JustMaths

BUMPER

"BETWEEN PAPERS 2 AND 3" PRACTICE PAPER (Q1 TO Q32)

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

Q1. Well done by many students but not by the majority of students, this standard routine also attracted frequent errors. For example many students had one incorrect midpoint, used values at the end of each interval instead of the midpoint or made one error somewhere else. There were also many students who added up the midpoints and divided by 5 and a surprising number of students who found the sum of the products of class interval multiplied by frequency.

Q2. This question was answered very poorly. Students struggled to write correct expressions for Bob's height and Cath's height. Those who did write $x + 10$ and $x - 4$ often got no further. Some used $10x$ rather than $x + 10$ and it was common to see just the single expression $x + 10 - 4$ which gained no marks. Very few students attempted to divide their total by 3

Q3. The students that translated the given information into a pair of simultaneous equations usually went on to score well, often full marks. Those students attempting trial and improvement/error methods usually failed to gain any credit. A small number of students wrote down the two initial equations but then did nothing with them. There were many responses using a ratio method, often initially dividing through by 9, which also failed to gain any credit.

Q4. Most students did not realise that they needed to set up a pair of simultaneous equations. The students who did successfully set up two equations sometimes got no further than this. It was surprising to see just how many students mistakenly based their method on working out £28.20 ÷ 5 and £44.75 ÷ 8. Attempts using a trial and improvement approach were again frequently seen. They were almost always unsuccessful.

Q5. At this stage in the paper there were many who failed to attempt this question. Of those who did, the weaker students attempted it by numerical methods, which all too frequently resulted in no marks. Of those who did attempt some algebra, the equation was sometimes not equated to N, but did attract some marks in (b) when simplified, though some students rejected their algebra in (a) for a numerical approach in (b).

Q6. There were some pleasing approaches to the solution of this problem. Successful candidates used properties of isosceles triangles to find the size of one of the base angles. If they got as far as this, the successful candidates invariably went to the angle PQR and solved the equation $2x + 13 = 58$ to get $x = 22.5$

Other approaches were tried but these were not successful as they were more algebraically complex.

The most common error was to say that the sum of the two base angles was 64 giving a starting point of $4(x-8) + 2x+13 = 64$

Q7. There were a high proportion of fully correct answers. Those that didn't score full marks often used 68 and 92 independently, rather than adding to make 160. Another common mistake was simply to divide 30 by 6. A number of candidates started by dividing 160 by 30, those who realised they needed to divide the result by 33 were then able to continue to a fully correct answer.

Q8. A small proportion of students answered this question apparently without hesitation and a few of these students gave a concise clear assumption. However, for most students the working space contained many calculations few of which were relevant to a correct solution.

Q9. Seeing the correct bounds was rare and 225.5 and 175.5 or 230 and 180 were often seen as the upper bounds of *BA* and *BC* respectively. Many students however earned the first mark for a correct upper bound for the angle.

Use of $\frac{1}{2}absinC$ was good, however it was not uncommon to see the students' upper bounds for *BA* and BC and then sin 50° used.

Q10. This question required the candidates to first find the side *BD* and then to use that to find the length of the side *CD*. Many got off to a good start by correctly using Pythagoras to find *BD*. At that point a number of candidates stopped, possibly believing that they had answered the question, and so lost the remaining three marks. Of those that realised they needed to continue, a good many managed to use a correct trigonometric expression to gain the third mark, although incorrect rearrangement often meant that they gained no further marks. Those that chose to use 'tan' often missed out on the remaining method mark for not realising that they had worked out the side *BC* and so still needed to

do one further calculation. Candidates who used Pythagoras incorrectly in the first stage were still able to gain the two marks for the second stage if they used their value for the length *BD* correctly. Early rounding of the length *BD* to 10.6 in this question was not penalised as it still gave an answer within the range. Candidates should, however, be reminded not to prematurely round answers to 1dp at the intermediate stages of calculations.

Q11. This question was not always attempted. When it was attempted, a common error was for students to calculate $10^2 + 5^2$ rather than $10^2 - 5^2$ in their application of Pythagoras' Theorem. Premature rounding led some students to lose accuracy in their answers and consequently score 3 out of the 4 marks available.

Q12. This question tested the more able students. Many of these students attempted to expand the numerator but had no idea what 'rationalise the denominator' meant.

Q13. Part (a) was done correctly by those candidates who understood the standard process of rationalisation. Answers in any correct form, such as $4\sqrt{3}$ or $\sqrt{48}$ were accepted for full marks. If candidates went on to attempt to simply their answer and gave a subsequent incorrect answer then they were not awarded the final A mark.
Some candidates think that they can rationalise the denominator of the fraction by squaring the top and squaring the bottom presumably under a misapprehension that they are dealing with equivalent fractions.

Part (b) required candidates to expand the square – in many cases this proved too much, with many cases of the equivalent of $a^2 + b^2$. The use of $a^2 + 2ab + b^2$ was rarely used even by successful candidates. Some could expand the brackets correctly, but could not see how to simplify their square roots so unsimplified answers such as $10 + 2\sqrt{16}$ were seen. Many went on to 'simplify' wrongly, giving answers such as $\sqrt{32}$

Q14. In part (a) the vast majority of students were able to interpret the graph to find the population in 1991. Students were a little less successful in part (b). Common incorrect answers were 4 (not taking into account that the vertical scale represents population in 1000s) and 2000

Q15. Both part (a) and part (b) were answered extremely well. Incorrect answers were usually the result of failing to read the question properly, eg using 2005 rather than 2006 in part (a) and giving the greatest profit rather than the year in which the company made the most profit in part (b).

Although the explanation was not always well written, most candidates were able to indicate in part (c) that the profit increased in the given time period. The exceptions were when candidates focused on finding the numerical values rather than describing the change in profit from 2009 to 2012.

Q16. This six-mark question testing functional elements for understanding a bank account with the interpretation of a line graph was well-answered. Candidates scored good marks in the graphical interpretation, and part (a) gave a good spread of marks as some candidates mixed up the £85 going out instead of in and the £45.56 going in rather than being taken out.

Q17. The most common error in part (a) was to plot the points at the end of each interval rather than at mid-interval. Other errors included joining the points with a curve rather than line segments.

Part (b) was generally well done although some candidates gave the answer as 35 rather than the class interval. Some students also gave the value of the frequency, 16, rather than the class interval.

Part (c) was not as well done as might have been expected.

Q18. The first two parts of this question were answered correctly by about two thirds of all students. The most common incorrect responses seen to parts (a) and (b) were 46 and 14 respectively. Part (c) of the question was much less well done and it was clear that many students do not have the depth of understanding to realise that the box plot divided the 80 children ' misunderstandings led to incorrect calculations, most commonly $80 \div 6$ or $^6/_{25}$ of 80.

Q19. Factorisation of a quadratic function with non-unitary coefficient of x^2 was poor. Many chose to employ the formula to solve the given equation. Any mistake in the use of the formula, which was more often than not, resulted in no marks. A fully correct solution by this method gained just one of the three available marks. Many did make good attempts at factorising but then failed to complete the solution. A common incorrect attempt at factorisation was $(4x-9)(2x+3)$.

Q20. 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.

Q21. Many of the attempted solutions demonstrated that candidates were not conversant with this part of the specification. A large proportion of candidates used $y = kx$ leading to an answer of 60 and gained no marks. A minority understood that y α x^2 or $y = kx^2$ was the essence of this problem and most of these candidates gained full marks. Some, however, correctly worked out $k = 4$ but then went on to multiply 4 by 5 instead of by 5^2 and lost two possible marks. Some candidates doubled the value of x and then squared to get the correct answer of 100, i.e. using $y = (2x)^2$.

Q22. The best candidates gave neat, clear and concise proofs. However, these were relatively rare and (n ─ 1)² + n^2 + (n + 1)² = n^2 + 1² + n^2 + n^2 + 1² or equivalent was frequently seen on candidates scripts. Just under 20% of candidates gained credit for correctly expanding at least one of the two expressions (n ─ 1)² or (n + 1)². These candidates usually completed the proof successfully though the presentation of their argument was sometimes a bit "haphazard".

Q23. In this question on algebraic proof there were very few fully correct answers. One mark for establishing n and n + 1 or equivalent was awarded to a few candidates and another small number of candidates who were able to write $(n + 1)^2 - n^2$ gained 2 marks. Some candidates were then able to correctly expand the brackets and correctly simplify the expression to $2n$ + 1 or equivalent, scoring 3 marks. For the fourth mark candidates had to establish and state that both elements of the original statement were equal.

A significant number of candidates used an arithmetic approach and gained no marks. There were also many nil attempts.

Q24. Most students showed they were able to expand the brackets correctly. Many also demonstrated that they could rearrange terms, either by rearranging a t term, or by dividing through by a numerical value. Some struggled with sign changes. The final mark was frequently lost when the candidate could not resolve all terms correctly. The final expression did not have to be fully simplified, but candidates did have to write an expression that was algebraically equivalent with the correct answer.

In part (b) clear working out was essential. It was encouraging to see many detailed attempts. Trial and improvement approaches rarely resulted in correct solutions. Substitution methods were equally unsuccessful. Most errors were due to arithmetic mistakes or error in handling negative signs. Most candidates were able to manipulate the equations but processing them was much harder.

Q25. 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.

Q26. In part (a) some candidates picked two points on the line and used these to work out the gradient, though there were many cases where the inverse of the gradient was given. Some chose to use a triangle on the line, but in this case many incorrectly counted squares rather than using the scale on the axes.

In part (b) it was disappointing to find too many giving an incorrect value of 35 or 36, when it was quite clear from the graph that the intersection point lay between these two values.

Q27. This problem was too much for many students. In fact many didn't get much further than one mark for the perimeter of the triangle and then possibly the B1 for the units. It was possibly the lack of diagram that caused many to struggle and students should be encouraged to draw diagrams in similar problems to aid their solution.

Q28. This proved to be a challenging question for the vast majority of candidates on this paper. Many candidates failed to show their working in an organised manner and they rarely made it clear exactly what they were working out. As a result examiners were faced with working scattered all over the working space with little explicit description of the strategy the candidate was using. It was often difficult to make out whether candidates were using volumes, areas or lengths. Some candidates employed methods involving the division of a volume or a rate by a length to find a time. Whilst a reasonable number of candidates were awarded some credit for their responses, only a small number were able to see the problem through to a successful conclusion. Some candidates worked with a cuboid rather than a prism.

Q29. Most candidates took the first step of finding the volume of the large tin; it was encouraging that most were able to remember the volume for a cylinder correctly. Further, most were also able to substitute the correct values. A minority unfortunately spoilt their solution by not using division to find the height of the new tin. Some candidates chose to use similar figures as an alternative process, but this was less successful due to the fact they were unable to scale these up.

Q30. A popular incorrect method was to evaluate $\frac{1}{3} \times \pi \times 15^2 \times 20$. Some candidates were able to write down a correct expression for the volume of the large cone but then did not realise that the radius of the smaller cone was 7.5 cm and so failed to make further progress. There was evidence of the wrong formula being used for the volume of a cone despite this being given on the formula sheet at the front of the paper; formulae for the volume of a cylinder or surface area of a cone were commonly seen. It was common to see the volume of the large cone being found correctly, and then halved for the volume of the frustum.

Q31. There were very few correct answers in part (a). Many students gave answers of 330° or 30° without working. Working accompanying 30° came from 360°- 330°. Very few students drew a diagram; those who did often left out one of the north lines.

In part (b) many students tried to break down the distance and speed obtaining 1 hour for 120 miles and trying to find the time needed for the remaining 80 miles. Unfortunately this method was often unsuccessful due to arithmetic errors. One mark was awarded for 200 ÷ 120 but this often resulted in an incorrect decimal (eg 1.8) which was converted incorrectly. However some marks were available when time conversions were done correctly. Some students tried to use the speed, distance and time formula but used 10 as the time. This often resulted in (10 × 120) ÷ 200. Another common error was to calculate 200 × 120. A small number of students spoiled an otherwise correct response by failing to give an actual time of arrival, giving instead the duration.

Q32. Well done by many students, answers to this question revealed a large number of accurate diagrams. A small proportion of students drew rectangles and other shapes.
The question was not attempted by some students and this left examiners wondering whether the students concerned had access to a pair of compasses.

Mark Scheme

Q1.

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
	$10 \times 75 + 14 \times 105 + 9 \times 135 + 5 \times 165 + 2 \times 195$ $750 + 1470 + 1215 + 825 + 390$ $4650 \div 40$	116.25	4	M1 for finding at least 4 products *ft* consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints. M1 (dep on 1st M) for 'Σft' $\div 40$ A1 for 116.25

Q2.

Question		Working	Answer	Mark	Notes
			$\frac{x+10+x+x-4}{3}$	3	M1 for $x + 10$ or $x - 4$ M1 for $x + 10 + x + x - 4$ A1 for $\frac{x+10+x+x-4}{3}$ oe

Q3.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
*		Example: $4a+5b=1115$ $3a+2b=530$ $12a+15b=3345$ $12a+8b=760$ $7b=1225$ $b=175$ $a=(1115-5\times175)\div4\ (=60)$ OR $8a+10b=2230$ $15a+10b=2650$ $7a = 420$ $a=60$ $b=(1115-4\times60)\div5\ (=175)$	Small = 60 Large = 175	5	M1 for two correct equations expressed in terms of two variables M1 (dep) for correct process to eliminate either variable (condone one arithmetic error) A1 for 60 or 175 M1 (dep) for correct substitution of their found variable or M1 (indep) for correct process to eliminate the other variable (condone one arithmetic error) C1 (dep on M3) for a statement giving small = 60 **and** large = 175

Q4.

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*		eg $2a+3c=28.2$ $3a+5c=44.75$ $6a+9c=84.6$ $6a+10c=89.5$ $c=4.9$ $2a+14.7=28.2$ $2a=13.5$ $a=6.75$	Adult ticket £6.75 Child ticket £4.90	5	M1 for correctly stating both equations algebraically M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for correct substitution of their found value to find other variable OR (indep) correct process to eliminate second variable (condone one error in arithmetic) A1 for 6.75 or 4.9 C1 for Adult ticket £6.75 and Child ticket £4.90 in correct money notation

Q5.

PAPER: 5MB3F_01					
Question		Working	Answer	Mark	Notes
	(i)		$N = 3x + 7$	5	M1 for $x + x + 3 + x + 4$ (=N) A1 cao
	(ii)		21		M1 ft for 61 = "$3x + 7$" M1 for isolating the x A1 ft "18" + 3 OR M1 for choosing a value of x and stating x, x+3, x+4 M1 for adding their values A1 ft

Q6.

Question		Working	Answer	Mark	Notes
			22.5	4	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, or $x - 8 = \frac{2x}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2x = 45$, $\frac{x}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8)$ = "58" or $2x + 13$ = "58" or "58" – 13 (= 45) M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ or "45" ÷ 2 A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for $\frac{45}{2}$ or 22.5

Q7.

		Working	Answer	Mark	Notes
		$\frac{15+18}{160} \times 30$	6	3	M1 for finding the proportion of the stratum e.g. $^{15}/_{160}$ Or $^{18}/_{160}$ or $\frac{15+18}{160}$ OR for finding the proportion of the population eg $^{30}/_{160} \times 100$ or 18.75% M1 for completing their method to find the sample size e.g $\frac{15+18}{160} \times 30$ oe or 18.75÷100×(15+18) or sight of 6.1(875) A1 cao

Q8.

5MB1H_01 November 2015					
Question		Working	Answer	Mark	Notes
			400 and correct assumption	4	M1 for partial working eg $\frac{60}{12}$ oe or 20% or $\frac{1}{5}$ seen or $80 \div 12$ (= 6.66..) or $\frac{12}{80}$ oe M1 for complete method eg $\frac{80 \times 60}{12}$ or 80×5 or $6.66.. \times 60$ or $\frac{12}{60} = \frac{80}{n}$ oe or $80 \div 0.2$ oe A1 cao C1 for a correct mathematical assumption eg population has not changed overnight or mark which does not wear off or sample is random etc

Q9.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			15500 to 15600	3	B1 for 50.5 (accept 50.4$\dot{9}$) or 227.5 (accept 227.4$\dot{9}$) or 177.5 (accept 177.4$\dot{9}$) M1 for 0.5 × "227.5" × "177.5" ×sin"50.5" A1 for an answer in the range 15575 to 15580 from using three **correct** upper bounds

Q10.

Question		Working	Answer	Mark	Notes
		$BD^2 + 12^2 = 16^2$ oe BD= $\sqrt{256-144}$ (=10.58...) sin 40 = $'10.58'/_{CD}$ $CD = '10.58'/_{CD}$	16.5	5	M1 for $BD^2 + 12^2 = 16^2$ oe or $16^2 - 12^2$ or 112 seen M1 for $\sqrt{256-144}$ or $\sqrt{112}$ (=10.58...) M1 for sin 40 = $'10.58'/_{CD}$ or cos 50 = $'10.58'/_{CD}$ M1 for $(CD=)$ $'10.58'/_{\sin 40}$ or $'10.58'/_{\cos 50}$ A1 for 16.4 – 16.5 **OR** M1 for $BD^2 + 12^2 = 16^2$ oe or $16^2 - 12^2$ or 112 seen M1 for $\sqrt{256-144}$ or $\sqrt{112}$ (=10.58..) M1 for $(BC=)$ '10.58'× tan 50 or $'10.58'/_{\tan 40}$(=12.6...) M1 for $\sqrt{'12.6'^2+'10.58...'^2}$ A1 for 16.4 – 16.5

Q11.

PAPER: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			9.54	4	M1 for $10^2 - 5^2$ (=75) or $(BD=)$ 10 × cos 30 (=8.66...) M1 for "75" + 4^2 (=91) or "8.66..."^{2} + 4^2 (=91) M1 for $\sqrt{(10^2 - 5^2 + 4^2)}$ or $\sqrt{("8.66..."^2 + 4^2)}$ A1 for 9.53 – 9.54

Q12.

5MB2H_01 November 2015					
Question		Working	Answer	Mark	Notes
			$2\sqrt{7}$	3	M1 for multiplying numerator and denominator by $\sqrt{7}$ M1 for correct method to expand $(4+\sqrt{2})(4-\sqrt{2})$ with 3 out of no more than 4 terms correct with correct signs or the 4 terms seen, ignoring signs A1 for $2\sqrt{7}$ (accept $\sqrt{28}$)

Q13.

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
	(a)		$4\sqrt{3}$	2	M1 for $\frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ A1 for $\frac{12\sqrt{3}}{3}$ oe with a rational denominator
	(b)		18	2	M1 for $\sqrt{2}\times\sqrt{2} + \sqrt{2}\times\sqrt{8} + \sqrt{8}\times\sqrt{2} + \sqrt{8}\times\sqrt{8}$ oe A1 cao OR M1 for $(\sqrt{2} + 2\sqrt{2})^2$ A1cao

Q14.

Question		Working	Answer	Mark	Notes
	(a)		8000	1	B1 (accept 8 thousand or 8)
	(b)		4000	1	B1 cao

Q15.

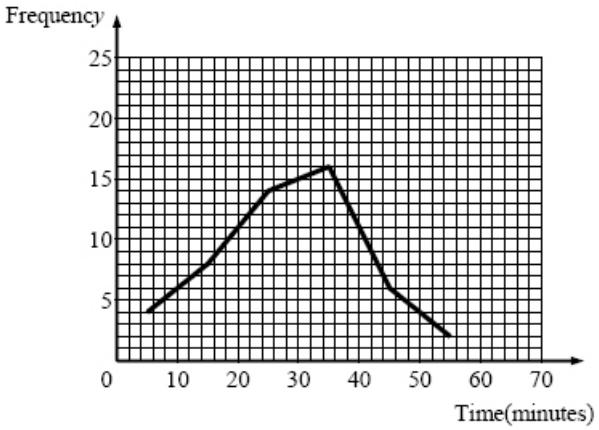
		Working	Answer	Mark	Notes
	(a)		2.5	1	B1 cao
	(b)		2008	1	B1 cao
	(c)		Correct statement	1	B1 for a correct statement, e.g. profit increased, profit went up by 2 million pounds

Q16.

		Working	Answer	Mark	Notes
	(a)		175.14	3	M1 for 135.70 + 85 (= 220.70) **or** 135.70 – 45.56 (= 90.14) **or** 85 – 45.56 (= 39.44) **or** 45.56 – 85 (= 39.44) M1 for correct complete method, eg. 135.70 + 85 – 45.56 A1 cao
	(b)		700	1	B1 cao
	(c)		November	1	B1 for Nov oe
	(d)		April , August	1	B1 for April and August oe

Q17.

Question	Working	Answer	Mark	Notes
(a)		Correct Frequency Polygon	2	B2 Fully correct polygon. Points plotted at the midpoint (B1 All points plotted accurately not joined, **or** one error in plotting but joined **or** all points plotted accurately and joined with, additionally, first joined to last **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (Includes joining last to first to make a polygon))
(b)		$30 < t \leq 40$	1	NB: ignore polygon before 1st point, and after last point. Ignore any histograms.
(c)	(6 +2) = 8, (4 + 8 + 14 + 16 + 6 + 2) = 50	$\frac{8}{50}$oe	2	B1 Allow any notation eg, 30-40 ft polygon M1 (6 +2)÷ (4 + 8 + 14 + 16 + 6 + 2) **or** ft figures from polygon **or** $\frac{8}{a}$with $a >$ 8 **or** $\frac{c}{50}$ with $c >$50**or** 8 and 50 used but notation incorrect (eg. 8:50 , 8 out of 50) A1 $\frac{8}{50}$oe (eg. 0.16) **or** ft figures from polygon



Q18.

Paper_ 5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)		48	1	B1 cao
	(b)		12	1	B1 cao
	(c)		20	2	M1 for 80 ÷ 4 A1 cao

Q19.

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
		4.5, –0.75 oe	3	M2 for $(2x - 9)(4x + 3)$ oe (M1 for $(2x \pm 9)(4x \pm 3)$) oe A1 for 4.5, –0.75 oe [SC: B1 for 4.5 and –0.75 oe, found by any other method]

Q20.

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

Q21.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		100	4	M1 $y = kx^2$ oe or $36 = k \times 3^2$ A1 $k = 4$ M1 (dep on M1) $(y =)$ '4'$\times 5^2$ A1 cao

Q22.

Question	**Working**	**Answer**	**Mark**	**Notes**
	$n^2 - 2n + 1 + n^2 + n^2 + 2n + 1$ $3n^2 + 2$	Proof	2	M1 for correct expansion of either $(n - 1)^2$ or $(n + 1)^2$ or $n^2 - 2n + 1$ or $n^2 + 2n + 1$ seen A1 for $3n^2 + 2$ from correct working

Q23.

		Working	**Answer**	**Mark**	**Notes**
*		$(n + 1)^2 - n^2$ $= n^2 + 2n + 1 - n^2$ $= 2n + 1$ $(n + 1) + n = 2n + 1$ OR $(n + 1)^2 - n^2$ $= (n + 1 + n)(n + 1 - n)$ $= (2n + 1)(1) = 2n + 1$ $(n + 1) + n = 2n + 1$ OR $n^2 - (n + 1)^2 = n^2 - (n^2 + 2n + 1) =$ $-2n - 1 = -(2n + 1)$ Difference is $2n + 1$ $(n + 1) + n = 2n + 1$	proof	4	M1 for any two consecutive integers expressed algebraically eg n and $n + 1$ M1(dep on M1) for the difference between the squares of 'two consecutive integers' expressed algebraically eg $(n + 1)^2 - n^2$ A1 for correct expansion and simplification of difference of squares, eg $2n + 1$ C1 (dep on M2A1) for showing statement is correct, eg $n + n + 1 = 2n + 1$ and $(n + 1)^2 - n^2 = 2n + 1$ from correct supporting algebra

Q24.

Question	Working	Answer	Mark	Notes
(a)	$2a + 2t = 5t + 7$ $2a = 3t + 7$ $2a - 7 = 3t$	$\frac{2a-7}{3}$	3	M1 for expansion of bracket eg $2\times a+2\times t$ or divide all terms by 2 M1 for attempt at rearrangement of t term eg $-2t$ each side; $2a = 3t+?$ but with separate terms. A1 $\frac{2a-7}{3}$ oe but must have one term in t. NB: for $\frac{2}{3}$ accept working to 2 dp: 0.67, 0.66, 2.33 or better
(b)		$x = \frac{2}{3}$ $y = -1\frac{1}{2}$	3	M1 for correct process to eliminate either x or y (condone one arithmetic error) M1 (dep on 1st M1) for correct substitution of their found variable or other acceptable method A1 cao for both $x = \frac{2}{3}$ and $y = -1\frac{1}{2}$ oe SC: B1 for $x = \frac{2}{3}$ or $y = -1\frac{1}{2}$ oe NB: for $\frac{2}{3}$ accept working to 2 dp: 0.67 or 0.66 or better

Q25.

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

Q26.

5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)		0.28	2	M1 for method shown to work out the gradient for car A A1 for 0.27 – 0.29
	(b)		35.5	1	B1 for 35.1 – 35.9

Q27.

5MB2F November 2016					
Question	Working	Answer	Mark	Notes	Type
	8 +8 + 8 = 24 24 ÷ 4 = 6 6 × 6 = 36	36 cm^2	5	M1 for 8 +8 + 8 (= 24) M1 for finding square side length ("24" ÷ 4) M1 for squaring side length ("24" ÷ 4) × ("24" ÷ 4) A1 for 36 cao B1 for cm^2	E

Q28.

		Working	Answer	Mark	Notes
			1 hour 45 mins	6	M1 for method to find volume of pond, eg ½ (1.3 + 0.5) × 2 × 1 (= 1.8) M1 for method to find the volume of water emptied in 30 minutes, eg 1 × 2 × 0.2 (= 0.4), 100 × 200 × 20 (= 400000) A1 for correct rate, eg 0.8 m^3/hr, 0.4 m^3 in 30 minutes M1 for correct method to find total time taken to empty the pond, eg "1.8" ÷ "0.8" M1 for method to find extra time, eg 2 hrs 15 minutes − 30 minutes A1 for 1.75 hours, 1¾ hours, 1 hour 45 mins or 105 mins **OR** M1 for method to find volume of water emptied in 30 minutes,.eg. 1 × 2 × 0.2 (= 0.4), 100 × 200 × 20 (= 400000) M1 for method to work out rate of water loss eg. "0.4" × 2 A1 for correct rate, eg 0.8 m^3/hr M1 for correct method to work out remaining volume of water eg. ½ (1.1 + 0.3) × 2 × 1 (= 1.4) M1 for method to work out time, eg "1.4" ÷ "0.8" A1 for 1.75 hours, 1¾ hours, 1 hour 45 mins or 105 mins NB working could be in 3D or in 2D and in metres or cm throughout

Q29.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
		14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (=1526.42...) M1 (dep) for $\frac{\text{'1526.42...'}}{\pi \times 5.8^2}$ A1 for 14.4 - 14.5 **OR** M1 for $\frac{5.8}{6.5}$ or $\frac{6.5}{5.8}$ or 0.89(23…) or 1.12(06896…) M1 for $11.5 \div \left(\frac{5.8}{6.5}\right)^2$ or $11.5 \div \left(\frac{6.5}{5.8}\right)^2$ A1 for 14.4 - 14.5

Q30.

		Working	Answer	Mark	Notes
		$\frac{1}{3} \times \pi \times 15^2 \times 40 - \frac{1}{3} \times \pi \times 7.5^2 \times 20$	8250	4	B1 for 15cm as diameter or 7.5 cm as radius of smaller cone (may be marked on diagram or used in a formula) M1 for a numerical expression for the volume of one cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) **or** $\frac{1}{3} \times \pi \times 7.5^2 \times 20$ (=1178...) M1 for $\frac{1}{3} \times \pi \times 15^2 \times 40$ oe $-\frac{1}{3} \times \times \pi \times 7.5^2 \times 20$ oe A1 for answer in the range 8240 – 8250 **OR** B1 for 2^3 M1 for a numerical expression for the volume of the large cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) M1 volume of frustrum = $\frac{7}{8} \times \frac{1}{3} \times \pi \times 15^2 \times 40$ oe A1 for answer in the range 8240 – 8250

Q31.

Question		Working	Answer	Mark	Notes
	(a)		150	2	M1 for 180 – (360 – 330) or 180 – 30 or 330 – 180 or a complete diagram showing the bearing of 330° A1 cao
	(b)		11 40	4	M1 for 200 ÷ 120 (=1 2/3 h) M1 for conversion between hours and minutes A1 for 1 h 40 min or 100 minutes B1 (ft dep on M1) for 11 40

Q32.

PAPER: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			Region shaded	3	B1 for circle centre f radius 3.5cm B1 for circle centre b radius 6cm B1 for correct region shaded