GCSE Mathematics (1MA0) – Foundation Tier Paper 1F

June 2016 mark scheme

NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme

M1 – method mark for appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.

A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.

C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.

In some cases full marks can be given for a question or part of questions where no working is seen. However, it is wise to show working for one small slip could lead to all marks being lost if no working is shown.

Some questions (such as QWC) require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners are prepared to award zero marks if the student's response is not worthy of credit according to the mark scheme.

Question 1 (Total 3 marks)

This lower demand question tested students' ability to extract data from lists and tables (specification reference **SPe**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	February	B1	This mark is awarded for the correct answer only
(b)	Onions	B1	This mark is awarded for the correct answer only
(c)	Lettuces	B1	This mark is awarded for the correct answer only

Examiner's comment: Students were very successful with all parts of this question with very few errors made.

The average score for this question was 2.98. Students aiming for grade C would be expected to score all 3 marks; students aiming for grade F would also be expected to score all 3 marks.

Question 2 (Total 6 marks)

This lower demand question tested students' ability to extract undertand decimals, percentages and fractions (specification references **Na**, **Nh**, **Ni**, **Nj**, and **Nl**).

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	0.5	B1	This mark is awarded for the correct answer only
(b)	$\frac{3}{10}$ (or an equivalent fraction)	B1	This mark is awarded for $\frac{3}{10}$ or an equivalent fraction
(c)	80	B1	This mark is awarded for the correct answer only
(d)	57.6	B1	This mark is awarded for the correct answer only
(e)	$\frac{7-3}{12}$ or $\frac{4}{12}$	M1	This mark is awarded for writing over a single denominator
	$\frac{1}{3}$	A1	This mark is awarded for the correct answer only

Examiner's comments:

Part (a): students making errors here generally used the numerator and/or denominator digits of $\frac{1}{2}$ to form their decimal answer giving 1.2, 0.12 or 0.2.

Part (b): the most common error, made by nearly half of students, was to give $\frac{1}{3}$ instead of $\frac{3}{10}$ as the conversion for 0.3.

Part (c): About two-thirds of students gave the correct 80% for 0.8 but many of the rest wrote 8%.

Part (d): Incorrect answers involved errors with the placement of the decimal point, typically giving 5.76 rather than 57.6.

Part (e): Some students lost a mark by failing to simplify their answer as requested. Some students unnecessarily found a common denominator of 144 by cross multiplication.

The average score for this question was 3.66. Students aiming for grade C would be expected to score at least 5 marks; students aiming for grade F would be expected to score at least 3 marks.

Question 3 (Total 2 marks)

This lower demand question tested students' ability to identify shapes which are congruent and are similar (specification reference **GMf**).

Part	Working or answer an examiner might expect to see	Mark	Notes
	A, D	B1	This mark is awarded for the correct answer only
	B	B1	This mark is awarded for the correct answer only

Examiner's comments: Students were far more successful recognising congruent shapes in part (a) than similar shapes in part (b). Many were not fully familiar with the mathematical meaning of the word 'similar'; those making an error choose shape D rather than the rotated shape B. Students need to be aware that they should be checking for an actual enlargement and use the grid squares to check that an identified scale factor has been applied consistently.

The average score for this question was 1.44. Students aiming for grade C would be expected to score 2 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 4 (Total 6 marks)

This lower demand question tested students' arithmetic and the ability to understand 12 and 24-hour notation (specification references **Na** and **GMo**). Part (a) also tests the student's quality of written communication (QWC) in showing working to support an answer.

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	185 + 108 + 133 + 231 + 124 (= 781) or 177 + 120 + 128 + 230 + 118 (= 773) **OR** the difference in the number of visitors for each castle, e.g. 8, –12, 5, 1, 6 or –8, 12, –5, –1, –6	M1	This mark is awarded for showing a method to find total visitors for 2009 or for 2010
	781 **and** 773 (or 781 000 **and** 773 000) OR correct total net difference, 8 or –8	A1	This mark is awarded for accurately demonstrating the difference between the total visitors to the castles in 2009 and 2010
	A greater total number of people visited these castles in 2009 (supported by working)	C1	This mark is awarded for clearly stating 2009 as your answer (supported by working) – it can only be given if the M1 mark has been awarded
(b)(i)	09 36	B1	This mark is awarded for the correct answer only
(b)(ii)	54	B1	This mark is awarded for the correct answer only
(c)	09 21	B1	This mark is awarded for the correct answer only

Examiner's comments: Students added 3 digit numbers with confidence in part (a) although there were some arithmetic slips made. The alternative method of using differences was rarely used. Some students added an incorrect number of zeros in an attempt to acknowledge that the figures given were for thousands of visitors. Students need to be aware that a clear conclusion was essential for the award of the final mark in this starred question; for example, just circling one year did **not** suffice.

Parts (b)(i) and (c) which involved reading the timetable were very well answered but part (b)(ii) involving the calculation of a time interval, less so. When students attempted to find the difference between the two times using a column subtraction approach they made errors effectively assuming 100 minutes in 1 hour or with the actual subtraction. Use of a time line proved far more successful where any working was actually seen.

The average score for this question was 4.92. Students aiming for grade C would be expected to score all 6 marks; students aiming for grade F would be expected to score at least 5 marks.

Question 5 (Total 3 marks)

This lower demand question tested students' ability to understand probability (specification reference **SPm**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	unlikely	B1	This mark is awarded for the correct answer only
(b)	cross marked at $\frac{1}{2}$	B1	This mark is awarded for cross at $\frac{1}{2}$
(c)	cross marked at 0 (zero)	B1	This mark is awarded for a cross marked at 0 (zero)

Examiner's comments: Students were very successful identifying the correct word "unlikely" to describe probability in part (a) with just a few giving "likely" instead. Students were very successful dealing with the zero probability in part (c) whereas more errors were made identifying the probability of a red counter as $\frac{1}{2}$ in part (b). Most errors here involved placement of the cross somewhere between $\frac{1}{2}$ and 1.

The average score for this question was 2.6. Students aiming for grade C would be expected to score 3 marks; students aiming for grade F would be expected to score 2 or 3 marks.

Question 6 (Total 5 marks)

This lower demand question tested students' arithmetic and ability to systematically list all outcomes for two successive events (specification references **Na** and **SPo**).

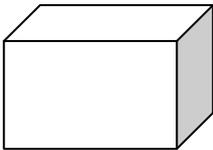| Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	21×6 (= 126) or $32 \times 6 \div 2$ (= 96)	M1	This mark is given for showing a method to work out the total cost of at least one the meals on Saturday and on Monday–Friday
	$21 \times 6 - (32 \times 6 \div 2)$ $= 126 - 96$	M1	This mark is given for showing a method to work out the difference between the total cost of the meals on Saturday and on Monday–Friday
	30	A1	This mark is awarded for the correct answer only
(b)	list of 6 pairs (C, F) (C, E) (C, T) (L, F) (L, E) (L, T)	B2	Two marks are awarded for six correct and distinct pairs with no repeats (One mark is awarded for at least three correct pairs and no incorrect pairs)

Examiner's comments: Students generally understood the special offer in part (a) and were able to select the correct operations to calculate the difference. There were, however, often arithmetic errors with some struggling to find the difference between 126 and 96, typically giving 20 as their answer.

The vast majority of students were able to correctly list all six combinations in part (b) and usually did so in a systematic manner which helped to prevent duplication or omission.

The average score for this question was 4.49. Students aiming for grade C would be expected to score all 5 marks; students aiming for grade F would be expected to score at least 4 marks.

Question 7 (Total 2 marks)

This lower demand question tested students' knowledge of 2D and 3D shapes (specification references **GMd** and **GMk**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	parallelogram	B1	This mark is awarded for the correct answer only (though a spelling mistake will be allowed).
(b)	sketch of a cuboid, for example: 	B1	This mark is awarded for a sketch of cuboid

Examiner's comments: Just over a half of students correctly named the parallelogram. Incorrect responses included 'rhombus'.

Students were successful with cuboid sketches although presentation was very variable indeed. Encouraging students to use a ruler would probably help them ensure that all faces did have pairs of parallel sides although some leniency was given in this respect. Rectangles were seen along with incorrect 3D shapes such as cylinders, cones and spheres.

The average score for this question was 1.33. Students aiming for grade C would be expected to score both marks; students aiming for grade F would be expected to score at least 1 mark.

Question 8 (Total 4 marks)

This low/medium demand question tested students' ability to solve linear equations (specification reference **Ad**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$12 + 3 = 15$	B1	This mark is awarded for the correct answer only
(b)	$30 \div 5 = 6$	B1	This mark is awarded for the correct answer only
	$2w + 7 - 7 = 13 - 7$ or $\dfrac{2w + 7}{2} = \dfrac{13}{2}$	M1	This mark is awarded for showing a method to subtract 7 from both sides or a method to divide all terms by 2 as a first step
(c)	$2w = 6$ so $w = 3$ or $w + 3.5 = 6.5$ so $w = 3$	A1	This mark is awarded for the correct answer only

Examiner's comments: Solution of the simple equations in both parts (a) and (b) caused few problems. Where errors were made in part (a), students had either subtracted 3 from the right hand side (12) rather than adding to give an answer of 9; or gave the answer 4 perhaps from dividing 12 by 3.

Similarly, in part (b), answers of 25 suggested students had subtracted 5 from the right hand side (30) rather than dividing.

Formal algebraic solution of the equation in part (c) was often replaced by just calculation using the inverse operations to show $13 - 7$ then $\div 2$. Some students wrote down an answer 6 or 13 even if they had found the correct answer 3 in their working.

Students need to take care to give the actual value of the unknown even if they show an embedded solution or carry out a check of a found value.

Some students interpreted $2w$ as being $2 + w$, typically leading to an answer of 4.

The average score for this question was 3.14. Students aiming for grade C would be expected to score all 4 marks; students aiming for grade F would be expected to score at least 3 marks.

Question 9 (Total 3 marks)

This lower demand question tested students' ability to measure area (specification reference **GMx**). This question also tests the student's quality of written communication (QWC) in showing working to support an answer.

Part	Working or answer an examiner might expect to see	Mark	Notes
	Shape A: $6 + 3$ or $12 - 3$ Shape B: $4 + 4$ or $12 - 4$	M1	This mark is awarded for a method to find the area of A **or** area of B (or both)
	Area of A = 9 cm^2 Area of B = 8 cm^2	A1	This mark is awarded for finding the correct areas of both shape A and shape B (answers of 9 and 8 would be acceptable)
	Shape A has an area which is 1 cm^2 greater that of shape B	C1	This mark is awarded for a comment to say which shape has the greater area and by how much (giving correct units cm^2) This comment must be supported by working – it can only be given if the M1 mark has been awarded

Examiner's comments: Incorrect answers for this question usually occurred as a result of confusion between area and perimeter. Many students resorted to counting squares rather than formal calculation and most dealt with the half squares with confidence.

Clear labelling on the actual shapes themselves often helped and where calculations were used many students drew a rectangle to enclose the triangle part of each shape.

This was a starred question but many students with correct numerical work failed to get the final mark which was awarded for correct units cm^2 or square given with the answer 1.

The average score for this question was 1.42. Students aiming for grade C would be expected to score at least 2 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 10 (Total 3 marks)

This lower demand question tested students' understanding of factors and multiples (specification references **Nc**, **Na** and **Nq**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	6	B1	This mark is awarded for the correct answer only
(b)	44	B1	This mark is awarded for the correct answer only
(c)	33, 11, 4 or 4, 11, 33 or 8, 4, 6 or 6, 4, 8	B1	This mark is awarded for a correct answer only

Examiner's comments: Students were more successful identifying a factor of 42 in part (a) than multiple of 22 in part (b) Students appeared to understand the meaning of factor with the most common incorrect answers being 4 or 8 but for the multiple, another factor of 42 was typically given.

Just under half of all students gave a correct set of 3 numbers to complete the statement in part (c).

Incorrect answers most often involved the first 2 numbers where the division part of the calculation was often given in the wrong order, for example $4 \div 8 \times 6$ rather than the correct $8 \div 4 \times 6$.

The average score for this question was 1.65. Students aiming for grade C would be expected to score at least 2 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 11 (Total 5 marks)

This low/medium demand question tested students' ability to use algebra to solve problems in context (specification references **Ab**, **Ac** and **Ad**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$4 \times 10 \ (= 40)$	M1	This mark is awarded for a method to work out what Amber earned on Saturday
	$180 - 40$ (from part (a) = 140, then $140 \div 7$ to give 20 (hours)	M1	This mark is awarded for a method to work out how many hours Amber worked from Monday to Friday
	Total hours worked: $4 + 20 = 24$	A1	This mark is awarded for the correct answer only
(b)	$7 \times e$ or $5 \times e$ or $7 \times 5 \times e$	M1	This mark is awarded for a method to work out what Chris earns each week
	$7 \times 5 \times e = 35e$	A1	This mark is awarded for the correct answer only

Examiner's comments: Part (a) was generally well answered. Students would be well advised to reread the actual question to make sure that their answer matches it – in this instance they would remind themselves to add the 4 hours back on to the 20 calculated for the rest of the week, Monday to Friday.

Many of the students who failed to score any marks had not realised that they needed to subtract the £40 for Saturday first and instead proceeded to attempt to divide £180 by 7. This was one of several questions where a lack of skill with division hampered accuracy. Those that used cumulative addition as a method of division were not as successful as others who worked from knowledge of $7 \times 2 = 14$ to deduce that $140 \div 7 = 20$.

Students had far less success with part (b) with only a few offering the correct simplified expression $35e$. Some made a little progress and offered $7e$ but many others clearly did not understand the meaning of the word expression. Some attempted numerical work, often using information from part (a) or gave an equation.

The average score for this question was 2.45. Students aiming for grade C would be expected to score at least 3 marks; students aiming for grade F would be expected to score at least 2 marks.

Question 12 (Total 3 marks)

This lower demand question tested students' ability to use arithmetic and make conversions (specification reference **Na** and **GMp**).

Part	Working or answer an examiner might expect to see	Mark	Notes
	12×330 (= 3960) or $12 \times \dfrac{330}{1000}$ (= 3.96) or digits 396	M1	This mark is awarded for a method to work out how many m*l* or *l* of cola Jodie buys in total
	$4 \times 1000 - (12 \times 330)$ (= 40) or $4 - (12 \times \dfrac{330}{1000})$ (= 0.04)	M1	This mark is awarded for a method to work out the difference between the amount of cola Jodie and Rob but (in m*l* or *l*)
	40 m*l* or 0.04 *l*	A1	This mark is awarded for a correct answer only (including units of m*l* or *l*)

Examiner's comments: There were many good attempts at this question where students were confident in identifying the correct operations to use. Issues arose with accuracy of multiplication for 330×12 and many lost the final mark through failing to give units.

A key part of this question was the need to convert between litres and millilitres. Most students knew the correct conversion factor but would be well advised to choose the unit that avoids decimals, here millilitres, when deciding which unit to work with. There were a few students who used $1l = 100ml$.

The average score for this question was 1.84. Students aiming for grade C would be expected to score all 3 marks; students aiming for grade F would be expected to score 1 or 2 marks.

Question 13 (Total 8 marks)

This low demand question tested students' use of arithmetic and problem-solving in context (specification references **Na**).

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	300×3 (= 900) or $150 \div 3$ (= 50)	M1	This mark is awarded for a method to work out how many grams of coffee Adam needs in total or for the number of cups which can be made from one jar.
	$900 \div 150$ (= 6 jars) or $300 \div 50$ (= 6 jars)	M1	This mark is awarded for a method to work out the number of jars of coffee needed
	$500 \div 160$ (= 3.125, so 4 boxes needed)	M1	This mark is awarded for a method to work out how many boxes of tea bags Adam needs in total
	6 (jars) $\times$ £4 + 4 (boxes) $\times$ £4.50 (= £24 + £18)	M1	This mark is awarded for a method to work out the total cost of the jars of coffee and boxes of tea bags
	(£)42	A1	This mark is awarded for the correct answer only
(b)	6×30	M1	This mark is awarded for a method to work out the total number of cakes delivered
	$180 - 12$	M1	This mark is awarded for a method to work out the number of cakes sold
	168	A1	This mark is awarded for the correct answer only

Examiner's comments: Difficulties arose in this question with division, particularly with $500 \div 160$ for the number of boxes of tea required. The best work was well laid out with a clear structure which enabled

the student to follow their own working and avoid arithmetic slips. Students need to consider as a final check whether their answer makes sense in the context given – there were some very unrealistically high total costs offered as final answers.

Students were very successful indeed in part (b) with virtually all work involving at least one step of a correct method.

The average score for this question was 5.22. Students aiming for grade C would be expected to score at least 7 marks; students aiming for grade F would be expected to score at least 4 marks.

Question 14 (Total 4 marks)

This medium demand question tested students' arithmetic and ability to use conversion graphs (specification reference **As** and **Na**). This question also tests the student's quality of written communication (QWC) in showing working to support an answer.

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	4.5 (read off from the graph)	B1	This mark is awarded for the correct answer only
(b)	Correct use of graph to convert 0 °F into °C or Correct use of graph to convert −10 °C into °F	M1	This mark is awarded for use of the graph to find a conversion from 0 °F into °C or from −10 °C into °F
	°C in the range −17.5 to −18 or −10 °C equivalent to 14 °F	A1	This mark is awarded for a correct conversion between °F and °C
	Dave's freezer is warmer than it needs to be at 10 °C (needs to be −18 °C) or Dave's freezer is warmer than it needs to be at 14 °F	C1	This mark is awarded for clearly stating Dave's freezer is warmer than it needs to be with a converted temperature using the correct units (supported by working) – it can only be given if the M1 mark has been awarded

Examiner's comments: The most common incorrect answer came from a scale misreading to give 4.9. Successful students often showed markings between 0 and 5 along the °C axis, some went as far as to number their marks.

In part (b) most students had some success reading the graph but relatively few followed this with an appropriate comparison to describe the relative temperatures. For this starred question, it was essential for the final comparative statement to not only include correct and consistent units but also make a reference equivalent to the fact that Dave's freezer was warmer than the recommended temperature.

The average score for this question was 1.47. Students aiming for grade C would be expected to score 2 or 3 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 15 (Total 3 marks)

This medium demand question tested students' understanding of data collection (specification reference **SPd**).

Part	Working or answer an examiner might expect to see	Mark	Notes
		B1	This mark is awarded for a 'type of fruit' type column.
		B1	This mark is awarded for a tally column.
	Suitable data collection sheet	B1	This mark is awarded for a frequency column.

Examiner's comments: For those students only awarded part marks, it was the tally column that was most frequently missing.

Some students did misunderstand the question and offered a questionnaire question with response boxes instead. When students are taught techniques for checking through a completed examination paper, they could be reminded to compare questions – here the presence of a questionnaire question later in the paper may have been a reminder that a data collection sheet would be different.

The average score for this question was 2.12. Students aiming for grade C would be expected to score all 3 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 16 (Total 2 marks)

This medium demand question tested students' ability to xxxx (specification references **Nl**, **Nm** and **No**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$100 - 15 - 12 - 43 = 30$	B1	This mark is awarded for a correct answer only
(b)	$\dfrac{15}{100} \times 800$ (or equivalent)	M1	This mark is awarded for finding a method to calculate 15% of 800
	120	A1	This mark is awarded for a correct answer only

Examiner's comments: Students found part (a) straightforward although a few forgot to subtract the total for other spending from 100 so gave 70% instead of the correct 30% for rent.

Although students are regularly asked to find the percentage of an amount without a calculator as in part (b), many did not show any method. Students should be aware that the operations used to get values must be seen to award marks if the values themselves are incorrect.

The average score for this question was 2.06. Students aiming for grade C would be expected to score x marks; students aiming for grade F would be expected to score x marks.

Question 17 (Total 4 marks)

This medium demand question tested students' ability to plot linear graphs (specification reference **Al**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	y-values: 3, (5), 7, (9), 11, 13	B2	These marks are awarded for the values 3, 7, 11 and 13 added to the table (B1 for 2 or 3 correct values)
(b)	6 points plotted	M1	This mark is given for at least 5 points correctly plotted
	Correct graph from $x = 0$ to $x = 5$	A1	This mark is awarded for a correctly plotted graph

Examiner's comments: Occasionally, students plotted the points correctly but failed to join them with a straight line. This question was another one where good checking strategies could be used to identify errors. When points plotted did not form a line, not only could the appropriate points themselves be reviewed but also the matching table entries in part (a).

The average score for this question was exactly 3. Students aiming for grade C would be expected to score all 4 marks; students aiming for grade F would be expected to score 2 or 3 marks.

Question 18 (Total 4 marks)

This medium demand question tested students' arithmetic and ability to understand pie charts (specification reference **SPi**, **Nh** and **Na**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$360 - 45 - 105 - 90 \; (= 120)$ or measuring angle in the range $118° - 122°$	M1	This mark is awarded for a method to find the fraction of votes by subtracting using the information given in the pie chart or by measuring the missing angle
	$\dfrac{1}{3}$ or equivalent (e.g. $\dfrac{120}{360}$)	A1	This mark is awarded for a correct answer only
(b)	4500×4 or $4500 \times \dfrac{90}{360}$	M1	This mark is awarded for a method to find the total number of votes using the information that $90°$ represents 4500 votes
	18 000	A1	A1 for the correct answer only

Examiner's comments: Many students were able to calculate the size of the angle for Megan Wells but a significant proportion failed to proceed on to give the actual fraction for this sector. A final check read of the question could have picked up the crucial word.

In part (b), students who realised that Ellen's proportion of the votes was represented on the pie chart by a right angle invariably went on to calculate the answer successfully. Those who failed to realise that Ellen received a quarter of the votes did not carry out the straightforward calculation of 4500×4 but instead attempted a much more complicated, and often unsuccessful attempt, to calculate individual votes. Students could be encouraged to refer to the number of marks available to guide them to using a simpler method for questions attracting just 1 or 2 marks.

The average score for this question was 1.57. Students aiming for grade C would be expected to score at least 3 marks; students aiming for grade F would be expected to score at least 1 mark.

Question 19 (Total 7 marks)

This medium to higher demand question tested students' knowledge of faces, edges, vertices, nets and finding the volume of a prism (specification references **GMk** and **GMaa**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)(i)	12 vertices	B1	B1 for the correct answer only
(a)(ii)	8 faces	B1	B1 for the correct answer only
(b)		M1	This mark is awarded for an attempt to draw net with two of the following three features: 6 rectangles 2 polygon faces with at least 5 edges a net with correct connections to give at least one vertex with 3 faces meeting.
	correct sketch of net of the prism	A1	A1 for a correct sketch of a net
(c)	30×25	M1	This mark is awarded for finding a method to calculate the volume of the prism
	750	A1	This mark is awarded for the correct answer (750) only
	cm^3	B1	This mark is awarded for the correct units (cm^3)

Examiner's comments: Identifying the number of vertices and faces proved to be a challenge for many students in part (a), with incorrect answers for vertices given by just over half of students. Successful students often indicated evidence of counting carefully on the diagram with, for example, vertices circled and faces ticked.

Many students managed to draw a correct net but others had too many or too few rectangles, or used alternative polygons, notably octagons. If students had readily connected their answer for the number of faces in part (a) to the number actually drawn in part (b), some errors could have been avoided. Students should be encouraged to use pencil for all diagrams as many used pen and had to resort to crossing out errors made.

For part (c), many students did not remember the formula for the volume of a prism nor refer to the formula sheet to find it. It was very common to have 30 squared, presumably due to the units given with the 30 cm^2 area of the cross-section in the diagram. Many students failed to score the third final mark for giving correct units – these were either omitted altogether, or cm^2 given instead. Students should be reminded to write numbers clearly, especially if they are indices.

The average score for this question was 3.46. Students aiming for grade C would be expected to score at least 5 marks; students aiming for grade F would be expected to score at least 2 marks.

Question 20 (Total 4 marks)

This higher demand question tested students' ability to expand, simplify and factorise algebraic terms (specification reference **Ac**).

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	p^7	B1	This mark is awarded for the correct answer only
(b)	$3m + 12$ or $-8m - 2$ or $8m + 2$	M1	This mark is awarded for multiplying out at least one of the two terms involving brackets correctly
	$3m + 12 - 8m - 2 = -5m + 10$ (or equivalent)	A1	This mark is awarded for a correct answer only
(c)	$n(n - 7)$	B1	This mark is awarded for the correct answer only

Examiner's comments: Just over half of students dealt with indices correctly in part (a) with incorrect attempts usually showing indices multiplied rather than added to give p^{10}.

The subtraction in part (b) caused problems and so only a small minority gained both marks although many did secure a mark for expanding at least one set of brackets correctly.

The majority of students did not understand the demand to factorise in part (c) but where they did it was usually done successfully.

The average score for this question was 1.46. Students aiming for grade C would be expected to score at least 2 marks; students aiming for grade F might score 1 mark for part (a).

Question 21 (Total 5 marks)

This higher demand question tested students' ability to estimate and to find the probability of an event happening (specification reference **SPn**).

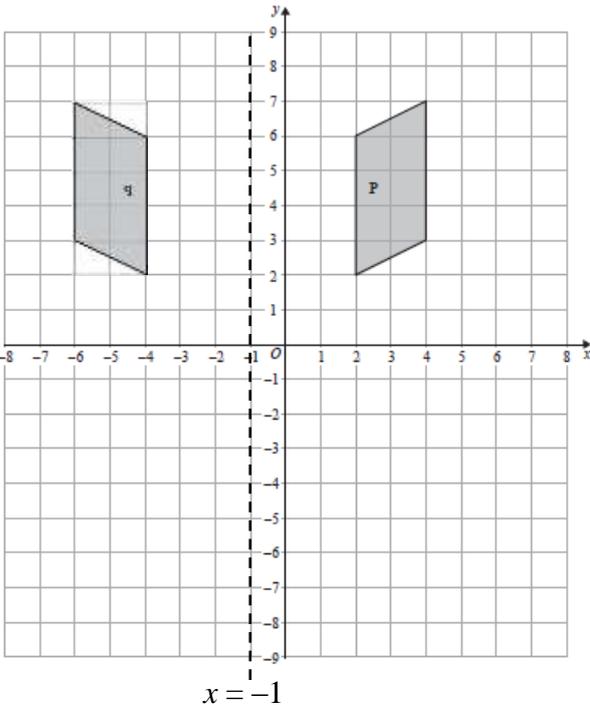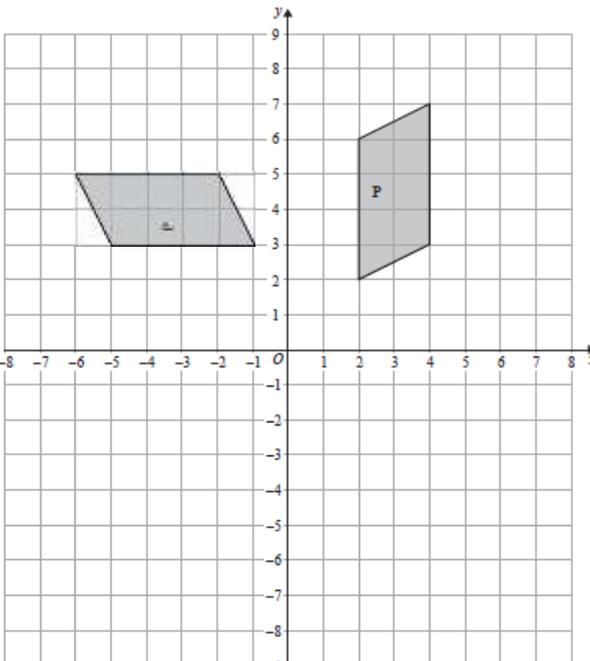| Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$400 \div 8$ or $\dfrac{5}{8}$ (or equivalent)	M1	This mark is awarded for a method to find a fraction for the probability of spinning a C
	$400 \times \dfrac{5}{8}\ =\ 250$	A1	This mark is awarded for the correct answer only
(b)	$\dfrac{16}{39+25+16} = \dfrac{16}{80}$ or $\dfrac{300}{80}$ (or equivalent)	M1	This mark is awarded for a method to find a fraction for the probability of spinning an L
	$\dfrac{16}{80} \times 300$ or $\dfrac{300}{80} \times 16$	M1	This mark is awarded for a method to find an estimate of the number of times Dan will spin an L
	60	A1	This mark is awarded for the correct answer only

Examiner's comments: In part (a), many students successfully gained a method mark for showing the required fraction $\frac{5}{8}$ but then did not know how to use this to estimate the number of times Beth would get a C. A common error was to divide 400 by 5 rather than 8. Some students used an equivalent fractions method to scale up from $\frac{5}{8}$ to $\frac{250}{400}$.

Students found part (b) more challenging than (a) and when they initially attempted to divide 300 by 80 many used the demand for an estimated probability as licence to round at this stage up to 4 and hence reach a final answer of 64 rather than 60. Successful students were often able to recognise $\frac{16}{80}$ as equivalent to $\frac{1}{5}$.

The average score for this question was 1.16 and by this measure was the hardest on the paper. Students aiming for grade C would be expected to score at least 2 marks; students aiming for grade F might score 1 mark.

Question 22 (Total 4 marks)

This higher demand question tested students' ability to transform 2D shapes by reflection and rotation (specification reference **GMl**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	Correct shape reflected in the line $x = -1$ $x = -1$	B2	These marks are awarded for a correct reflection with vertices (–4, 2). (–6, 3) (–6, 7) and (–4, 6) (B1 is given for a reflection in any vertical or horizontal line)
(b)	Correct shape rotated 90° anti-clockwise about (0, 1)	B2	These marks are awarded for a correct rotation with vertices (–1, 3), (–5, 3), (–6, 5) and (–2, 5) (B1 is given for a rotation of 90° clockwise about (0, 1) **or** a correct orientation fully in the correct quadrant)

Examiner's comments: Some students understood reflection in part (a) but not where the line $x = -1$ should be. They were able to get a single mark for a reflection but only a minority gained both marks for a completely correct transformation.

Students had slightly more success with the rotation in part (b) but, again, although many understood the nature of a rotation, using the centre of rotation to ensure the correct position was found to be more challenging.

The average score for this question was 1.23. Students aiming for grade C would be expected to score at least 2 or 3 marks; students aiming for grade F might score 1 mark.

Question 23 (Total 4 marks)

This high demand question tested students' ability to criticise and design questions for a questionnaire (specification reference **SPc**).

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	Reasons : No time frame is given (e.g. could be "how often do people buy crisps per week or per month"), The response boxes are too vague (e.g. how often is "often"? How is that different to "sometimes"?), The response boxes are not exhaustive (e.g. they should also include the response "always")	B2	These marks are awarded for **two** reasons shown (B1 given for 1 reason)
(b)	For example: How often do you buy crisps each week?	B1	This mark is awarded for a suitable question which includes a time frame (the time frame could appear with the response boxes)
	Never, 1–3 times, 4–7 times, 8 times or more	B1	This mark is awarded for at least three non-overlapping exhaustive response boxes and with no use of inequality symbols

Examiner's comments: In part (a) many students gave at least one correct criticism of the questionnaire question but did not gain both marks as explanations were sometimes vague or the same point was used twice.

Of those offering correct reasons, the majority of students were aware that the question did need a time frame and understood that the responses were vague but some were unable to communicate this well. Students need to practise writing down explanations using appropriate key words such as time frame.
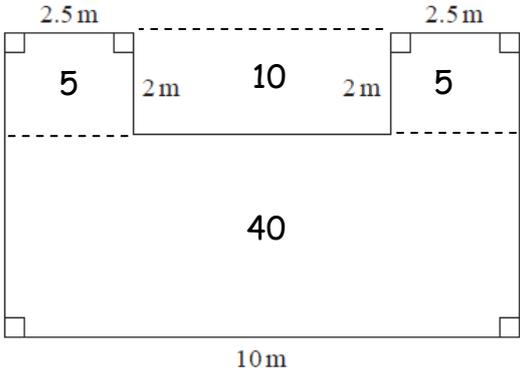
A common mistake was to say there were not enough option boxes without explaining that they needed to be exhaustive and cover all possible options.

In part (b) most students were able to write a question with a time frame but many wrote questions about the quantity of crisps purchased rather than frequency. Some did not give exhaustive response boxes, particularly when a week was used as a time frame and the upper limit of 7 was given without acknowledgement that more than one purchase could be made per day. There were also errors with overlapping response boxes.

The average score for this question was 2.20. Students aiming for grade C would be expected to score at least 3 marks; students aiming for grade F would be expected to score 2 marks.

Question 24 (Total 5 marks)

This high demand problem-solving question tested students' ability to calculate areas of compound shapes (specification references **Na**, **GMx** and **GMs**). This question also tests the student's quality of written communication (QWC) in showing working to support an answer.

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2 \times 2.5 \ (= 5)$ or $4 \times 10 \ (= 40)$ or 2.5×6 or 5×2	M1	This mark is awarded for finding the area of one rectangle which is not 6×10
	$5 + 5 + 40$ or $60 - 10 \ (= 50)$ 	M1	This mark is awarded for a complete method to find the total area of the floor
	$50 \div 5 \div 2.5 \ (= 4 \text{ tins})$ or $50 \div 5 \ (= 10 \text{ litres})$ or $3 \times 2.5 \times 5 \ (= 37.5 \text{ m}^2)$	M1	This mark is awarded for a complete method to find the number of tins needed or for a complete method to find the number of litres needed. or for a complete method to find the area covered by 3 tins
	$50 \ (\text{m}^2)$ **and** (4 tins needed) **or** for 10 (litres) **and** 7.5 (litres) **or** for $50(\text{m}^2)$ **and** $37.5(\text{m}^2)$	A1	This mark is awarded for a correct answer only
	Angie does not have enough varnish to cover the floor	C1	This mark is awarded for a comment to say whether or not Angie has enough varnish to cover the floor. This comment must be supported by working – it can only be given if the first two M marks have been awarded

Examiner's comments: Common errors stemmed from working out dimensions of the floor incorrectly. Many students correctly used 2×2.5 or 2.5×6 but then incorrectly added on 10×6 or 5×6. Students could be encouraged to show the methods used to find missing lengths and show calculated lengths on the diagram. In this way marks for a correct method can be awarded even if the final answer is incorrect.

A minority of students worked out the perimeter of the shape instead of the area. Some innovative solutions involved splitting the floor area into ten 5 m^2 rectangles to conclude that 10 litres would needed.

The average score for this question was 1.30. Students aiming for grade C would be expected to score at least 3 marks; students aiming for grade F might score 1 mark.