JustMaths

BUMPER "BETWEEN PAPERS" PRACTICE PAPER

SET 2 (OF 3)

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 IT MAY STILL COME UP ON PAPERS 2 OR 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 BUT WE CANNOT GUARANTEE HOW A TOPIC WILL BE EXAMINED IN THE NEXT PAPERS ...

ENJOY!

MEL & SEAGER

EXAMINERS COMMENTS

Q1. Many students did attempt to make a common denominator but often they only managed to get one of the two fractions correctly converted so could only access two of the three marks available. Others added the fractions correctly but forgot to add the whole number. Some started by converting the mixed number into an improper fraction but then could not cope with 19 × 7. Others left their answer as an improper fraction.

Q2. Although 90° and 24° angles were often clearly marked on the diagram these were not always in the correct place. There was generally a good recognition of the 90° angle between a radius and a tangent. The question stated that angle *TPO* = 24° but a large number of candidates took angle *TPS* to be 24° and this resulted in 156 being a common incorrect answer. Some candidates gave angle *SOT* as 48° from incorrectly applying 'the angle at the centre is twice the angle at the circumference'.

Q3. Some students could recall the need to consider multiplying the recurring decimal by powers of ten but not many could use a correct combination to eliminate the recurring nature of the decimal. A small number of students gave a clear, accurate and complete solution to score full marks.

Q4. About half of the students gave fully correct answers to the solution to a pair of simultaneous equations. It was gratifying to see that few students attempted a trial and improvement method of solution with the elimination method being the most popular with the elimination of *y* by adding being the most successful.

Q5. Performance on algebraic fractions does not seem to get very much better over time, although a few candidates did gain 1 mark for writing the left-hand side of this equation over a common denominator or correctly multiplying out by a common multiple of 2 and 5.

A common error was to see all the left-hand side multiplied by 10, but not the righthand side. The percentage of candidates who could then turn this into a linear equation of the form $ax = b$ was very small and fully correct solutions of $^{12}/_{13}$ were seldom seen. There were many attempts using inappropriate trial and improvement methods, all of which were unsuccessful.

Q6. There remains a lot of confusion about frequency polygons. Weaker candidates confuse them with bar charts, or plot the points at the ends of the interval. Others plot them as if a scatter diagram, without joining the points. What to do at the ends is a further confusion, and some joint the two end points. Candidates who drew a bar chart gained some credit if the midpoints of the top of the bars was indicated, but no credit if the corners were used instead. Candidates who superimposed a polygon on top of the bar chart could get full marks.

Q7. A well answered question. The most common errors seen were either calculations involving 246, taking the total number of Year 8 students 120, or the use of 531. Candidates need to think about whether their final answer makes sense; for example, answers greater than 120 clearly make no sense given the context. Some lost the final mark since they failed to give the answer as a whole number of students.

Q8. In part (a) students could either convert to percentages to make the comparison, or find 10% of 360° for a comparison to be made. Both methods were equally popular, though the latter more successful. Some had difficulty in converting to a percentage from a fraction (e.g. $^{40}/_{360}$ or $^{1}/_{9}$). In part (b) many realised that they had to first find the missing angle for those who cycled, and this was presented in working, on the diagram, or frequently as their final answer. Only a minority went on to use this to calculate the number of students who cycled.

Q9. Many candidates were relatively comfortable in the use of a correct conversion factor between kilometres and miles (8 km = 5 miles). Loss of marks tended to reflect candidates inability to deal with 2 hours 45 minutes as an expression in hours only (2.75), many

multiplying their converted distance in miles by 165 minutes or more alarmingly 2.45 hours. Again arithmetic errors cost many candidates dearly. A lot of candidates only seemed to want to calculate part of the solution and final answers of 50 or 220 were common.

Q10. Part (a) was well answered with 84% of candidates gaining full marks.

In part (b), for those that had an answer to part (a) the majority plotted the points correctly and joined them with a curve or straight line segments. Only a few did not plot the points at the end of the intervals but provided they were consistent within the intervals they scored one mark instead of two.

In part (c), a significant number managed to get answers within the range 48 – 52 and gained the 2 marks. The range of 48 to 52 was too tight for some students but follow through marks were available in this part of the question. Where answers were incorrect some forgot to subtract their reading at 36 from 120, these candidates scored 1 mark only, others read off the value at 33 not realising that the 2 scales were different and so failed to score.

Q11 The reflection in part (a) proved demanding for many. Reflections in vertical or horizontal line were common as were translations. A significant number of candidates were able to reflect the vertex at the right angle correctly but then had the vertical side of the reflected triangle as 3 cm rather than 2 cm. Some tried to use different lines of reflection other than the given line.

In part (b) candidates had to name the transformation as a translation rather than give a written description. Likewise, giving a written description of the translation such as ' 2 left and 4 down' was insufficient; the correct vector had to be seen in order to gain full marks.

Common errors were incorrect signs on one or other of the vector components or incorrect order. The vector was inverted by many candidates with fewer either writing the vector as coordinates or omitting the brackets.

Q12.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.

Q13. There were a good proportion of fully correct frequencies given in part (a). With others scoring M1 by calculating the first line (15) correctly. There were then significantly more errors in the following lines.

In part (b), many correct answers were seen, although some failed to read the question fully and wrote "13:80" rather than "13:93". Many scored follow through full marks, using "13:their frequency total". Some candidates failed to score, having calculated the bottom frequency as "13", and not providing reasoning or a complete method for using 13 again in the ratio, evidence of a correct method was necessary to gain marks. Some gave the final answer as a fraction.

In part (c), very few marks scored. A fair number identified that they had to find the 47th value, but had no idea how to do this. The most common incorrect answer was 1250, and even amongst the stronger candidates a method to find the 46.5th value was frequently seen. The mean was also incorrectly given as the answer for this part.

Q14. Very few candidates failed to construct an accurate box plot showing the given information in part (a). Some failed to draw a box whilst a minority showed all 5 pieces of information in a box.

Part (b) was very much less well done. Many candidates clearly appear not to understand the

meaning of quartiles in the context of a problem and failed to grasp that they had to find ¾ of the data. The most common incorrect approach was to try to use the Weight values as frequency values.
For example 6.5 – 2.8 = 3.7

Q15. Part (a) was a standard trinomial factorisation and many candidates were able to show their skill. Many other candidates gained one mark by a nearly correct factorisation (the signs incorrect). They could have checked that their answer was correct by expanding and simplifying, as this skill is generally done more accurately.

Part (b) was an example of expanding brackets including surds and most candidates were able to supply four terms. Often the first term was wrong, being written as $6\sqrt{5}$ instead of, for example, $6\sqrt{25}$.

Surprisingly, some candidates gave their final answer as $30 + \sqrt{5} - 1$
Most candidates were well-primed to gain at least one mark in part (c) by multiplying numerator and denominator by $\sqrt{12}$, although only a few could go on to simplify their expression to get $\sqrt{3}$, with the answer being left as $\frac{\sqrt{12}}{2}$ or as $\sqrt{6}$

Q16. This was another well answered question. Most students completed the table of values correctly and went on to plot points accurately in part (b). By far the most common loss of marks was because students either joined their points with straight line segments or because they did not join them at all. Many students scored full marks.

Q17. Few chose the correct bounds to use, and of those most incorrectly chose both lower bounds as part of the calculation.

Q18. Most students were successful with this question through a variety of approaches. The most common incorrect calculation seen was $\frac{20}{32} \times 25$.

Q19. Many candidates did not fully understand the 'compound' nature of the depreciation in this question and merely subtracted 20% (£2000) and 10% (£1000) of the original cost of £10000 giving an answer of £7000. This did gain one mark only for the implied subtraction of £2000 from the cost for the first year. Some candidates merely gave £3000 as their answer. This scored no marks. Again arithmetic errors were in abundance and it was not uncommon to see 20% of 10000 as 200, etc.

Q20. The majority of candidates were able to gain a mark in part (a), most often for working out the profit. Following this, some candidates successfully used a 'build up' method to arrive at 3% but many were unable to make further progress. Some just divided 4500 by 100 and gave an answer of 45%; others worked out 150 000 ÷ 4500, giving 33.3% as their final answer. Some responses reached 103% but stopped there, failing to realise that this was an increase of 3%.

In part (b), many used simple rather than compound interest, for which they gained 1 of the 3 available marks. Evaluating $154\,000 \times 0.04^2$ was seen from some candidates rather than the correct $154\,000 \times 1.04^2$. The most common approach, however, was to calculate the interest year by year.

Q21.Very few attempted this question and of those that did few gained full marks. Areas of triangles were attempted to gain partial credit, but often '$\frac{1}{2}$' was omitted. Working was often poorly presented and attempts at simplifying surds were generally weak.

Q22 This question was well attempted by most candidates, though poor arithmetic when calculating the area did prevent some candidates from achieving full marks. Most candidates opted to cut the shape into two rectangles adding the areas to get 15 then diving by 2.25 and

most chose to use repeated adding to find 15 ÷ 2.25. These candidates were the most successful. A few candidates chose to divide the individual areas by 2.25 and then add the areas. This usually worked unless candidates rounded before adding, which in some cases, led to incorrect answers. Candidates who decided to calculate the area of the shape using subtraction of areas were less successful. Weaker candidates calculated the perimeter. Virtually all candidates remembered to finish their answer which a short sentence stating the number of packs required.

Q23 Successful candidates either worked out the value of 1 share or used equivalent ratios 3:4, 30:40 and 60:80. Errors occurred when candidates did not initially divide £140 by 7 but divided by either 3 or 4 leading to common incorrect answers of £105 or £35. Some candidates just divided £140 into 2 equal parts. As this was the first question on the paper, it may have been haste to get on that led to some candidates who completed correct calculations not presenting Jack's share alone as the final answer. On this occasion they did gain full credit but centres could encourage candidates to reread a question before moving on to make sure that they have answered the actual demand.

Q24 This question was generally answered very well. Candidates usually attempted it by listing multiples of 12 and multiples of 20. Arithmetic mistakes were surprisingly common and some candidates miscounted the multiples or transposed the two answers.

Some wrote the common multiple, not the number of boxes of each required, on the answer lines in part (i). Relatively few candidates expressed 12 and 20 as a product of prime factors although those that attempted this method were often successful.

Part (ii) was usually answered correctly, although some candidates did double their LCM to 120 and some halved it to 30.

Q25 Only very few students scored marks as they did not know that there are 100 centimetre^2 in a metre^2. Some did produce a rectangle with sides of 4 m and 1 m and changed this to 400 cm and 100 cm. If they followed this with 400 × 100 = 40000 then they got the two marks available.

Q26 Most candidates understood what they needed to do and marks were most frequently lost due to a lack of care and attention to detail. Monetary answers had to be shown with the correct currency units, and written correctly (eg £26.5 is not enough). There were also errors in undertaking subtraction, even neglecting to do it after a currency conversion.

Q27 This question was well attempted by most candidates with many scoring full marks. The most common error was 32 where candidates did 2 × 16 rather than 2.5 × 16. Other candidates calculated the amount of biscuits that could be made from each ingredient then either chose the wrong answer, made a computational error or added all their answers together. A few candidates tried to calculate the ingredients needed for one biscuit but, for almost all, the calculations proved too difficult. Computational errors were common on this question.

Q28 Many students employed inappropriate methods in their attempts to find the unknown angle *x*. Pythagoras' theorem was often applied to triangle *ADC* or to triangle *ABC* with *AB* taken as 10.4 cm. Some students assumed triangle *ADC* to be isosceles and came close to the correct answer by taking *DC* equal to 10.4 cm. Other incorrect methods involved the incorrect use of the sine or cosine rules again in triangle *ADC*. Those using the sine rule correctly often gave angle *ADC* as an acute angle. This did gain some credit but no marks were awarded for subsequent working which sometimes led to the correct answer by incurring further errors. Students who took the direct route to find angle *ACB* usually gained full marks, however at times premature approximation resulted in the loss of the accuracy mark. Another common successful approach was to find *BC* using Pythagoras' theorem and then use trigonometry to find the required angle.

Q29 This question was well attempted by students and they were gaining the full range of marks. The weakest candidates often gained a mark for finding an angle but usually could not see how to proceed to find TR with many drawing in extra lines to create what they assumed to be right-angled triangles or made assumptions that their lines had bisected angles and so led to incorrect final answers. The slightly more able usually correctly used the Sine Rule to find the length of AR but were unable to then correctly use the Cosine Rule or tried to apply the Sine Rule again so only gained three marks. The most able students were able to correctly apply both the Sine and Cosine rule but some lost the accuracy mark due to premature rounding in their working out.

Q30 Many of the more able students found this question straightforward. However, for a significant number of students, progress beyond finding the size of the angle *APT* or the size of angle *QRD* was limited. Those students who found the size of angle *APT* (58°) did not always recognize that angle *PTR* was the same size (alternate angles) though this route was the one which featured most commonly among fully correct solutions.

Students who found the size of angle *QRD* could not usually work out that to use it a line parallel to *APB* and *CTRD* through *Q* was needed. More often, students assumed that angle *PTR* and angle *QRD* were equal in size despite their being no indication that line *PT* was parallel to line *QR*.

A small number of students drew a vertical line through *Q* and went on to complete the question successfully.

Q31 Many students were able to score at least 1 mark for calculating the exterior/ interior angle of the octagon or for finding the angle *KFG* (110°) in the hexagon. A common error here was to treat the hexagon as a regular hexagon, or to incorrectly state the sum of the interior angles of the hexagon as 360°. A significant number of students had difficulty in working out 360 ÷ 8 or 1080 ÷ 8.

Q32 It was encouraging to see that many students drew an appropriate line from *D* on the diagram to make a parallelogram to help them with their calculations. However many thought that angle *ABC* was 140°. Students should be encouraged to show their calculated angles on the diagram for clarity as they often did not write down which angle they were calculating when doing calculations. Although many students worked out that *x* was 24°, students are still missing out key words such as "angles" in their explanations and most did not give any reason relating to parallel lines or a parallelogram which meant they could not access the 2 marks for giving reasons.

Q33. Many candidates showed some understanding of the relative size of the powers of 5 in this question and were able to score at least one mark for ordering three or more of the numbers correctly or for evaluating 5^{-1} or 5^0 correctly. Unfortunately, a significant proportion of candidates evaluated either 5^{-1} or 5^0 incorrectly as −5 or 0.5 and 0 respectively and so could not be awarded full marks. A surprising number of candidates did not show that −5 was the smallest of the four numbers listed.

Q34 Most candidates earned the mark in part (a). The only common error was where candidates added the indices rather than taking them away.

In part (b), there was a general understanding as to what to do with the individual number and algebra terms. y^3 and y sometimes ended up as just y^3 and the 5 sometimes became a 6. However, by far the most common error was in writing the answer with an operation embedded, $5x^6 + y^4$ and $5x^6 \times y^4$ being the most usual.

Q35 Very few candidates attempted to solve this problem algebraically, the majority employing trial and improvement methods. Some used a ratio approach which was usually fully correct. Some candidates found the correct costs without showing a clear method but

could gain full credit if they showed clearly that their total cost of the 8 purses and 9 key rings was £40

The most common error, scoring no marks, was to divide £40 in the ration 1 : 2 and then find their costs by dividing the two parts by 8 and 9 for the cost of a purse and key ring respectively. This led to answers where the price of a purse was not double the price of a key-ring.

Q36 This question was well attempted and many gained full marks. Most set up the equation $7b + 22 = 2(5b + 2)$ and correctly solved it however, many were complicating the problem by solving it using the simultaneous equations $7b + 22 = 2x$ and $5b + 2 = x$ or by setting up the equation $7b + 22p = 2(5b + 2p)$. Despite these more complex methods students still gained full marks by correctly eliminating the x or by realising that $p = 1$. Weaker students were unable to solve their equations but usually scored M1 or resorted to a trial and improvement method hence either scored zero, one mark for the expressions or full marks if successful.

Q37 Students were equally successful in parts (a) and (b) though many did not gain full marks. Many students did not realise the connection between parts (a) and (b) and even those who gained full marks in part (a) often lost the mark in part (b). Likewise, students who were unable to gain full marks in part (a), sometimes even scoring zero in part (a), then wrote in a fully correct coordinates for their answer to part (b). In part (a) weaker students were often able to write $(x - 4)^2$ or wrote $p = 4$ to gain one mark and slightly more able students correct completed the square, writing $(x - 4)^2 - 10$ or equivalent but then gave the answer $p = -4$ with $q = -10$.

Q38 This question was well attempted by the more able students who quickly identified that it required the use of the formula. These students usually worked carefully and accurately to score full marks. Of the many students who were not successful, most either attempted to factorise the quadratic expression or they attempted other fruitless algebraic manipulation. Attempts using trial and improvement were also often seen but these were invariably unsuccessful.

Q39 This question was not done well. Few students could construct the perpendicular from the given point to the line. When drawing the arcs at point *C* centre *A* and centre *B*, students should be advised to draw arcs below the line as well as at point *C*. It was evident that a significant number of students did not use compasses to draw their construction arcs. A common incorrect answer was to draw the perpendicular bisector of the line *AB*.

Q40. About two thirds of all students entered for this paper were able to score some credit for their responses to this question. About a third of students provided a fully correct response and a further third of students scored part marks for at least one correct boundary. A common error was to replace what should have been an arc with a vertical line.

MARK SCHEME

Q1.

5MB2H_01 November 2015					
Question		Working	Answer	Mark	Notes
			$4\frac{8}{35}$	3	M1 for converting both fractions to get a common denominator of a multiple of 35 with at least one correctly converted. M1 (dep on M1) for $3+\frac{"28"}{35}+\frac{"15"}{35}\left(=3\frac{43}{35}\right)$ oe A1 for $4\frac{8}{35}$ cao

Q2

Question		Working	Answer	Mark	Notes
		Angle *PTO* = angle *PSO* = 90 Angle *TPS* = 24 × 2 = 48 360 – 90 – 90 – 48 OR Angle *PTO* = 90 Angle *TOP* = 180 – 90 – 24 = 66 66 × 2	132	3	M1 for angle *PTO* = 90 or angle *PSO* = 90, could be marked on the diagram M1 for 360 – 90 – 90 – (24 × 2) A1 cao OR M1 for angle *PTO* = 90 or angle *PSO* = 90, could be marked on the diagram M1 for 2 × (180 – 90 – 24) A1 cao

Q3

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
		$\frac{59}{330}$	3	M1 for $100x = 17.87878787\ldots$ or $1000x = 178.7878787\ldots$ **and** $10x = 1.7878787$ M1 (dep) for subtraction, $100x - x$ or $1000x - 10x$ or $\frac{17.7}{99}$ or $\frac{177}{990}$ seen A1 working leading to given fraction

Q4

Question		Working	Answer	Mark	Notes
		$20x + 10y = 35$ $6x - 10y = -48$ $x = -\frac{1}{2}$ $y = \frac{9}{2}$ OR $12x + 6y = 21$ $12x - 20y = -96$ $26y = 117$ $y = \frac{9}{2}$ $x = -\frac{1}{2}$	$-\frac{1}{2}, \frac{9}{2}$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao **NB** Trial and improvement methods score 0 marks unless both x and y are correct

Q5

		Working	Answer	Mark	Notes
			$^{12}/_{13}$	3	M1 for multiplying throughout by 10 oe or writing LHS as a single fraction e.g $2(4x-1)+5(x+4)=3\times 10$ or $\frac{2(4x-1)+5(x+4)}{10}$ or $\frac{2(4x-1)}{10}+\frac{5(x+4)}{10}$ M1 (dep) for a complete correct method to obtain linear equation of the form $ax = b$ (condone one arithmetic error in multiplying out the bracket) A1 for $^{12}/_{13}$ oe (decimal equivalent is 0.923...)

Q6

		Working	Answer	Mark	Notes
			Points plotted at (5, 6), (15, 9), (25, 8), (35, 7), (45,5) and joined with line segments	2	B2 for correct plotting of 5 points and joining with line segments (B1 for points plotted correctly 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 point joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Q7

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
		15	2	M1 for $\frac{134}{1065}\times 120$ or 15.098... oe A1 cao

Q8

Paper_5MB1F_01					
Question		Working	Answer	Mark	Notes
	(a)		No and comparison	2	M1 for writing a fraction of 360 eg $\frac{40}{360}$ or $\frac{36}{360}$ OR $\frac{1}{9}$ or $\frac{1}{10}$ or decimals 0.11 or 0.1 or percentages 11.1% or 10% (% needed) A1 for No and $\frac{40}{360}>\frac{36}{360}$ oe OR M1 for $\frac{10}{100}\times 360$ (= 36) A1 for No with 36
	(b)		75	3	M1 for $360-(70+40+150)$ (= 100) M1 for $150\div$ ("100" ÷ 50) oe A1 cao

Q9

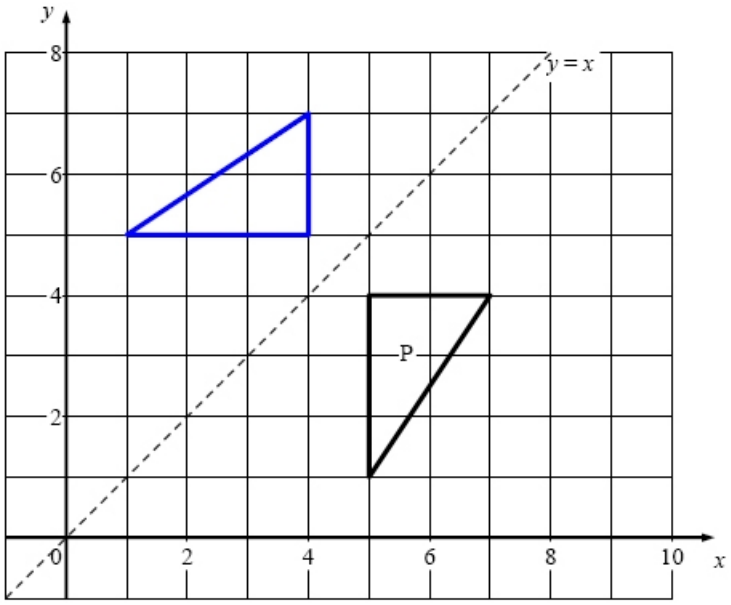
Question	Working	Answer	Mark	Notes
	80 × $\frac{5}{8}$ = 50 50 × 2.75 OR 80 × 2.75 = 220 220 × $\frac{5}{8}$	136 to 138 inc.	3	M1 for 80 × $\frac{5}{8}$ or 80 ÷ 1.6 oe (= 50) M1 (indep) for "50" × 2.75 [accept "50"× 165 (=8250)] or "50" + "50" + "50"÷2 (=25) + "25" ÷2 (=12.5) Note: "50" is what is considered to be their speed in miles per hour calculated using an explicitly stated conversion factor A1 for an answer in the range 136 to 138 inc. OR M1 for 80 × 2.75 (=220) [accept 80 × 165 (=13200)] or 80 + 80 + 80÷2 (=40) + "40"÷2 (=20) M1 (indep) for "220" × $\frac{5}{8}$ Note: "220" is what is considered to be their distance in kilometres calculated using an explicitly stated conversion factor A1 for an answer in the range 136 to 138 inc.

Q10.

5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)		4, 22, 46, 86, 110, 120	1	B1 for all correct
	(b)	Graph drawn.	cf graph	2	B1 for 5 or 6 of their points correctly plotted (±2mm) B1 for their points joined by a curve or line segments provided no gradient is negative SC B1 if 5or 6 points plotted not at the end but consistent within each interval and joined by a curve or line segments provided no gradient is negative
	(c)	Read off from cf graph at 36 miles. OR Use table $24+10+\frac{4}{10}\times40$ 24+10+16=50 OR $\frac{6}{10}\times40+46$ 24+46=70 120-70=50	50	2	M1 clear method to read off from cf graph at 36 miles. Can be awarded from their reading ±2mm OR $24+10+\frac{4}{10}\times40$ OR $120-(\frac{6}{10}\times40+46)$ A1 ft or answer in the range 48 to 52 (SC B1 for answer in range 68-72 if M0 scored)

Q11.

Question		Working	Answer	Mark	Notes
	(a)		Triangle with vertices (1, 5) (4, 5) (4,7)	2	B2 correct reflection (B1 a translation of the correct answer with the final shape above $y = x$ **or** any two correct vertices) SC : B1 for a triangle with vertices at (2, 5) (4, 5) (4, 8)
	(b)		Translation by $\begin{pmatrix}-2\\-4\end{pmatrix}$	2	B1 Translation B1 $\begin{pmatrix}-2\\-4\end{pmatrix}$ NB. Award no marks for a combination of transformations



Q12.

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

Q13.

		Working	Answer	Mark	Notes
	(a)	0.016 × 500 = 8 0.03 × 500 = 15 0.08 × 250 = 20 0.096 × 250 = 24 0.026 × 1000 = 26	(8), 15, 20, 24, 26	2	M1 for correct calculation to find one frequency e.g. 0.03 × 500 or 0.08 × 250 or 0.096 × 250 or 0.026 × 1000 or for one frequency correct or establishing that 1 cm^2 = 2.5 fish A1 for all frequencies correct
	(b)	0.026 × 500 = 13 8 + 15 + 20 + 24 + 26 = 93	13 : 93	2	M1 ft for a complete correct method to find the number of fish over 2000 g ie 0.026 × 500 (=13) or '26'÷2 A1ft for 13 : 93 or '0.026 × 500' : 'total for all their fish' or '26'÷2 : 'total for all their fish'
	(c)	47th item needed	1292	2	SCB1 for 93:13 given as the answer M1 for a complete correct method to divide the area of the histogram into two equal parts **OR** for a complete correct method to interpolate for the 47th value A1 for answer in range 1290 to 1300

Q14.

Question	Working	Answer	Mark	Notes
(a)		Box plot	2	B2 for correct box plot (B1 for box plot with at least 3 pieces of information correctly plotted) Note: There must be a box
(b)	75% × 60	45	2	M1 for 0.75 × 60 oe A1 cao [SC: B1 for an answer of 15 if M0 scored]

Q15.

5MB2H/01 June 2015				
Question	Working	Answer	Mark	Notes
(a)		$(y-7)(y+2)$	2	B2 cao (B1 for $(y \pm 7)(y \pm 2)$)
(b)		$\sqrt{5}+29$	2	M1 expand brackets, with at least 3 correct terms including signs or 4 correct terms ignoring signs eg $2\sqrt{5}\times3\sqrt{5}-2\sqrt{5}+3\sqrt{5}-1\times1$ A1 for $\sqrt{5}+29$ or $29+\sqrt{5}$
(c)		$\sqrt{3}$	2	M1 for $\frac{6}{\sqrt{12}}\times\frac{\sqrt{12}}{\sqrt{12}}$ oe or $\sqrt{12}=2\sqrt{3}$ A1 cao

Q16.

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
(a)		−3 −2 −1 0 1 2 3 −5 **8** 9 **4** **−1** 0 13	2	B2 for all 3 correct values (B1 for 2 correct values)
(b)			2	M1 (dep on B1) for plotting at least 6 values from their table A1 for a correct graph

Q17

5MB3H_01 November 2015				
Question	Working	Answer	Mark	Notes
		0.063	3	B1 for 252.5 or 247.5 or 3950 or 3850 M1 for 247.5 ÷ 3950 or ft "lower bound for 250" ÷ "upper bound for 3900" A1 for 0.062–0.063 (from correct working)

Q18

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
		40	2	M1 for 32 ÷ 20 (= 1.6) or 32 × 25 (= 800) or 20:25 (or use of) A1 cao

Q19

Question		Working	Answer	Mark	Notes
		10 000 × 0.8 8000 × 0.9 = 7200 OR 10 000 – $^{20}/_{100}$ × 10 000 = 8000 8000 – $^{10}/_{100}$ × 8 000 OR 10 000 × 0.8 × 0.9	7200	3	M1 for 10 000 × 0.8 (= 8000) M1 (dep) for "8000" × 0.9 (= 7200) A1 for £7200 cao OR M1 for 10 000 – $^{20}/_{100}$ × 10 000 oe M1 (dep) for "8000" – $^{10}/_{100}$ × "8 000" oe A1 7200 cao OR M1 for 0.8 × 0.9 (=0.72) M1 (dep)for 10 000 × "0.72" A1 for 7200 cao [SC: B1 for an answer of 7000 if M0 scored]

Q20

		Working	Answer	Mark	Notes
	(a)	154500 – 150000 $^{4500}/_{150000}$ × 100	3	3	M1 for 154500 – 150000 or 4500 M1 for $'^{154500 - 150000}/_{150000}$ × 100 oe A1 cao **OR** M1 for $^{154500}/_{150000}$ (× 100) M1 for $"^{154500}/_{150000}$ × 100" – 100 oe A1 cao
	(b)	154500 × $^{4}/_{100}$ + 154500 160680 × $^{4}/_{100}$ + 160680 or 154500 × 1.04^2	167107.20	3	M1 for 154500 × $^{4}/_{100}$ or 6180 **or** 12360 **or** 160680 **or** 166860 **or** 1.04 × 154500 M1 (dep) for (154500 + '6180') × $^{4}/_{100}$ or 6427.2(0) or ' 160680' × 1.04 A1 for 167107.2(0) as final answer **OR** M2 for 154500 × 1.04^2 (M1 for 154500 × 1.04) A1 167107.2(0) as final answer

Q21

Question	Working	Answer	Mark	Notes
		$\frac{1}{4} - \frac{\sqrt{6}}{12}$	3	M1 for $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2}$ or $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{3}$ M1 for $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} - \frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{3}$ A1 for $\frac{1}{4} - \frac{\sqrt{6}}{12}$ oe OR M1 for (BC =) $\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3}$ M1 for $\frac{1}{2} \times \left\{\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3}\right\} \times \frac{\sqrt{2}}{2}$ A1 for $\frac{1}{4} - \frac{\sqrt{6}}{12}$ oe

Q22

		Working	Answer	Mark	Notes
		4.5 × 2 + 3 × 2 = 15 or 4 × 3 + 2 × 1.5 = 15 or 4 × 4.5 – 2 × 1.5 = 15	7	4	M1 for a correct method to calculate at least one area using correct dimensions M1 for a complete method to find the total area (can be implied by 15) M1 for "15" ÷ 2.25 (=6.66…) or 2.25 × 6 (=13.5) or 2.25 × 7 (=15.75) or repeated addition to within 2.25 of "15" C1 (dep on at least 1 method mark) for 7 packs clearly identified and supported by their calculations

Q23

Question	Working	Answer	Mark	Notes
	140 ÷ (3 + 4)(= 20) "20"×4	80	2	M1 for 140 ÷ (3 + 4) or 20 or $\frac{4}{7}$ × 140 A1 cao

Q24

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
	(i)	20, 40, 60 12, 24, 36, 48, 60 20 = 4×5 = 2×2×5 12 = 4×3 = 2×2×3	3 and 5 or any multiple of 3, 5	4	M1 attempts multiples of both 20 and 12 (at least 3 of each shown but condone errors if intention is clear) or identifies 60 or a multiple of 60 M1 (dep on M1) for a division by 20 or 12 or counts up 'multiples' or identifies a common multiple (implied if one answer is correct or answers reversed) A1 cheese slices (packets) 3, burgers (boxes) 5 or any multiple of 3, 5 OR M1 for expansion of either 20 or 12 into factors M1 for demonstration that both expansions include 4 (or 2 × 2) A1 cao for cheese slices (packets) 3, burgers (boxes) 5
	(ii)		60		B1 for 60 or ft from their correct answer in (i) or ft 'common multiple'

Q25

Question		Working	Answer	Mark	Notes
			40 000	2	M1 for 100 × 100 isolated or 4 × 100 × 100 A1 cao

Q26

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
		£26.50 **or** HK$325.95	3	M1 for 3179.55 ÷ 12.3 (=258.5) M1 (dep) for 285 - '258.5' A1 for £26.50 (correctly stated with currency) **OR** M1 for 285 × 12.3 (=3505.5) M1 (dep) for '3505.5' - 3179.55 (=325.95) A1 for HK$325.95 (correctly stated with currency)

Q27

		Working	Answer	Mark	Notes
		250 ÷ 100 = 2.5 300 ÷ 50 = 6 600 ÷ 120 = 5 60 ÷ 15 = 4	40	3	M1 for 250 ÷ 100 or 300 ÷ 50 or 600 ÷ 120 or 60 ÷ 15 M1 for 250 ÷ 100 **and** 16 × '2.5' or 2.5 oe seen **and** 16 × '2.5' A1 cao **SC** M2 (16+16+16÷2) oe A1 cao **SC** M2 (250÷ $^{100}/_{16}$) oe A1 cao

Q28

Question		Working	Answer	Mark	Notes
			30.1	4	M1 for a correct trigonometric statement to find an unknown angle, eg. $\sin(30+x)$ or $\cos A = \frac{10.4+5.2}{18}$ or $\frac{\sin ADC}{18} = \frac{\sin 30}{10.4}$ M1 for a complete method to find the angle, eg. $\sin^{-1}\left(\frac{10.4+5.2}{18}\right)$ (= 60.07...) or $\cos^{-1}\left(\frac{10.4+5.2}{18}\right)$ (= 29.92..) or $\sin^{-1}\left(\frac{18\times\sin 30}{10.4}\right)$ (= 59.92.. or 180 – 59.92.. = 120.07..) M1 (dep on M2) for a fully complete method to find angle x, eg. "60.07.". – 30 or 60 – "29.92.." or 90 – "59.92.." A1 for answer in the range 30.07 to 30.1 OR M1 for $(BC^2=)\ 18^2 - (10.4+5.2)^2$ or $BC^2 + (10.4+5.2)^2 = 18^2$ M1 for $(BC=)\ \sqrt{18^2 - (10.4+5.2)^2}$ (= 8.97...) M1 (dep on M2) for a fully complete method to find angle x, eg. $\tan^{-1}\left(\frac{5.2}{"8.97..."}\right)$ A1 for answer in the range 30.07 to 30.1

Q29

5MB3H/01 June 2015				
Question	Working	Answer	Mark	Notes
		6.2	5	M1 for a method to find an angle $RAB = 70$, $ABR = 50$, $BRA = 60$ or $TAR = 20$ M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$ M1 for use of sine rule to find AR, $AR = \frac{12}{\sin"60"} \times \sin"50"$ (=10.61) M1 for substitution into cosine formula $TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (=37.92) A1 for 6.15 - 6.2

Q30

Question		Working	Answer	Mark	
			88	4	M1 for (*APT* =) 180 − (32 + 90) (=58) M1 for (*PTR* =) "58" M1 for 360 − ("58" + 124 + 90) A1 cao OR (line *XY* drawn through *Q* parallel to *AB*) M1 for (*QRD* =) 180 − 124 (=56) M1 for (*XQR* =) "56" M1 for (*PQX* =) 32 A1 cao

Q31

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
			25	4	M1 for complete method to work out interior angle of a regular octagon **or** 135° identified as an interior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg "135" − "110" or (8×"135" − 4×"135" − 4×"110") ÷ 4 or (3×180 − 2×"135" − 2×"110") ÷ 2 A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg 180 − "45" − "110" A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *JKF* or angle *JKF* identified as 70° M1 (dep on M2) for complete method to work out angle *KFE*, eg "70" − "45" A1 for 25 with supporting working

Q32

5MB2H_01 November 2015					
Question		Working	Answer	Mark	Notes
		360 − 64 140 + 40 + 296 + 40 = 516 540 − 516 = 24	24°	4	M1 for 1 correct relevant angle calculation A1 for 24 cao C2 for all reasons (C1 (dep M1) for reason relating to parallel lines or parallelogram which is relevant to their chosen method) eg angles on a straight line add to 180° angles at a point add to 360° angles in a triangle add to 180° angles in a quadrilateral add to 360° alternate angles are equal corresponding angles are equal allied angles / co-interior angles add up to 180° opposite angles in a parallelogram are equal

Q33

		Working	Answer	Mark	Notes
		– 5, 0.2, 0.5, 1	-5, 5^{-1}, 0.5 , 5^{0}	2	M1 for either 5^{-1} or 5^{0} evaluated correctly A1 for a fully correct list from correct working, accept original numbers or evaluated (SC B1 for one error in position or correct list in reverse order)

Q34

Question		Working	Answer	Mark	Notes
	(a)		m^2	1	B1 for m^2 or m^{5-3}
	(b)		$5x^6y^4$	2	M1 for $x^{4+2}y^a$ or x^by^{3+1} A1 cao

Q35

PAPER: 5MB3H_01

Question	Working	Answer	Mark	Notes
*	Key ring: 1.6 × 9 = 14.4 Purse : 3.2 × 8 = 25.6	Key ring £1.60 Purse £3.20	4	M1 for $9x$ or $8 \times 2x$ (where x is the price of a key ring) M1 for equation $9x + 8 \times 2x = 40$ oe A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation OR M1 for (8×2) : 9 (= 16 : 9) M1 for 40 ÷ (16 + 9) A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation OR M2 for trial with attempt to evaluate $9x$ and $8 \times 2x$ with £1 < x < £2 (M1 for trial with attempt to evaluate $9x$ and $8 \times 2x$ with £1 ≤ x ≤ £4) A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation [SC: B2 for both £1.60 cao and £3.20 cao clearly identified for correct items with correct money notation if no working shown]

Q36

5MB3H/01 June 2015				
Question	Working	Answer	Mark	Notes
		6	4	M1 for $7x + 22$ or $(5x+2)$ or $7b + 22p$ or $5b + 2p$ M1 for forming equation $7x + 22 = 2(5x + 2)$ M1 for correct intent to isolate x on one side A1 cao

Q37

5MB3H/01 June 2015				
Question	Working	Answer	Mark	Notes
(a)		$p = 4$, $q = -10$	3	M1 for sight of $(x - 4)^2$ or $p = 4$ M1 for $(x - 4)^2 - 16 + 6$ A1 for $p = 4$, $q = -10$ OR M1 for $x^2 - 2px + p^2 + q$ or $-2p = -8$ or $p^2 + q = 6$ M1 for $-2p = -8$ and $p^2 + q = 6$ A1 for $p = 4$, $q = -10$
(b)		(4, -10)	1	B1 ft

Q38

PAPER: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			$-2.87, 0.87$	3	M1 for substitution into formula; allow sign errors in b and c M1 for reduction to $\frac{-4-\sqrt{56}}{4}$ or $\frac{-4+\sqrt{56}}{4}$ A1 for 0.87 to 0.88 and -2.87 to -2.88 OR M1 for $(x+1)^2$ M1 for reduction to $\sqrt{\frac{7}{2}}-1$ or $-\sqrt{\frac{7}{2}}-1$ A1 for 0.87 to 0.88 and -2.87 to -2.88

Q39

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
			construction	2	M1 for a pair of arcs or a single arc, centre C, that cut line AB **and** at least one pair of arcs not at C within guidelines A1 for perpendicular within guidelines with appropriate construction arcs **OR** M1 for an arc, centre A radius AC **and** an arc centre B radius BC. The two arcs must intersect below AB A1 for perpendicular within guidelines with appropriate construction arcs (SC If M0 scored, B1 for correct perpendicular line within guidelines)

Q40

PAPER: 1MA0 2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		Loci drawn	3	B1 for line parallel to BC and 3 cm from BC B1 for arc drawn, centre C, with radius 4 cm B1 ft for shading a region below their horizontal line **and** inside their arc