JustMaths

BUMPER

"BETWEEN PAPERS 2 AND 3" PRACTICE PAPER (Q33 TO Q65)

HIGHER TIER (SUMMER 2017)

EXAMINERS REPORTS & MARKSCHEME

NOT A "BEST" GUESS PAPER.

NEITHER IS IT A "PREDICTION" ... ONLY THE EXAMINERS KNOW WHAT IS GOING TO COME UP! FACT!
YOU ALSO NEED TO REMEMBER THAT JUST BECAUSE A TOPIC CAME UP ON PAPER 1 OR PAPER 2 IT MAY STILL COME UP ON PAPER 3

WE KNOW HOW IMPORTANT IT IS TO PRACTISE, PRACTISE, PRACTISE .... SO WE'VE COLLATED A LOAD OF QUESTIONS THAT WEREN'T EXAMINED IN THE PEARSON/EDEXCEL NEW 9-1 GCSE MATHS PAPER 1 AND PAPER 2 BUT WE CANNOT GUARANTEE HOW A TOPIC WILL BE EXAMINED IN THE FINAL PAPER
ENJOY!

MEL & SEAGER

NB: SOME OF THESE QUESTIONS MAY HAVE ALSO BEEN INCLUDED IN THE PAPERS USED BETWEEN PAPERS 1 AND 2 ... THE PRACTISE IS GOOD FOR YOU!

EXAMINERS COMMENTS

Q33. Few candidates used a fully algebraic approach and it was extremely rare to find the equation $3x+2=26$ being successfully reached and then solved. Most candidates used a numeric approach, scoring at least one mark for showing three ages that added to 26 or giving at least three trials. Some candidates who tried to use algebra gave the expression $4x$ for Peter's age instead of $x+4$.

Q34. This question on transformation geometry was not very well answered with a small percentage of candidates giving a fully correct answer. More than three quarters of candidates scored no marks but 1 mark was awarded for showing a similar-sized shape in the correct orientation in the third quadrant or for a shape of the correct size in the correct orientation. If they showed both of these, they scored 2 marks.

The negative scale factor of this transformation proved a major stumbling block with many candidates instead using a scale factor of + ½ .

Q35. Part (a) was poorly answered, the majority giving 80 × 2 = 160. One reason might have been that candidates did not associate paint with area.

Greater success was found with part (b). Many used a scale factor 8 correctly to find the answer. Many also chose a circuitous route of working with volumes of cones to find the answer; a minority trying this route used prematurely rounded figures and therefore failed to reach an accurate final answer.

Q36. This question was answered poorly by all but the best candidates. Candidates usually found the correct length of the larger prism but then also doubled the cross sectional area rather than multiplying it by 4, so answers of 600 with or without units were often seen. A small number of candidates successfully answered the question by working out the vertical height of the triangle *ABC*, doubling the dimensions of the prism then working out the volume of the larger prism. A large number of candidates were able to score at least one mark for stating the correct units.

Q37. Most candidates were able to score at least one mark by recognising that angles *OTP* and *ORP* were right angles, although very few were able to give a correct reason as to why. 'tangent' and '90º' were often seen written, but candidates failed to relate this to the radius. The correct identification of the 90º was usually followed by the correct use of either angles in a triangle = 1800 or angles in a quadrilateral = 360°. Once again, since this was a 'starred' question assessing quality of written communication, candidates failing to explicitly state (angle) *TOR* = 140° or even showing the 140° clearly in the diagram failed to receive credit even when 140° was correctly calculated. A number of candidates found the 'correct' answer of 140° by incorrect methods, often making the assumption that *ROTP* was a cyclic quadrilateral, without proof. This gained no credit. In a great many cases though, candidates failed to score full marks by their failure again to express their geometric reasoning in a satisfactory way. Failure to use correct three letter notation to identify angles during working was again common.

Centres are advised to look carefully at the requirements of the mark scheme in this respect with its demand for the inclusion of key words.

Q38. Students tend to struggle with inequalities and this proved to be the case in this question with only about half the students being able to score any marks. Answers were often given as equalities or with the inequality sign pointing in the wrong direction. Only about a third of the students were able to give fully correct solutions.

Q39. Part (a) was often answered well with students scoring at least one mark. Many treated this as an equality which resulted in $e = 2.25$ for one mark. Many quoted $e > 2.25$ and then simply write 2.25 on the answer line. This was not penalised. Failure to conclude with a value of 2.25 or equivalent was generally a result of either poor arithmetic (12 − 3 = anything but 9 was common) or poor algebraic manipulation; many adding e to both sides of the inequality by mistake.

In part (b), many students were unable to draw the straight line $x + y = 1$. The most common error was to draw the lines $x = 1$ and $y = 1$ and then shade the positive quadrant formed. Many drew the line $x + y = 2$. In addition shading was often in error showing confusion with the inequality.

Q40. The vast majority of candidates gained at least one mark in part (a) and many listed the five correct integers. The most common error was to leave out one value (most commonly 3) and some candidates gave an extra value (most commonly −2). Some candidates clearly confused < and ≤ as they included −2 and omitted 3. Seen less often, was writing the values in a non-numerical order and

missing one out, usually 0 or 1. The term 'integer' was generally understood. Candidates were less successful in part (b). A significant number of candidates wrote '3.25' on the answer line, in some cases after showing $x < 3.25$ in the working. Many approached solving the inequality by treating it as an equation which meant that they usually failed to use an inequality sign in their answer. Isolating the x terms and the non-x terms proved to be a problem for many candidates and $10x$, 5 and – 5 were often seen. Some of those who got as far as $4x < 13$ did not go on to complete the final step of the solution.

Q41. Very few students gained more than one mark in this question and this was usually for the graph of x + y = 7 correctly shown in the diagram. The graph of y = 2x was rarely correct with y = 0.5x sometimes seen instead. The line x = 3 was commonly seen confused with y = 3. Some were able to pick up a second mark for correct shading between x + y = 7 and y = 3 It was more common to see an array of vertical and horizontal lines drawn on the grid. When the three lines were correctly drawn, a fully correct solution was usually seen. A common error was to try and incorporate the inequality into the drawing of the lines so, for example, the line x + y = 6 was drawn in response to x + y < 7.

Q42. In part (a), most candidates gave the correct answer and those who didn't usually gained one mark for substituting –2 into $3e + 5$. The most common errors were to get as far as –6 + 5 but then give the answer as 1, to work out 3 – 2 instead of 3 × (–2), and to get 6 instead of –6. These were all infrequent.

Part (b) was another well-answered question. Most candidates were able to gain the first mark by subtracting $2y$ or 3 from both sides and the majority went on to solve the equation correctly. Some had the correct idea of subtracting either $2y$ or 3 from both sides but then failed to carry out the operations correctly. Both $2y = 17$ and $6y = 11$ were quite common. Some candidates added the $2y$ and 3 instead of taking them away to get $6y = 17$. A few candidates, having correctly reached $2y = 11$, then divided 2 by 11 instead of dividing 11 by 2.

The majority of candidates in part (c) answered this question correctly and those that didn't usually gained the first method mark by expanding the brackets to get $3x – 15$. Most candidates expanded the brackets as a first step with hardly any choosing to divide by 3 first. Two common errors were subtracting 15 from 21 rather than adding it to 21 and failing to multiply 5 by 3 when expanding the brackets.

In part (d), it was pleasing to see that nearly all candidates understood what is meant by an integer with the majority scoring full marks. Of those that did not, more were seen to include either –3 or 4 rather than to include both these values, which appeared somewhat illogical. Others neglected to include zero.

Q43. Many candidates were able to identify at least one bound, but very few correctly paired the upper and lower bounds. Weaker candidates just calculated 170 ÷ 54

The most successful candidates used the standard 54.5 and 53.5 rather than attempting to use recurring decimals.

Q44. The majority of candidates gained full marks for this question, finding the missing values and drawing a correct graph. Very few candidates failed to calculate at least one correct value. The points were usually accurately plotted although the point (2, 11) was sometimes plotted at (2, 13). Some candidates only gained one mark in part (b) as they joined the points with straight lines rather than drawing the curve freehand. Some did not join the points at all and some drew a line of best fit for the points. Curves were sometimes inaccurate, not passing through the points exactly or drawn with too thick a line or with several lines. Some candidates seemed to have pre-conceived ideas as to what the graph should look like and drew a parabola that contradicted their calculations.

Q45. Even though the formula to find the volume of a sphere is given on the formula sheet, many used alternative formulae, often formulae for finding area. All methods using area gained no marks at all. Many students working with the correct volume and subsequent density failed to score the final mark with an incomplete conclusion. Students here were required to compare their calculated density to that given.

Q46. Questions involving bounds continue to prove very challenging for all but the most able students. There were a good number of succinct and correct answers but most students did not start well as they

could not identify correct bounds for either the distance or the time. Often 235 and 200 were used to find the speed. This was given no credit. Students who used 230 miles and 205 minutes were given some credit for recognising that bounds were needed and that "lower bound of distance" ÷ "upper bound of time" was the correct calculation to be used. Many students simply divided a lower bound by a lower bound. Some students identified the correct calculation for speed but failed to convert units of time from minutes to hours. They scored 2 out of the 4 marks available. This was a question where clear and correct working was needed in order for examiners to award marks where they were deserved.

Q47. This was probably the most challenging question on the paper. Very few were able to see it fully through to a conclusion. Many students were able to score one mark for correct use of one of the given volume formulae but then unable to go any further. Some students ignored any volume calculations altogether and treated the problem as a simple rate of change/ratio problem. A number of the better attempts read the height in the cylinder as 6 metres after 5 hours instead of 6 metres above the vertex of the cone. Many students spent a lot of time attempting to find answers using numerical values for π

Q48. Generally this question was done reasonably well; the main mistake for those not gaining full marks for (a) and (b) was to believe the scale factor was 2, coming from incorrectly assuming the sides BC (5cm) and EC (10cm) corresponded rather than AC (4cm) and EC (10cm). There were also mistakes made when students attempted to add or subtract and also attempts using Pythagoras' theorem. Part (c) was less well done, most students forgetting that you needed to square a scale factor for area.

Q49. The answer to part (a) was almost always correct. There was less success in part (b) with many students using the linear rather than area scale factor and so giving the common incorrect answer of 19.2

Q50. The correct answer of 4.5 cm and the incorrect answer of 2cm (from 10÷(15÷3)) were the most frequently seen answers. 8 (from 15 + 3 − 10) was another common incorrect answer.

Q51. Students generally scored either full marks or no marks for part (a). Occasionally, the correct fractions were seen added together rather than multiplied. In part (b), a few managed to give an answer of $x = 15$ without showing any appropriate working and so scored no marks. Most students showed fully correct working in part (b) as required by the question. Those who related the question back to part (a) and so only gave the positive value for x received full marks, provided supporting working was seen.

Q52. Those familiar with this sort of question were usually accurate in completing the Venn diagram in part (a). However, a significant number of students just put the given values into sections on the Venn diagram, taking no account of intersections. In part (b), the conditional element of the question was one step too far for many students. Answers such as $\frac{5}{14}$ and $\frac{5}{32}$ were quite common; some tried to multiply pairs of probabilities.

Q53. There were very few correct answers in (a) or (b). The errors were diverse suggesting that most students did not have a working knowledge of set theory. In (b) many students presented a list of numbers, again suggesting that they did not understand what was being asked.

Q54. This was quite well done for a question this late in the paper but many students clearly did not understand the concepts needed to complete the Venn diagram correctly. Those that got the Venn diagram correct were often able to continue and answer the two sets questions correctly.

Q55. This question highlighted that many students did not fully understand set notation. Although most were able to complete the Venn diagram in part (a), a variety of responses were seen in parts (b) – (d). Many confused union with intersection and some listed the members when they were being asked to find the number of elements in a set and vice versa.

Q56. Many candidates were able to work out an unknown angle in both an equilateral and an isosceles triangle. This often led to full marks but the final mark was sometimes lost through candidates' lack of familiarity with capital letter notation for describing an angle. Other candidates found either 60° or 51° but not both. Beyond this, attempts were variable and often based on the false assumption that the diagram had 2 lines of symmetry.

Q57. – Q65 No Examiner's Report available for this question

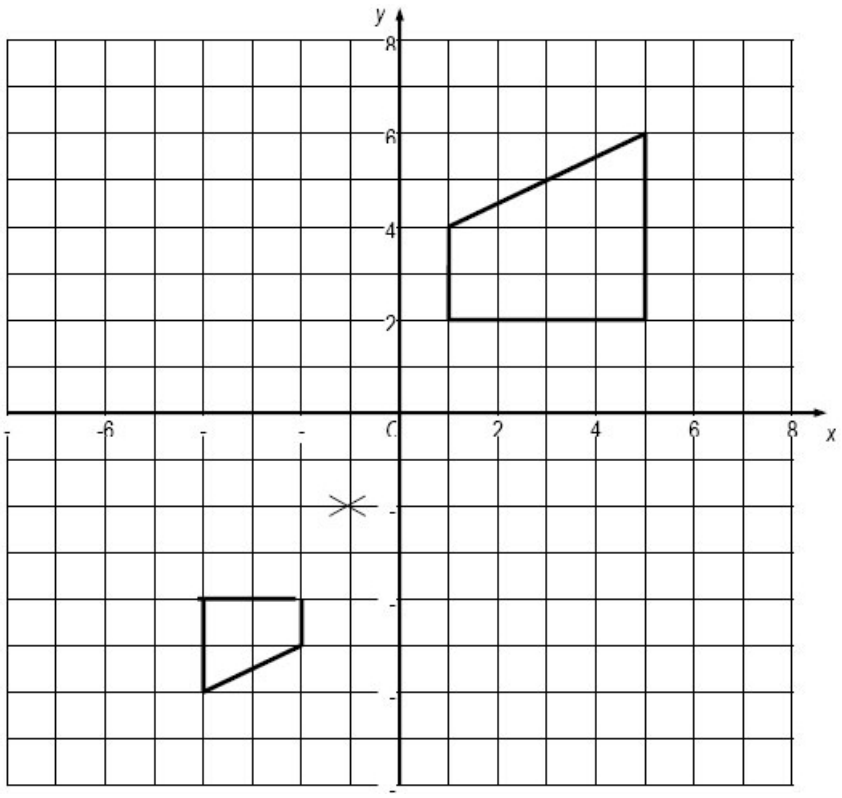
Mark Scheme

Q33.

Question		Working	Answer	Mark	Notes
	(a)	$\begin{pmatrix}4\\8\end{pmatrix}-\begin{pmatrix}2\\4\end{pmatrix}$	$\begin{pmatrix}2\\4\end{pmatrix}$	2	M1 $\overrightarrow{OQ}-\overrightarrow{OP}$ in co-ordinates or vectors or $\begin{pmatrix}2\\y\end{pmatrix}$ or $\begin{pmatrix}x\\4\end{pmatrix}$ A1 cao [SC If no marks then B1 $\begin{pmatrix}4\\2\end{pmatrix}$ or $\begin{pmatrix}-2\\-4\end{pmatrix}$
	(b)	$M = (3, 6)$ $N = (4, 8) + ½ (6, –4) = (7,6)$ $\overrightarrow{MN}=\begin{pmatrix}7\\6\end{pmatrix}-\begin{pmatrix}3\\6\end{pmatrix}$ OR $\overrightarrow{MN}=½\overrightarrow{PR}$ $\overrightarrow{PR}=\begin{pmatrix}6\\-4\end{pmatrix}+\begin{pmatrix}2\\4\end{pmatrix}=\begin{pmatrix}8\\0\end{pmatrix}$ OR $\overrightarrow{MN}=½\overrightarrow{PQ}+½\overrightarrow{QR}$ $\overrightarrow{MN}=½\begin{pmatrix}2\\4\end{pmatrix}+½\begin{pmatrix}6\\-4\end{pmatrix}$	$\begin{pmatrix}4\\0\end{pmatrix}$	3	B1 $M = (3, 6)$ M1 $N = (4, 8) + ½ (6, –4)$ or $(7, 6)$ or $\overrightarrow{MN}=\begin{pmatrix}7\\6\end{pmatrix}-\begin{pmatrix}3\\6\end{pmatrix}$ A1 cao OR B1 $\overrightarrow{MN}=½\overrightarrow{PR}$ M1 ft $\overrightarrow{PR}=\begin{pmatrix}6\\-4\end{pmatrix}+\begin{pmatrix}'2'\\'4'\end{pmatrix}$ or $\begin{pmatrix}8\\0\end{pmatrix}$ A1 cao OR B1 $\overrightarrow{MN}=½\overrightarrow{PQ}+½\overrightarrow{QR}$ M1 ft $\overrightarrow{MN}=½\begin{pmatrix}'2'\\'4'\end{pmatrix}+½\begin{pmatrix}6\\-4\end{pmatrix}$ A1 cao

Q34.

		Working	Answer	Mark	Notes
		Vertices at (–2, –4), (–4, –4), (–4, –6), (–2, –5)	Correct diagram	3	M1 for a similar shape in the correct orientation in the third quadrant M1 for an image in the correct orientation of the correct size A1 cao



Q35.

Question		Working	Answer	Mark	Notes
	(a)	$1:2^2$ or $2^2:1$ $80 \times 2^2 = 80 \times 4 =$	320	2	M1 for sight of $1:2^2$ or $2^2:1$ or 2^2 or ¼ for ratio of area or 80×4 or identification of 4 as the scale factor A1 cao
	(b)	$1:2^3$ or $2^3:1$ 171700×2^3 $= 171700 \times 8 =$ OR $h_a = \frac{171700 \times 3}{\pi \times 40^2}$ $=102.47589$ $h_b = h_a \times 2 = 204.95..$ $vol_b = \frac{1}{3}\pi \times 80^2 \times 204.95..$	1 373 600	3	M1 for sight of $1:2^3$ or $2^3:1$ or 2^3 or ⅛ for ratio of volumes or identification of 8 as the scale factor M1 for $2^3 \times 171700$ A1 cao OR M1 for complete calculation to find the height of A (=102.47589..) M1 (dep) for $h_a \times 2$ and used to find vol_b A1 cao

Q36.

		Working	Answer	Mark	Notes
			1200 cm^3	4	M1 for $10 \times 2 \times 2$ and 15×2 M1 for "40" × "30" A1 for 1200 B1 (indep) for cm^3 OR M1 for 10×15 or 2^3 or 8 indicated as scale factor M1 for $10 \times 15 \times 2 \times 2 \times 2$ A1 for 1200 B1 (indep) for cm^3 SC B2 for 600 cm^3 (B1 for 600)

Q37.

Question		Working	Answer	Mark	Notes
*		180 –(90 + 20) = 70 2 × 70 = 140 (180 – 40)÷2 =70 180 – 2×(90 –70) = 140	Angle *TOR* =140°	4	M1 for angle *PTO* (*PRO*) = 90° or seeing it marked on the diagram with a right angle or as 90° M1 (dep) for 180 –(90 + 20) (=70°) or for 360 – (90 + 90 + 40) (=140) A1 for (angle) *TOR* = 140° or for 140° seen in the correct place in the diagram [140° alone without the *'TOR ='* gets A0] C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from: Sum of angles in a triangle is 180° Sum of angles in a quadrilateral is 360° Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length OR M1 for angle *PTO (PRO)* = 90° or seeing it marked on the diagram with a right angle or as 90° M1 for (180 – 40)÷2 (=70) and [180 – 2×(90 –"70")] (=140) A1 for (angle) *TOR* = 140° or for 140° seen in the correct place in the diagram [140° alone without the *'TOR ='* gets A0] C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from: Sum of angles in a triangle is 180° Base angles of an isosceles triangle are equal Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length

Q38.

Question	Working	Answer	Mark	Notes
		$x < 2$	2	M1 for an attempt to isolate x and number terms or multiply all terms by 2, or for $\frac{3}{2}x < 3$ or $-\frac{3}{2}x < -3$ or $x = 2$ A1 cao

Q39.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
	(a)		$e > \frac{9}{4}$	2	M1 for correct process to isolate terms in e from other terms A1 for $e > \frac{9}{4}$ oe
	(b)		shaded region	2	M1 for $x + y = 1$ drawn or for a region shaded above their line with negative gradient A1 for region shaded above line

Q40.

Question		Working	Answer	Mark	Notes
	(a)		−1, 0, 1, 2, 3	2	B2 for all 5 correct values; ignore repeats, any order. (−1 for each omission or additional value)
	(b)	$7x - 3x < 4 + 9$ $4x < 13$	$x < 3.25$	2	M1 for a clear intention to use a correct operation to collect x terms or non-x terms in an (in)equality A1 for $x < 3.25$ oe (SC: B1 for 3.25 oe seen if M0 scored)

Q41.

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
		Region identified	4	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading

Q42.

		Working	Answer	Mark	Notes
	(a)	$3 \times -2 + 5$	−1	2	M1 for substitution of −2 into $3e + 5$ e.g. $3 \times -2 + 5$ A1 cao
	(b)	$4y - 2y = 14 - 3$ $2y = 11$ $y = 11\frac{1}{2}$	$11\frac{1}{2}$	2	M1 for clear attempt to subtract $2y$ or 3 from both sides A1 for $11\frac{1}{2}$ oe
	(c)	$3x - 15 = 21$ $3x = 36$ $x = 12$	12	2	M1 for $3 \times x - 3 \times 5$ or intention to divide both sides of equation by 3 as a first step A1 cao
	(d)		−2, −1, 0, 1, 2, 3	2	B2 for all 6 correct values; ignore repeats, any order (B1 for 5 correct and no incorrect values e.g. −2, −1, 1, 2, 3 or 6 correct and one incorrect value e.g. −2, −1, 0, 1, 2, 3, 4)

Q43.

		Working	Answer	Mark	Notes
		d: UB = 54.5 (or 54.499), LB = 53.5 *C*: UB = 170.5 (or 170.499), LB = 169.5 170.5 ÷ 53.5 169.5 ÷ 54.5	3.19 3.11..	4	B1 for any one correct bound quoted M1 for 170.5 ÷ 53.5 or 169.5 ÷ 54.5 A1 for UB = answer in range 3.18 to 3.19 from correct working A1 for LB = 3.11.. from correct working

Q44.

		Working	Answer	Mark	Notes
	(a)		–13, –1, 2	2	B2 for all values correct (B1 for any one value correct)
	(b)		Graph drawn	2	M1 ft for at least 4 points plotted correctly from their table A1 cao for correct curve drawn from (–2, –13) to (2, 11)

Q45.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
*			No with reason	4	M1 for $\frac{4}{3} \times \pi \times 2^3$ (=33.51...) M1 for 45 ÷ "volume" A1 for 1.3 – 1.4 C1 (dep on M1) for No and eg. 1.34 > 1.24 OR M1 for (volume =) 45 ÷ 1.24 (= 36.29...) oe M1 for (r^3 =) "36.29..."÷ ($\frac{4}{3} \times \pi$) oe A1 for 8.6 – 8.7 C1 (dep on M1) for No and eg. 8.6... > 8

Q46.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
	$\frac{232.5}{202.5} \times 60$	68.9	4	M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for correct conversion of "upper bound of time" from minutes to hours, (202.5 to 205) ÷ 60 M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (3.375 to 3.41(6…)) A1 for 68.8 to 69 from correct working OR M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (202.5 to 205) M1 for correct conversion of "lower bound of speed" from miles per minute to miles per hour, ((1.12(1...) to 1.14(8...)) × 60 A1 for 68.8 to 69 from correct working

Q47.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		$\frac{14}{3}$	5	M1 for correct substitution into a volume formula for a cylinder or a cone, eg. $\frac{1}{3}\times\pi\times3^2\times4$ (= 12π) or $\pi\times3^2\times(6-4)$ (= 18π) or $\pi\times3^2\times h$ (= $9\pi h$) or $\pi\times3^2\times(h-2)$ M1 for method to find volume after 5 hours, eg. "12π" + "18π" (= 30π) M1 (dep on M1) for use of a correct ratio, eg. "30π" $\times\frac{9}{5}$ (= 54π) or "30π" $\times\frac{4}{5}$ (= 24π) M1 for deriving an equation in h, eg. "54π" = "$9\pi h$" + "12π" A1 for $\frac{14}{3}$ or equivalent fraction

Q48.

Question	Working	Answer	Mark	Notes
(a)	$5\times\frac{10}{4}$ oe	12.5	2	M1 A1
(b)	$18\div\frac{10}{4}$ oe	7.2	2	M1 A1
(c)		$6.25T$	1	B1 Accept $T\times\left(\frac{10}{4}\right)^2$
				Total 5 marks

Q49.

Question	Working	Answer	Mark	Notes
(a)	$8\times\frac{8}{5}$ oe	12.8 oe	2	M1 A1
(b)	12 x 1.62	30.72	2	M1 M1 for 1.62 (=2.56) **or** 0.6252 (=0.39..) **or** $\left(\frac{8}{5}\right)^2\left(=\frac{64}{25}\right)$ **or** $\left(\frac{5}{8}\right)^2\left(=\frac{25}{64}\right)$ or 0.5 x 8 x "12.8" x sin 36.9 A1 cao
				Total 4 marks

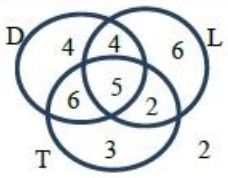
Q50.

Question Number	Working	Answer	Mark	Notes
	$10\times x=3\times15$ **or** $(x=)\ 3\times15\div10$ oe	4.5 oe	2	M1 A1
				Total 2 marks

Q51.

Question Number	Working	Answer	Mark	Notes
(a)	$\frac{7}{x} \times \frac{6}{x+1} = 0.2$ $42 = 0.2x(x-1)$ $210 = x^2 - x$	$x^2 - x - 210$ (=0)	2	M1 for $\frac{7}{x} \times \frac{6}{x-1} = 0.2$ **or** $\frac{7}{x} \times \frac{6}{x-1} = \frac{1}{5}$ A1* * answer given; sufficient steps must be seen to get to correct quadratic
(b)	$(x - 15)(x + 14)$ (=0)	−14 , 15	3	M2 M1 for $(x \pm 15)$ $(x \pm 14)$ A1 (dep on M2) for −14, 15 **or** 15 M1 $\frac{-(-1) \pm \sqrt{(-1)^2 - 4 \times 1 \times (-210)}}{2}$ (may be partially evaluated, condone no brackets around negative numbers, accept 1^2) M1 (indep) for $\sqrt{841}$ or 29 A1 (dep on M1) for −14, 15 **or** 15
				Total 5 marks

Q52.

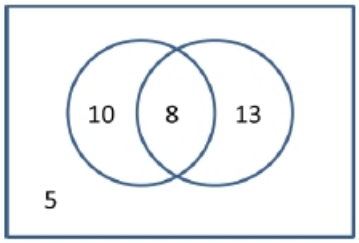
Q	Working	Answer	Mark	Notes
(a)			3	M1 For 5 in the middle and 1 from $4(D \cap L \cap T')$ or $2(L \cap T \cap D')$ or $6(D \cap T \cap L')$ M1 For any 4 correct entries A1 For all correct including 2 outside the circles inside the rectangle
(b)		$\frac{5}{9}$	1	B1 ft from incorrect diagram
				Total 4 marks

Q53.

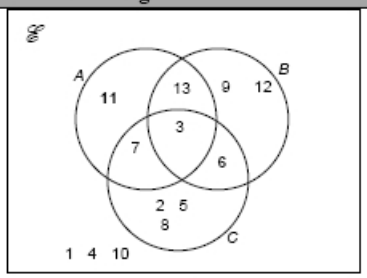
Ques		Working	Answer	M	Notes
	a		5 and 6 in the correct regions of the Venn diagram	2	B2 Both correct, B1 for one correct
	bi ii		25 12	2	B1 Correct or ft from their Venn Diagram dep on both values entered Correct or ft dep on a value for "5" B1 in Venn diagram
					Total 4 marks

Q54.

The correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Marks	Comments
(a)		5, 10, 8, 13	3	B1 for 8 in intersection and 13 in correct position B1 for 5 in correct position B1 for 10 in correct position
(b)		31	1	B1 or ft from diagram
(c)		10	1	B1 or ft from diagram
				Total 5 marks

Q55.

Question	Working	Answer	Mark
(a)		1	B1 6 and 11 in correct regions Note: Award B0 for any numbers added to incorrect regions
(b)		{2, 5, 7, 8}	1	B1 ft from Venn diagram Ignore brackets and separators.
(c)		{9, 12}	1	B1 ft from Venn diagram Ignore brackets and separators.
(d)		6	1	B1 ft from Venn diagram
				Total 4 marks

Q56.

Question	Working	Answer	Mark	Notes
	$(\angle ABD =)\ 60^\circ$		4	B1 May be stated or marked on diagram
	$(\angle DBC =)$ $\frac{180^\circ - 78^\circ}{2}$			M1
	51°			A1 May be stated or marked on diagram
		111		A1
				Total 4 marks

Q57.

Question	Working	Answer	Notes
a		$7\frac{1}{2}$	M1 $\frac{9}{4}\times\frac{10}{3}$ oe M1 $\frac{90}{12}$ oe A1 $7\frac{1}{2}$
b		$5\frac{1}{4}+6\frac{2}{3}$ or $5\frac{2}{3}+6\frac{1}{4}$	B1 $5\frac{1}{4}+6\frac{2}{3}$ or $5\frac{2}{3}+6\frac{1}{4}$

Q58.

Paper 1MA1: 2F			
Question	Working	Answer	Notes
		shown	B1 $ABC = 80$ M1 $180 - 80° - 50°$ A1 $ACB = 50$ C1 statement that since $ACB = CAB = 50°$ with reasons eg Vertically opposite angles are equal, Angles in a triangle add up to 180°, The exterior angle of a triangle is equal to the sum of the interior opposite angles; Base angles of an isosceles triangle are equal.

Q59.

Paper 1MA1: 2F			
Question	Working	Answer	Notes
	£ per kg: 1.89 ÷ 2 = 0.945 (94.5); 4.30 ÷ 5 = 0.86 (86); 8.46 ÷ 9 = 0.94 (94) kg per £: 2 ÷ 1.89 = 1.058(2..) ; 5 ÷ 4.30 = 1.162(79…); 9 ÷ 8.46 = 1.0638(297…) Price per 90 kg: 1.89 × 45 = 85.05; 4.30 × 18 = 77.4(0); 8.46 × 10 = 84.6(0)	5 kg (supported)	P1 for a process (for at least two boxes) of division of price by quantity or division of quantity by price or a complete method to find price of same quantity or to find quantity of same price P1 for a complete process to give values that can be used for comparison of all 3 boxes C1 for 5 kg and correct values that can be used for comparison for all 3 boxes and a comparison of their values

Q60.

Paper 1MA1: 3H			
Question	Working	Answer	Notes
(a)	550 × 3.5601	1958	M1 550 × 3.5601 A1
(b)	210 ÷7 × 2 = 30 × 2 Or 60 ÷2 = 30 and 30 × 7 = 210	Shown	M1 For correct method to convert cost in UK to lira or vice versa, using Asif's approximation C1 Shown with correct calculations
(c)		Correct evaluation	C1 For an evaluation eg. It is a sensible start to the method because he can do the calculations without a calculator and 3.5 lira to the £ is a good approximation

Q61.

Question	Working	Answer	Mark type	AO	Notes
	$3x - 3c = 2x + 5$ $x = 3c + 5$	Shown	P P C	2.2 2.2 2.4a	P1 for a process to start a chain of reasoning P1 for a process to isolate terms in x C1 convincing explanation from $x = 3c + 5$

Q62.

Question	Working	Answer	Mark	AO	Notes
(a)	$g(1 - 5\times1) = 1 + 5\times(-4)$ or $1 + 5f(1) = 1 + 5\times(-4)$	Shown with working	P P	2.2 2.2	P1 for process to begin expansion, e.g. $(1 - 5\times1)$ or $1 + 5f(1)$ P1 for full process to stated expression
(b)	$f^{-1}(x) = \frac{1-x}{5}$ $f^{-1}(x) + g^{-1}(x) = \frac{1-x}{5} + \frac{x-1}{5}$ $= \frac{1-x+x-1}{5} = 0$	Proof	P P P	2.4b 2.4b 2.4b	P1 for start to proof, e.g $f^{-1}(x) = \frac{1-x}{5}$ or $g^{-1}(x) = \frac{x-1}{5}$ P1 For continuation of proof, e.g. $g\,f^{-1}(x) = \frac{1-x}{5}$ and $g^{-1}(x) = \frac{x-1}{5}$ P1 for a complete proof with all steps shown

Q63.

Question	Working	Answer	Notes
(a)		$2(x + 4)^2 + 3$	P1 process to find a, eg $2x^2 + 16x + 35 = 2(x^2 + \ldots)$ or $a = 2$ P1 for $2((x + 4)^2 + \ldots))$ or $b = 4$ A1 for $2(x + 4)^2 + 3$ or $a = 2$, $b = 4$, $c = 3$
(b)		$(-4, 3)$	B1 ft from answer of form $a(x + b)^2 + c$

Q64.

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
(a)		3 to 4	C1 for a tangent drawn at $t = 6$ B1 for answer in range 3 to 4
(b)		452	C1 for splitting the area into 3 strips and a method of finding the area of one shape under the graph, eg. $\frac{1}{2} \times 4 \times 35$ (= 70) M1 for complete process to find the area under the graph, eg "70" + $\frac{1}{2} \times 4 \times (35 + 51)$ (= 172) + $\frac{1}{2} \times 4 \times (51 + 54)$ (= 210) [= 452] A1 for 452

Q65.

Paper 1MA1: 3H			
Question	**Working**	**Answer**	**Notes**
(a)	$F(x) = x^3 + 4x - 1$ $F(0) = -1, F(1) = 4$	Shown	M1 Method to establish at least one root in [0,1] eg. $x^3 + 4x - 1 (= 0)$ and $F(0) (= -1), F(1) (= 4)$ oe A1 Since there is a sign change there must be at least one root in $0 < x < 1$ (as F is continuous)
(b)	$4x = 1 - x^3$ Or $\frac{x^3}{4} + x = \frac{1}{4}$	Shown	C1 C1 for at least one correct step and no incorrect ones
(c)	$x_1 = \frac{1}{4} - \frac{0}{4} = \frac{1}{4}$ $x_2 = \frac{1}{4} - \frac{\left(\frac{1}{4}\right)^3}{4} = \frac{1}{4} - \frac{1}{256}$	0.246(09375) Or $\frac{63}{256}$	B1 $x_1 = \frac{1}{4}$ M1 M1 for $x_2 = \frac{1}{4} - \frac{\left(\frac{1}{4}\right)^3}{4}$ A1 A1 for 0.246(09375) or $\frac{63}{256}$ oe