Pearson Edexcel

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)
Mathematics (1MA1)

November 2022 Exemplar
1MA1-1F Paper 1 (Non-Calculator)
Foundation Tier
Senior Examiner's feedback on student responses

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About this booklet

This document has been produced to support mathematics teachers delivering the new GCSE (9-1) Mathematics specification.

This document looks at a selection of questions from the November 2022 GCSE (9 - 1) Mathematics Foundation tier examination. It shows real student responses to selected questions and how the examining team follow the mark schemes to demonstrate how the students would be awarded marks on these questions.

Our examining team have selected student responses to Foundation tier questions and common questions that are in both the Higher tier and Foundation tier from the November 2022 examination.

Following each question, you will find the mark scheme for that question, examiner comment, data on how the question performed and then a range of student responses with accompanying examiner comments on how the mark scheme has been applied, the marks awarded, and the common errors for this sort of question.

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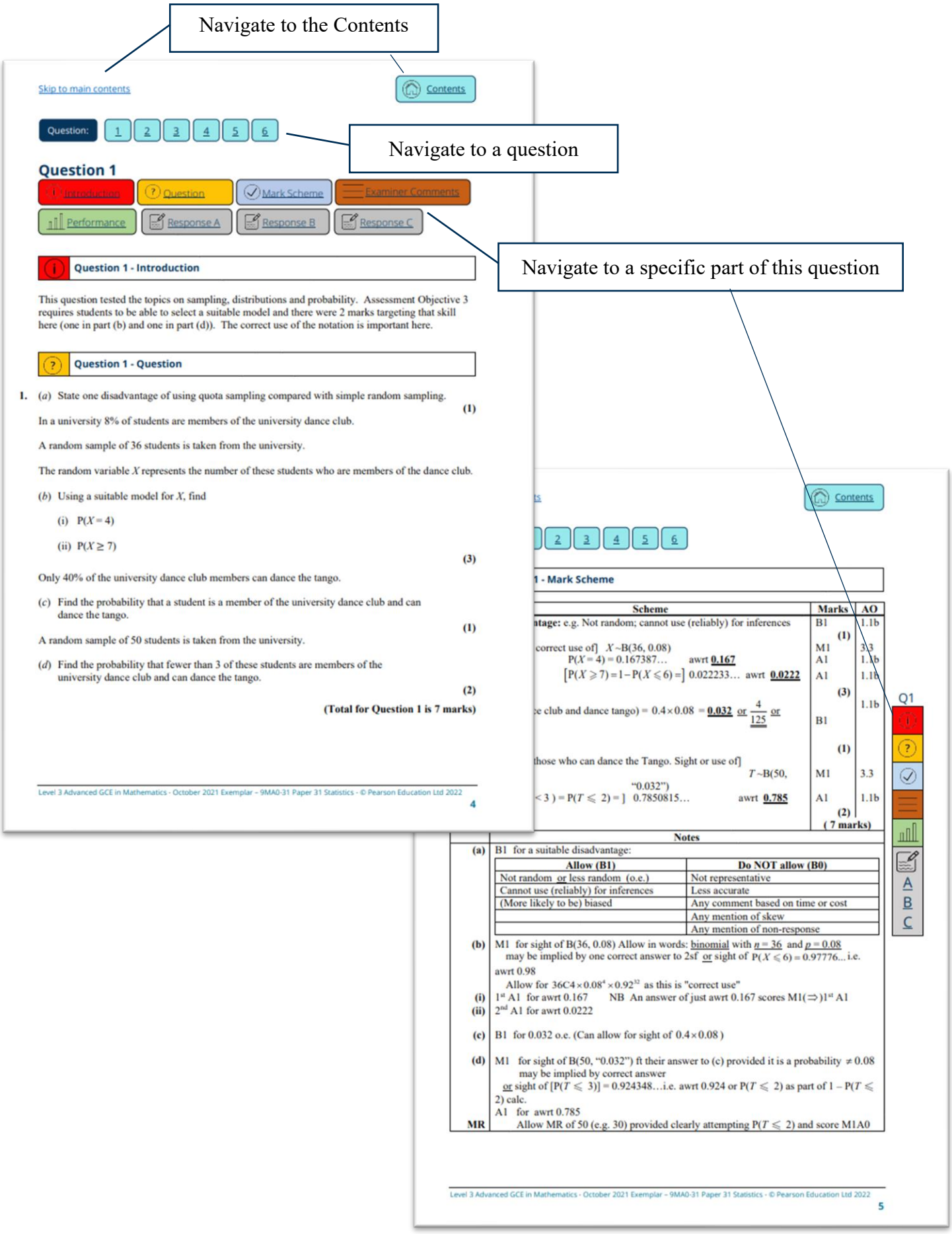
How to use this booklet



General Examiner Feedback

The paper offered an opportunity for students of all abilities to demonstrate their understanding of a variety of mathematical concepts.
The early questions acted as a good confidence building way into the paper, with many students gaining a good proportion of the early marks.

Lack of careful reading of some of the questions was a cause for concern; particular ones are quoted in the summary below. Also worrying is the number of arithmetical errors that featured in many students' work. Simple application of the four rules was found wanting on many occasions. For example, 10000/8 being seen as 8/10000. Students should be encouraged to check working before being totally satisfied with their answers.

Some students were clearly avoiding tackling questions that involved algebraic techniques. These attempted trial-and-error methods from quite early on in the paper, even for the simpler questions where an algebraic approach was straightforward.

The quality of handwriting from some candidates made their responses difficult to read. Students are advised to avoid rushing through their work.

Areas of the curriculum that need more attention are, Geometric reasoning (Q9b), Describing transformations (Q11), Equation of a straight line (Q11bii), Fractions (Q20), Indices (Q21) Comparison of ratios (Q24) and Factorisation of polynomials (Q26b).

Again, it was pleasing to see many students clearly showing their working and utilising their communication skills when required. This continues to be an area of improvement.

Question 6

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 6 - Question

6 Fay is planning a trip to a theme park for 1 adult and 2 children.

These are the costs for the trip.

Total cost of petrol	£23
Tickets to theme park	£33 each adult
	£24.50 each child
Meals	£15 each adult
	£10 each child

Fay has £200 to spend.

She pays all the costs.

How much money does she have left?

£.....

(Total for Question 6 is 4 marks)

Question 6 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
6	60	P3	for complete process to find the total costings eg 23 + 33 + 24.5(0) + 24.5(0) + 15 + 10 + 10 (= 140) **or** for a complete process to find the total money left, eg. 200 – 23 – 33 – 24.5(0) – 24.5(0) – 15 – 10 – 10 (= 60), condone one error, eg one omission or one additional cost	All processes may be seen as part of subtractions to find money left
		(P2	for process to find the total cost of all theme park tickets, eg 33 + 2 × 24.5(0) (= 33 + 49 = 82) **or** for process to find the total cost of all meals, eg 15 + 2 × 10 (= 15 + 20 = 35) **or** for process to find the total cost for the children, eg 2 × 24.5(0) + 2 × 10 (= 49 + 20 = 69) **or** for process to find total costs with just **one** child, eg 23 + 33 + 24.5(0) + 15 + 10 (= 105.5(0)))	Additions may include other elements for process marks, eg. 23 + 33 + 2 × 24.5(0)
		(P1	for a start to a correct process, considering at least 2 costs eg 33 + 24.5(0) (= 57.5(0)) or 2 × 24.5(0) (= 49) **or** for start to a process to find money left, eg 200 – 23 (= 177) or 200 – 33 (= 167))	May be any start to a correct process
		A1	cao	

Q6
A
B
C

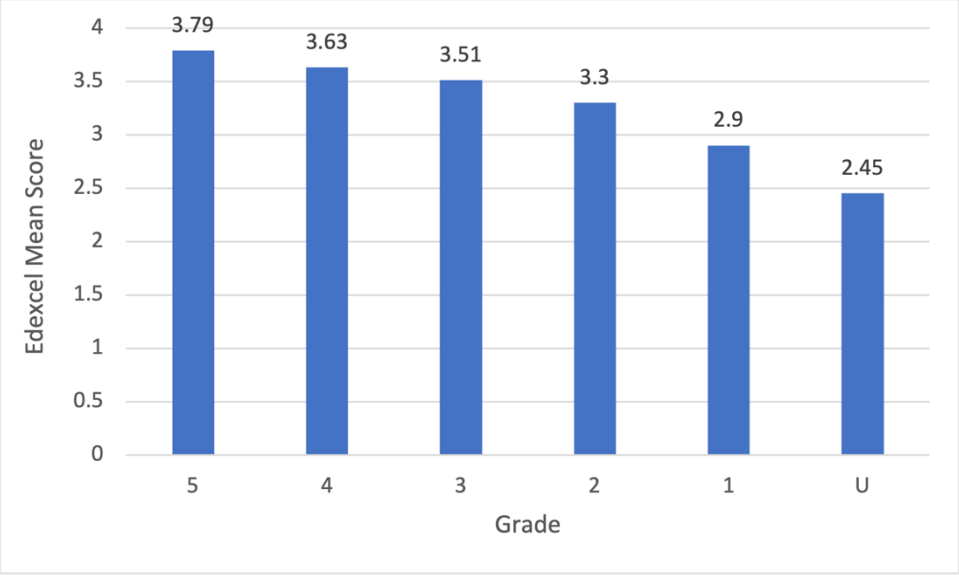
Question 6 - Examiner Comments

It was very pleasing to see so many students gaining good marks on this multi-step question. The vast majority gaining 2+ marks. In general, marks were lost through not reading the question carefully. Often just one child was considered, or two adults were included. Another common mistake was to omit the cost of petrol while in other cases it was seen as a cost for each person. Poor arithmetic often denied many full marks, mainly with the addition of two child tickets (the only non-integer), or with an inability to line up integers and non-integers successfully in a column addition method. Some gave the total cost of the trip instead of the change.

The standard of presentation of answers was lacking, in some cases, with little structure or order to what they were doing.

Question 6 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
3.45	4	86	3.45	3.79	3.63	3.51	3.30	2.90	2.45



Question 6 - Response A

6 Fay is planning a trip to a theme park for 1 adult and 2 children.

These are the costs for the trip.

Total cost of petrol	£23
Tickets to theme park	£33 each adult £24.50 each child
Meals	£15 each adult £10 each child

Fay has £200 to spend.
She pays all the costs.

How much money does she have left?

£200 → total

1 adult ticket £33
2 child tickets £49
meal (adult) £15
meal (child) £20 (10x2)
petrol + £23
140
2

24.50
24.50
49.00
1

£200 - £140
£60 left

£ 60

Q6

A
B
C

4 /4

P3 for complete process to find the total costings. At this stage, since there are no errors made, the process marks are awarded without the need to subtract from £200

A1 for a correct answer

Question 6 - Response B

6 Fay is planning a trip to a theme park for 1 adult and 2 children.

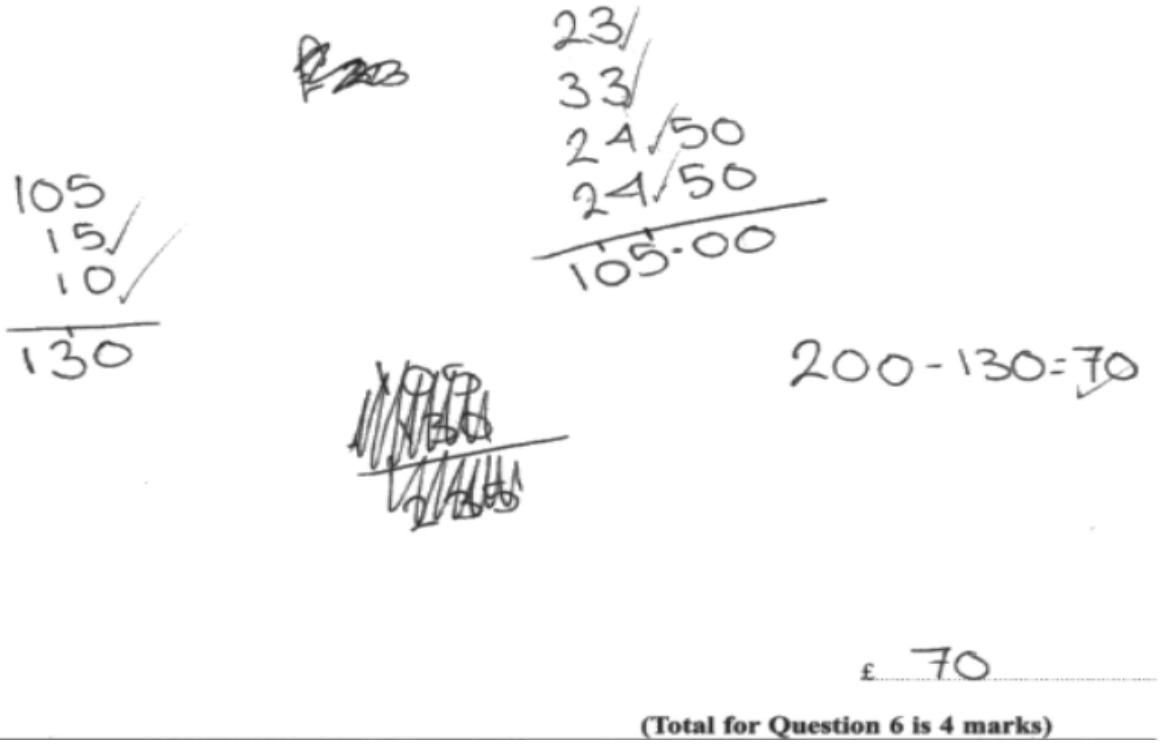
These are the costs for the trip.

Total cost of petrol	£23
Tickets to theme park	£33 each adult £24.50 each child
Meals	£15 each adult £10 each child

105.00

Fay has £200 to spend.
She pays all the costs.

How much money does she have left?



£ 70

(Total for Question 6 is 4 marks)

3 /4

Q6

A
B
C

P3 for a complete process to find the total money left, condoning one error.
Here the student has only accounted for one child meal, instead of two. This is the one error condoned and the total of £130 has been subtracted from £200

A0 since the final answer is incorrect.

Question 6 - Response C

6 Fay is planning a trip to a theme park for 1 adult and 2 children.

These are the costs for the trip.

Total cost of petrol	£23
Tickets to theme park	£33 each adult £24.50 each child
Meals	£15 each adult £10 each child

Fay has £200 to spend.
She pays all the costs.

How much money does she have left?

£23
+£33
+£24.50
+£15
+£10
105.50

200.00
- 105.50
094.50

£94.50

£ 94.50

(Total for Question 6 is 4 marks)

2 /4

P2 for process to find total costs with just **one** child, e.g. 23 + 33 + 24.5(0) + 15 + 10 (= 105.5(0)).
Even though the remaining amount has been calculated, no additional credit is given.

A0 for an incorrect answer.

Question 8

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 8 - Question

8 (a) Solve $m - 3 = 4$

$m =$ .....

(1)

(b) Solve $3n + n = 24$

$n =$ .....

(2)

(Total for Question 8 is 3 marks)

Question 8 - Mark Scheme

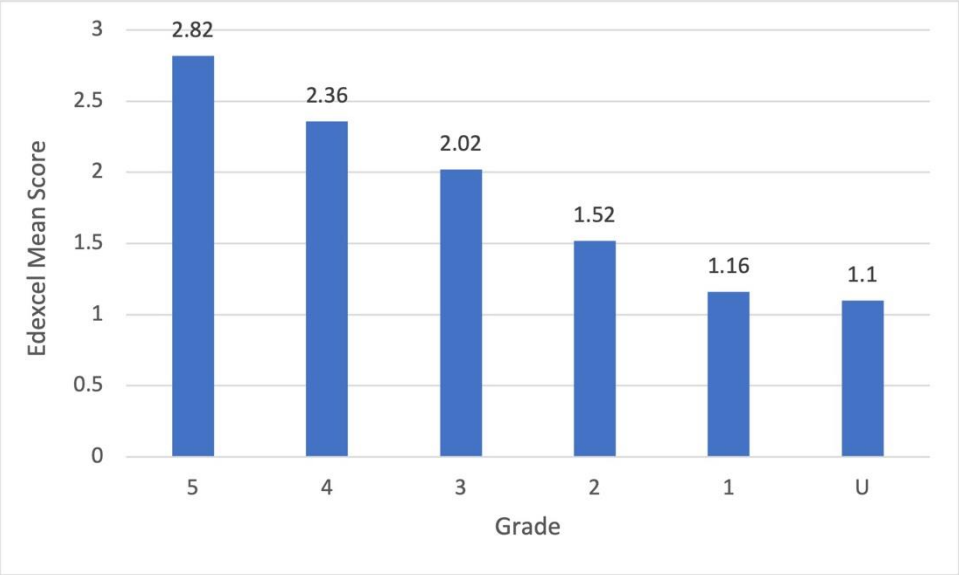
Question	Answer	Mark	Mark scheme	Additional guidance
8(a)	7	B1	cao	
8(b)	6	M1	for $4n$ (= 24) or $24 \div 4$	
		A1	cao	

Question 8 - Examiner Comments

Part (a) was answered well, with very few failing to score the mark. Candidates performed less well in part (b) with many not collecting the like terms of $3n$ and n together as a first step. Many tried to subtract the n from both sides of the equation either resulting in $2n = 24$ (giving $n = 12$) or $3n = 24$ (giving $n = 8$). In this question, students usually scored no marks or full marks. Some used an embedded solution, with mixed success. Many candidates who achieved full marks did not attempt the algebraic approach and instead simply stated that $3 \times 6 + 6 = 24$, with a correct answer on the answer line.

Question 8 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
1.93	3	64	1.93	2.82	2.36	2.02	1.52	1.16	1.10



Question 8 - Response A

8 (a) Solve $m - 3 = 4$

3+4 = 7

7-3 = 4

$m =$ 7

(1)

(b) Solve $3n + n = 24$

4n = 24 ÷4

n = 6

$n =$ 6

(2)

3 /3

(a)
B1 for correctly adding 3 to both sides of the equation to give a correct answer

(b)
M1 for combining $3n$ and n to give $4n$
A1 for a correct answer.

Question 8 - Response B

8 (a) Solve $m - 3 = 4$

$7 - 3 =$

$m =$ 4

(1)

(b) Solve $3n + n = 24$

$$4 \overline{)24} \quad 08$$

$n =$ 8

(2)

1 /3

Q8

(a)
B0: The correct answer of 7 is embedded in the working but the answer on the answer line can't be ignored and since there is only one accuracy mark available, no credit can be given.

(b)
M1 for the division of 24 by 4; unfortunately poor arithmetic prevents the award of full marks.
A0 for an incorrect answer.

Question 8 - Response C

8 (a) Solve $m - 3 = 4$

$m - 3 = 4$
$+3 \quad +3$
$m = 1$

$m =$ 1

(1)

(b) Solve $3n + n = 24$

$3n + n = 24$
$-n$
$2n = 24$
$n = \frac{24}{2}$

$n =$ 12

(2)

0 /3

(a)
B0: It was common to see 3 subtracted (instead of added) to both sides.

(b)
M0: The subtraction of n from the LHS was common
A0 for an incorrect answer.

Question 12

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 12 - Question

12 Elena spent 120 minutes at a sports centre.

She played badminton for 50 minutes.

She used the swimming pool for $\frac{1}{6}$ of the 120 minutes.

She used the gym for 20% of the 120 minutes.
She then spent the rest of the 120 minutes in the cafe.

(a) Work out the total time, in minutes, that Elena spent in the cafe.

..... minutes
(4)

Elena got to the sports centre at 1.30 pm.
She had asked her friend to meet her in the cafe at 3 pm.

(b) Did Elena get to the cafe by 3 pm?
Give a reason for your answer.

.....

.....

.....
(1)

(Total for Question 12 is 5 marks)

Question 12 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
12(a)	26	P1	for process to find $\frac{1}{6}$ of 120 minutes, eg $\frac{1}{6}$ × 120 (= 20)	
		P1	for process to find 20 % of 120 minutes, eg $\frac{20}{100}$ × 120 (= 24)	
		P1	(dep on P2) for a complete process to find the time remaining, eg 120 – 50 – "20" – "24"	May be seen in stages
		A1	cao	
(b)	No, (supported)	C1	for No with reason or ft (a) **Acceptable examples** she was (at least) 4 minutes late she did not arrive until (at least) 3 04 pm it took her more than 90 minutes doing the activities **Not acceptable examples** Yes ….. she arrived after 3pm	The 'No'(or 'Yes') may not be required if it is clear from the reasoning that Elena did not (did) get to the café by 3pm

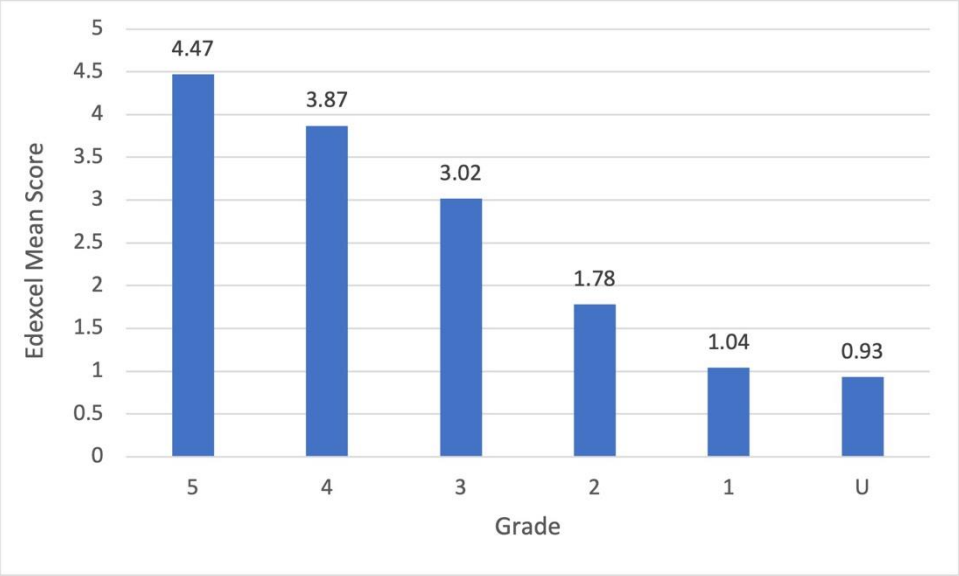
Question 12 - Examiner Comments

Again with this multi-step problem in part (a), it was pleasing to see many students gaining good marks, often 2 or more. In this question, students had to find a sixth and 20% of 120 minutes. When performing calculations of this type it is important for students to show their working, eg 120 ÷ 6 or $\frac{20}{100} \times 120$ so that credit can be awarded for correct method if errors are made with accuracy. In solving this problem, some students subtracted 50 from 120 to give 70 minutes and used this as the time spent playing badminton. Arithmetic errors were seen far too often from students when subtracting from 120.

In part (b), many ignored the good work they had done in part (a) and explained that Elena did not get to the café on time because she spent 2 hours at the sports centre making it 3.30pm when she left. This part followed through the working and answer in part (a) and the mark awarded if the reason and working were correct for the time given in (a).

Question 12 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
2.81	5	56	2.81	4.47	3.87	3.02	1.78	1.04	0.93



Question 12- Response A

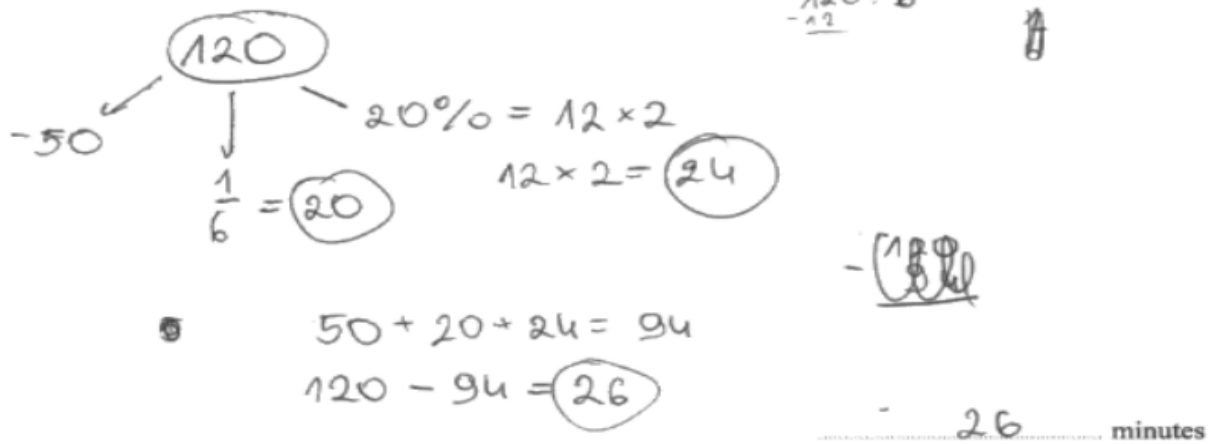
12 Elena spent 120 minutes at a sports centre.

She played badminton for 50 minutes.

She used the swimming pool for $\frac{1}{6}$ of the 120 minutes.

She used the gym for 20% of the 120 minutes.
She then spent the rest of the 120 minutes in the cafe.

(a) Work out the total time, in minutes, that Elena spent in the cafe.



26 minutes

(4)

Elena got to the sports centre at 1.30 pm.
She had asked her friend to meet her in the cafe at 3 pm.

(b) Did Elena get to the cafe by 3 pm?
Give a reason for your answer.

120 minutes equals 2 hours 1.30 pm + 2 hours is 3.30pm Elena spent 26 minutes at the cafe, so she met her friend at 3.04 pm. Elena did not get to the cafe by 3.00 pm. (1)

Q12

A
B
C

5 /5

(a)
P1 for 1/6 (out of 120) = 20
P1 for 20% = 12 × 2 (= 20) It is implied here that 10% of 120 is 12 which has then been doubled to get 20%
P1 for the complete process, adding the times together and subtracting from 120 to find the remaining time.
A1 for a correct answer of 26 minutes.

(b)
C1: Even though we don't see the word "yes", it is clear from the explanation that this is implied. All times quoted (3.04 pm) are accurate.

Question 12 - Response B

12 Elena spent 120 minutes at a sports centre.

She played badminton for 50 minutes.

She used the swimming pool for $\frac{1}{6}$ of the 120 minutes.

She used the gym for 20% of the 120 minutes.

She then spent the rest of the 120 minutes in the cafe.

(a) Work out the total time, in minutes, that Elena spent in the cafe.

6 ÷ 120 = 20

20 x 1 = 20

20% of 120 = 24

20
24
50
94

120
94
26

120
- 50
20
24
026

26 minutes

(4)

Elena got to the sports centre at 1.30 pm.

She had asked her friend to meet her in the cafe at 3 pm.

(b) Did Elena get to the cafe by 3 pm?
Give a reason for your answer.

120 mins = 2 hours

1.30 pm + 2 hours = 3.30 pm

Elena did not get to the cafe by 3pm

She got there at 3.30pm

(1)

Q12

A B C

4 /5

(a)

P1 for 6 ÷ 120 = 20 implying that 120 is being divided by 6

P1 for 20% = 24

P1 for the complete process, adding the times together and subtracting from 120 to find the remaining time

A1 for a correct answer of 26 minutes.

(b)

C0: A very common mistake, ignoring previous working. Clearly an example of failing to recognise that the café was in the sports centre.

Question 12 - Response C

12 Elena spent 120 minutes at a sports centre.

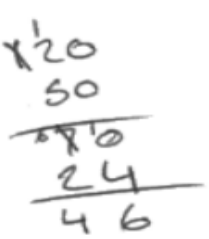
She played badminton for 50 minutes.

She used the swimming pool for $\frac{1}{6}$ of the 120 minutes.

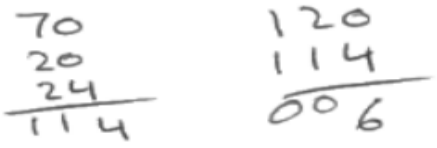
She used the gym for 20% of the 120 minutes.

She then spent the rest of the 120 minutes in the cafe.

(a) Work out the total time, in minutes, that Elena spent in the cafe.



Badminton = 120 - 50 = 70
Swimming = 20 minutes
Gym = 24 minutes



6 minutes

(4)

Elena got to the sports centre at 1.30 pm.
She had asked her friend to meet her in the cafe at 3 pm.

(b) Did Elena get to the cafe by 3 pm?
Give a reason for your answer.

No Because 114 minutes is 1 hour and 54 minutes so that would of made her late.

(1)

Q12

A B C

3 /5

(a)
P1 for swimming = 20 even though no working is shown
P1 for gym = 24, again showing no working but we can accept it as the value is correct
P0 The time spent playing badminton has now been incorrectly altered to 120 – 50 = 70
A0 for an incorrect answer.

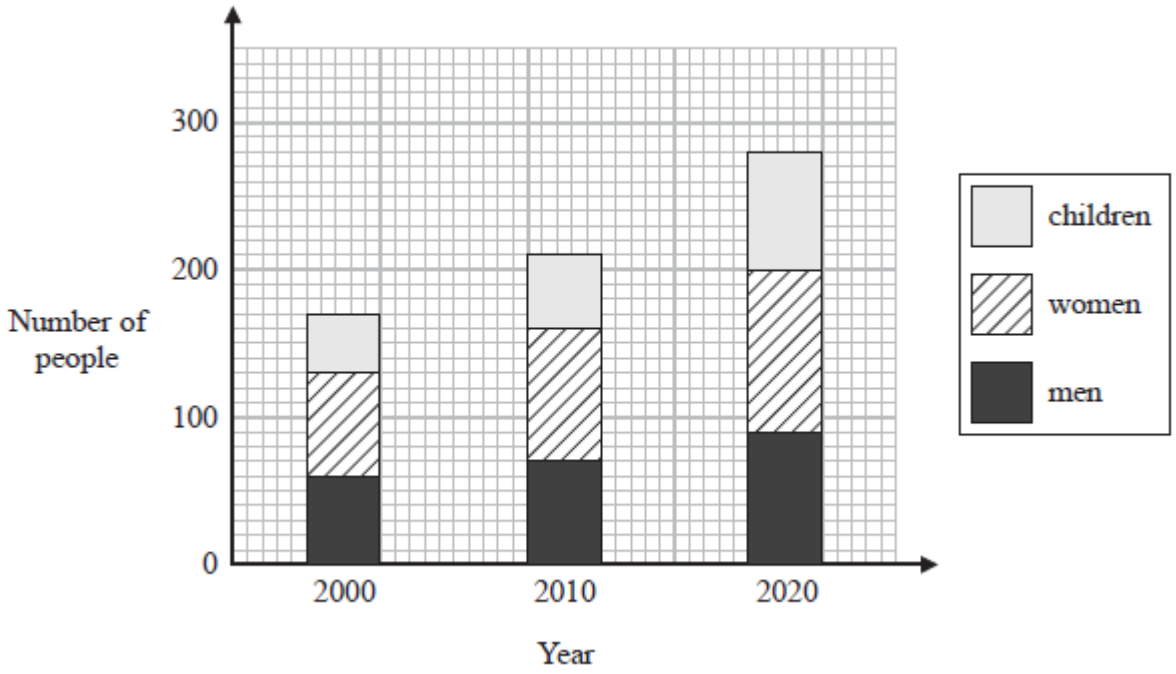
(b)
C1: The actual number of minutes late has not been quoted but the time they think that has been spent on the activities is 1 hour 54 minutes which **would** have made her late.

Question 13

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 13- Question

13 The composite bar chart shows information about the number of people living in a village.



(a) Write down the number of men living in the village in the year 2000

.....

(1)

(b) Find the number of children living in the village in the year 2010

.....

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

.....

(2)

(Total for Question 13 is 4 marks)

Question 13 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
13 (a)	60	B1	cao	May be seen on diagram
(b)	50	B1	cao	May be seen on diagram
(c)	80 : 200	P1	for process to **use** the number of children, 80 or the total number of men and women, 200 in a ratio **or** for $\frac{80}{200}$	
		A1	for 80 : 200 oe	Award for a correct ratio even if subsequently incorrectly simplified.

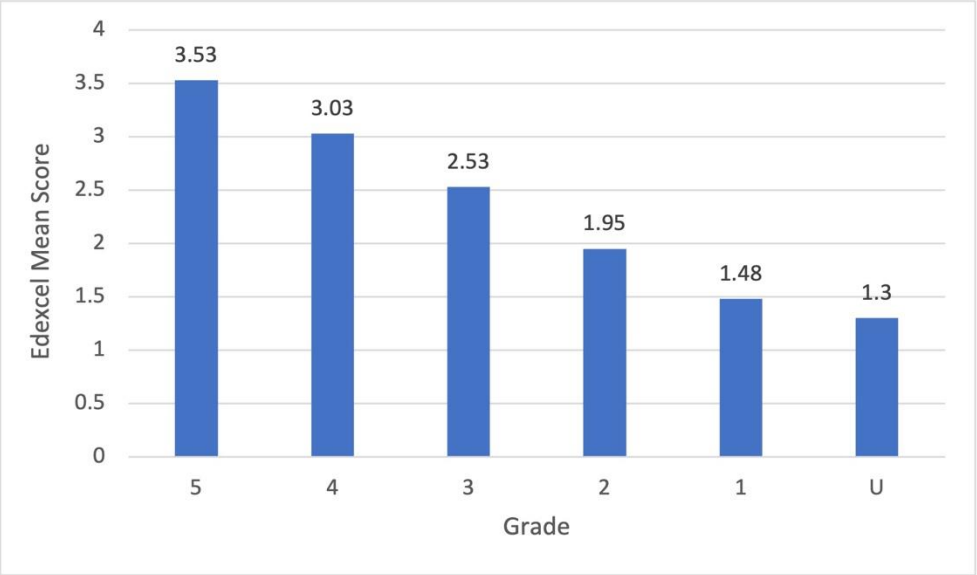
Question 13 - Examiner Comments

Part (a) was answered correctly by the majority of students, reading 60 from the bar chart. Part (b) was answered less well when a certain amount of extrapolation was required from the chart. 210 was a common incorrect answer.

In part (c), it was evident that many students weren't able to accurately read data from a composite bar chart, many reading the number of men as 90, women 200 and children 280 in 2020. The method mark here was awarded for sight of 80 (children) or 200 (men + women) used in a ratio. Many gained this mark but failed to score full marks as a result of incorrect values read from the chart. As a result of not reading the questions correctly, some students wrote an answer of 80 (child) : 90 (men) : 110 (women).

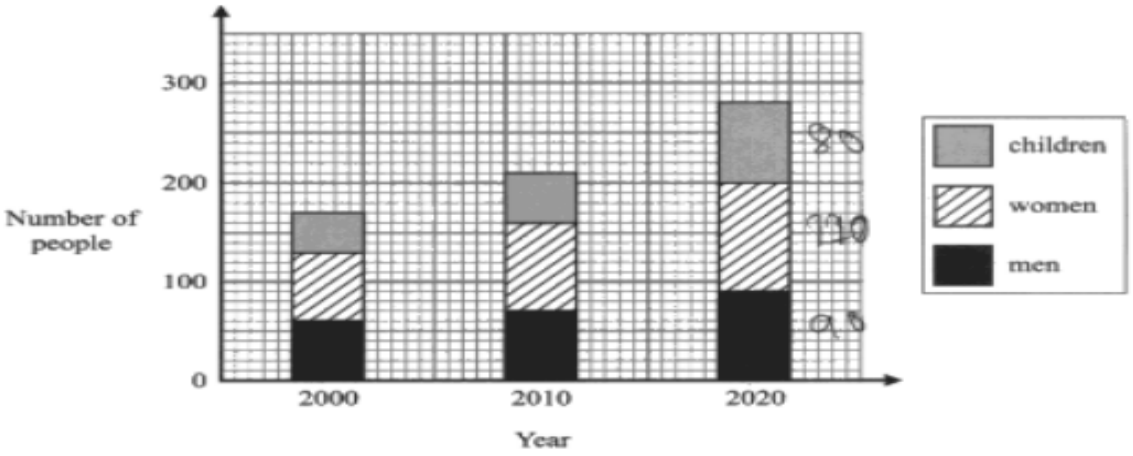
Question 13 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
2.45	4	61	2.45	3.53	3.03	2.53	1.95	1.48	1.30



Question 13 - Response A

13 The composite bar chart shows information about the number of people living in a village.



(a) Write down the number of men living in the village in the year 2000

60

(1)

(b) Find the number of children living in the village in the year 2010

50

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

40+90= 200

80 : 200 ÷10 ÷10

8 : 20 ÷4 ÷4

4:5

4 : 5

(2)

(Total for Question 13 is 4 marks)

Q13

A B C

4 /4

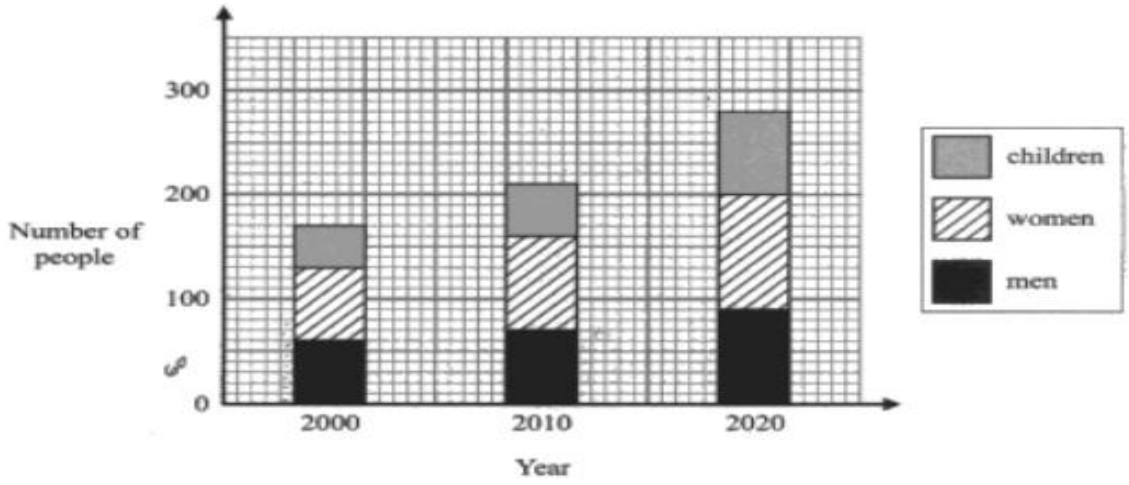
(a)
B1 for a correct answer.

(b)
B1 for a correct answer.

(c)
M1 for either 80 or 200 used in a ratio
A1 for 80 : 200 This has been simplified incorrectly to 4 : 5, however simplification of ratios is not being assessed in this question so the incorrect final answer can be ignored.

Question 13 - Response B

13 The composite bar chart shows information about the number of people living in a village.



(a) Write down the number of men living in the village in the year 2000

60 men

(1)

(b) Find the number of children living in the village in the year 2010

50 children

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

200 : 80
100 : 40
50 : 20
25 : 10

25 : 10

(2)

(Total for Question 13 is 4 marks)

Q13

A
B
C

3 /4

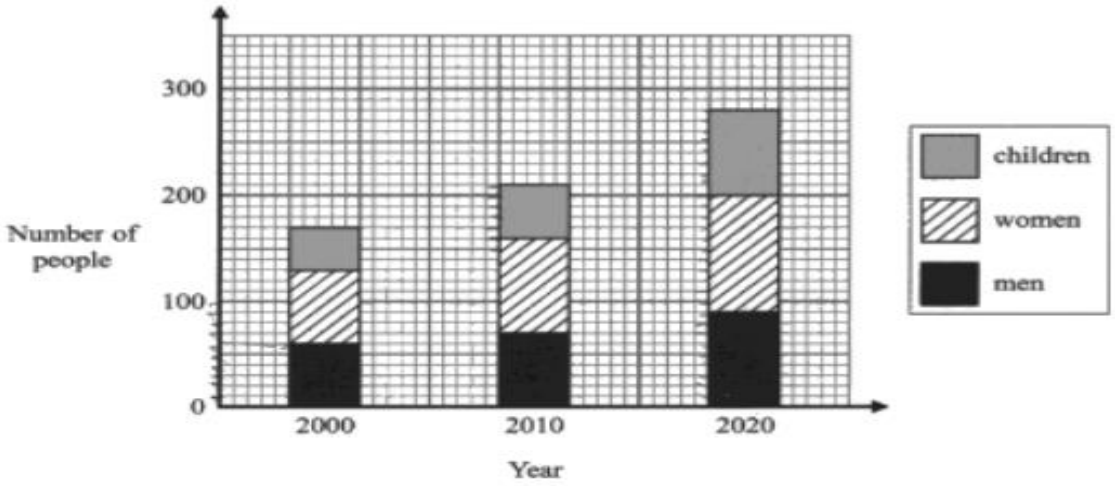
(a)
B1 for a correct answer.

(b)
B1 for a correct answer.

(c)
M1 for either 80 or 200 used in a ratio
A0 for 200 : 80 the ratio has been written in reverse.

Question 13 - Response C

13 The composite bar chart shows information about the number of people living in a village.



(a) Write down the number of men living in the village in the year 2000

60

(1)

(b) Find the number of children living in the village in the year 2010

60

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

200 men + women

80 kids

-20 both = 180 60

1 : 3

(2)

(Total for Question 13 is 4 marks)

Q13

A B C

1 /4

(a)
B1 for a correct answer.

(b)
B0 for an in correct answer.

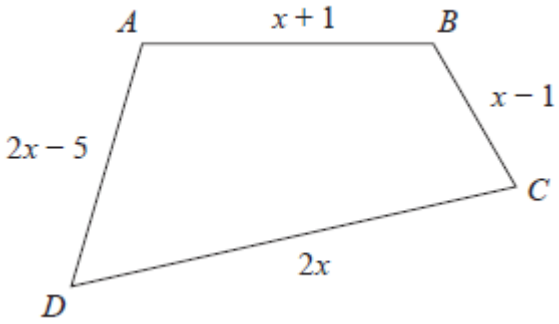
(c)
M0: 80 and 200 are seen but not used in a ratio
A0 for an incorrect answer.

Question 16

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 16 - Question

16 Here is a quadrilateral $ABCD$.



All the measurements are in centimetres.

The perimeter of $ABCD$ is 52 centimetres.

Work out the length of DC.

..... centimetres

(Total for Question 16 is 4 marks)

Question 16 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
16	19	P1	for process of finding perimeter in terms of x, eg $2x - 5 + x + 1 + x - 1 + 2x$ oe	
		P1	for process to form equation, eg "$6x - 5$" = 52	This mark may be awarded for a correct but unsimplified equation, eg. $2x - 5 + x + 1 + x - 1 + 2x = 52$ oe
		P1	(dep on P2) for a correct process to find x, eg $(52 + 5) \div 6$ (= 9.5) **or** for a correct process to find $2x$, eg $(52 + 5) \div 3$ **or** ft an equation of the form $ax + b = c$,	Trial & Improvement attempts must be fully correct giving $x = 9.5$ before any credit given a, b and c must be clearly stated but need not be correct
		A1	cao	

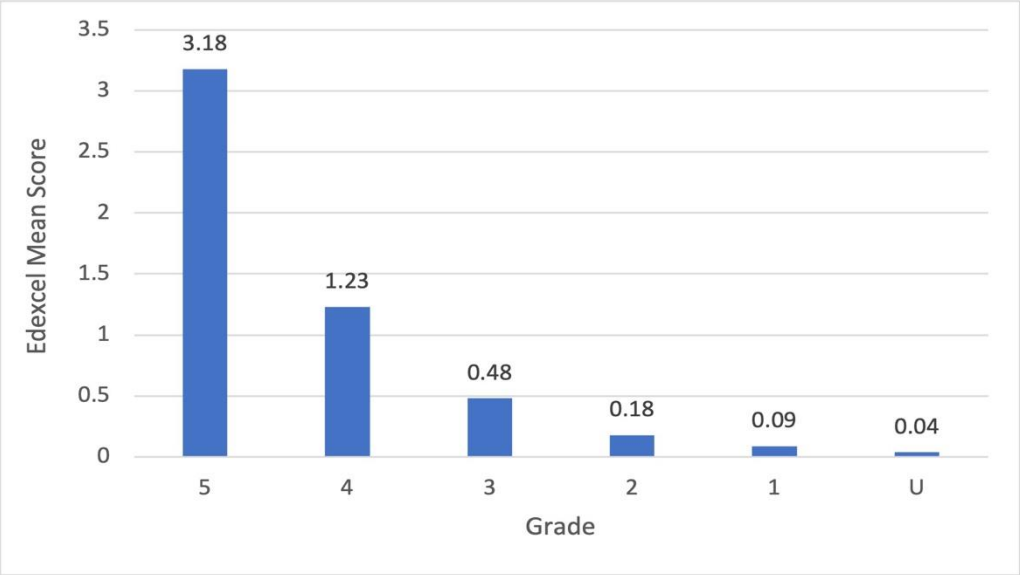
Question 16 - Examiner Comments

Those students who attempted an algebraic solution often picked up good marks, 2 or more, for a correct expression for the perimeter and then equating it to the given value of 52. Simplifying their algebraic expression often proved more difficult and it was not uncommon to see quadratic terms creeping in. Some students assumed all the lengths to be the same and calculated 52/4 gaining no marks.

Some students correctly found the value of x and then failed to answer the question by finding $2x$, the length of DC. Poor arithmetic let many students down in being unable to divide 57 by 6 and hence not being able to achieve the accuracy mark.
Many students did however adopt a trial and improvement approach which usually cost them a great deal of time for little reward.

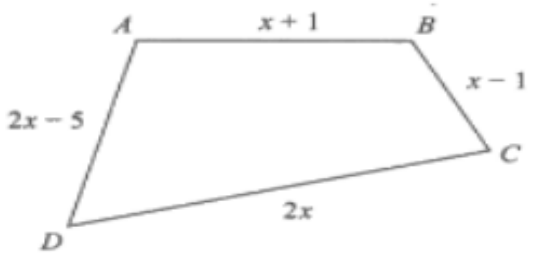
Question 16 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
0.59	4	15	0.59	3.18	1.23	0.48	0.18	0.09	0.04



Question 16 - Response A

16 Here is a quadrilateral *ABCD*.



All the measurements are in centimetres.

The perimeter of *ABCD* is 52 centimetres.

Work out the length of *DC*.

$x+1+2x-5+x-1+2x=52$

$x+2x+x+2x+1-5-1=52$

$6x-5=52$

$6x=52+5$

$6x=57$

$x=\frac{57}{6}$

$DC=2x$

$=2x=2\left(\frac{57}{6}\right)$

$=\frac{57}{3}=19$ cm

19 centimetres

(Total for Question 16 is 4 marks)

Q16

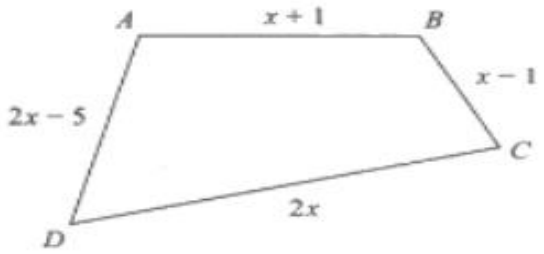
A
B
C

4 /4

P1 for process of finding perimeter in terms of *x*.
P1 for equating their expression to 52
P1 for a correct process to solve their equation; this is awarded on sight of 57/6
A1 for a correct final answer.

Question 16 - Response B

16 Here is a quadrilateral $ABCD$.



All the measurements are in centimetres.

The perimeter of $ABCD$ is 52 centimetres.

Work out the length of DC.

$(2x-5)+(x+1)+(x-1)+(2x)$

$= 6x - 3$

$6x - 3 = 52$

$6x = 52 + 3$

$x = \frac{55}{6}$

$x = 9.16\dot{6}$

$9.16 \times 2 = 18.32$

09.166
6 | 55.000
12
18
24
30
36
42
48
54
60

18.32 centimetres

(Total for Question 16 is 4 marks)

Q16

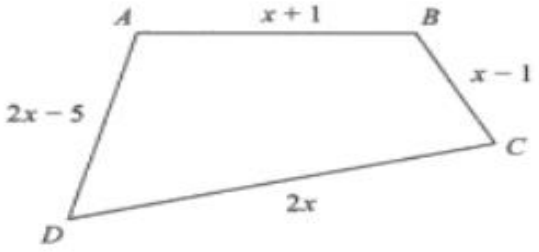
A B C

3 /4

P1 for process of finding perimeter in terms of x.
P1 for equating their expression to 52 This is seen after an incorrect simplification of their expression.
P1 for a correct process to solve their equation which although not correct is of the form $ax + b = c$,; this is awarded on sight of 55/6
A0 since their final answer is incorrect.

Question 16 - Response C

16 Here is a quadrilateral *ABCD*.



All the measurements are in centimetres.

The perimeter of *ABCD* is 52 centimetres.

Work out the length of *DC*.

$(2x-5)+(x+1)+(x-1)+2x = 52$

$2x(2x-5)+(x+1)+(x-1)=52$

$(4x^2-10x)+(x+1+x-1)=52$

$=52$

$4x^2-10x+x^2-1 = 52$

$:52$

..... centimetres

2 /4

Q16

A
B
C

P1 for process of finding perimeter in terms of x.
P1 for equating their expression to 52
P0 since their simplification of their expression is not of the form $ax + b = c$
A0 since their final answer is incorrect.

Question 18

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 18 - Question

18 There are 240 cans of drink on a shelf.
Each can contains cola or lemonade or orange.

the number of cans of cola : the number of cans of lemonade : the number of cans of orange = 5 : 3 : 2

$\frac{1}{2}$ of the cans of lemonade and $\frac{1}{12}$ of the cans of orange are removed from the shelf.

Work out the number of cans of cola as a percentage of the total number of cans of drink remaining on the shelf.

.....%

(Total for Question 18 is 5 marks)

Question 18 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
18	60	P1	for 240 ÷ (5 + 3 + 2) (= 24)	
		P1	for complete process to find the number of cans of each drink eg 5 × "24" (= 120) and 3 × "24" (= 72) and 2 × "24" (= 48)	
		P1	for process to find the number of cans removed eg "72" ÷ 2 (= 36) and "48" ÷ 12 (= 4)	
		P1	for process to find percentage eg $\frac{"120"}{240-("36"+"4")} \times 100$ or $\frac{"120"}{"120"+("72"-"36")+("48"-"4")} \times 100$	
		A1	cao	
			Alternative	
		P1	for process to find proportion of lemonade and orange cans removed, eg $3 \times \frac{1}{2}$ $(= 1\frac{1}{2})$ and $2 \times \frac{1}{12}$ $(= \frac{1}{6})$	
		P1	for process to find proportion of lemonade and orange cans remaining, eg $3 - "1\frac{1}{2}" + 2 - "\frac{1}{6}"$ $(= 3\frac{1}{3})$	
		P1	for $5 + "3\frac{1}{3}"$ $(= 8\frac{1}{3})$	
		P1	for process to find percentage eg $(5 \div "8\frac{1}{3}") \times 100$	
		A1	cao	

Q18

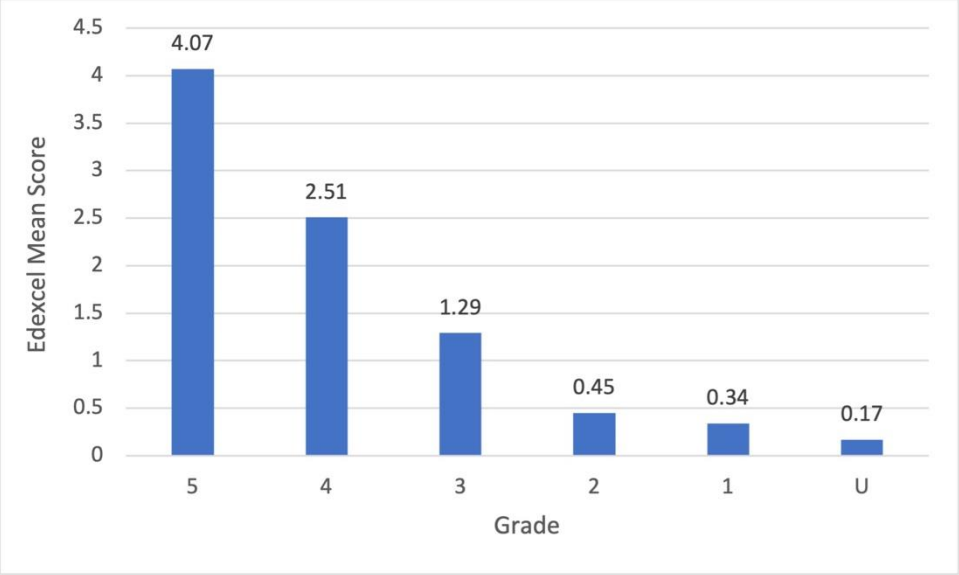
A
B
C

Question 18 - Examiner Comments

Many students were unable to make any progress in this question by not reading the question fully and jumping in to either find a half and/or a twelfth of 240 or to divide 240 by 5, then 3 then 2. Those that correctly divided 240 in the ratio 5 : 3 : 2 usually went on to gain good marks. Many scored 3 marks for finding the numbers of cans remaining, 120, 36 and 44 but were then unable to find the required percentage of cola cans remaining. Finding one number as a percentage of another is an area that needs addressing. Those that did find a percentage were often successful by simplifying their fraction of 120/200 to 60/100.

Question 18 – Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
1.35	5	27	1.35	4.07	2.51	1.29	0.45	0.34	0.17



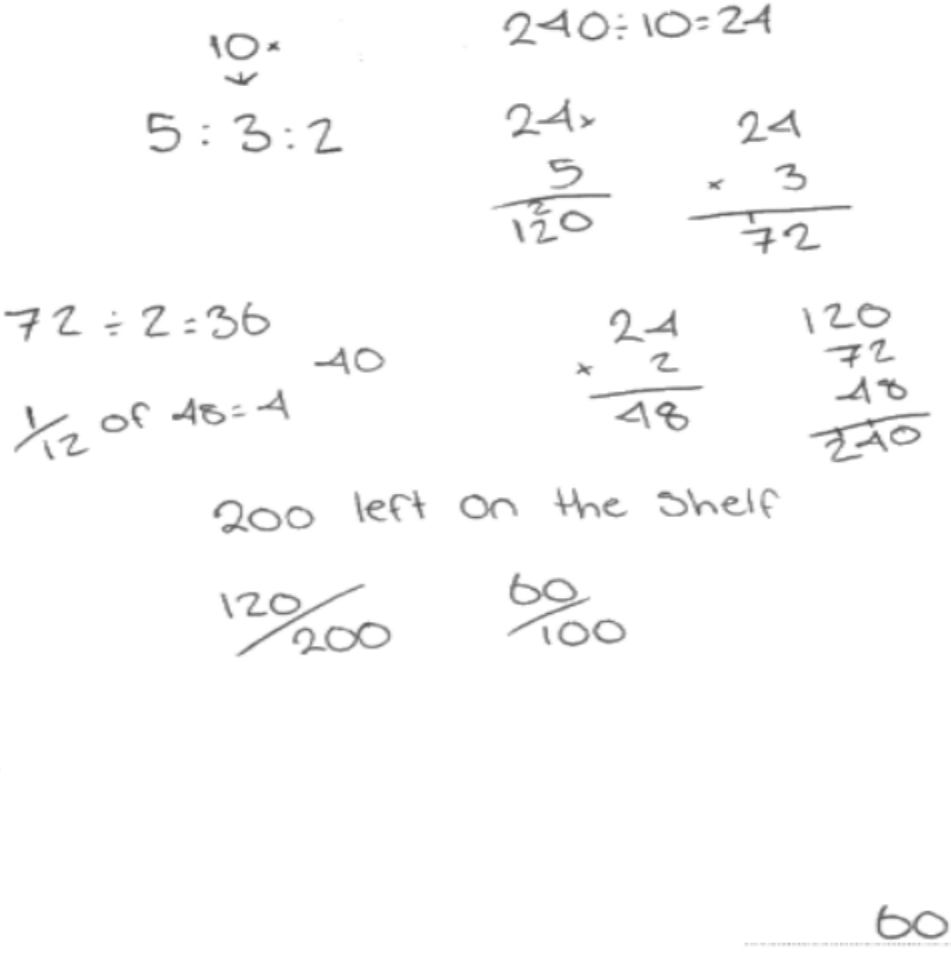
Question 18 - Response A

18 There are 240 cans of drink on a shelf.
Each can contains cola or lemonade or orange.

$$\frac{\text{the number of cans of cola}}{:}\ \frac{\text{the number of cans of lemonade}}{:}\ \frac{\text{the number of cans of orange}}{} = 5:3:2$$

$\frac{1}{2}$ of the cans of lemonade and $\frac{1}{12}$ of the cans of orange are removed from the shelf.

Work out the number of cans of cola as a percentage of the total number of cans of drink remaining on the shelf.



60 %

5 /5

Q18

A B C

P1 for 240 ÷ 10
P1 for 24 × 5 and 24 × 3 and 24 × 2
P1 for process to find the number of cans removed, 72 ÷ 2 and 1/12 of 48 = 4
P1 for a correct process to convert 120 to a percentage of 200
A1 for a correct final answer.

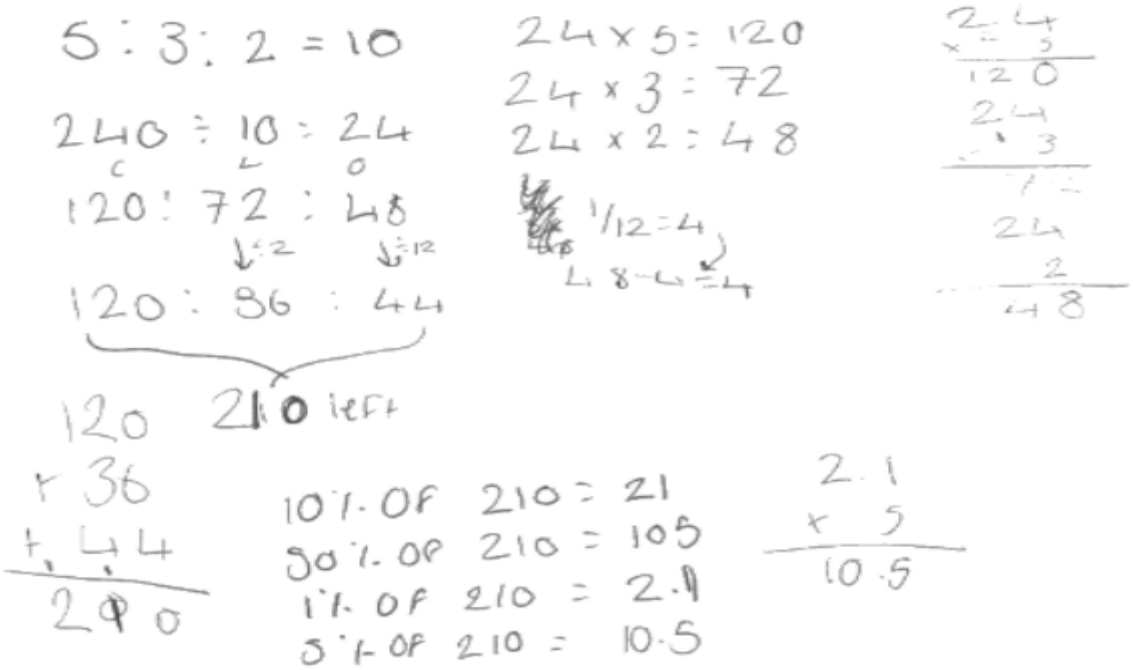
Question 18 - Response B

18 There are 240 cans of drink on a shelf.
Each can contains cola or lemonade or orange.

$$\frac{\text{the number of cans of cola}}{} : \frac{\text{the number of cans of lemonade}}{} : \frac{\text{the number of cans of orange}}{} = 5:3:2$$

$\frac{1}{2}$ of the cans of lemonade and $\frac{1}{12}$ of the cans of orange are removed from the shelf.

Work out the number of cans of cola as a percentage of the total number of cans of drink remaining on the shelf.



.....%

3 /5

P1 for 240 ÷ 10
P1 for 24 × 5 and 24 × 3 and 24 × 2
P1 for process to find the number of cans removed, 72 ÷ 2 and 1/12 of 48 = 4
P0 for a failed attempt to convert 120 to a percentage of their 200 which they have written as 210
A0 there is not a final answer.

Question 18 - Response C

18 There are 240 cans of drink on a shelf.
Each can contains cola or lemonade or orange.

$$\frac{\text{the number of cans of cola}}{} : \frac{\text{the number of cans of lemonade}}{} : \frac{\text{the number of cans of orange}}{} = 5:3:2$$

$\frac{1}{2}$ of the cans of lemonade and $\frac{1}{12}$ of the cans of orange are removed from the shelf.

Work out the number of cans of cola as a percentage of the total number of cans of drink remaining on the shelf.

C : L : O
5 : 3 : 2
120 : 72 : 48

240 cans total

5 + 3 + 2 = 10 parts Total

240 ÷ 10 = 24

2 parts = 48
3 parts = 72
5 parts = 120

48 + 24 = 72
72 + 48 = 120

72 ÷ 2 = 36

2 | 72 = 36

48 ÷ 10 = 4

48 ÷ 100 = 0.4

0.4 x 2 = 0.8

4 + 0.8 = 48

.....%

2 /5

P1 for 240 ÷ 10
P1 for 2 parts = 48, 3 parts = 72 and 5 parts = 120
P0 We see 72 ÷ 2 but there is no correct process to find 1/12 of 48 so this award is not made.
P0A0 as no further progress is made.

Question 20

Question 20 - Question

20 (a) Work out $1\frac{3}{5}+2\frac{1}{4}$

Give your answer as a mixed number.

.....

(2)

(b) Show that $2\frac{2}{3}\div 6=\frac{4}{9}$

(2)

(Total for Question 20 is 4 marks)

Question 20 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
20(a)	$3\frac{17}{20}$	M1	for finding two fractions with a correct common denominator (multiple of 20), with at least one correct corresponding numerator, eg. $\frac{12}{20}, \frac{5}{20}$ or $\frac{32}{20}, \frac{45}{20}$	May be from $\frac{3}{5}$ and $\frac{1}{4}$ or from $\frac{8}{5}$ and $\frac{9}{4}$
		A1	for $3\frac{17}{20}$ or an equivalent mixed number SC: B1 for 3.85 if M0 scored	
(b)	shown	M1	for $\frac{8}{3} \times \frac{1}{6}$ oe or $\frac{4}{9} \times \frac{6}{1}$ oe or $\frac{8}{3} \times \frac{9}{4}$ oe	
		A1	for unsimplified fraction which could lead to $\frac{4}{9}$, eg $\frac{8}{18}$ or for $\frac{4}{3} \times \frac{1}{3}$ or $\frac{24}{9} \div 6$ **or** for unsimplified fraction which could lead to $2\frac{2}{3}$, eg $\frac{24}{9}$ **or** for unsimplified fraction which could lead to 6, eg $\frac{72}{12}$	

Question 20 - Examiner Comments

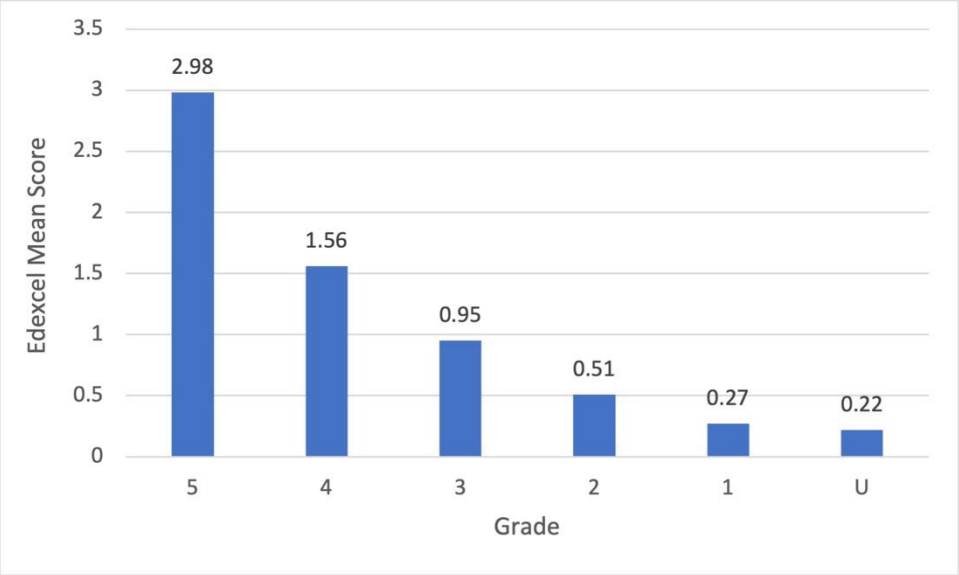
In part (a), those students who dealt with the fractions and whole numbers separately often gained greater success in achieving full marks, although an answer of $3\frac{4}{9}$ was not uncommon.
Although no credit was given for simply converting the mixed numbers to improper fractions, many did so accurately and then were able to convert both to a common denominator with at least one correct numerator to gain one mark. However, the answer following this approach was often left as an improper fraction, $\frac{77}{20}$.
Unfortunately, many just added the numerators and the denominators to give an incorrect answer of $\frac{17}{9}$.

Part (b) proved to be a much greater challenge for many students, many tried to concoct means of dividing $2\frac{2}{3}$ by 6 to get $\frac{4}{9}$, a few students however correctly changed $\frac{8}{3}$ to $\frac{24}{9}$ and divided this by 6 to get $\frac{4}{9}$. The most successful approach was $\frac{8}{3} \times \frac{1}{6}$ showing an ability to divide a fraction by a whole number. Some had success by transposing the problem to show that $\frac{4}{9}$ multiplied by 6 is equal to $2\frac{2}{3}$, although $\frac{24}{54}$ was often seen.

Many students seemed to not understand the requirements for this question.

Question 20 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
0.97	4	24	0.97	2.98	1.56	0.95	0.51	0.27	0.22



Question 20 - Response A

20 (a) Work out $1\frac{3}{5} + 2\frac{1}{4}$

Give your answer as a mixed number.

$1\frac{3}{5} + 2\frac{1}{4}$

$= \frac{32}{20} + \frac{45}{20} = \frac{77}{20}$

$\frac{77}{20}$ $3\frac{17}{20}$

20
40
60

$77 - 60 =$

$3\frac{17}{20}$

(2)

(b) Show that $2\frac{2}{3} \div 6 = \frac{4}{9}$

$\frac{8}{3} \div 6 = \frac{4}{9}$

$\frac{8}{3} \times \frac{1}{6} = \frac{8}{18} = \frac{4}{9}$

(2)

Q20

4 /4

(a)
M1 for converting to fractions with a common denominator and either correct numerator.
A1 for a correct answer.

(b)
M1 for 8/3 × 1/6
A1 for showing that this is equal to 8/18, ie a fraction which can be simplified to give 4/9 the given fraction.

Question 20 - Response B

20 (a) Work out $1\frac{3}{5} + 2\frac{1}{4}$

Give your answer as a mixed number.

$\times 4 \quad \frac{8}{5} + \frac{9}{4} \times 5 \qquad \frac{32}{20} + \frac{45}{20} = \frac{77}{40}$

$1\frac{37}{40}$

(2)

(b) Show that $2\frac{2}{3} \div 6 = \frac{4}{9}$ KFC

$\frac{8}{3} \times \frac{1}{6} = \frac{54}{12} \times \frac{3}{12} = \frac{162}{12}$

$\frac{54}{12} \times \frac{3}{12} = \frac{162}{12}$

$54 \times 3 = 162$

(2)

2 /4

Q20

A B C

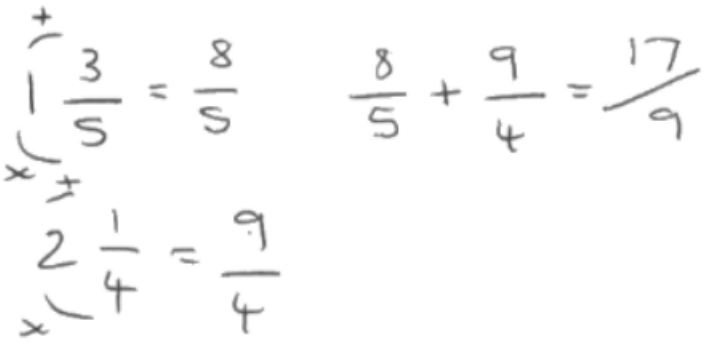
(a)
M1 for converting to fractions with a common denominator and either correct numerator.
A0 for an incorrect answer found by mistakenly adding the denominators.

(b)
M1 for 8/3 × 1/6
A0 for attempting, wrongly, to convert to fractions with a common denominator.

Question 20 - Response C

20 (a) Work out $1\frac{3}{5} + 2\frac{1}{4}$

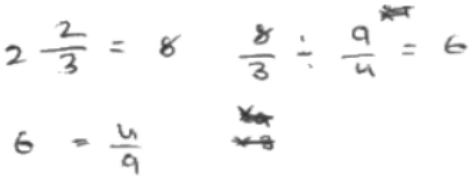
Give your answer as a mixed number.



17/9

(2)

(b) Show that $2\frac{2}{3} \div 6 = \frac{4}{9}$



(2)

0 /4

Q20

A
B
C

(a)
M0 There is no credit given for just converting the mixed numbers to improper fractions.
A0 for an incorrect answer.

(b)
M0 for 8/3 ÷ 9/4. It should have been multiplied by 9/4
A0 for incomplete solution.

Question 21

Question | Mark Scheme | Examiner Comments | Performance | Response A | Response B | Response C

Question 21 - Question

21 Simplify $(2^{-5} \times 2^{8})^{2}$

Give your answer as a power of 2

.....

(Total for Question 21 is 2 marks)

Question 21 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
21	2^{6}	M1	for the start of a method of simplification, eg 2^{-5+8} (= 2^{3}) or $2^{-5\times2}$ (= 2^{-10}) or $2^{8\times2}$ (= 2^{16})	
		A1	cao SC B1 for answer of 64 or 8^{2} or 4^{3} if M0 scored.	

Question 21 - Examiner Comments

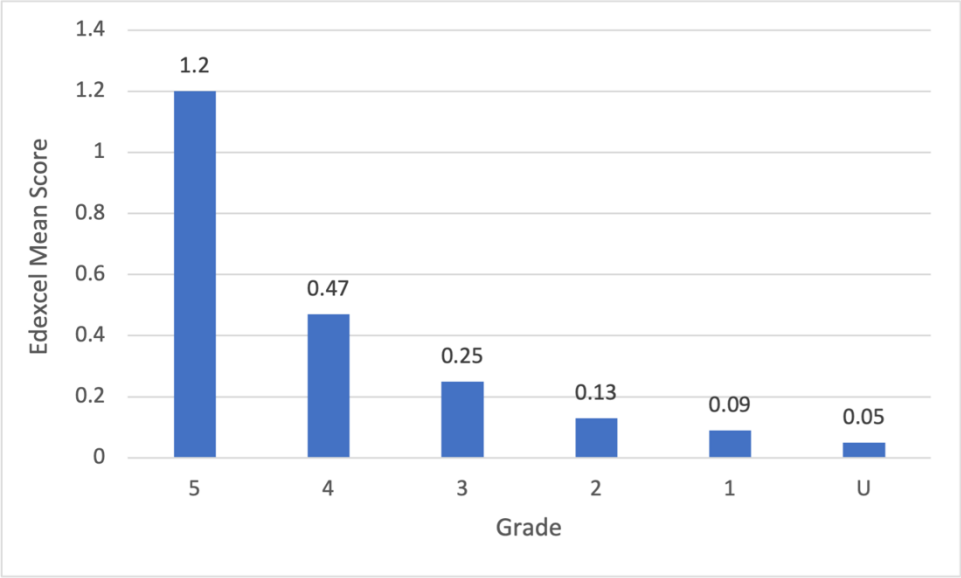
It was clear that the rules of indices are known by many students but the application of them was very poor. $(2^{-5} \times 2^{8})$ was often written as 4^{3}. This had to be carefully marked as 4^{3} as a final answer was an acceptable Special Case answer for one mark.

Sometimes 2^{-10} or 2^{16} were seen but rarely both.

Less able students often unsuccessfully tried to evaluate the terms before finding a product or squaring and had little understanding of negative indices. Occasionally 2^{3} was seen for the method mark but this was followed by 2^{5}. Working with negative numbers continues to be a problem with -5+8 being evaluated as 13 or -13. Many worked exclusively with the powers and did not include the base number at all; -5 + 8 = 3 was often seen.

Question 21 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
0.28	2	14	0.28	1.20	0.47	0.25	0.13	0.09	0.05



Question 21 - Response A

21 Simplify $(2^{-5} \times 2^{8})^{2}$

Give your answer as a power of 2

$(2^{-5} \times 2^{8})^{2}$

$(2^{-5+8})^{2}$

$(2^{3})^{2}$

$= 2^{3 \times 2} = 2^{6}$

2^{6}

2 /2

Q21

M1 for a correct first step in the use of the laws of indices. 2 to the power -5 + 8 gets the mark.
A1 for a correct answer

Question 21 - Response B

21 Simplify $(2^{-5} \times 2^{8})^{2}$

Give your answer as a power of 2

$2^{-5} \times 2^{8} = 2^{3}$

$2^{2} + 2^{3}$

2^{5}

2^{5}

1 /2

M1 for 2 cubed seen
A0 for an incorrect answer.

Question 21 - Response C

21 Simplify $(2^{-5} \times 2^{8})^{2}$

Give your answer as a power of 2

0 /2

Q21

A
B
C

M0 for a first step showing 4 cubed; a very common error. Even though the next step is carried out 'correctly', no credit is given because of the earlier mistake.
A0 for an incorrect answer

Question 23

Question 23 - Question

23 A car factory is going to make four different car models **A**, **B**, **C** and **D**.

80 people are asked which of the four models they would be most likely to buy.

The table shows information about the results.

Car model	Number of people
A	23
B	15
C	30
D	12

The factory is going to make 40 000 cars next year.

Work out how many model **B** cars the factory should make next year.

.....

(Total for Question 23 is 2 marks)

Question 23 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
23	7500	M1	for method to find expected number of model B, eg $\frac{15}{80} \times 40000$ oe **or** $\frac{15}{"23+15+30+12"} \times 40000$ oe	
		A1	cao	

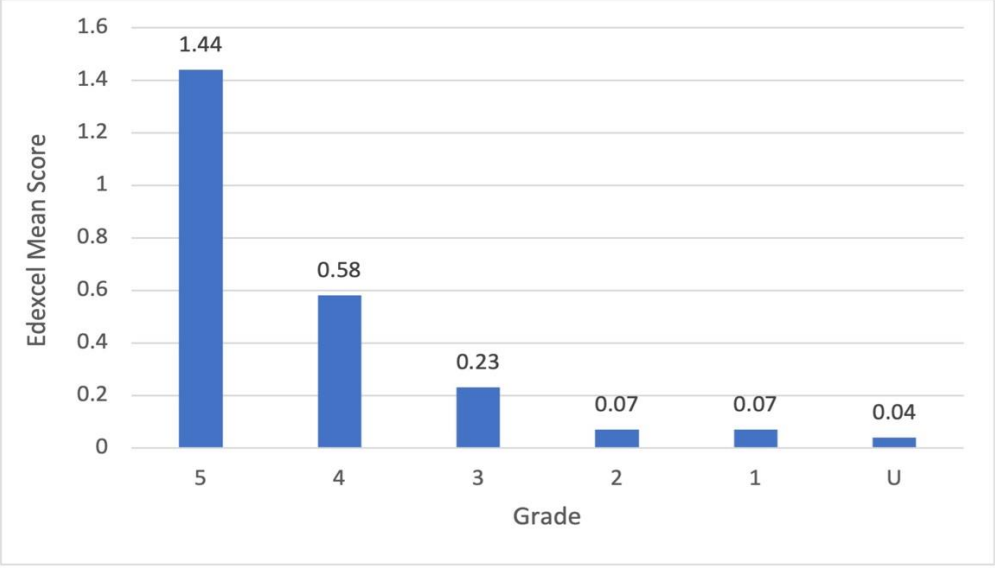
Question 23 - Examiner Comments

This question was not answered well at all. Sampling techniques were not well understood at this level. Many either multiplied 40 000 by 80 or divided by 15. Attempts to divide 40 000 by 80 often introduced arithmetic errors, some just left 500 as their answer and those that knew to multiply by 15 struggled to do so correctly. Some students tried to work with percentages which rarely gained any credit eg 15%.

Students need to be encouraged to consider the suitability of their answers as some offered answers which were greater than 40 000, the total number of cars produced.

Question 23 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
0.28	2	14	0.28	1.44	0.58	0.23	0.07	0.07	0.04



Q23
A
B
C

Question 23 - Response A

23 A car factory is going to make four different car models **A**, **B**, **C** and **D**.

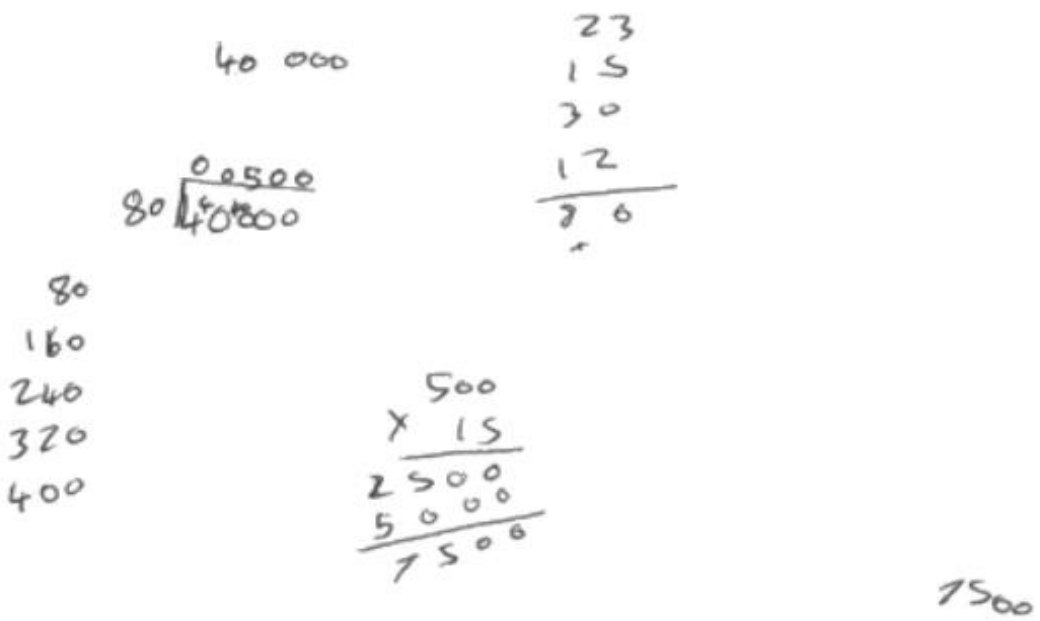
80 people are asked which of the four models they would be most likely to buy.

The table shows information about the results.

Car model	Number of people
A	23
B	15
C	30
D	12

The factory is going to make 40 000 cars next year.

Work out how many model **B** cars the factory should make next year.



Q23

A
B
C

2 /2

M1 for dividing 40 000 by 80 and then multiplying by 15
A1 for a correct answer.

Question 23 - Response B

23 A car factory is going to make four different car models **A**, **B**, **C** and **D**.

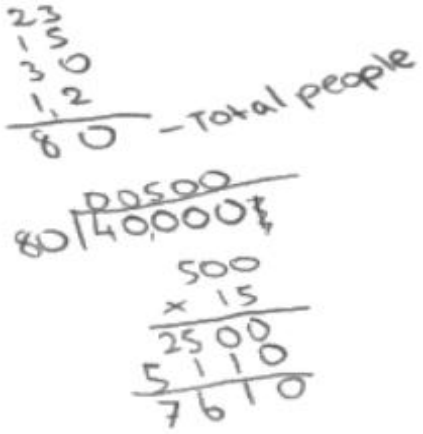
80 people are asked which of the four models they would be most likely to buy.

The table shows information about the results.

Car model	Number of people
A	23
B	15
C	30
D	12

The factory is going to make 40 000 cars next year.

Work out how many model **B** cars the factory should make next year.



7610

1 /2

M1 for dividing 40 000 by 80 and then multiplying by 15
A0 owing to arithmetic errors in multiplying by 15

Question 23 - Response C

23 A car factory is going to make four different car models **A**, **B**, **C** and **D**.

80 people are asked which of the four models they would be most likely to buy.

The table shows information about the results.

Car model	Number of people
A	23
B	15
C	30
D	12

The factory is going to make 40 000 cars next year.

Work out how many model **B** cars the factory should make next year.

40000 cars

15 / 80 said model B

40000 ÷ 80 = 500

0500
8|4000

500 / 40000

500

Q23

A
B
C

0 /2

M0 40 000 is divided by 80 to give 500 but there is then no attempt to multiply by 15
A0 for an incorrect answer.