

Unit 1 Statistics and Number - Foundation tier (43601F)
Question 2 (c) (i)
AO3 and functional elements

2 (c) (i) Nick wants to compare his scores with Jen's scores.

Draw a suitable diagram that he can use. (4 marks)

Mark scheme:

2ci	Attempts a dual bar chart	B1	Allow errors if intention clear
	Structure correct	B1	Bars paired, vertical scale numbered, horizontal scale labelled, key/labels for Nick and Jen
	Heights all correct	B2	Using their scale, linear between 40 and 90 B1 all but one or two heights correct
	Alternative method 1		
	Turns Nick's pictogram into a bar chart, scales structure and heights correct	Max B3	Vertical scale and horizontal labels Structure including equal gaps Heights B2 for two correct B1 for one correct
	Alternative method 2		
	Turns Jen's bar chart into a pictogram, structure, number of symbols, key	Max B3	B2 two of structure, number of symbols and key B1 one of structure, number of symbols and key

This was the first AO3 question on the Foundation paper and attempts overall were good 60% of candidates scored either 3 or 4 marks.

Candidates often knew that a dual bar chart was the required method to obtain full marks as this was the only single diagram that could give a full comparison.

Many excellent and carefully produced graphs were seen such as that exemplified in Figure 1.1. Other candidates chose a key rather than labelling. Either method was accepted.

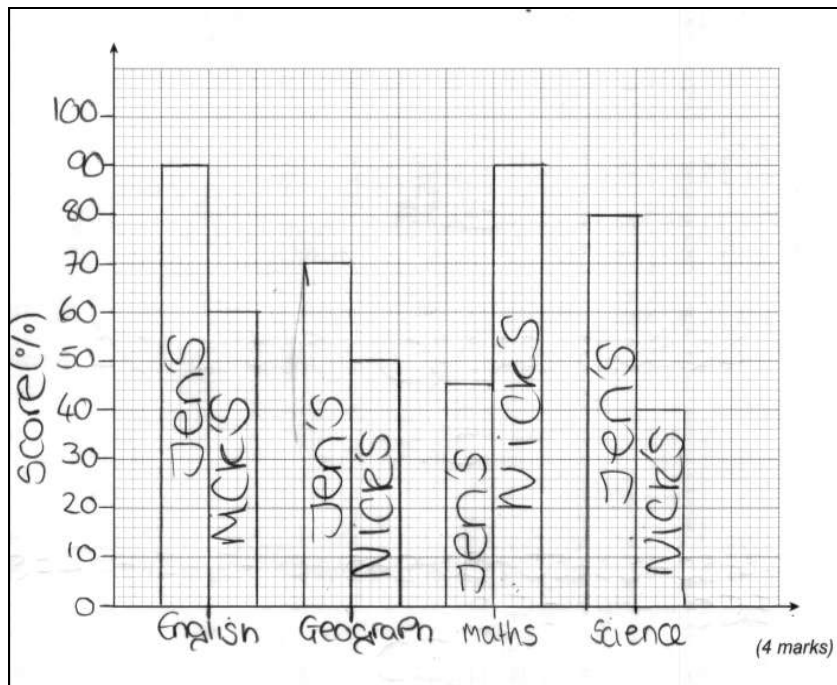


Figure 1.1

3 marks were available for candidates who chose to convert either Nick's pictogram to a bar chart or Jen's bar chart to a pictogram – the former being more common. Thus, an accurately drawn and labelled bar chart such as Figure 1.2 below would be awarded 3 marks.

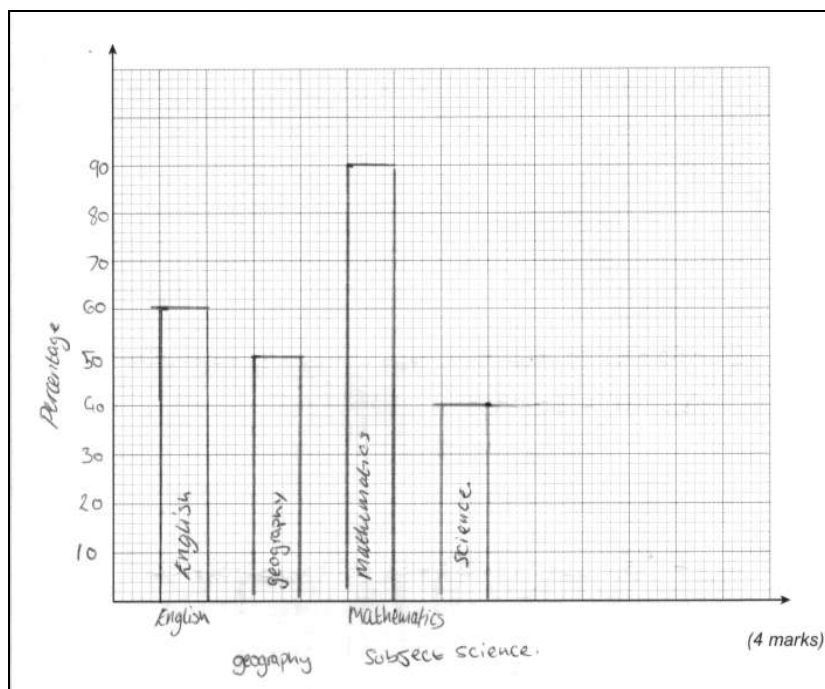


Figure 1.2

The most common error was to plot points inaccurately.

Line graphs, such as Figure 1.3, were often seen. These scored 2 marks if the heights were plotted correctly.

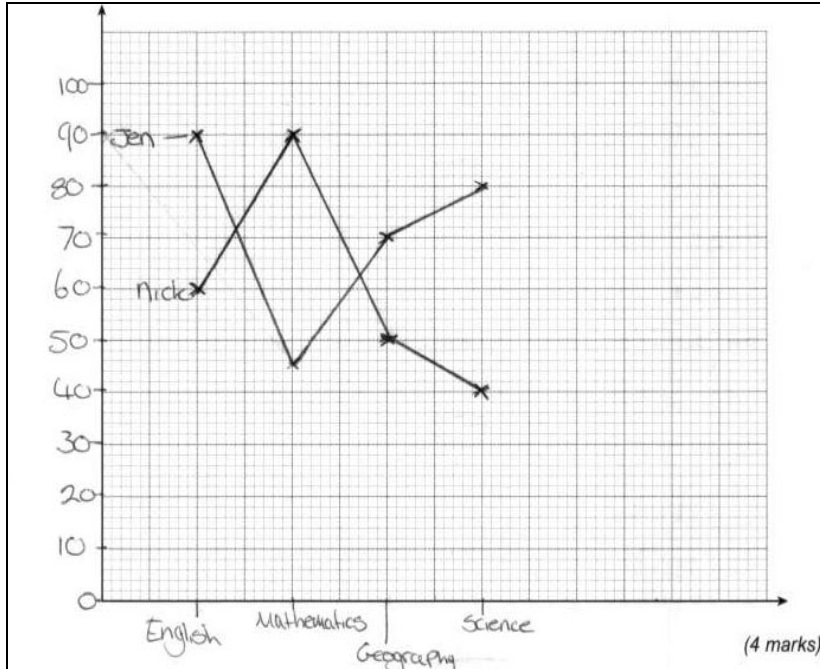


Figure 1.3

Other candidates made a good attempt, but were unable to sort out all the information. Unfortunately others were also unable to deal with the structure of these types of diagrams. In Figure 1.4 the candidate has made a good attempt, but made two errors – a frequency to an incorrect height and an inconsistent use of gaps between the bars.

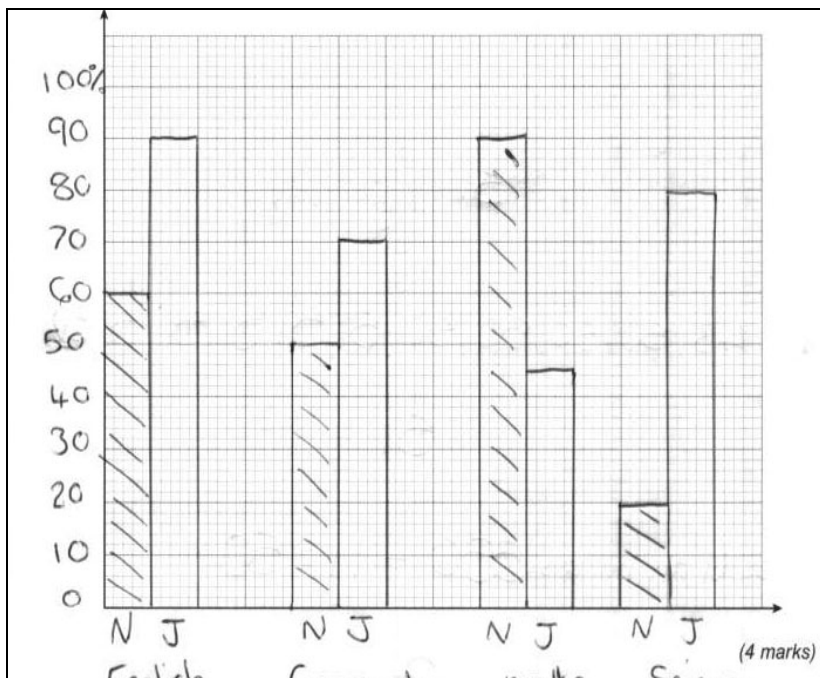


Figure 1.4

It was fairly common to see charts without gaps between bars (whether a dual or single bar chart) as in Figure 1.5 below.

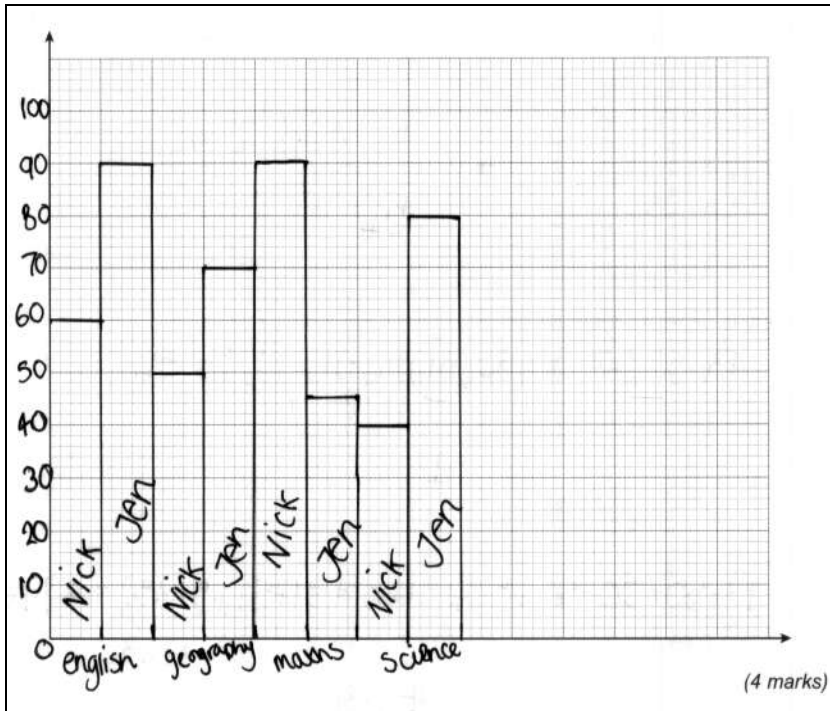


Figure 1.5

Question 2 (c) (ii)

AO2, functional elements and quality of written communication

2 (c) (ii) Write down three facts comparing their scores.

Fact 1.....

Fact 2

Fact 3

(4 marks)

Mark scheme:

2cii	3 correct comparisons	B2 ft	B1 ft 2 correct comparisons eg English was Jen's best score but Mathematics was Nick's best score ft their diagram
	A comparative statement for Nick and Jen for one subject or totals or means or ranges	Q1	Strand (iii)

Many candidates were able to score well on this question. 60% of candidates scored full or 2 marks. It was sufficient to make simple comparisons to obtain the marks. Anything that was clearly visible from the graph(s) could gain credit, but other comparisons had to be supported by figures.

In Figure 2.1, the candidate made 3 correct comparisons and so gained 3 marks. Fact 3 actually contained two correct statements which would have scored 2 marks on its own.

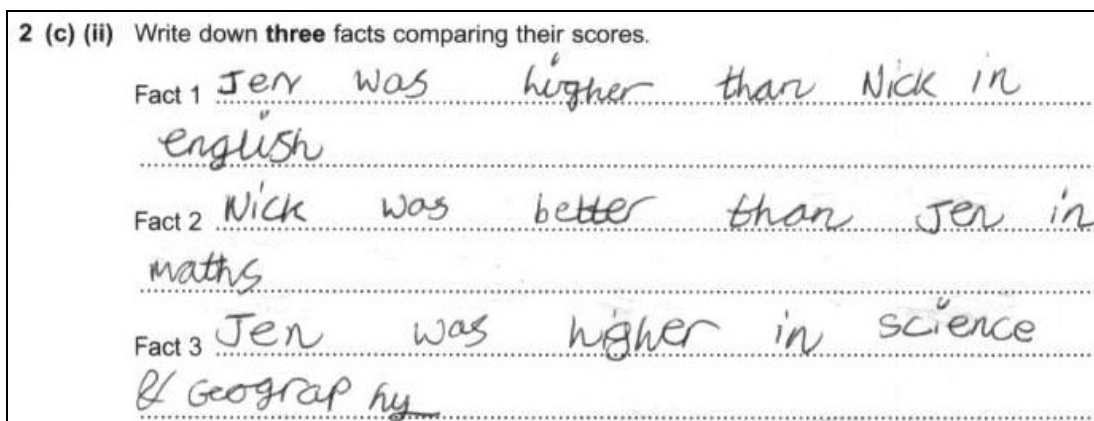


Figure 2.1

It was possible to score all three marks from just one statement. Fact 2 in Figure 2.2 is one such example. If irrelevant statements were seen elsewhere these were ignored, unless statements contradicted each other.



Figure 2.2

Many candidates quantified their statements, which was accepted, but the quantities given had to be correct as in Figure 2.3.

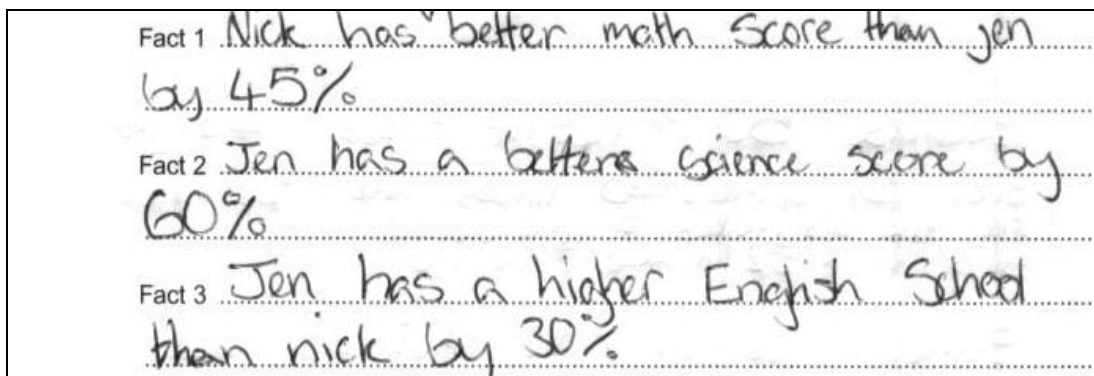


Figure 2.3

One of the marks in this question was for the candidate's quality of written communication. This was awarded for an attempt to compare the performances, even if the actual comparison was wrong. Thus in Figure 2.4 below if the only response given had been Fact 2 then this candidate would have scored the Q mark. An attempt to compare had been made but their answer of 295 was wrong. The overall totals comparison (or mean) was one of the examples where supporting values were required as it was not immediately obvious.

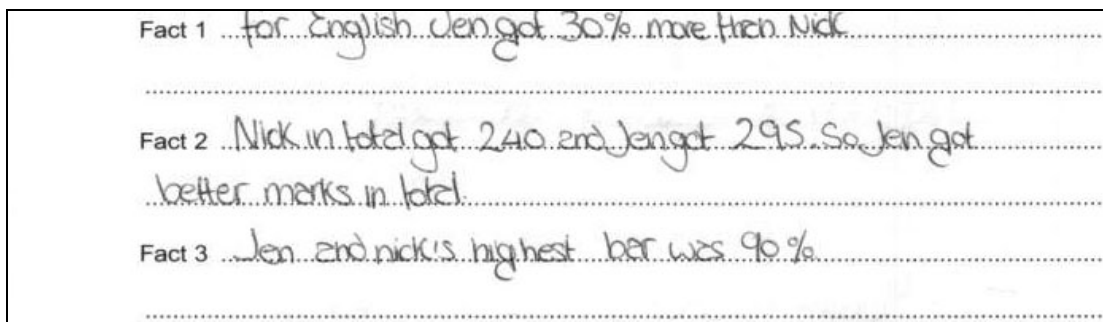


Figure 2.4

Figure 2.5 highlights a fairly common situation where a candidate only scored 2 of the available marks. These marks were awarded for two correct comparisons, but the third fact was one that was not immediately apparent as it was not supported by figures and so did not score any marks. Facts 1 and 2 were credited without supporting figures as these facts could be seen on the diagrams.

2 (c) (ii) Write down **three** facts comparing their scores.

Fact 1 ... Jen is better at English than Nick
by 30%.

Fact 2 ... Nick is better at Mathematics than
Jen by 45%.

Fact 3 ... Altogether Jen's scores overall is
higher than Nicks.

Figure 2.5

Other common errors included candidates only comparing the different subjects for one person or stating things that could be done with the data, rather than facts about it.

Question 6 (b) and (c)

AO3

6 (b) A different bag contains only black counters, pink counters and white counters.

When one counter is chosen at random, each colour is equally likely.

Write down **two** possible values for the total number of counters in this bag
(2 marks)

6 (c) Another bag contains only green counters and yellow counters.

There are more than 10 counters in the bag.

When one counter is chosen at random, the probability of choosing a green counter is $\frac{3}{4}$.

Write down **two** possible values for the total number of counters in this bag
(2 marks)

Mark scheme:

6b	Any two multiples of 3	B2	3, 6, 9, 12, ... (not 0) B1 one multiple of 3 SC1 two or more correct lists of counters with no totals SC1 two different fractions both equivalent to $\frac{1}{3}$
6c	Any two multiples of 4 greater than 10	B2	12, 16, 20, 24, ... B1 one multiple of 4 greater than 10 SC1 4 and 8 SC1 two or more correct lists of counters with no totals

This type of problem solving question was new for this specification. Many candidates (42%) were successful in obtaining multiples of 3 in their answers for part (b) and then obtaining equivalent correct values in part (c).

Figures 3.1 and 3.2 highlight typical, correct answers that show a clear strategy. By using this approach, candidates are likely to achieve part marks, even if they go on to make an arithmetical error. Many candidates only offered answers and consequently lost marks through poor arithmetic as there was no visible evidence of a correct method being used.

6 (b) A different bag contains only black counters, pink counters and white counters. When one counter is chosen at random, each colour is equally likely.

Write down **two** possible values for the total number of counters in this bag.

18 ~~in~~ in the bag. each have 6 counters.

6 in the bag each have 3 counters.

Answer 18 and 6 (2 marks)

Figure 3.1

6 (b) A different bag contains only black counters, pink counters and white counters. When one counter is chosen at random, each colour is equally likely.

Write down **two** possible values for the total number of counters in this bag.

3 black, 3 pink, 3 white 4, 4, 4 =

Answer 9 and 12 (2 marks)

Figure 3.2

Many candidates scored just one of the available marks. They had clearly understood the scenario, but had not answered the question being asked. Figure 3.3 shows one such example.

6 (b) A different bag contains only black counters, pink counters and white counters. When one counter is chosen at random, each colour is equally likely.

Write down **two** possible values for the total number of counters in this bag.

~~2 black~~ 1 black 1 pink 1 white.

3 black 3 pink 3 white.

Answer 1 black 1 pink 1 white and 3 black 3 pink 3 white. (2 marks)

Figure 3.3

Common questions

Question 5 (c) [common question with Higher Tier Q3b]

AO2 and functional elements

5 (c) Freddie has this hypothesis.
He says, "The shorter the song the more I like it."

Comment on his hypothesis.

(1 mark)

Mark scheme:

5c	There is some (weak or moderate) support for the hypothesis	B1	oe Do not allow strong support oe
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Commenting on a hypothesis based on a scatter diagram tested the understanding of the functional element of this question as candidates were required to interpret in the context of the question. Just under half of the Foundation Tier candidates and around three-quarters of the Higher Tier candidates were successful, basing their answers on the apparent negative correlation on the scatter diagram or confirming that the hypothesis seemed correct.

A comment referring to negative correlation was sufficient for the mark to be awarded, as shown in Figure 4.1 below. Commenting on specific songs was not sufficient.

3 (b) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".

Comment on his hypothesis.

It has a slight negative correlation so this is true as for example - Length - 3, Score 7 length - 10, score 3

(1 mark)

Figure 4.1

Although negative correlation is referred to in Figure 4.2, it contradicts the hypothesis being correct so is not a valid answer in this example.

3 (b) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".

Comment on his hypothesis.

This is wrong because it's negative correlation

(1 mark)

Figure 4.2

Figure 4.3 is an example of a candidate only referring to one or two of the songs and not using all the data.

3 (b) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".

Comment on his hypothesis.

Not true because he likes a 3 minute 24 second song more than a 2 minute 12 second song.

(1 mark)

Figure 4.3

Figure 4.4 shows a minimally acceptable response. Some candidates were too vague in their answers.

3 (b) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".

Comment on his hypothesis.

On his scatter diagram ~~graph~~ it is mostly right.

(1 mark)

Figure 4.4

It was also fairly common for candidates to simply restate the hypothesis. Figure 4.5 highlights the minimum interpretation needed to be awarded the mark – changing 'like it' to 'rates it' was accepted as a reference to the actual score.

3 (b) Freddie has this hypothesis.
He says, "The shorter the song the more I like it".

Comment on his hypothesis.

~~the longer the song, the lower~~
Freddie rates it.

(1 mark)

Figure 4.5

Question 7 (b) [common question with Higher Tier Q4b]

AO2 and functional elements

7 (b) The number of students who eat school dinners increases from 78 to 91.

Is the headteacher correct?
Show clearly how you decide.

(3 marks)

Mark scheme:

7b	0.25×78	M1	oe Including complete build-up
	19.5 or 19 or 20	A1	Condone 19.5% (but Q0 if then compared to 25%)
	Valid comparison with "13" (with M1 awarded)	Q1	"13" = their (91 – 78)
	Alternative method 1		
	$\frac{91-78}{78} (\times 100)$	M1	oe or 0.17 or 0.167 or 0.166... or $\frac{1}{6}$
	16.6... or 16.7 or 17	A1	
	Valid comparison with 25 (with M1 awarded)	Q1	25 may be implied by answer
	Alternative method 2		
	1.25×78	M1	oe
	97.5 or 97 or 98	A1	
	Valid comparison with 91 (with M1 awarded)	Q1	91 may be implied by answer
	Alternative method 3		
	$\frac{91}{78} (\times 100)$	M1	
	116.6... or 116.7 or 117 or 16.6... or 16.7 or 17	A1	
	Valid comparison (with M1 awarded)	Q1	Either with 25 (may be implied) or with 125 as appropriate

Candidates were generally able to construct an argument that the numbers had not increased by 25%. Three-quarters of Higher Tier candidates achieved 2 or the full 3 marks for this question. Foundation tier candidates were not as successful, but this was one of the more challenging questions on their paper.

There were some nice variations used to answer this question, with many candidates opting to find out what the figure would have been had the increase actually been 25% as in Figure 5.1 below.

4 (b) The number of students who eat school dinners increases from 78 to 91.

Is the headteacher correct?
Show clearly how you decide.

NO

$25\% \text{ of } 78 = 19.5$

$78 + 19.5 = 97.5$

78 ~~X~~ has not increased by 25%.

(3 marks)

Figure 5.1

Figure 5.2 shows another example of this method being used. However, the candidate does not give a clear or correct interpretation of their calculation. Candidates should be familiar with this type of decision making.

4 (b) The number of students who eat school dinners increases from 78 to 91.

Is the headteacher correct?
Show clearly how you decide.

$78 - 4 = 19.5 = 25\%$

$78 + 19.5 = 97.5$

the headteacher was correct because ~~8~~ in saying the students who would eat dinners will increase but ~~she~~ her estimate was a bit lower.

(3 marks)

Figure 5.2

This candidate used a different strategy. It was equally valid to simply look at the actual increase and the theoretical increase had it been 25%. However, because the actual increase of 13 was not given in the question, candidates were expected to state it as part of their working (show clearly how you decide) so that it was clear what the candidate was comparing with - 19, 19.5 or 20. Many candidates omitted this, or else made poor arithmetical errors as shown in Figure 5.3.

4 (b) The number of students who eat school dinners increases from 78 to 91.

Is the headteacher correct?
Show clearly how you decide.

No, because 25% of 78 is 19.5.
If the number of students have only risen by 3 then it can't have increased by 25%.

Figure 5.3

Figure 5.4 shows a candidate using a reverse percentage method, which is perfectly valid, but generally found to be more difficult.

However, good advice for your more able students when practising these types of questions and discussing examination technique is to find as many different strategies as possible. That way, when they are faced with a question of this type in an examination, they opt for the most straightforward method where they are less likely to make an error.

4 (b) The number of students who eat school dinners increases from 78 to 91.

Is the headteacher correct?
Show clearly how you decide.

$125\% = 91$
 $1\% = \frac{91}{125} = 0.728$
 $100\% = 0.728 \times 100$

This is not true as the number of students that eat school meals has not increased by 25% (3 marks)

Figure 5.4