The practice of looking at the two values nearest the gap and halving the two values was seen more often.

This usually leads to an acceptable answer. Here it led to (42 + 56) ÷ 2 giving 49. However, many candidates could not read the judge B scale correctly as it went up in 2s also. In many cases answers were given just outside the accepted tolerance but were awarded no marks as there was no supporting work on the scatter diagram.

Q9. Most students got part (a) correct with the main incorrect response being (5, 1).

Part (b) was well answered. The most common incorrect responses were plotting at (2, 6) or (4, 6) or (0, 2) or (0,3) or (0,4). Those students who did not gain a mark often forgot about it being a rectangle or did not know that the vertices *ABCD* had to go in order around a shape.

Q10. Perhaps surprisingly, it is disappointing to report that many students were unable to identify what they needed to do in this question, particularly in part (b). Those students who did realise that they needed to divide cost by number of cubic metres of water often took the readings from one point and divided the y coordinate by the x coordinate rather than the increase in cost divided by the increase in volume, that is they failed to find the gradient of the line. Methods were often not made clear and relatively few students showed a triangle drawn on the line to help them work out the gradient. Where students did draw triangles and use an appropriate method for finding the gradient, they often did not interpret the scales on the axes correctly and so obtained an incorrect answer. Thus relatively few students were awarded 1 mark for a correct method (but an incorrect answer). Some students answered part (b) in the working space for part (a).

Q11. Most students got as far as finding the coordinates of *M* but no further. This did not score any marks. It was evident that students struggled with finding the equation. Few of those students that attempted to find the gradient of *AB* recognised that the gradient should be negative and even fewer students knew how to find the equation once they had found the gradient.

Q12. In part (a), many students scored at least one mark for one correct coordinate of the midpoint. Those clearly showing the mean of each coordinate usually gained full marks whilst students who tried to use diagrams often found the correct x-coordinate only. Other common errors included an answer of (6, 13) or subtracting the relevant co-ordinates instead of adding them before dividing by 2. In part (b), very few students were able to gain any credit. Many tried unsuccessfully to use sequences, often assuming proportionality from one of the points and many tried to use gradients or derive equations of straight lines with moderate success. A significant number of students used multiples of the midpoints thinking this would produce points on the line. Often, one mark only was awarded usually for students correctly finding the gradient of AB but unable to go any further. Reciprocals of gradients were often found.

Q13. Many scored full marks for their table, with the value for $x = -1$ proving the most challenging. The biggest loss of marks in part (b) was for those students who correctly plotted the points, but then failed to join them to give the line. Some who drew a correct line by ignoring some incorrect points then failed to go back to the table to correct them.

Q14. Many values were given correctly in part (a). The most common error was in giving and answer of 3 or -3 for x=-1. Plotting points was quite well done in part (b); nearly all candidates realised that a curve was needed to join the points. Not all candidates knew how to answer part (c). Common errors included reading from the line y=1 or giving the solutions as coordinates rather than values. Few candidates marked the intersection with their curve to show where they were attempting to read off the values. Reading accurately was spoilt sometimes by poorly drawn curves.

Q15. Travel graphs are usually well understood and this was the case here as far as the horizontal line was concerned but drawing a slant line of the correct gradient proved too difficult for most candidates.

Q16. Students found this question challenging.

In part (a) a large number of students used change in x over change in y, possibly as this gave an answer greater than 1. Others failed to use a large enough triangle to gain an accurate answer.

In part (b) many wrote down a correct answer but some discussed the relative speed of the trains and gave incorrect statements. There were a significant number who discussed the correlation of the speed, thus misunderstanding the question entirely.