Countdown to your final Maths exam ... part 10 (2018)

Examiners Report & Markscheme

Mark Scheme

Q1.

		Working	Answer	Mark	Notes
	(a)		$^{15}/_{100}$	5	M1 for fraction with 15 as the numerator or 100 as the denominator A1 for $^{15}/_{100}$ oe or 0.15 or 15%
	(b)		0	1	B1 oe Accept $^{0}/_{100}$, 0%, 0 out of 100 but not 0:100
	(c)		$^{1}/_{10}$		M1 for 100 – (50 + 25 + 15) A1 oe

Q2.

Question		Working	Answer	Mark	Notes
	(a)	construction = 120° hairdressing = 168° tourism = 72°	120° 168° 72°	3	M1 for correct working to find an angle (could be implied by one angle drawn correctly on the pie chart. A1 all three angles drawn ±2° B1 (dep on M1) correct labels NB: stating the angles is not labels
	(b)		explanation	1	B1 ft reason given eg NO and "we don't know the actual figures", "there could be less Y10 students", or refers to the fact that the totals for the pie charts (or the sample groups) could be different NB: YES could also be justified.

Q3.

Question		Working	Answer	Mark	Notes
		$^{12}/_{20} \times {}^{11}/_{19} + {}^{5}/_{20} \times {}^{4}/_{19} + {}^{3}/_{20} \times {}^{2}/_{19}$ $1 - ({}^{12}/_{20} \times {}^{11}/_{19} + {}^{5}/_{20} \times {}^{4}/_{19} + {}^{3}/_{20} \times {}^{2}/_{19})$	$^{222}/_{380}$	4	B1 for $^{12}/_{19}$ or $^{5}/_{19}$ or $^{3}/_{19}$(could be seen in working or on a tree diagram) M1 for $^{12}/_{20} \times {}^{5}/_{19}$ *or* $^{12}/_{20} \times {}^{3}/_{19}$ *or* $^{5}/_{20} \times {}^{12}/_{19}$ *or* $^{5}/_{20} \times {}^{3}/_{19}$ *or* $^{3}/_{20} \times {}^{12}/_{19}$ *or* $^{3}/_{20} \times {}^{5}/_{19}$ M1 for $^{12}/_{20} \times {}^{5}/_{19} + {}^{12}/_{20} \times {}^{3}/_{19} + {}^{5}/_{20} \times {}^{12}/_{19} + {}^{5}/_{20} \times {}^{3}/_{19} + {}^{3}/_{20} \times {}^{12}/_{19} + {}^{3}/_{20} \times {}^{5}/_{19}$ A1 for $^{222}/_{380}$ oe or 0.58(421...) **OR** B1 for $^{8}/_{19}$ or $^{5}/_{19}$ or $^{17}/_{19}$ M1 for $^{12}/_{20} \times {}^{8}/_{19}$ *or* $^{5}/_{20} \times {}^{15}/_{19}$ *or* $^{3}/_{20} \times {}^{17}/_{19}$ M1 for $^{12}/_{20} \times {}^{8}/_{19} + {}^{5}/_{20} \times {}^{15}/_{19} + {}^{3}/_{20} \times {}^{17}/_{19}$ A1 for $^{222}/_{380}$ oe or 0.58(421...) **OR** B1 for $^{11}/_{19}$ or $^{4}/_{19}$ or $^{2}/_{19}$ M1 for $^{12}/_{20} \times {}^{11}/_{19}$ *or* $^{5}/_{20} \times {}^{4}/_{19}$ *or* $^{3}/_{20} \times {}^{2}/_{19}$ M1 for $1 - ({}^{12}/_{20} \times {}^{11}/_{19} + {}^{5}/_{20} \times {}^{4}/_{19} + {}^{3}/_{20} \times {}^{2}/_{19})$ A1 for $^{222}/_{380}$oe or 0.58(421...) **NB** if decimals used they must be correct to at least 2 decimal places

					SC : with replacement B2 for $^{111}/_{200}$ oe **OR** e.g. B0 M1 for $^{12}/_{20} \times {}^{8}/_{20}$ *or* $^{5}/_{20} \times {}^{15}/_{20}$ *or* $^{3}/_{20} \times {}^{17}/_{20}$ M1 for $^{12}/_{20} \times {}^{8}/_{20} + {}^{5}/_{20} \times {}^{15}/_{20} + {}^{3}/_{20} \times {}^{17}/_{20}$ A0

Q4.

Question		Working	Answer	Mark	Notes
	(a)		20	2	M1 for $\frac{60}{360} \times 120$ A1 cao **OR** M1 for $360 \div 120\ (=3)$ or $60 \div 3$ A1 cao
	(b)		50	3	M1 for $360 - (45 + 60 + 105)$ $(=150$; could be measured) M1 for $360 \div 120$ $(=3°)$ or "150" ÷ 3 A1 for 50; allow answers in the range 49-51 **OR** M1 for $360 - (45 + 60 + 105)$ $(=150$; could be measured) M1 for $\frac{"150"}{360} \times 120$ A1 for 50; allow answers in the range 49-51 **OR** M1 for $360 - (45 + 60 + 105)$ $(=150$; could be measured) M1 for $\frac{"150"}{60} \times "20"$ A1 for 50; allow answers in the range 49-51 **OR** M1 for working out how many in all three sectors M1 for subtraction from 120 A1 for 50; allow answers in the range 49 - 51

Q5.

Question		Working	Answer	Mark	Notes
	(a)	0.10 + 0.25 + 0.30 or 1 − (0.15 + 0.20)	0.65	2	M1 for 0.10 + 0.25 + 0.30 or 1 − (0.15 + 0.20) A1 for 0.65 oe SC B1 for 0.85
	(b)	200 × 0.30	60	2	M1 for 200 × 0.30 A1 cao

Q6.

		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

Q7.

		Working	Answer	Mark	Notes
			11	3	M1 for $52 \times \frac{3}{4}$ (=39) oe or $\frac{120}{360} \times 150$ (=50) oe M1 for $52 \times \frac{3}{4}$ (=39) oe and $\frac{120}{360} \times 150$ (=50) oe A1 cao

Q8.

Question		Working	Answer	Mark	Notes
		P(F) = $\frac{3}{5}$ $\frac{3}{5}$students = 96 Total = 96 ÷ 3 × 5 = 32 × 5 or F : M = 3 : 2 = 96 : x M = 96 ÷ 3 × 2 = 32 × 2 = 64 Total = 96 + 64	160	3	M1 for P(F) = $\frac{3}{5}$ or 96 ÷ 3 or $\frac{3}{5}$(students) = 96 oe or 32 seen M1 for 96 ÷ 3 × 5 or "32" × 5 or "480" ÷ 3 A1 cao or M1 for F : M = 3 : 2 oe or 3 : 2 = 96 : ? oe or 96:64 or 64 seen M1 for 96 ÷ 3 × 2 + 96 or "32" × 2 + 96 or "192" ÷ 3 + 96 or "64" + 96 A1 cao

Q9.

Question	Working	Answer	Mark	Notes
12		48	M1 M1 A1	for 0.25×0.6 (= 0.15) or 0.75×0.4 (= 0.3) for 0.25×0.6 (= 0.15) and 0.75×0.4 (= 0.3) or for 24 ÷ "0.15" (= 160) cao

Q10.

PAPER: 1MA0/1F				
Question	**Working**	**Answer**	**Mark**	**Notes**
	(A, 1), (A, 2), (A, 3) (B, 1), (B, 2), (B, 3) (C, 1), (C, 2), (C, 3)	$\frac{1}{9}$	3	M1 for any 3 combinations with no incorrect combinations or for 3 × 3 A1 for all 9 combinations with no duplicates or extras **or** for 9 B1 (dep on M1) for $\frac{1}{'9'}$ **Alternative scheme** B1 for $\frac{1}{3}$ seen M1 for $\frac{1}{3} \times \frac{1}{3}$ A1 for $\frac{1}{9}$ oe

Q11.

Paper_5MB1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
			$\frac{20 - x}{20}$	2	M1 for writing $20 - x$ OR 20 as any denominator below an algebraic expression in x or $20 - x \div 20$ A1 for $\frac{20 - x}{20}$ or $1 - \frac{x}{20}$ oe

Q12.

		Working	Answer	Mark	Notes
		EE + CC + HH **Or** EC+EH+CE+CH+HE+HC **Or** E,not E+ C,not C + H,not H	$^{76}/_{110}$	5	M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{3}/_{10}$ *or* $^{5}/_{11} \times {}^{4}/_{10}$ *or* $^{2}/_{11} \times {}^{1}/_{10}$ M1 for $^{4}/_{11} \times {}^{3}/_{10} + {}^{5}/_{11} \times {}^{4}/_{10} + {}^{2}/_{11} \times {}^{1}/_{10}$ $\left(=\frac{34}{110}\right)$ M1 (dep on previous M1 for $1 - {}^{'34'}/_{110}$ A1 for $^{76}/_{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{5}/_{10}$ or $^{4}/_{11} \times {}^{2}/_{10}$ or $^{5}/_{11} \times {}^{4}/_{10}$ or $^{5}/_{11} \times {}^{2}/_{10}$ or $^{2}/_{11} \times {}^{4}/_{10}$ or $^{2}/_{11} \times {}^{5}/_{10}$ M2 for $^{4}/_{11} \times {}^{5}/_{10} + {}^{4}/_{11} \times {}^{2}/_{10} + {}^{5}/_{11} \times {}^{4}/_{10} + {}^{5}/_{11} \times {}^{2}/_{10} + {}^{2}/_{11} \times {}^{4}/_{10} + {}^{2}/_{11} \times {}^{5}/_{10}$ (M1 for at least 3 of these) A1 for $^{76}/_{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{7}/_{10}$ *or* $^{5}/_{11} \times {}^{6}/_{10}$ *or* $^{2}/_{11} \times {}^{9}/_{10}$ M2 for $^{4}/_{11} \times {}^{7}/_{10} + {}^{5}/_{11} \times {}^{6}/_{10} + {}^{2}/_{11} \times {}^{9}/_{10}$ (M1 for two of these added) A1 for $^{76}/_{110}$ oe **PTO for SC's** **SC:** B2 for $^{76}/_{121}$ **SC:** B1 for $^{4}/_{11} \times {}^{4}/_{11} + {}^{5}/_{11} \times {}^{5}/_{11} + {}^{2}/_{11} \times {}^{2}/_{11}$ $(= {}^{45}/_{121})$ **Or** $^{4}/_{11} \times {}^{5}/_{11} + {}^{4}/_{11} \times {}^{2}/_{11} + {}^{5}/_{11} \times {}^{4}/_{11} + {}^{5}/_{11} \times {}^{2}/_{11} + {}^{2}/_{11} \times {}^{4}/_{11} + {}^{2}/_{11} \times {}^{5}/_{11}$ **Or** $^{4}/_{11} \times {}^{7}/_{11} + {}^{5}/_{11} \times {}^{6}/_{11} + {}^{2}/_{11} \times {}^{9}/_{11}$

Q13.

PAPER: 5MB1H_01					
Question		Working	Answer	Mark	Notes
	(a)		$0.75 - x$	2	M1 for or $1 - 0.25 + x$ or $0.25 + x$ A1 for $0.75 - x$ oe
	(b)		60	2	M1 for 0.25×240 oe A1 cao

Q14.

PAPER: 1MA0/2F				
Question	Working	Answer	Mark	Notes
		36	1	B1 cao for Cazda
		120°	1	B1 cao for Zusuki
		42	2	M1 for correct method from using 105° eg 18÷45×105, "36"÷90×105 or from table eg Cazda "36"×4−(18+36+48) A1 for 42 or ft values from their table.

Q15

Question	Working	Answer	Mark	Notes
(a)		$\frac{3}{10}$	2	B1 for $\frac{3}{10}$ correct for 1st sock
		$\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$		B1 for $\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$ correct for 2nd sock
(b)	$\frac{7}{10} \times \frac{6}{9} + \frac{3}{10} \times \frac{2}{9}$	$\frac{48}{90}$	3	M1 ft for $\frac{7}{10} \times$ '$\frac{6}{9}$' or '$\frac{3}{10}$' $\times$ '$\frac{2}{9}$' M1 for $\frac{7}{10} \times$ '$\frac{6}{9}$' + '$\frac{3}{10}$' $\times$ '$\frac{2}{9}$' A1 for $\frac{48}{90}$ oe SC B2 for $\frac{58}{100}$ oe seen

Q16.

		Working	Answer	Mark	Notes
	(a)(i)		46-50	2	B1 for 46 – 50
	(ii)		$\frac{48}{360}$		B1 ft from their part (i) for their $\frac{48}{360}$, $\frac{8}{60}$, $\frac{2}{15}$ oe; do not accept decimals.
	(b)		23	3	M1 ft for 360 – (90 + "48" +" 84") [=136-140] M1 ft for 360 ÷ 60 = 6° or "138" ÷ 6 A1 cao **Or** M1 ft for 360 – (90 + "48" + "84") [=136-140] M1ft for using their 138 in $\frac{138}{360} \times 60$ (=22.5 – 23.5) A1 cao

Q17.

		Working	Answer	Mark	Notes
		0.93×800	744	2	M1 0.93×800 oe or 744 A1 cao

Q18.

Question		Working	Answer	Mark	Notes
			Tulip 130 Hyacinth 90 81° and 162° sectors	4	M1 for 360 ÷ 400 (= 0.9) or 400 ÷ 360 (= 1.1..) M1 for 117 ÷ "0.9" (=130) or 117 × "1.1.." (=130) or 400 – 180 – 130 (= 90) M1 for "90" × "0.9" (=81) or "90" ÷ "1.1.." (=81) or 180 × "0.9" (=162) or 180 ÷ "1.1.." (=162) A1 2 correct angles drawn on pie chart ± 2° with labels.

Q19.

Question		Working	Answer	Mark	Notes
	(a)		$\frac{3}{10}$	2	M1 for $\frac{a}{10}$ or $\frac{3}{b}$ where $a < 10$ and $b > 3$ A1 for $\frac{3}{10}$ oe
	(b)		$\frac{7}{10}$	1	B1 ft or for $\frac{7}{10}$ oe

Examiner's Report

Q1. There were relatively few cases of candidates using incorrect probability notation. Part (a) & (b) were well answered; the only problem in part (c) was from miscalculation. Some lost the mark in (c) through failing to state the probability correctly (sometimes using ratio notation).

Q2. There is clear evidence that many candidates attempting this question were doing so without the aid of a protractor. Drawing angles of 40, 56, 24 resulted in four sectors, which did not appear to bother some candidates. The majority drew a pie chart with three sectors that only approximated to the proportions of the number of students in each category.

Part (b) was also poorly answered, with too many answers referring to the sizes of the sectors or angles, rather than focussing on the actual number of students (which we did not know). Although most tried to justify a reason for "no", there were equally some acceptable justifications for an answer of "yes".

Q3. This question was a good discriminator. Many of the weaker candidates were unable to make a good attempt at it but the more able candidates often gained full marks. Most candidates used a tree diagram with mostly correct branches and the majority recognised that there was no replacement. Some went on to include a third set of branches or had 18 as the denominator for the second set of branches. The most common approach was to add six products with most candidates selecting the correct pairs of probabilities. Arithmetic errors did occasionally lead to loss of the final accuracy mark. Far fewer candidates attempted the method of 1 – (probability of two of the same type) which is a quicker way of working out the required probability. Those who used replacement often earned both of the two marks available for this approach and some scored one mark for having at least one correct product. Most candidates used fractions throughout and gave their answer as a fraction or converted it to a decimal at the end. Some converted to decimals at an earlier stage and often lost accuracy as a result of premature rounding. For the weaker candidates the tree diagram was often all they managed; they did not know what to do with the probabilities and some added rather than multiplied the probabilities.

Q4. About a half of all students scored full marks on this question requiring the interpretation of a pie chart. Students who did not score full marks in part (a) often could not identify what fraction of the circle represented "do not know". In part (b) most students worked out the size of the angle for the sector representing "enough". However a significant proportion of students could not use this to calculate the number of students represented by this sector. Few students appeared to have measured the angle of the sector.

Q5. The phrase 'greater than 2' confused some who still included the 0.20 in their sum. Probability notation is a problem for some, equally in part (a) and part (b), where some gave the answer as probability rather than a number of times. Candidates also need to be aware of the difference between being asked for a description of a probability (using a word) and working out a probability, which is a number.

Q6. 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.

Q7. Many candidates had difficulty working out the number of games won for both Caroline and Marc.A common approach for Caroline was to find a quarter of 52 and either subtract it from 52 (common) or multiply it by 3 (rare).

Many candidates did not realise that the 120 degrees given in the pie chart represented a third of the total number of games won. Most simply calculated a quarter of the total and added a bit on.

A significant number of candidates did not use the information for the total numbers of games played and just added or subtracted the angles, eg 360 – 90 – 120

Q8. This question was attempted by most candidates but many failed to gain any marks or only gained M1 for equating 96 to $^3/_5$ The most common error was to equate 96 to $^2/_5$ which led to 38.4 which they rounded to 38 and added to 96 to get 134, these candidates usually gained M0M0A0 though a few also had 96 equated to $^3/_5$ in their working to gain M1.

Other candidates, who only gained M1, correctly calculated 32 or 64 but did not realise that they needed to multiply the 32 by 5 or add the 64 to 96. Candidates rarely used ratios to solve the problem and when they did often incorrectly used 5 for the female shares.

Q9. Working out 0.75 × 0.4 to get the probability of both spinners landing on white and working out 0.25 × 0.6 to get the probability of both spinners landing on red gained the two method marks. Some students found only one of these probabilities, usually the former, and scored one mark only. A number of those students who did work out both probabilities failed to spot that 0.3 is double 0.15 and therefore the answer will be double 24. Some students used 0.15 and 24 to work out that the total number of spins is 160 and were then often able to get the correct answer. A common error was to add the probabilities instead of multiplying them.

Q10. This question discriminated very well with almost all students gaining one mark for showing at least three correct combinations and about half then going on to give the correct answer to the question. The final mark was sometimes lost because the students gave the wrong fraction for their probability or wrote it as a ratio e.g. 1 : 9. For those that realised the probability of a letter was ⅓ and the probability of a number was ⅓ often scored one mark only because they added rather than multiplying these fractions.

Q11. This question was not well answered, and poor algebra inhibited many getting to the final answer. Many realised that they needed to take red from 20, and not infrequently $20 - x$ was seen in working. Writing this as a probability was a step too far for most. Some confused the issue by introducing their own variable (commonly y) for yellow, giving expressions in both x and y (e.g. $x + y = 20$) but then found rearrangement difficult.

Q12. This probability question without replacement was recognised as such by most of the candidates, although a surprising number did give a denominator of 121, showing that they thought one of the sandwiches was replaced before the second one was taken. An answer of $^{76}/_{121}$ was awarded 2 marks for the work in dealing correctly with the numerator.

If candidates were able to correctly show a denominator of 10 on a tree diagram or use it as part of a second probability then 1 mark was earned and some candidates earned this 1 mark.

A second mark was earned by candidates who could write the probability of one combination of correct probabilities as a product and a further mark was gained if those, or at least three of them, were shown to be added.

The fourth method mark was awarded if all six combinations were added or if they were working from 1 – probability of both of the same types taken. Fully correct answers were given by only a small number of candidates.

Q13. In part (a) candidates appeared to understand that subtraction from 1 had to occur somewhere, and/or that a first step was to deal with both x and 0.25, but putting it all together caused significant problems. Many left ambiguous statements such as $1 - 0.25 - x$. Others showed the correct answer, but then spoilt this by over-simplification on the answer line. The answer did not need to be simplified, and all equivalent expressions to $0.75 - x$ were credited.

Q14. Most could evaluate the missing angle successfully, and to a slightly lesser extent the 36. Very little evidence of method was seen on scripts thus making the awarding of any available method marks difficult. Those who correctly identified that each student was equivalent to 2.5° tended to score full marks. Premature rounding in some work led to an inaccurate final answer. Rarely was the total of 144 students identified to then get 42 for the last entry.

Q15. This question proved to be a good discriminator. Nearly all candidates gained at least one mark for putting $^{3}/_{10}$ on the first stage of the tree diagram in part (a). They then attempted to complete the diagram but a much smaller proportion of candidates realised the non replacement nature of this question and it was common to see the $^{7}/_{10}$ and $^{3}/_{10}$ repeated for the 2nd sock. There were many credit worthy attempts to part (b) of the question with a large proportion of candidates correctly discriminating when to use the multiplication and/or addition of probabilities. However, the multiplication and/or addition of fractions was often not carried out accurately, even though the use of a calculator was permissible. This is reflected in the award of marks. The majority of candidates gained at least one mark for their attempt at part (b).

Q16. Part (a)(i) was a simple measurement but clearly some candidates did not have a protractor so took a guess. Marks were given in (a)(ii) for correct use of their stated angle, even though this sometimes led to an unrealistic answer. Sight of a guessed angle such as $^{1}/_{6}$ or $^{1}/_{8}$ was also common. In part (b) most realised the angles had to add to 360°, but some used 380°, 180° or 200° instead of 360°. Finding a fraction of 60 was also a problem for some. Again use of a "guessed" fraction such as $^{3}/_{8}$ resulted in no marks; answers needed to be based on angle calculations.

Q17. The idea of using exact numbers to get an estimate in this case was well known to the majority of candidates. A few ignored the % sign and got 74 400 as their answer. Others thought that 'estimate' meant work to one significant figure and so worked out 90% of 700, for example.

Q18. A huge variety was seen in this question. There were many fully correct answers. There were some who decided that 117 was the number of tulips planted.

Others divided the remaining people in half. They then used 110 as the angle as well. There was some working out seen but students would have benefitted from showing more working on this style of question. When working was seen 1.1 was often used instead of 1.111.. bringing rounding errors into the final answer.

Q19. Most students gave correct probabilities in response to this question. A few students gave descriptive words such as "unlikely" instead of a probability and there were occasional arithmetic errors or the use of incorrect notation.