BUMPER "BETWEEN PAPERS (2 &3)" PRACTICE

SUITABLE FOR BOTH FOUNDATION & HIGHER TIERS

SUMMER 2019

EXAMINERS REPORT & 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 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 9-1 GCSE MATHS PAPER 1 OR 2 BUT WE CANNOT GUARANTEE HOW A TOPIC WILL BE EXAMINED IN THE NEXT PAPER ...

ENJOY!
MEL & SEAGER

Examiner's Report

Q1. In part (a), it was common to see an incorrect answer of −1.822... from those students who did not realise that the sum in the denominator needed to be evaluated before the division. Some students who made this error were able to pick up the mark in (b) for giving an answer of −1.8 but many left off the negative sign. Students who got the answer to part (a) wrong did not always show their working; those who did generally gained one mark for either the numerator or the denominator of the fraction evaluated correctly.

However, some of those who did show working, rounded the evaluation of the square root to 2.72 and this led to a lack of accuracy in their final answer. It is important that accuracy is maintained and no rounding takes place until the final answer. In (b), rounding to just one decimal place was common.

Q2. 'Radius' was the most common answer in (a), but a whole host of other words were seen such as fraction, obtuse, area, diameter etc. The selection of words offered was even wider in part (b) but the correct answer of 'sector' was rarely seen. While many students gained either 2 marks for 1/6 or 1 mark for 60/360 or a partially simplified fraction, a surprisingly high number used 60/100, which they sometimes, but not always, simplified. 60/180 was seen, alongside a range of other seemingly random fractions. The occasional decimal or percentage made an appearance. There were more blank responses than might have been expected.

Q3. (a) The majority of students know how to write a decimal as a percentage, but we saw a fair number of 8% rather than 80%
(b) Writing 0.023 as a fraction clearly caused a number of students a problem, some not appearing to know what a fraction is and others thinking that 23 should be written as a fraction over 100.
(c) Students found this rounding question very difficult. Many moved the position of the decimal point to give 563.82 which actually meant they multiplied by 100 rather than rounding to 2 decimal places.
(d) This calculator question involved a square root and a square and candidates often gave us the answer 6.62872.... This came from continuing the square root over the whole of the calculation. We often test the use of the root around just part of the sum and it must be stressed to students to ensure that the calculation that comes up on their calculator screen is the same as the one that appears in the question. If students had shown us a correct part of the answer, such as 6.5 or 1.69 we would have awarded a method mark.
(e) Finding $\frac{3}{8}$ of 56.8 was challenging for many students; many wrong answers came from dividing 56.8 by $\frac{3}{8}$.

Q4. No Examiner's Report available for this question

Q5. Mistakes were rare on this opening question. In part (c) in a minority of cases, some candidates opted to estimate 60% by shading just over a half of the shape, using part squares, rather than shading 3 full squares as anticipated. In such cases a judgement was required on behalf of the marker and full marks may have been awarded.

Q6. In part (a)(ii) truncating rather than rounding to 2 decimal places led to regular incorrect answers of 8.46 Both components of part (b) were more demanding. In part (b)(i) common mistakes were to cube 30 or take the square root. In rounding from the correct answer of 3.10723 . . . many chose to round to 2 decimal places rather than 2 significant figures.

Q7. Calculating the area of a rectangle was achieved by most students but there was less success with calculating the area of the circle. 8^2, $\pi \times 8$, $\pi \times 16$, $\pi^2 \times 8$, $\pi + 8$ were all seen as incorrect attempts. There were also those students who did not work out the area of the rectangle but instead found its perimeter or ventured into the 4th dimension by multiplying together the dimensions of all four sides. Where correct methods were seen for finding both areas, the second method mark was awarded for the subtraction of the two values found. From correct values, the majority of students went on to give a sufficiently accurate final answer to gain full marks. The question was beyond some at this tier, who combined the numbers on the diagram in a variety of creative ways.

Q8. Many students do not know how to find the midpoint between two given coordinates and we saw several different incorrect attempts, e.g. summing the x coordinates and y coordinates, subtracting the x coordinates and y coordinates, summing the x and y coordinate together and a few inaccurate diagrams

trying to plot the points A and B. If students picked up a mark, it was generally for the y coordinate being correctly given as 7; the x coordinate of -1.5 seemed harder to find.

Q9. On the whole, students demonstrated a good understanding of the mode and median in (a) and (b). Occasionally, the middle number of the unordered list was found for the median which of course scored zero marks.

Only a minority of students were unable to write the word that described the probability of the two outcomes described in (c). Likewise, in (d), most were able to choose an appropriate numerical probability to describe a situation.

Q10. This commonly set question was well answered with a majority of candidates scoring at least 2 marks. Some candidates completed a correct factor tree or division ladder but then wrote a list of prime factors rather than a product.

Q11. The most common answer in Q6(a) was the correct name of hexagon, In Q6(b) and Q6(c) candidates were able to identify the two parallel lines more often than they were able to identify the two perpendicular sides. Q6(d) was well answered, although the x and y coordinates were sometimes transposed.

Q12. In part (a), the question clearly stated that the answer was to be given as a single power of 2. Therefore, those candidates who gave the answer as 128 did not gain the mark. A common incorrect answer was 4^7. 4 was a common incorrect answer to part (b) from candidates who failed to interpret 2^n correctly and used $2n$ instead. Some candidates who did understand the notation then gave their final answer as "2^3" rather than "3" and so failed to gain the accuracy mark.

Q13. The correct name 'octagon' featured regularly, as however did hexagon, descriptions such as rectangular polygons and non-responses. The most common way that a mark was gained in (b) as to why the given shape was irregular focused in various ways on the lengths not all being equal. Some degree of precision was needed so more vague responses about the shape being stretched or wider than normal did not gain the mark. A surprisingly high number of students gave the reason for its irregular shape as being due to it having parallel sides or having 8 sides. (c) was correctly answered more often than the previous parts of this question; unfortunately those students who probably recognised several pairs of parallel lines but who marked them all with the same symbol could not be credited.

Q14. The area was almost always worked out correctly.

Q15. Those with some idea of probability scored well. A labelled cross was not essential to score marks, as a letter on its own was sufficient.

There seemed to be some confusion over the position of R, which was often pushed forward of halfway point, possibly because there were more red sectors than blue or yellow. The position of blue was generally correctly marked. Candidates did not have to measure the line; just put B in a sensible position. Green was the most common correct answer. A few candidates did not label any of their crosses so gained no marks.

Q16. This question proved to be straightforward for the vast majority of students. Those who lost marks did so by dividing by 120 or 1.2 or performed only a partial conversion.

Q17. Most candidates correctly answered part (a). The most common incorrect answers were 5 and 7 In part (c), the formula for the area of a trapezium was available on the formulae sheet but many candidates opted to divide the front face into a rectangle and two triangles, with some success.

In part (d), many of the candidates who got part (c) fully correct also went on to work out the volume correctly. Surprisingly, there were some who got the volume correct following on from an incorrect answer to part (c). This often happened because candidates had worked out (or attempted to work out) the total surface area in part (c). A follow through was allowed in part (d) from multiplying correctly, *their* answer to part (c), by 12.

Q18.Most students appreciated that part (a) involved a reflection although some described it as rotational symmetry. Occasionally, the line of symmetry was incorrectly stated as $x = 1$ rather than $y = 1$. In part (b), some candidates lost one mark for having a parallelogram of the correct size but in the wrong position, the top left hand corner sometimes being at (0, 0) or (1, -1). The occasional student reflected shape R in part (c) and some rotated it 90° about the origin or another centre.

Q19. Part (a) was well answered with only a few students not knowing what to do and a few increasing the price of the dress rather than reducing it. Part (b) was answered correctly by about half of the students, but for those who did not gain full marks, they often gained a mark for correctly calculating the actual increase but were unable to progress sufficiently to gain any more credit. Some calculated the percentage increase as a percentage of the new pay rather than the original pay and some gave an answer of 0.04 or 0.4 having not multiplied by 100 or having multiplied by 10.

Q20. A reasonable number of students found this to be a straightforward question and gave clear working with correct answers to gain 5 marks. However, a significant number found the question rather challenging, linking the numbers given in the question in ways that showed little understanding. Between these extremes were students who started well with the correct multiplication but failed to give an integer number of notes or rounded down to 8 instead of up to 9 or simply gave the original product as their answer.

Many who were successful in part (a) went on to gain marks in part (b). Of the rest, many were still able to pick up at least a method mark and sometimes the accuracy mark as well, provided that they had an integer value in (a) and that the amount of change they received was not negative. Premature rounding was seen too often and frequently resulted in the loss of the accuracy mark. There were blank responses, more in part (b) than part (a).

Q21. Students did well in part (a), the main error was multiplying by 1.75 instead of 1.075. In part (b) the most common errors were to leave their answer as 22500, forgetting to add back the 1800. Others evaluated 1800 × 1.08 or 1800 × 0.08.

Q22. This question was challenging to students at the lower ability ranges, and it highlighted the algebraic weaknesses of many students. In part (a), most weren't able to simplify $8d \times 7d$, with a large number giving an incorrect answer of $56d$. They were more successful at expanding the bracket in part (b), although many didn't understand how to factorise in (c).

In part (d), some students did manage to substitute $g = 2$ to find H but 2^3 was often confused with 2×3.

Q23. 1Many candidates were able to identify the single transformation as a rotation and correctly described the direction and centre. Those who did not score full marks often omitted either the size of the angle (90° or 270°) or the direction of the turn (clockwise or anticlockwise). There were some who indicated the centre of the rotation as a vector rather than in the standard Cartesian form. A number of candidates indicated more than one transformation, typically a rotation followed by a translation, which resulted in no marks being scored.

Q24. Many candidates gained full marks, often using 1.05 as a multiplier. Candidates who stated the correct answer, $9261, subtracted $8000 from it and then gave the interest, $1261, as their answer were not penalised. Simple interest was sometimes used, instead of compound interest; candidates who made this error generally scored 1 mark out of 3, usually for the interest earned at the end of the first year.

Q25. Less than a quarter of students scored full marks with the majority only picking up at most one mark. Those who were successful tended to start by multiplying 64 by 4 and 70 by 5. Unsuccessful attempts included dividing 64 by 4 and 70 by 5.

Q26. In part (a) there was clear evidence of some students misreading this question and so giving the total amount of interest earned rather than the value of the investment after 4 years. It was disappointing to see a significant number of students using a 'build up' method to find 4.5% and 2.75% rather than using their calculator efficiently. Several candidates appeared to use a % key on their calculator and write down their results without showing the method. In these cases inaccuracy led to loss of method marks. Whilst many students did use multipliers and so an efficient method there were a significant number of students who worked out the interest gained each year as a separate calculation; the latter method frequently resulted in a loss of accuracy in the final answer. One common error was to find the interest for one year of 4.5% from investing £8000, then find the compound interest for investing £8000 for 3 years at 2.75% and then add together either the two total amounts or the two lots of interest. Another common error was to use the wrong scale factors, for example, 1.45 or 1.0045 instead of the correct 1.045

In part (b) the candidature was split between those who recognised the problem as a reverse percentage and so divided by 1.02 and those who employed the incorrect method of decreasing the given amount by 2%. A few students did employ the correct method of solution but with the wrong multiplier, usually 1.2

Some multiplied by 1.02 rather than dividing.

Q27. Those candidates who realised that they could find the sum of the four numbers by multiplying 2.6 by 4 usually went on to obtain the correct answer. Those that failed to realise this usually tried to find numbers that fitted the given data and were often unsuccessful. If they chose the latter approach and they found four numbers including 5 with a total of 10.4 or three numbers with a total of 5.4, they gained the first method mark.

Q28. While most students produced correct tallies and frequencies in the table, careless errors from time to time crept in. There were also those who were not able to interpret tally and frequency, giving the frequencies in the tally column and various other values (usually score multiplied by frequency) in the frequency column; for full marks, the correct frequencies needed to be seen in the frequency column. Many candidates failed to check that their four frequencies added up to 20. The meaning of mode was well understood, with many correct answers in (b), the most common error being to give the frequency of the modal score rather than the mode itself. The idea of range being the difference between the highest and lowest values was also well understood but wrongly using the frequencies for this calculation was seen about as often as the correct use of the actual scores.

To gain a mark in part (d), students had to both identify that 9 is not a prime number and give a brief explanation as to why it is not prime. There was a good number of acceptable responses which gained credit but also many that were incomplete, muddled or completely wrong. Students appear to have difficulty articulating the distinction between numbers being divided by another number and numbers dividing into other numbers. Hence, '9 goes into other numbers' was frequently given as a reason for it not being prime.

Most tables were correctly completed in part (e), although some students multiplied the scores despite some entries already having been entered for them. It was rare to see an incomplete table. A pleasing number of students progressed to give correct probabilities in part (f); it was encouraging to see that these nearly always used correct notation. Students who simply gave a word description, for example 'unlikely', gained no credit. A regularly seen error in f(ii) was interpreting greater than 12 as including 12 itself.

Q29. Whilst there were a good number of correct answers seen, there were also a number of errors seen. Such errors included dividing the total number of vehicles by 6 rather than by 70, using 3.5, 8.5… as mid–interval values rather than 3, 8… and summing the frequency column and then dividing by 6. Students would be well advised to consider the reasonableness of their final answer.

Q30. Extra numerical processes, following on from the correct answer of 67 cm were not penalised. This was to take into account the numerous attempts to find the mean average. 67 calculated by a correct method, therefore gained full marks and subsequent working was ignored. Multiplying incorrectly by zero in the fourth interval (eg $7 \times 0 = 7$) resulted in one method mark and the accuracy mark being withheld. A minority of candidates multiplied each frequency by two (the class width).

Q31. The gradient calculation proved to be the biggest issue here with students obtaining either 0.5, –0.5 or 2. Those using $y = mx + c$ managed to get the intercept correct from the graph and this enabled them to pick up 1 mark. An alternative method often seen was to use $(y - y_1) = m(x - x_1)$, but this was often used incorrectly as $(y - 3) = m(x - 5)$ where it should have been $(y - 3) = m(x + 5)$; this approach was often less successful for this particular question.

Q32. Most students were able to write down the coordinates of point B and D in parts (a)(i) and (a)(ii), although some wrote (1, 3) and/or (3, –2) respectively. Part (b) was only accessible to those aiming for one of the higher grades, with many not knowing where to start. In part (c), about half of the students managed to find the area of the quadrilateral, with 9 being an error that was occasionally seen.

Q33. Some students wrote down coordinates which gained no marks. From those students who understood what was required, the most common error was in naming an equation, where $y = x$ and $xy = 0$ were often seen.

Q34. In Q(a) many tried to spell "quadrilateral", and 'parallelogram' was also a common response. Trapezium was identified by only a small number of candidates. On Q(b) candidates misinterpreted the term 'congruent' for 'similar' and chose shapes B and G. Q(c) was generally well done, though some candidates lost a mark by incorrect labelling, (ie that an 'x' was placed at the intersection of 3 or more lines). In Q(e) candidates offered an answer around 18 (from 5×3.6). The mark scheme took into account, and

gave credit for, the attempts at square counting.

Q35. Part (a) required the use of angles on a straight line and angles on parallel lines. The most common successful approach was to work out angle ABC as 68% and then use alternate angles. Some students thought that angles BCD and CDE were equal or that the interior angle at C was equal to the exterior angle at D. A number of students thought that angle ABC was 67%.

The most direct way of working out the answer to part (b) was to use the sum of the exterior angles of a polygon. Many students did this and were not penalised if they had used an incorrect value for their answer to part (a). The most direct way of completing part (c) was to use the interior angle sum formula for a polygon. Many students instead used the formula for the internal angle of a regular polygon and came with the answer of 108, not noticing that this was smaller than some of the interior angles they had already worked out in part (b). Some students worked out the sum of the interior angles they found in 6the polygon.

Q36. No Examiner's Report available for this question

Q37. Those who knew which angle to measure generally gained the mark in part (a) but the vast majority of students measured either the acute or reflex angle at M once LM had been drawn. Marking the position of a ship given a distance and bearing proved problematical for most students. Some could work out that the required distance on the scale drawing was 8cm and gained a mark either for stating this or for showing 8cm on the drawing. However, a significant number measured 8 cm from M rather than from L suggesting that they had not read the question carefully enough. A smaller number were able to indicate the correct bearing to gain one mark. Surprisingly, there were students who could do both but were still unable to mark the correct position, although successful answers were seen. Many responses showed little understanding of what was required and blank drawings were regularly seen.

Q38. Most students answered this question correctly using Pythagoras' theorem. Few of those that tried to use trigonometry were able to follow this method through to the correct answer. Some early rounding led to loss of the accuracy mark.

Q39. The majority of students were able to gain full marks for this question. Some students evaluated the fraction and then rounded their answer before using the inverse cos function on their calculator; this generally resulted in a final inaccurate answer and the loss of the accuracy mark. There were some lengthier attempts, such as sine rule, or finding the other angle first, or using Pythagoras's theorem first; providing accuracy was maintained throughout the working, full credit was given.

Q40 Many students were able to divide 360^0 by 15 and give the correct answer for the exterior angle as 24^0. However, there seemed to be much confusion between interior and exterior angles for a good number of students, with 156^0 appearing as the final answer, both from 24^0 already found and from (13 x 180)/15. This was awarded one method mark. Finding only the sum of the interior angles and division by 15 of a number other than 360 failed to gain any marks.

Q41. Marks were rarely lost in part (a) although occasionally students used an incorrect formula. In part (b), there was a good awareness that Pythagoras' Theorem was required and only a small proportion used it incorrectly, usually by adding the squared numbers.

Q42. Part (a) was well done with most candidates being able to find the correct answer of 80° and then able to give a cogent explanation. A written explanation of any arithmetic performed involving 360 was allowed for the "explain" mark.

Part (b) proved more challenging. Many opted for the use of the unitary method by finding the number of litres equivalent to 1° or to 10°. Other candidates tried 50° + 50° = 100° giving 90 + 90 = 180 litres, but could not deal with the 40°, often resorting to simply adding on 40. As a result this question proved to be a good discriminator for candidates around the grade E boundary.

Q43. In Q23(a), a common incorrect answer was $12x + 3$ or $2x - 3$, which came from the wrong expansion of the second bracket with a final term of +12 rather than −12. In Q23(b), a significant number of candidates only gave two terms when expanding the brackets. Those who used the correct method of expansion sometimes gave the final term as 9 rather than 14. The correct expansion was sometimes seen followed by incorrect simplification.

Q44. Candidates who used the correct formula for the circumference of a circle generally went on to gain full marks. However, a significant number of candidates incorrectly used either πr^2 or $2\pi d$. Candidates

are advised to show their working and their initial un-rounded answer. On occasion an answer of 23.8 was given without any supporting working shown. As the guidance given in the question was for an answer correct to three significant figures, an unsupported answer of 23.8 gained no marks.

Q45. 17.5 was a common incorrect answer, possibly arising from students failing to read the question carefully, as this was the length of AC rather than the required BC.

Q46. While pie charts are a familiar topic, the two-step element of this question was not obvious to many students, although some produced succinct working and the right answer. The most popular first step was to work out the angle for the services sector, usually correctly, as 86° but frequently students then gave this as their answer for how much was spent, not appreciating that further working was needed. Others struggled with convoluted manipulation of angles and money, with assorted numbers of zeros, but most attempted something rather than leave the response blank.

Q47. Many students showed that they did not understand what was meant by an exterior angle of an 8 sided polygon, with only a minority achieving full marks on this question. Some multiplied 180 by 8 and some divided 180 by 8. Some used totals of angles in a polygon such as 720 and divided by 8. The most popular incorrect answer was the interior angle of an 8 sided polygon, which gained no marks as it showed a lack of understanding of what was required.

Q48. This question was challenging for all but the most able students. For those who did not score full marks, the majority managed to score one mark for the correct area of one face. Those who didn't manage to score any marks often added some of the sides together whilst others attempted to find the volume of the prism.

Q49. The vast majority of students showed an understanding of volume and gained full marks. A few worked with surface area rather than volume and so gained no marks.

Q50. The vast majority of students gave the correct answer for part (a). Many students could find the correct answer to part (b), providing that they understood the condition that C must lie on the circle with AB as diameter. For those that did not understand this, they often put C at the point (8, 3).

Q51. No Examiner's Report available for this question

Q52. Although many candidates answered this question correctly, a very common answer was 9. This was usually arrived at as a result of incorrectly finding the volume of the triangular prism by multiplying its base by height by depth.

Q53. Common incorrect answers in part (a) included $6n - 2$, $-6n$, $4n$ and 4. There were many blank responses to part (b); $5p$ was a common incorrect answer. Part of the requirement of part (c) was to show algebraic working; the majority of students followed this instruction. However, those who chose not to and just gave an answer scored no marks whether or not the answer they gave was correct. There were some students who were able to show clear algebraic working to arrive at a fully correct solution. Many attempted to use algebra but were unable to progress correctly.

Although the question demanded algebraic working, some candidates used a numerical approach. The most common error was to ignore the xs and to write $7 - 3 = 4$ and then $4 \div 2 = 2$; other students left the x in and gave $7x - 3 = 4x$ then $4x \div 2 = 2x$ and gave the answer as $2x$ or 2. Those who gained the first mark often then made sign errors giving answers such as -0.6

Q54. Arithmetic involving fractions in the style of "show that" questions is a well established topic on International GCSE papers. The basic premise is for candidates to demonstrate, without a calculator, how the left hand side of the expression can be manipulated into an equivalent fraction to that on the right hand side.In part (a) this was obtained by changing to 2 correct fractions with a common denominator of a multiple of 15 and then adding to reach $\frac{22}{15}$ or equivalent improper fraction. In part (b) the same criteria applied. The mixed fractions were converted correctly into improper fractions for the first method mark. The most favoured method was then to invert the second fraction and state an intention to multiple. The final method mark is to either show cancelling to reach $\frac{9}{14}$ or reach $\frac{18}{28}$ without cancelling. Work involving decimals was ignored and gained no credit.

Q55.Equations with a 3 mark tariff require starting with an algebraic process in order for the accuracy mark(s)

to be awarded. Difficult as it was to 'spot' the correct answer by trial and error, if successful, this method gained no credit. The minimum requirement was to reach a correct equation involving one unknown typically $2y = 4$ or $4x = -6$.

Q56. (a) Some students struggled to realise that all three sets of branches had different probabilities on them; however, these students often picked up a method mark for 2 correct probabilities in the correct position. A few students made errors in calculating the probabilities for 'does not rain' which cost them a mark.

(b) The method marks were followed through from incorrect probabilities in (a) and several students were able to benefit from this. Some students did not realise that the probabilities needed to be multiplied together along the branches, often adding them. Some students got confused between when to add and when to multiply probabilities, this was demonstrated in their working out as $0.8 + 0.35 \times 0.2 + 0.4$.

Q57. Many were able to gain one mark for giving three of more correct members of the set; the most commonly omitted member was 100.

Q58 Whilst the majority of candidates understood that to factorise a quadratic, two brackets were necessary, some took t outside a bracket for the first two terms only. A few candidates misunderstood the question and attempted to solve the equation $2t2 - 7t + 3 = 0$ by substituting into the quadratic formula and so gained no marks.

In part (b), some candidates failed to gain the accuracy mark through failing to deal correctly with a negative sign. Others failed at the first step by misplacing a negative sign at this early stage.

Q59. Neither part of this question was well done by students at this tier, although some produced fully correct solutions. Commonly seen errors in part (a) arose from finding the members of the intersection rather than the union or simply listing the members of set A. Where full marks were not awarded in part (b), one mark was gained for just 4 and 5, for including 4 and 5 with two incorrect numbers (these did have to be from the universal set), for including 4 and 5 with all four other possible values when only two of these should have been selected, or for these four values without including the 4 and 5. All of these appeared, showing some understanding of sets. However, from the number of non-responses, it is clearly not a well-known topic.

Q60. Throughout this question, those who used a ruler and drew lines on the graph to assist in taking readings from the graph generally displayed a greater degree of accuracy and therefore greater success in giving correct answers.

In part (c) those students who knew how to find the area of a rectangle generally gained all 3 marks. However, having found the correct area of $34m^2$, some students stopped and offered that as their final answer or else used the graph incorrectly and tried to take the readings from $y = 34$ (cost axis) rather than the correct $x = 34$ (area axis).

Q61. (a) and (b) The majority of students were able to read the correct information from the travel graph for these two parts.

(c) The majority of students were able to correctly show on their travel graph Lia getting home at 16 30 but they were unable to show the time of 1½ hours at the shopping centre.

Q62. The point in part (a) was always plotted accurately if given. Part (b) was also well answered, the most common error in identifying a single point rather than a relationship (e.g. the most drinks were sold at the maximum temperature) or by giving a partial answer (e.g. negative rather than negative correlation). Too many in part (c) gave lines of best fit that were too far distanced from the points, or merely joined up each of the points. Whether or not a line of best fit was drawn, most students were able to give an answer in (d) that was reasonable, sometimes choosing to ignore their line and give a better answer using estimation.

Q63. Candidates were able to plot the point successfully, as you would expect on this paper. They were also able to name the type of correlation, some giving strength as well, this was not necessary but was accepted. Only a few candidates gave positive as an incorrect answer. The line of best fit was well drawn by the majority, it most commonly started at the upper limit on the left at (1,48) which was just in tolerance. The most common incorrect answers appeared where the line was drawn just above this point. The reading from the graph was usually accurately given.

Q64. A variety of diagrams were seen. Some candidates insist on joining the first to last points forming an enclosed shape. This may come from their interpretation of the word polygon in this question. Centres should ensure candidates are aware this is not correct when drawing a frequency polygon. Another common error is to plot the heights at the end of the intervals. If candidates did this consistently they were awarded one mark. Some candidates draw the histogram first and then add the frequency polygon, this is an acceptable method and full marks can be awarded.

Q65. In part (a) a variety of answers were seen. Some students gave the correct interval but others felt the need to give a value for example, 55 or 60 were common incorrect answers. Some students gave a frequency as an answer.

For part (b) students who correctly plotted the middle of the interval invariably scored full marks by joining all points with straight line segments, it was pleasing to note that the majority of candidates used a ruler rather than attempting freehand line segments. Some students are still losing a mark by joining the first and last points to complete the 'polygon'. However, the most common error seen was to plot the points at the end of the interval, if these were joined with straight line segments a mark was awarded.

Q66. No Examiner's Report available for this question

Mark Scheme

Q1.

(a)	$\frac{2.720294102}{7.7}$		2	M1	for 2.7202(9...) if first 5 figures correct (rounded or truncated) **or** for 7.7 **or** for $\frac{2\sqrt{185}}{77}$
		0.35328(4948)		A1	Accept if first 5 figures correct
(b)		0.35	1	B1	ft from (a) only if more than 2 sig figs given in (a)
					Total 3 marks

Q2.
For all questions, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

	Working	Answer	Mark	Notes
(a)		Radius	1	B1
(b)		Sector	1	B1
(c)	$\frac{60}{360}$		2	M1 oe
		$\frac{1}{6}$		A1
				Total 4 marks

Q3.
Apart from question 18c where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
(a)		80	1	B1
(b)		$\frac{23}{1000}$	1	B1
(c)		5.64	1	B1
(d)	6.5 + 1.69	8.19	2	M1 for 6.5 or 1.69 or $\frac{819}{100}$ or 8.2 A1
(e)	$\frac{3}{8} \times 56.8$ or $56.8 \div 8 \times 3$ oe	21.3	2	M1 or $\frac{213}{10}$ A1
				Total 7 marks

Q4.

Question number	Working	Answer	Mark	Notes
(a)		(2 , 4)	1	B1 cao
(b)		(−1 , 3)	1	B1 cao
(c)		S plotted at 5, 3	1	B1 Accept X in place of S or rhombus in correct position
(d)	2 x 3 oe	6	2	M1 A1 SC B1 for 5 to 7 inclusive (but not 6) or 8
(e)		$x = 2$ oe	1	B1
				Total 6 marks

Q5.

Question	Working	Answer	Mark	Notes
(a)		5	1	B1
(b)		12	1	B1
(c)		3 Squares shaded	1	B1
				Total 3 marks

Q6.

Question number	Working	Answer	Mark	Notes
(a) (i)		8.4681	1	B1
(ii)		8.47	1	B1 ft from a i) if a i) > 2dp
(b) (i)		3.107(232506..)	1	B1 4 sf at least needed
(ii)		3.1	1	B1 ft from b i) if b i) >2sf
				Total 4 marks

Q7.

Q	Working	Answer	Mark	Notes
	32×17 or 544 or $\pi \times 8^2$ oe or 200.9 – 201.602		3	M1
	$32 \times 17 - \pi \times 8^2$			M1 for the complete, correct method
		343		A1 for awrt 343
				Total 3 marks

Q8.

Q	Working	Answer	Mark	Notes
	$\frac{-4+1}{2}$ or $\frac{9+5}{2}$			M1 or for (−1.5 , y) or (x, 7) or (7, −1.5)
		(−1.5 , 7)	2	A1 oe
				Total 2 marks

Q9.

Question	Working	Answer	Mark	Notes
(a)		2	1	B1
(b)	Numbers in order 1, 2, 2, 2, 3, 4, 5, 7, 8	3	2	M1 Ascending or descending order. Condone 1 omission. A1
(c) (i)		Impossible	1	B1
(ii)		Unlikely	1	B1
(d) (i)		B	1	B1 Accept 1/9
(ii)		E	1	B1 Accept 1
(iii)		C	1	B1 Accept 5/9
				Total 8 marks

Q10.

Question	Working	Answer	Mark	Notes
	Fully correct factor tree or repeated division to reach prime factors (condone 1's) or 3, 5, 5, 11 or 3 x 5 x 5 x 11 x 1			M2 factors must multiply to 825 If not M2 then award M1 for correct but incomplete factor tree/ division ladder which includes 2 different primes. (e.g. 25 x 3 x 11)
		3 x 5 x 5 x 11	3	A1 cao Accept $3 \times 5^2 \times 11$ and dots in place of x signs
				Total 3 marks

Q11.

Q	Working	Answer	Mark	Notes
(a)		hexagon	1	B1
(b)		correct pair	1	B1 arrows on two parallel sides and no others
(c)		correct pair	1	B1 crosses on two perpendicular sides and no others
(d)		−2, 7	1	B1
(e)		2, 6	2	B2 B1 for x-coord of 2 B1 for y-coord of 6
				Total 6 marks

Q12.

Question	Working	Answer	Mark	Notes
(a)		2^7	1	B1 cao
(b)	$\frac{280}{35}$ or $\frac{280}{5\times 7}$ or 8 or $280 = 8 \times 5 \times 7$ or 2^3 or fully correct factor tree or repeated division or 2, 2, 2, 5, 7 or $2 \times 2 \times 2 \times 5 \times 7$		2	M1
		3		A1 cao
				Total 3 marks

Q13.

Question	Working	Answer	Mark	Notes
a		octagon	1	B1 condone incorrect spelling
b		reason	1	B1 eg. sides are not all the same length **or** only 2 lines of symmetry
c		parallel lines marked	1	B1
				Total 3 marks

Q14.

Question Number	Working	Answer	Mark	Notes
	12 × 7		2	M1
		84		A1 cao
				Total 2 marks

Q15.

Question	Working	Answer	Mark	Notes
(i)		R marked at 0.5	1	B1
(ii)	B marked between 1cm & 3cm from 0		1	B1
(iii)		G marked at 0	1	B1
				Total 3 marks

Q16.

Question	Working	Answer	Mark	Notes
	50 × 1.2 × 120 or 50 × 1.2 or 60 or 1.2 × 120 or 144		2	M1 Allow $\frac{50 \times 1.2}{120}$
		7200		A1 **Note:** SCB1 for 5000 or $\frac{50 \times 120}{1.2}$ oe or 41.6(66666) × 120 oe with 41.6(66666) rounded or truncated to at least 3SF
				Total 2 marks

Q17.

Question	Working	Answer	Mark	Notes
(a)		6	1	B1
(b)		8	1	B1
(c)	0.5 x (11 + 7) x 10	90	2	M1 M1 for (0.5 x 2 x 10) + (7 x 10) + (0.5 x 2 x 10) A1
(d)	"90" x 12	1080	2	M1 ft Their area in (c) x 12 A1 ft
				Total 6 marks

Q18.

Question	Working	Answer	Mark	Notes
(a)		Reflection in $y = 1$	2	B1 For reflection B1 For $y = 1$ Award no marks if not a single transformation.
(b)	Parallelogram with vertices (3, -3), (9, -3), (6, -6) and (0, -6)		2	B2 Award B1 for any translation of the correct parallelogram.
(c)	Parallelogram with vertices (-3, 1), (-3, 3), (-2, 4), (-2, 2)		2	B2 Award B1 for a correct rotation through $\pm 90^\circ$ about any centre.
				Total 6 marks

Q19.

Q	Working	Answer	Mark	Notes
(a)	$\frac{12}{100} \times 45 (=5.4)$ $45 - "5.4"$	 39.6(0)	3	M1 or M2 for 45×0.88 oe eg $45 \times (1 - 0.12)$ (NB $45 \times (1-12\%)$ scores zero unless accompanied by a correct answer) M1 Dep on correct method for 12% A1
(b)	$546 - 525 (=21)$ $\frac{'21'}{525}$	 4	3	M1 546/525(=1.04) M1 Dep (("1.04" – 1) × 100) or $546/525 \times 100 - 100$ A1
				Total 6 marks

Q20.

For all questions, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

	Working	Answer	Mark	Notes
(a)	$25 \times 17.5(0)$ (= 437.5(0)) **or** 437 **or** 438		3	M1
	"437.5" ÷ 50 (= 8.75) **or** 50×9 **or** 50×8			M1 dep
		9		A1
(b)	"9" × 50 – "437.50" oe **or** 50 – ("437.5" – 400) oe		2	M1 for a complete method ; only ft from an integer answer to (a)
		12.50		A1 ft providing answer is positive. Accept 12.5
				Total 5 marks

Q21.

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

Question	Working	Answer	Mark	Notes
(a)	Eg $\frac{7\frac{1}{2}}{100} \times 15000$ or 0.075×15000 oe or 1125 or $0.075 \times 15000 + 15000$ or 15000×1.075 oe	 16125	 2	M1 For finding 7.5% of 15000 or for a complete method to increase 15000 by 7.5% (eg 1.075×15000) A1 cao

Question	Working	Answer	Mark	Notes
(b)	Eg $\frac{1800}{8} \times 108$ or $\frac{1800}{0.08} \times 1.08$ or 22500×1.08 or $\frac{1800}{0.08} + 1800$ or $\frac{1800}{8} \times 100 + 1800$ or $225 \times 100 + 1800$ or $22500 + 1800$	24300	3	M2 For a complete method M1 for 8% = 1800 or $0.08x = 1800$ or $\frac{1800}{8}$ or 225 or $\frac{1800}{0.08}$ or 22500 or $\frac{x}{1800} = \frac{108}{8}$ oe A1
				Total 5 marks

Q22.

Question	Working	Answer	Mark	Notes
(a)		$56\,d^2$	1	B1 cao
(b)		$12e - 20$	1	B1 Accept $-20 + 12e$
(c)		$f(f-2)$	2	B2 Accept $(f \pm 0)(f-2)$ oe If not B2 then B1 for factors when expanded and simplified give 2 terms, 1 of which is correct except B0 for $(f+a)(f-a)$
(d)	$2^3 + 6 \times 2$ or $8 + 12$	20	2	M1 A1 cao
				Total 6 marks

Q23.

Question	Working	Answer	Mark	Notes
		rotation		B1
		90° clockwise or −90°		B1 accept 270° or 270° anticlockwise.
		{centre} (0,0) or *O* or origin	3	B1 Award no marks if multiple transformations. condone lack of brackets around 0,0

Q24.

Question Number	Working		Answer	Mark	Notes		
	eg $\frac{5}{100} \times 8000 = 400$	OR 8000×1.05^3		3		M1 for eg $\frac{5}{100} \times 8000$ or 400	OR M2 for 8000×1.05^3 (M1 for 8000×1.05 or 8400 or 8000×1.05^2 or 8000×1.05^4)
	$\frac{5}{100} \times (8000+"400"$ = 420 $\frac{5}{100} \times (8000+"400"$ = 441 8000+"400"+"420"+"441"					M1 for completing method	
						Accept (1 + 0.05) as equivalent to 1.05 throughout.	
						SC If no other marks gained, award M1 for 8000×1.15 oe or 9200	
			9261		A1	Cao	

Q25.

Question	Working	Answer	Mark	Notes		
	64 x 4 (=256) 70 x 5 (=350) "350" − "256"	94 or 94% or 94 / 100 or 94 out of 100	4	M1 M1 M1 dep on M2 A1	0.64 × 400 (= 256) 0.7 × 500 (= 350) "350" − "256"	0.64 × 4 (= 2.56) 0.7 × 5 (= 3.5) (3.5 - 2.56) × 100
				NB: 94 embedded in working but not on answer line gets M3A0 unless contradicted.		
	Alternative (i): List of 4 numbers adding to 256 List of 5 numbers adding to 350 list of 5 is identical to list of 4 but also contains 94 eg 94,50,50,56,100 and 50,50,56,100	94 or 94% etc (as above)	4	M1 M1 M1 dep on M2 awarded A1 permitted answers as listed for A1 above		
	Alternative (ii): 70 - 64 (= 6) (70 - 64) × 4 (= 24) 70 + 24	94 or 94% etc (as above)	4	M1 M1 M1 dep on M2 awarded A1 permitted answers as listed for A1 above		
				Total 4 marks		

Q26.

Question	Working	Answer	Mark	Notes	
a	8000 × 1.045 oe (=8360)			M1 or 8000 × 1.0275^3 (=8678.316375)	M2 for 8000 × 1.045 × 1.0275^3
	"8360" × 1.0275^3 oe			M1 "8678.316375" × 1.045	
		9068.84	3	A1 accept 9069 and answers in the range 9068.8(0) – 9068.9(0) SC: B1 for an answer of 9020 (8000 + 360 + 3×220)	
b	1 + 0.02 (=1.02)			M1	M1 for 100(%) + 2(%) (= 102(%))
	5763 ÷ "1.02" oe			M1 dep	M1 (dep) for 5763÷"102" × 100 oe
		5650	3	A1	
					Total 6 marks

Q27.

Question	Working	Answer	Mark	Notes
	4 x 2.6 (= 10.4) (4 x 2.6 – 5) ÷ 3	1.8	3	M1 or 5.4 seen. M1 Correct full calculation which would lead to correct answer. A1 cao
	Alternative solution: Any 4 numbers (including 5) that have a total 10.4 or any 3 numbers that have a total of 5.4 (Sum of their 3 numbers) ÷ 3	1.8	3	M1 M1 Correct full calculation which would lead to correct answer. A1
				Total 3 marks

Q28.

Question	Working	Answer	Mark	Notes
a		4, 5, 4, 7	2	B2 for correct frequencies B1 for at least 2 correct frequencies or tallies
b		9	1	B1 ft from (a) **or** 9
c		6	1	B1
d		eg. 3 is a factor of 9	1	B1 for identifying 9 with a correct reason
e		(6), 8, (10), 12 8,(10),(12),14 (10),12,14,16 12,14,16,18	2	B2 B1 for at least 4 correct entries
fi		$\frac{3}{16}$ oe	2	B2 B1 for $\frac{a}{16}$ with $a < 16$ or $\frac{3}{b}$ with $b >$ 3 **or** 3 and 16 used with incorrect notation (eg. 3 : 16) ft from complete table for numerator only
fii		$\frac{6}{16}$ oe	1	B1 ft from complete table for numerator only
				Total 10 marks

Q29.

Ques	Working	Ans	Mark	Notes
	$3\times8 + 8\times10 + 13\times18 + 18\times20 + 23\times10 + 28\times4$ **or** $24 + 80 + 234 + 360 + 230 + 112$ **or** 1040		4	M1 finds products $f \times x$ consistently within intervals (inc end points) allow 1 error NB. products do not have to be evaluated
				M1 (dep on first M1) –uses midpoints
	$\frac{3\times8+8\times10+13\times18+18\times20+23\times10+28\times4}{8+10+18+20+10+4}$ **or** "1040" ÷ (8+10+18+20+10+4)			M1 (dep on first M1) $\Sigma fx \div \Sigma f$
		14.9		A1 14.8 – 14.9 or $14\frac{6}{7}$ Accept 15 if full working shown
				Total 5 marks

Q30.

Question Number	Working	Answer	Mark	Notes
	(19 x1)(=19) + (8x3)(=24) + (3x5)(=15) + (1x 9) (=9)	67	3	M2 for freq x all correct midpoint values correctly evaluated (condone omission of 4th interval) {do not have to see intention to add} if not M2 then M1 for freq x consistent point in each interval or M1 for 1 error in list of 19, 24, 15, (0), 9 A1 isw if 67 calculated correctly. (2.16.. = M2A1)
				Total 3 marks

Q31.

Question	Working	Answer	Mark	Notes
		$y = -2x + 1$	2	M1 For $y = -2x + c$ ($c \neq 1$) or $y = mx + 1$ or for a correct method to find the gradient or $m = -2$ and $c = 1$ stated A1 or $-2x + 1$ or $L = -2x + 1$ oe
				Total 2 marks

Q32.

Q	Working	Answer	Mark	Notes
(a)(i)		(3, 1)	1	B1
(ii)		(–2, 3)	1	B1
(b)		$y = 1$	1	B1
(c)		8	1	B1
				Total 4 marks

Q33.

Ques	Working	Answer	Mark	Notes
		A $x = 3$ B $y = -2$ C $y = -x$	3	B1 B1 B1
				Total 3 marks

Q34.

Question	Working	Answer	Mark	Notes
(a)		Trapezium	1	B1 (any recognisable spelling) accept trapezoid
(b)		D and F or F and D	1	B1
(c)			1	B1 angle marked in correct place in A or C or E and no errors (can be an arc with no label)
(d)		4	1	B1
(e)		10	2	B2 B1 for 8=< area <10 or 10 <area =<12 or 5x2
				Total 6 marks

Q35.

Question Number	Working	Answer	Mark	Notes
(a)(i)	$\angle ABC = 68°$ **or** $\angle BCD = 112°$		4	M1 May be stated or marked on diagram
		68		A1 cao
(ii)	360 − (67 + 112 + "68" + 74)			M1
		39		A1 ft from their (a)(i) Award 2 marks if the answer to (ii) is 107 − answer to (i)
(b)	(5 − 2) × 180 **or** 3 × 180 **or** (2 × 5 − 4) × 90 **or** 6 × 90 **or** 360 + 180 **or** (180−67) + (180−112) + (180−"68") + (180−74) + (180−"39") **or** 113 + 68 + 112 + 106 + 141		2	M1 Condone 1 incorrect interior angle
		540		A1 Cao SC B1 for 108
				Total 6 marks

Q36.

Q	Working	Answer	Mark	Notes	
	360 ÷ 8 (=45) 360 ÷ 5 (=72)_ 72° – 45° (=27°) 180 – 2 × 27	 126	5	M1 M1 M1 M1 A1	Method to find exterior angle of the octagon Method to find exterior angle of the pentagon Method to find *CAB* or *CBA* Fully correct method to find angle *y* Dep on at least M2
	Alternative				
	360 ÷ 8 (=45) 180 – 45 (=135) 360 ÷ 5 (=72) 180 – 72 (=108) 135° – 108° (=27°) 180 – 2 × 27	 126	5	M1 M1 M1 M1 A1	Method to find interior angle of the octagon Method to find interior angle of the pentagon Method to find *CAB* or *CBA* Fully correct method to find angle *y* Dep on at least M2
					Total 5 marks

Q37.

Question	Working	Answer	Mark	Notes
a		110	1	B1 for 108 – 112
b		cross marked in correct position	3	M1 for arc drawn radius 7.8 cm – 8.2 cm centre *L* or *P* marked 7.8 cm – 8.2 cm from *L* or 40 ÷ 5 (= 8) M1 for bearing of 238 ° – 242 ° from *M* A1 Overlay (*P* 7.8 cm – 8.2 cm from *L* and on a bearing of 238 ° – 242° from *M*)

Q38.

Question	Working	Answer	Mark	Notes	
	$12.8^2 - 9.7^2$ or 163.84 – 94.09 or 69.75		3	M1	For squaring and subtracting [$a = \cos^{-1}\left(\frac{9.7}{12.8}\right)(= 40.7...)$ **and** $\sin 40.7.. = \frac{x}{12.8}$ *or* $\tan 40.7.. = \frac{x}{9.7}$]
	$\sqrt{12.8^2 - 9.7^2}$			M1dep	For square root [$x = 12.8\sin 40.7..$ *or* $x = 9.7\tan 40.7..$]
		8.35		A1	Allow 8.35 - 8.352
					Total 3 marks

Q39.

Question Number	Working	Answer	Mark	Notes		
	use of cos		3	M1	cos must be selected for use in trig ratio **NOT** Cosine Rule	**or** M2 for sin and $\frac{\sqrt{"21.36"}}{9.5}$ following correct Pythagoras **or** M2 for tan and $\frac{\sqrt{"21.36"}}{8.3}$ following correct Pythagoras **or** correct Pythag and then correct use of sine or cosine rule with "21.36"
	cos ("x") = $\frac{8.3}{9.5}$ (=0.87...) **or** ("x" =) cos $^{-1}$ ($\frac{8.3}{9.5}$)			M1		
		29.1		A1	for awrt 29.1 e.g. (29.1103...)	
						Total 3 marks

Q40.

Question	Working	Answer	Mark	Notes
	360 ÷ 15			M1
		24	2	A1
				Total 2 marks

Q41.

Question	Working	Answer	Mark	Notes
(a)	$\pi \times 6.5^2$	133	2	M1 A1 awrt 133
(b)	$10.5^2 - 6.5^2$ or $110.25 - 42.25$ or 68 $\sqrt{10.5^2 - 6.5^2}$ or $\sqrt{110.25 - 42.25}$ or $\sqrt{68}$ oe	8.25	3	M1 M1 A1 awrt 8.25
				Total 5 marks

Q42.

Question	Working	Answer	Mark	Notes
(a) (i)		80	1	B1
(a) (ii)	angles at a point = 360 degrees		1	B1 (indep) Accept "angles at a centre = 360 degrees". "angles in a complete / full turn = 360 degrees". "angles in one revolution = 360 degrees". "angles in a pie chart = 360 degrees" any numerical explanation involving 360
(b)	140 / 50 x 90 oe	252	3	M2 i.e. one complete full correct method. If not M2 then M1 for 140 ÷ 50 (= 2.8) or 50 ÷140 (= 0.357..) or 90 ÷ 50 (= 1.8) or 50 ÷ 90 (= 0.55....) A1 cao
				Total 5 marks

Q43.

Q	Working	Answer	Mark	Notes
(a)	$6x - 15 - 4x - 12$		2	M1 for 3 correct terms
		$2x - 27$		A1 cao
(b)	$y^2 + 2y + 7y + 14$		2	M1 for 3 correct terms out o or for 4 correct terms igisigns or for $y^2 + 9y + c$ for anzero value of c or for ... + 9y + 14
		$y^2 + 9y + 14$		A1 cao
				Total 4 marks

Q44.

Q	Working	Answer	Mark	Notes
	$\pi \times 7.6$		2	M1 or $2\times\pi\times\frac{7.6}{2}$
		23.9		A1 for answer which rounds to 23.9
				Total 2 marks

Q45.

Question	Working	Answer	Mark	Notes	
	$\frac{20}{16}$ (=1.25) **or** $\frac{20}{16}\times 14$ oe (=17.5) **or** $\frac{AC}{20}=\frac{14}{16}$ oe			M1 or for a correct scale factor eg. $\frac{20}{16}$ or $\frac{16}{20}$ or 1.25 or 0.8 or $\frac{14}{16}$ oe or $\frac{16}{14}$ oe	M1 for $16\div(20-16)=4$
	eg. $14\times\frac{20}{16}-14$			M1 for complete method	M1 for complete method
		3.5	3	A1	
					Total 3 marks

Q46.

		Working	Answer	Mark
	$(360-76-82-30)\div 2=86$ **or** $225.5\div 82$ (=2.75) **or** $225.5\div 82\times a$ where $a\neq 86$ **or** $225.5\div 82\times(360-76-82-30)$ oe (=473)		3	M1 Accept digits 2255(000…) in place of 225.5 in both method marks
	$225.5\div 82\times$ "86" **or** $225.5\div 22.7..\times 23.8\ldots$ **or** digits 236… **or** "473" ÷ 2			M1(dep) for complete method (NB: 82 and 86 may be converted to percentage of 360 – and then these percentages used $\frac{82}{360}=22.7..\%$ or 23% ; $\frac{86}{360}=23.8..\%$ or 24%)
		236.5		A1 oe accept 236.5 million or 236 500 000
				Total 3 marks

Q47.

Q	Working	Answer	Mark	Notes
	$\frac{360}{8}$ or $180-\frac{(8-2)\times 180}{8}$	45	2	M1 For complete correct method for exterior angle A1 Do not isw interior angle found
				Total 2 marks

Q48.

Question	Working	Answer	Mark	Notes
	0.5 x 10 x 12 (= 60) or 13 x 8 (= 104) or 8 x 10 (= 80) 0.5 x 10 x 12 (= 60) and 0.5 x 10 x 12 (= 60) and 13 x 8 (= 104) and 13 x 8 (= 104) and 8 x 10 (= 80) or 2 x "60" and 2 x "104" and "80"	408	3	M1 One correct face M1 dep on M1 above (for exactly 5 correct faces) A1 Award M0A0 for 0.5 x 10 x 12 × 8 and M0A0 for 0.5 x 10 x 12 = 60 followed by 60 × 8, etc
				Total 3 marks

Q49.

Ques	Working	Answer	Mark	Notes
a	$8 \times 5 \times 50$		2	M1
		2000		A1
b	$12.5 \times 25 = 312.5$		3	M1 for 12.5×25 (= 312.5)
	$2000 \div 312.5$			M1 "2000" ÷ 312.5
		6.4		A1 ft
				Total 5 marks

Q50.

Question Number	Working	Answer	Mark	Notes
(a)		(3, 2)	2	B2 B1 for 3 B1 for 2
(b)	arc(s) centre *P* radius *PA*		2	M1
		Cross at (6, 3)		A1 Accept any clear indication. Condone omission of label if no ambiguity
				Total 4 marks

Q51.

Q	Working	Answer	Mark	Notes
	$6.20 \div 4$ (=1.55) oe		3	M1 Correct method to find the cost of 500g of grapes
	$(11.60 - 6.20 \div 4) \div 3$			M1
		3.35		A1 Fully correct method to find the cost of 1 kg of plums
				Total 3 marks

Q52.

Q	Working	Answer	Mark	Notes
	$10 \times 4.2 \times 7.5$ or 315 (cm^3) oe		4	M1 For volume of cuboid
	Eg $0.5 \times 7 \times x \times 5$ or $17.5x$ oe			M1 indep For volume of triangular prism
	$10 \times 4.2 \times 7.5 = 0.5 \times 7 \times x \times 5$ or $17.5x = 315$ oe or $\frac{10 \times 4.2 \times 7.5}{0.5 \times 7 \times 5}$ or $\frac{"315"}{"17.5"}$ oe			M1 Dep on M2 For a correct equation involving volume of cuboid and volume of prism or For a correct expression for x
		18		A1 18 SCB2 for For volume of cuboid = 315 and final answer = 9
				Total 4 marks

Q53.

(a)		$6n - 12$	1	B1	
(b)		$p(p - 5)$	2	B2	Also accept $(p+0)(p-5)$ for B2 B1 for factors which, when expanded and simplified, give two terms, one of which is correct. **SC:** B1 for $p(p - 5p)$
(c)	$7x - 3 = 2x$		3	M1	for $7x - 3 = 2x$ **or** $7x - 3 = 2 \times x$ **or** $\frac{7x}{2} - \frac{3}{2} = x$ oe
	$7x - 2x = 3$ or $5x = 3$			M1	for $7x - 2x = 3$ or $5x = 3$ **or** $5x - 3 = 0$ **or** $\frac{7x}{2} - x = \frac{3}{2}$ or $\frac{5x}{2} = \frac{3}{2}$ NB. All these examples could be written with all terms 'on the other side' eg. $-5x = -3$ etc
		$\frac{3}{5}$ oe		A1	**Award full marks if at least one method mark awarded and answer correct.**
					Total 6 marks

Q54.

Question	Working	Answer	Mark	Notes
(a)	$\frac{3\times4}{15} + \frac{5\times2}{15}$ or $\frac{12}{15} + \frac{10}{15}$			M1 Any pair of correct fractions with a denominator a multiple of 15
		22/15	2	A1 Dependent on first M1
(b)	$\frac{9}{4} \div \frac{7}{2}$			M1 May be implied by second M1
	$\frac{9}{4} \times \frac{2}{7}$ oe			M1
		18/28	3	A1 Award A1 for 9/14 if cancelling seen to have taken place.
(b)	Alt. method: $\frac{9}{4} \div \frac{7}{2}$			M1 May be implied by second M1
	$\frac{9}{4} \div \frac{14}{4}$			M1 Denominators must be the same.
		9/14	3	A1
				Total 5 marks

Q55.

Question	Working	Answer	Mark	Notes
	$2y = 6$ or $4x = -6$ oe	$x = -1.5$ $y = 3$	3	M1 Adding or subtracting correctly or correct substitution leading to one correct equation and one unknown A1 A1 dep on M1 awarded otherwise M0A0
				Total 3 marks
				A1 A1 dep on M1 awarded otherwise M0A0

Q56.

Q		Working	Answer	Mark	Notes		
	(a)		0.2, 0.65, 0.35, 0.4, 0.6	2	B2oe	B1 for any 2 correct probabilities (in correct position)	
	(b)	0.8 × "0.35"(=0.28) **or** "0.2" × "0.4"(=0.08)			M1	ft from (a)	M2 ft from (a) for 1−(0.8×'0.6'+'0.2'×'0.6') M1 for 1 − (0.8×'0.65') or 1− ('0.2'×'0.6')
		0.8 × "0.35" + "0.2" × "0.4"			M1	ft from (a)	
			0.36 oe	3	A1	eg $\frac{9}{25}$, 36%	
							Total 5 marks

Q57.

Question	Working	Answer	Mark	Notes
		5, 10, 20, 25, 50, 100	2	B2 If not B2 then B1 for at least 3 correct values and no incorrect values or all correct values with only 1 incorrect value
				Total 2 marks

Q58.

Question	Working	Answer	Mark	Notes
(a)				M1 $(2t \pm 1)(t \pm 3)$ **or** $(2t \pm 3)(t \pm 1)$ NB. Accept $1t$ in place of t
		$(2t-1)(t-3)$	2	A1 cao
(b)	$bx^2 = a - y$ **or** $-bx^2 = y - a$			M1 for isolating bx^2 (or $-bx^2$)
	$x^2 = \frac{a-y}{b}$ **or** $x^2 = \frac{y-a}{-b}$ **or** $x^2 = -\frac{y-a}{b}$			M1 for isolating x^2
		$x = \pm\sqrt{\frac{a-y}{b}}$	3	A1 **or** $x = \pm\sqrt{\frac{y-a}{-b}}$ **or** $x = \pm\sqrt{-\frac{y-a}{b}}$ (condone omission of ±)
				Total 5 marks

Q59.

Question	Working	Answer	Mark	Notes
a		1,2,3,4,5,6,7,9	1	B1 no repeats
b		eg. 4, 5, 7, 8	2	B2 for 4, 5, and any two of 7, 8, 9, 10 If not B2 then B1 for 4,5 **or** 4,5 and any one or two other numbers from the universal set **or** 4, 5, 7, 8, 9, 10 **or** 7, 8, 9, 10 **or** Venn diagram with 4,5 in intersection and any two correct numbers (eg. 8,10) in C
				Total 3 marks

Q60.

(a)		115	1	B1 cao
(b)		23	1	B1 cao
(c)	6.8 × 5		3	M 1
	34			A1 May be implied by ans of 95
		95		A1
				Total 5 marks

Q61.

Question	Working	Answer	Mark	Notes
(a)(i)		90	1	B1
(a)(ii)		25	1	B1
(b)		line from (13 45, 45) to (15 15, 45) and line from (15 15, 45) to (16 30, 0)	2	B2 B1 for line from ((13 45, 45) to (15 15, 45) **or** for a line from (x, 45) to (16 30, 0) where x is a time before 1630
				Total 4 marks

Q62.

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Question		Working	Answer	Mark	Notes
	(a)		Point plotted	1	B1 for point plotted at (6,35)
	(b)			1	B1 for description of dynamic relationship eg "the lower the temperature, the more hot chocolate sold" or negative correlation
	(c)			1	Single straight line of best fit which could be used to take readings
	(d)		21-26	1	B1 for answer in the range 21-26 or ft from single straight line segment (if previous B0)

Q63.

		Working	Answer	Mark	Notes
	(a)		Point plotted	1	B1 for point plotted
	(b)		Negative	1	B1 for Negative (correlation)
	(c)		Correct line	1	B1 for a straight line that lies between (1, 40) to (1, 48) and (5.5, 6) to (5.5, 14)
	(d)		30 – 34	1	B1 30-34 or ft lobf (dep on single str line segment with a negative gradient)

Q64

		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 points joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Q65

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Question	**Working**	**Answer**	**Mark**	**Notes**
(a)		$50 < a \leq 60$	1	B1 for correctly identifying the modal class interval e.g. 50 – 60 oe
(b)		Polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (can include joining last to first to make a polygon)) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.

Q66

Question		**Working**	**Answer**	**Mark**	**Notes**
			No with explanation	2	C1 for expansion of $(x + 5)^2$ with at least 3 terms correct or substitution of the same number into both expressions C1 No with $(x + 5)^2 = x^2 + 10x + 25$ or No with correct evaluation of both expressions