

# COUNTDOWN TO YOUR FINAL MATHS EXAM ... PART 7 (2017)

## EXAMINERS REPORT & MARKSCHEME

## Examiner's Report

### **Q1.**

In part (a) candidates adopted two approaches. Some added up the times, and then attempted a subtraction from 08 50, but  $08\ 50 - 100$  required some conversion of minutes into hours and minutes, which some found too difficult. The second method was to start with 08 50 and successively subtract each of the four times, which was far better done. Parts (b) and (c) were well answered. In part (d) two lines needed to be drawn. Most realised that a horizontal section was needed, but of these many terminated the line before 13 50. The majority inserted the correct sloping line, with only a minority drawing a line of incorrect gradient, or of positive gradient (disappearing off the top of the graph).

### **Q2.**

The vast majority of candidates gave the correct answers for parts (a) and (b).

Part (c) was also well done. Common errors included using six squares rather than five squares for the horizontal line and showing the wrong amount of time for the journey home. A few continued away from home while others went back in time to (2pm, 0). Nevertheless, it was pleasing to see that a large majority used a ruler to draw the lines.

### **Q3.**

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.

### **Q4.**

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.

### **Q5.**

The bill in part (a) was generally well completed - although occasionally the '12' as the number of light bulbs was omitted. A few candidates worked out the total price of the light switches by dividing by 5 instead of multiplying.

Similarly, many candidates got the correct answer to part (b), although there was the odd error of adding £64.83 instead of subtracting it. Some candidates thought they had to find 2.56% interest and then add it on.

### **Q6.**

Essential to gaining any marks in this question was some understanding of staged charges: a first charge added to a charge per unit, sometimes referred to as a standing charge per unit cost. Preparation for this type of question is important, and those students who were familiar with this charging structure gained many, if not all of the marks in this question. It was most common to find students stating the charge correctly for Quick Mix. For Speedy Hire some worked out  $7.20 \times 4$  (instead of  $\times 5$ ) though usually included the delivery cost. As long as there was some sensible working out shown, examiners could give credit for a sound conclusion based on their working, but a random guess without support gained no marks.

### **Q7.**

The majority of candidates could make some progress with this question and were generally unfazed by the context with its mixture of varying and fixed sponsorship amounts. The forms were used to show working but a few arithmetic errors particularly with  $2 \times 18$  or finding totals were seen. Some failed to give a final conclusion or thought that both Jamie and Lily were each aiming to raise £108 rather than combine their totals raised.

### **Q8.**

(Parts (a) and (b) of this question were attempted very well by students, and most gained both marks, though they were slightly less successful than in part (a). Most errors were down to not reading the scale accurately enough or converting 35km to miles.

Part (c) was also well attempted and it was rare to see blank responses but students were considerably less successful than in parts (a) and (b). Many students, instead of using their answers in parts (a) or (b), chose to start again using 5 miles=8km which did lead to fully correct responses for some, but others chose to use a new inaccurate conversion

facts from the graph or were using an incorrect conversion fact, consequently they rarely went on to achieve any marks. The weakest of the students failed to realise that the units were not consistent throughout the question.

#### **Q9.**

Part (a) of this question was well attempted with most candidates writing in 4 values, however, their values were often incorrect. The zero value caused the most problems with a common incorrect response being €0.20. €35 was another common incorrect response for £30.

Part (b) was the least successful part of this question. Although many candidates did score B2 for a fully correct line, the scale of two 2mm squares to 1 unit caused problems for many others. Having incorrect values in part (a) also prevented students achieving B2 but they did, in some cases, achieve B1 for plotting their points. A few candidates, whether they had responses in part (a) or not left part (b) blank.

Despite problems in part (b) some candidates still went on to gain M1A1 in part (c) realising that they could use £25 = €30, or any other given value, from the table though often correct answers of 300 were not supported by any working out. Several candidates gained M1 for  $1.20 \times 250$  but did not arrive at 300 for the correct answer.

#### **Q10.**

Scaling was an issue for some students throughout this question, indicated by incorrect answers of 28 or 29 in part (a). Various strategies were used in part (b), with many arriving at 220 pounds to enable them to give a correct conclusion. A common misconception was that pounds was equivalent to £s. Candidate who chose very small amounts to convert lost the accuracy in their answer. Attempts to extend the graph were unsuccessful since this also led to inaccuracy.

#### **Q11.**

Just under half of students used the conversion graph correctly in part (a) with the most common incorrect answer coming from a scale misreading to give 4.9. Successful students often showed markings between 0 and 5 along the °C axis, some went as far as to number their marks. In part (b) again about half of students had some success reading the graph but relatively few followed this with an appropriate comparison to describe the relative temperatures. For this starred question, it was essential for the final comparative statement to not only include correct and consistent units but also make a reference equivalent to the fact that Dave's freezer was warmer than the recommended temperature.

#### **Q12.**

No Examiner's Report available for this question

#### **Q13.**

This question was not done well. Many students were unable to use the graph accurately to change to the measurements to consistent units. A typical incorrect conversion using the graph was  $2 \text{ m} = 8$  (or even 5.3) feet. Often students had used changed units without stating how they had obtained them. Students should be advised to take more care when interpreting the scales of axes in graphs. A significant number of students did not use the graph to change the units but simply quoted a conversion factor- often inaccurately, e.g.  $1 \text{ m} = 3$  feet. Many students did not include the units with their final answer. Students should be advised to give the units with their final answer. Common incorrect answers include  $360 - 50 = 310$  and calculation errors such as  $360 - 165 = 295$ .

#### **Q14.**

This was a well answered question. Some weaker students failed to recognise that the Doll required a sale price and instead gave the answer as £1.50.

#### **Q15**

About a third of candidates scored full marks for completing the invoice correctly and another third made just one error. Calculation of the labour charge caused most difficulties with some leaving it as £18 for 1 hour or doubling to £36 rather than finding the correct cost for  $1\frac{1}{2}$  hours. Many students took advantage of the space given below the question to do their working and when their 4 figures were set out in columns to do the final addition they stood a better chance of gaining a follow through mark even if there were other inaccuracies.

#### **Q16.**

This bill-type question was well understood. Almost all candidates were able to gain at least two marks usually for the number of balls of wool or the follow-through on the total cost.

#### **Q17.**

Many candidates taking this paper found this question to be straightforward and they often scored full marks. Lines almost always extended over the full range of values for  $x$ . However a significant proportion of candidates made errors when substituting negative values into the equation, when evaluating  $\frac{1}{2}x$  or when using the vertical scale on the grid, for example plotting (1, 5.25) instead of (1, 5.5). Candidates who drew a graph which was not linear often failed to score any marks because they did not show a clear method.

**Q18.**

Part (a) was well answered with the vast majority of candidates gaining full marks. and only 4% failing to gain a mark.

Part (b) was answered well with the majority of candidates scoring 2 marks for drawing the correct line. Those who had errors in (a) generally scored 1 mark for plotting their points correctly.

Part (c), many candidates did not attempt to draw a perpendicular line. Of those who did, the most common incorrect response was to draw a reflection in the y axis of their line. Candidates had varying success in finding the equation of the perpendicular line. Some were able to use the fact that the gradients of the two lines had to multiply together to give -1 in order to work out the gradient of the perpendicular and so were able to use this to find the correct equation even if their perpendicular line was non-existent or incorrect. Others found the gradient of their 'perpendicular' line from their diagram and then used this together with the y-intercept to give the equation for their line thus gaining the follow through marks.

**Q19.**

Very few candidates correctly drew the equations of the given lines in parts (a) and (b). The best of the 'near misses' was to draw the graph of  $y = 3$  in part (a) and  $y = -x$  in part (b). Some candidates did not seem to understand that they needed to draw a line, as asked for in the question, rather than just plot a point.

In part (c), only a very few candidates showed any understanding of gradient. Many simply gave the coordinates of the intercepts on the coordinate axes, or just quoted  $\pm 2$  and 3 without any real relevance. Many candidates just gave the coordinates (2, 3) or drew a right-angled triangle on the graph but failed to label each side with the correct length or go any further to calculate the gradient. Some specified the correct equation of the line with 1.5 as gradient but lost a mark for not specifying separately the actual gradient on the answer line.

**Q20.**

Drawing and labelling a set of axes correctly was the main initial fault here, costing very many students the first mark. Axes needed to be correctly labelled x and y and linear scales including the origin. A number of L-shaped axes were seen, labelling as if in one quadrant from an "origin" of  $y = -7$  and  $x = -2$ . The most successful students showed a clear table of values with x and y clearly labelled ready to plot points easily. A number of students lost a final mark because they did not join their correctly plotted points together.

**Q21.**

Many candidates worked out the x distance and the y distance from A to C, giving the answer (9, 18), failing to recognise that they needed to add these values to A (2, 3) to get the coordinates of C. Many were not able to work on their own initiative to solve this question.

---

## Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
(a)	$10 + 45 + 20 + 25 = 100$ 1 hour 40 minutes	07 10	3	M1 for $10 + 45 + 20 + 25$ or 100 seen M1 for correct attempt to convert to hours and minutes A1 cao <b>OR</b> M2 for clear attempt to subtract all times from 08 50 (may be seen as working backwards) (M1 for clear attempt to take at least one time away from 08 50) A1 cao
(b)		11 20	1	B1 for 11 20 <b>or</b> twenty past eleven
(c)		12	1	oe
(d)		Straight line from (12 20,12) to (13 50,12) and from (13 50,12) to (14 30,0)	3	B1 cao  M1 for straight line segment on graph M1 for straight line with negative segment A1 for correct graph <b>or</b> M1 for straight line segment on graph M1 for $12 \div 18$ oe or 40 minutes seen A1 for correct graph SC: B2 for the correct straight line translated to left or right

Q2.

	Working	Answer	Mark	Notes
(a)		30	1	B1 for 30 minutes
(b)		20	1	B1 cao
(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis

Q3.

PAPER: IMA0_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)

**Q4.**

Question	Working	Answer	Mark	Notes
	<p>Lisa = <math>4\frac{1}{2}</math> miles in 30 min = 9 mph            Martin = <math>16 \times 5 \div 8 = 10</math> mph            Or            Lisa = <math>9 \times 8 \div 5 = 14.4</math> km/h            Martin = 16 km/h            Or            For 5miles Lisa took 33 minutes 10 miles is 66 minutes            Martin = <math>16 \times 5 \div 8 = 10</math> 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)</p>	Martin faster + calculation or graph	4	<p>M1 for Lisa's speed or distance <math>\times 8 \div 5</math> or Martin's <math>16 \times 5 \div 8</math>            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</p>

**Q5.**

Question	Working	Answer	Mark	Notes
(a)		32, 12, 88.92	3	<p>B1 for 32            B1 for 12            B1 ft "32" for 88.92</p>
(b)		509.98	3	<p>M1 for a correct step <math>452.25 + 120 (= 572.25)</math> or <math>452.25 + 2.56 (= 454.81)</math> or <math>452.25 - 64.83 (= 387.42)</math> or <math>120 + 2.56 (= 122.56)</math> or <math>120 - 64.83 (= 55.17)</math> or <math>64.83 - 2.56 (= 62.27)</math>            M1 for a complete method            A1 cao</p>

**Q6.**

Paper 5MB1F 01				
Question	Working	Answer	Mark	Notes
*		Quick Mix from correct working	4	<p>M1 for <math>13.50 + 4 \times 6.90 (= 41.1)</math>            M1 for <math>7.20 \times (4 + 1) + 5.90 (= 41.9)</math>            A1 for 41.1(0) and 41.9(0) if working seen            C1 ft (dep on M1) for a statement of Quick Mix with amounts clearly associated with correct companies</p>

**Q7.**

Question	Working	Answer	Mark	Notes
	<p><math>(1 \times 18 + 12 + 2 \times 18)</math>            +  <math>(10 + 15 + 1 \times 18 + 5)</math>            = <math>66 + 48</math>            = 114            OR  <math>12 + 10 + 15 + 5 = 42</math>  <math>1 + 2 + 1 = 4</math>  <math>4 \times 18 = 72</math>  <math>42 + 72</math></p>	Yes they have raised enough money	5	<p>M1 for <math>1 \times 18 + 12 + 2 \times 18 (=66)</math> or Jamie's form completed with correct 18 and 36 and a final total.            M1 for <math>10 + 15 + 1 \times 18 + 5 (=48)</math> or Lily's form completed with correct 18 and a final total.            M1 "66" + "48" (dep on M1)            A1 for 114            C1 (dep on M1) for clear comparison and conclusion using their answer for the total raised            OR            M1 for <math>12 + 10 + 15 + 5 (=42)</math> seen separately from any other total            M1 for <math>(1 + 2 + 1) \times 18</math> or 72            M1 for "42" + "72" (dep on 2nd M1)            A1 for 114            C1 (dep on M1) for clear comparison and conclusion using their answer for the total raised.</p>

**Q8.**

Paper: 5MB2F_01				
Question	Working	Answer	Mark	Notes
(a)		25	1	B1 cao
(b)		56	1	B1 cao
*(c)		Yes 200>180 oe	4	M1 for converting using figures from the graph or for 5 miles = 8 km oe M1 for correct method to convert 240 km into miles (=150 miles) or to convert 350 miles into km (= 560 km) or to convert 180 miles into km (= 288 km) M1 (dep on M2) for correct method for comparison eg 180 miles with 350 - 150 (= 200) miles eg 288 km with 560 - 240 (= 320) km C1 for a correct statement that she will have to stop oe with appropriate supporting evidence eg Yes and 200 miles is too far eg Yes and 330 < 350 eg Yes and 20 miles under" oe eg Yes and 320 > 288

**Q9.**

Question	Working	Answer	Mark	Notes
(a)		0, 1.20, 6, 12, 18, 24, 30, 36	2	B2 for a fully correct table [B1 for 2 correct entries]
(b)		Single line from (0, 0) to (30, 36)	2	B2 for a fully correct graph [B1 for at least 4 points plotted correctly or for a single line from (0,0) or for a short straight line segment joining any two correct points]
(c)	250 × 1.2 OR 30 × 10 from table Or for values read from the graph and used	300	2	M1 for correct use of any point the table or any point on the graph, eg 250 × 1.2 or 30 × 10 oe A1 ft for 300

**Q10.**

PAPER: IMA0_1F				
Question	Working	Answer	Mark	Notes
(a)		5.8 to 6	1	B1 for an answer in the range 5.8 to 6
*(b)		No (supported)	3	M1 for a correct conversion of any amount (lb to kg or kg to lb) excepting that in (a) M1 (dep M1) for a complete method to convert 100 kg (from 25×4) to lb (to compare with 200 lb) or to convert 50 lb (from 200÷4) to kg (to compare with 25 kg) C1 for "no" and a comparison with a converted weight of 212 - 228 pounds or 88 - 94 kg

**Q11.**

Question	Working	Answer	Mark	Notes
*	(a)	4.5	1	B1 cao
	(b)	Comparison (supported)	3	M1 for correct use of graph to convert 0°F into °C A1 for -17.5 to -18 C1 (dep M1) for correct comparison of relative temperatures with units correct. eg freezer is warmer with -18°C or ft using their converted temperature with correct units.  OR M1 for correct use of graph to convert -10°C into °F A1 for 14 C1 (dep M1) for correct comparison of relative temperatures with units correct. eg freezer is warmer with 14°F or ft using their converted temperature with correct units.

**Q12.**

Question	Working	Answer	Notes
		60 litres with evidence	M1 reads from graph, eg 30l = 6.6 gals or 6 gals = 27l C1 60 litres with sufficient evidence

**Q13.**

5MB2F/01 June 2015				
Question	Working	Answer	Mark	Notes
	eg 5m = 16.5ft (50m ⇒) 10 × 16.5 = 165ft 360 - 165 = 195ft OR eg 20ft = 6m (360ft ⇒) 18 × 6 = 108m 108 - 50 = 58m	185 - 210 feet or 55 - 63 metres	3	M1 for converting ft to m or m to ft M1 (dep) for difference in heights in consistent units A1 for 185 - 210 feet or 55 - 63 metres

**Q14.**

PAPER: 5MB3F_01				
Question	Working	Answer	Mark	Notes
		4.50 1.40 3.90	3	B1 cao B1 cao B1 ft sum of stated profit figures

**Q15.**

Question	Working	Answer	Mark	Notes
	8 × 1.5 20.90 ÷ 2 1.5 × 18 28.95 + 12 + 20.90 + 27	£12(.00) £10.45 £27(.00) £88.85	4	B1 B1 B1 B1 ft total of four figures: 28.95 + "12" + 20.90 + "27"

**Q16.**

Working	Answer	Mark	Notes
	8.32 8 51.22	3	B1 cao B1 cao B1 ft from '8.32'

**Q17.**

	Working	Answer	Mark	Notes
	$x$ -2 -1 0 1 2 3 4 $y$ 4 4.5 5 5.5 6 6.5 7	$y = \frac{1}{2}x + 5$ drawn	3	<p><b>(Table of values/calculation of values)</b>                      M1 for at least 2 correct attempts to find points by substituting values of <math>x</math>.                      M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly)                      A1 for correct line between <math>x = -2</math> and <math>x = 4</math></p> <p><b>(No table of values)</b>                      M1 for at least 2 correct points with no more than 2 incorrect points                      M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of <math>y = \frac{1}{2}x + 5</math> drawn                      A1 for correct line between <math>x = -2</math> and <math>x = 4</math></p> <p><b>(Use of <math>y=mx+c</math>)</b>                      M1 for line drawn with gradient 0.5 OR line drawn with <math>y</math> intercept at 5                      M1 for line drawn with gradient 0.5 AND line drawn with <math>y</math> intercept at 5                      A1 For correct line between <math>x = -2</math> and <math>x = 4</math></p> <p>SC B2 for a correct line from <math>x = 0</math> to <math>x = 4</math></p>

**Q18.**

Question	Working	Answer	Mark	Notes
(a)		3.5, 4.5, 5	2	B2 for 3.5, 4.5, 5 oe (B1 for 1 correct)
(b)		Single line from (-2, 3) to (2, 5)	2	B2 cao for correct single line between $x = -2$ and $x = 2$ (B1 ft for plotting at least 4 points correctly or for a line with gradient $\frac{1}{2}$ or for a single straight line passing through (0, 4))
(c)(i)	(1, 2) to (0, 4)	Correct line	3	B1 ft for a perpendicular line through (0, 4) for at least $x = -1$ to $x = 1$
(ii)		$y = -2x + 4$		B2 correct answer or f.t. correct equation for their line (B1 $y = -2x + k$ or $-2x+4$ or ft correct expression for their line with no $y =$ )

**Q19.**

	Working	Answer	Mark	Notes
(a)		$x = 3$ drawn	1	B1 for $x = 3$ drawn [Note: each line drawn must be a single line segment satisfying $x = 3$ ]
(b)		$y = x$ drawn	1	B1 for $y = x$ drawn [Note: each line drawn must be a single line segment satisfying $y = x$ ]
(c)	Gradient = $\frac{3-0}{0--2}$	1.5	2	M1 for a method to find the gradient of the given line A1 for 1.5 oe

**Q20.**

PAPER: 1MA0_2F								
Question	Working					Answer	Mark	Notes
						Straight line from $(-2, -7)$ to $(3, 3)$	4	<p><b>(Table of values)</b>            C1 for axes scaled and labelled            M1 for at least 2 correct attempts to find points by substituting values of <math>x</math>            M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly)            A1 for correct line between <math>x = -2</math> and <math>x = 3</math></p> <p><b>(No table of values)</b>            C1 for axes scaled and labelled            M1 for at least 2 correct points with no more than 2 incorrect points            M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of <math>y = 2x - 3</math> drawn            A1 for correct line between <math>x = -2</math> and <math>x = 3</math></p> <p><b>(Use of <math>y = mx + c</math>)</b>            C1 for axes scaled and labelled            M1 for line drawn with gradient of 2 OR line drawn with a <math>y</math> intercept of <math>-3</math>            M1 for line drawn with gradient of 2 AND with a <math>y</math> intercept of <math>-3</math>            A1 for correct line between <math>x = -2</math> and <math>x = 3</math></p> <p>[SC B2 (indep of C1) for the correct line between <math>x = 0</math> and <math>x = 3</math>, ignore any additional incorrect line segment(s)]</p>

**Q21.**

	Working	Answer	Mark	Notes
		(11, 21)	3	<p>M1 for <math>5 - 2</math> or <math>9 - 3</math> OR <math>3</math> or <math>6</math> as long as these are not related to the <math>3</math> from A or multiple <math>3</math> or <math>9, 18</math></p> <p>M1 for <math>2 + 3 \times "3"</math> and <math>3 + 3 \times "6"</math>            OR for <math>5 + 2 \times "3"</math> and <math>9 + 2 \times "6"</math>            OR for <math>2 + 3 \times "3" (=11)</math> and <math>(y=) 2 \times '11' - 1</math></p> <p>A1 cao</p> <p>SC: B1 if no method shown and answer shows <math>x</math> coordinate as <math>11</math> or <math>y</math> coordinate as <math>21</math>.</p>