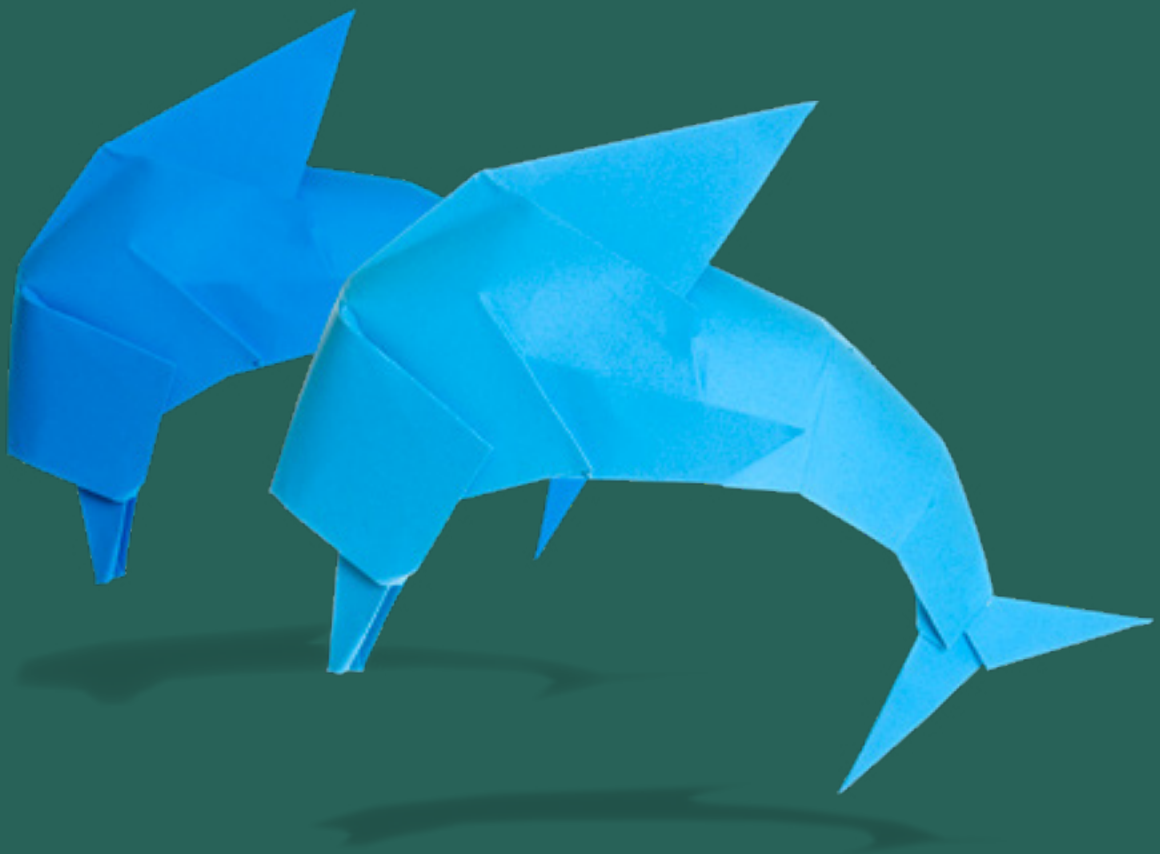


Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Mathematics (1MA1)



June 2019 - Exemplar

Student answers with examiner comments

Foundation

First certification 2017

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

The booklet looks at a selection of questions from the Summer 2019 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.

How to use this booklet

Our examining team have selected student responses to foundation tier questions and common question that are in both the Higher tier and Foundation tier from the Summer 2019 examination. Following each question, you will find the mark scheme for that question and then a range of student responses with accompanying examiner comments on how the mark scheme has been applied and the marks awarded, and on common errors for this sort of question.

Student response B

9 Work out $3\frac{1}{2} \times 1\frac{3}{5}$
Give your answer as a mixed number in its simplest form.

$$3 \times 2 = 6$$

$$+ 1$$

$$= \frac{7}{2} \times \frac{8}{5}$$

$$1 \times 5 = 5 + 3 = 8$$

$$3\frac{8}{2}$$

$$\begin{array}{r} 8 \\ 16 \\ 24 \\ 32 \\ 40 \\ 48 \\ 56 \end{array}$$

$$\frac{7 \times 8}{2 \times 5} = \frac{56}{10} = 5\frac{6}{10}$$

$$\frac{56}{2} = \frac{28}{1}$$

$$\frac{28}{5}$$

$$\frac{56}{10} \frac{28}{5}$$

Student response

Mean score for each question

Mean score: 1.59

Examiner comment

Both fractions were converted to improper fractions and multiplied correctly to give $\frac{56}{10}$, so the two M1 marks were awarded. The fraction $\frac{56}{10}$ was written in its simplest form and also as the mixed number $5\frac{6}{10}$ but it was not written as a mixed number in its simplest form, so A1 could not be awarded.

2/3

Examiner commentary on the student response

Marks awarded for the question or question parts

Paper 1F (non-calculator)

Exemplar question 1

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Foundation tier Question 6

- 6 Harry is planning a holiday for 4 people for 7 days.

Here are the costs for the holiday for **each person**.

Travel	£150
Hotel	£50 for each day
Spending money	£250

Work out the total cost of the holiday for 4 people for 7 days.

£.....

(Total for Question 6 is 4 marks)

Mean score: 3.33

Examiner comments

This was the first problem on the paper. Students were required to deal with a number of variables in a relatively common setting.

Students were required to multiply and add. The numbers 50, 150 and 250 enable students to solve the problem with basic numerical manipulation.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
6	3000	P1	for a correct step for travel or/and spending money e.g. $4 \times 150 (= 600)$ or $4 \times 250 (= 1000)$ or $150 + 250 (= 400)$	Can be embedded e.g. $4 \times 7 \times 150$
		P1	for an appropriate step with the hotel price e.g. $7 \times 50 (= 350)$ or $4 \times 50 (= 200)$	Can be $4 \times 7 \times 50$
		P1	for combining at least two “costs” for 4 people for 7 nights e.g. $4 \times 150 + 4 \times 250 (= 1600)$ or $4 \times 150 + 7 \times 4 \times 50 (= 2000)$	Must be correct process for two costs e.g. not $4 \times 150 \times 7$ but may be 2 correct costs and one incorrect
		A1	cao	

Examiner comments

There were many approaches taken to answer this question.

The last process mark was allowed for adding at least two costs; the use of “costs” meant that the cost **must** come from correct processes.

Student response A

- 6 Harry is planning a holiday for 4 people for 7 days.
Here are the costs for the holiday for **each person**.

Travel	£150
Hotel	£50 for each day
Spending money	£250

Work out the total cost of the holiday for 4 people for 7 days.

Handwritten calculations showing the total cost of the holiday for 4 people for 7 days.

Costs for each person (Travel: £150, Hotel: £50 for each day, Spending money: £250):

For 4 people:

- Travel: £150, £150, £150, £150
- Hotel: £50, £50, £50, £50
- Spending money: £250, £250, £250, £250

For 7 days (Hotel cost):

- £50, £50, £50, £50
- £50, £50, £50, £50
- £50, £50, £50, £50
- £50, £50, £50, £50
- £50, £50, £50, £50
- £50, £50, £50, £50
- £50, £50, £50, £50

Total costs for 4 people and 7 days:

- Travel: £600
- Hotel: £1400
- Spending money: £1000

Final calculation:

$$£1400 + £600 + £1000 = £3000$$

4/4

Examiner comments

This student showed column addition rather than multiplication, but the process and accuracy was all correct.

They added the correct values and arrive at the final answer with no arithmetic errors and so all marks were awarded.

As there was no requirement in the question to show working, the correct answer alone would have scored full marks, but students should always be encouraged to show all their working.

Student response B

- 6 Harry is planning a holiday for 4 people for 7 days.
Here are the costs for the holiday for **each person**.

Travel	£150
Hotel	£50 for each day
Spending money	£250

Work out the total cost of the holiday for 4 people for 7 days.

Travel :
 $150 \times 4 = \pounds 600$

Hotel :
 $50 \times 7 = \pounds 350$
 $350 \times 4 = \pounds 1400$

Spending :
 $250 \times 4 = \pounds 1000$

1400
 1000
 600
 350
 ———
 3350

£ 3350

3/4

Examiner comments

The student correctly evaluated the cost of travel for 4 people and the spending money for 4 people. They were also able to deal with the cost of the hotel for 4 people for 7 nights each. They combined the costs, but also added in one extra cost (£350) and so the final answer is incorrect.

Hence all the P1 marks can be given but not A1.

Student response C

- 6 Harry is planning a holiday for 4 people for 7 days.
Here are the costs for the holiday for **each person**.

Travel	£150
Hotel	£50 for each day
Spending money	£250

Work out the total cost of the holiday for 4 people for 7 days.

$$T \quad 4 \times 150 = 600$$

$$H \quad 7 \times 50 = 350$$

$$S \quad 250$$

$$1200$$

£1200

2/4

Examiner comments

This student started correctly by calculating the cost of the travel for the 4 people.

They also calculated the cost of the hotel for 7 nights for 1 person. This allowed the award of the first two P1 marks. However, the addition was not of two correct costs for 4 people for 7 nights and so no more marks could be awarded.

Exemplar question 2

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Foundation tier Question 9

- 9 Ruth left her home at 9 am and walked to the library.
She got to the library at 10 30 am.
Ruth walked at a speed of 4 mph.

(a) Work out the distance Ruth walked.

..... miles
(2)

Ruth got to the library at 10 30 am.
She stayed at the library for 50 minutes.
Then she walked home.

Ruth took $1\frac{1}{4}$ hours to walk home.

(b) At what time did Ruth get home?

.....
(2)

(Total for Question 9 is 4 marks)

Mean score: a) 0.90, b) 1.46

Examiner comments

This question tested the students' ability to work with time and speed.

They needed the knowledge that there are 60 minutes in one hour and also the fact that distance is speed $\times$ time.

The classic mistake for this type of question was to work with time as if there are 100 minutes in one hour. For example, many stated that 1 hour 25 minutes is 1.25 hours.

Another common error was to use $4 \times 90 = 360$ and then not divide by 60, thus using inconsistent units and so not finding the distance in miles.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
9(a)	6	M1	for method to find distance, e.g. $4 \times \text{time difference}$ or 30 mins = 2 miles	10.30 am – 9 am may be seen as 1.5 (hr) or 1 (hr) 30 (min) or 90 (min) or $\frac{3}{2}$ (hr) or $1\frac{1}{2}$ (hr)
(b)	12 35 pm	A1	cao	Allow 12 35 but not 12 35 am
		M1	for method to add time using consistent units e.g. 11 20 or $50 + 75$ or 2 hours 5 mins	
		A1	12 35 pm or 12 35 (h)	

Examiner comments

Part (a): M1 could be awarded for $4 \times$ (a time difference); this time difference can be 90 minutes or come from a subtraction. The lack of understanding about units was condoned for this mark.

Part (b): $10\ 30 + 50$ was enough for M1. The answer of 11 20 would also imply M1. Using 1 hour 25 minutes is not acceptable for $1\frac{1}{4}$ hours as this is not using consistent time units.

The final answer can be accepted in a variety of formats, e.g. 12:35 or 1235 pm but not in any format where am is used.

Student response A

- 9 Ruth left her home at 9am and walked to the library.
She got to the library at 1030am.
Ruth walked at a speed of 4mph.



- (a) Work out the distance Ruth walked.

Time = 1hr 30mins or 1.5

$$4 \times 1.5$$

$$\begin{array}{r} 1.5 \\ \times 4 \\ \hline 6.0 \end{array}$$

6 miles
(2)

2/2

Ruth got to the library at 10 30 am.
She stayed at the library for 50 minutes.
Then she walked home.

Ruth took $1\frac{1}{4}$ hours to walk home.

- (b) At what time did Ruth get home?

$$10:30 + 50\text{min} = 11:20 \text{ am.}$$

$$11:20 + 1\text{hr} = 12:20 \text{ pm.}$$

$$12:20 + 15\text{min} = 12:35 \text{ pm.}$$

12:35pm
(2)

2/2

Examiner comments

Part (a): The student's response was fully correct, with 1 hour 30 minutes given as 1.5 and 4×1.5 seen, and 6 given as the final answer.

Part (b): This was a fully correct answer with working shown. The time was broken down into 50 minutes and 1 hour and 15 minutes, all of which were correctly added to the starting time of 10 30 am.

Student response B

- 9 Ruth left her home at 9 am and walked to the library. She got to the library at 10 30 am. Ruth walked at a speed of 4 mph.

(a) Work out the distance Ruth walked.

$$4 \times 1.5 =$$



$$4 \times 1.5 \\ = 4.20$$

$$\underline{4.2} \text{ miles} \\ (2)$$

1/2

Ruth got to the library at 10 30 am. She stayed at the library for 50 minutes. Then she walked home.

Ruth took $1\frac{1}{4}$ hours to walk home.

(b) At what time did Ruth get home?

① left at 11.20 $\xrightarrow{1 \text{ hour}}$ 12.20 $\xrightarrow{15 \text{ min}}$ 12.35
②

$$\underline{12.35 \text{ am}} \\ (2)$$

1/2

Examiner comments

Part (a): This student realised that 4×1.5 is required and so gained M1. Unfortunately, they then evaluated this as 4.2 not 6, so scored A0.

Part (b): The student dealt with $1\frac{1}{4}$ hours as 1 hour and 15 minutes, but forgot to include the 50 minutes in the working. This would not have been a problem if the answer was fully correct. However, 12 35 am was incorrect and so A0.

Student response C

- 9 Ruth left her home at 9 am and walked to the library.
She got to the library at 10 30 am.
Ruth walked at a speed of 4 mph.

(a) Work out the distance Ruth walked.

$$\begin{aligned} 1 \text{ hr } \frac{1}{2} \text{ to get there} \\ 1 \text{ hr} = 4 \text{ miles} \\ \frac{1}{2} = 2 \end{aligned}$$

$$\begin{array}{r} 4 \frac{1}{2} \text{ miles} \\ \hline (2) \end{array}$$

1/2

Ruth got to the library at 10 30 am.
She stayed at the library for 50 minutes.
Then she walked home.

Ruth took $1 \frac{1}{4}$ hours to walk home.

(b) At what time did Ruth get home?

$$\begin{aligned} 1 \frac{1}{4} &= 1.25 \text{ hours} \\ 10:30 + 50 \text{ min} &= 11:20 \\ 1 \frac{1}{4} &= 1 \text{ hr } 25 \text{ min} \\ 11:20 + 1 \text{ hr } 25 \text{ min} &= 12:45 \\ 10:30 & \\ 45 & \\ \hline 12:45 \text{ am} \\ (2) \end{aligned}$$

1/2

Examiner comments

Part (a): The student equated 1 hour with 4 miles and $\frac{1}{2}$ hour with 2 miles, so this gained M1.

They then added $\frac{1}{2}$ to 4 instead of 2 to 4 and so scored A0.

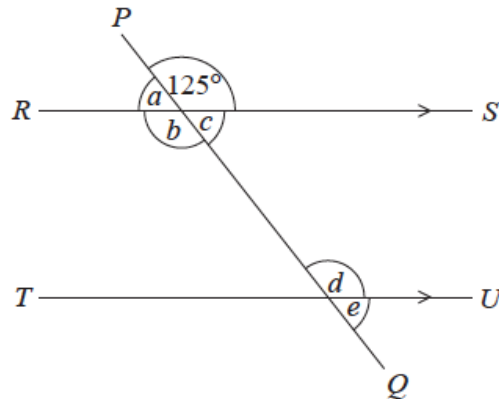
Part (b): The student clearly added 50 minutes to 10 30 am and gained M1. However, they used 1.25 for $1 \frac{1}{4}$ hours, thus scoring A0.

Exemplar question 3

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Foundation tier Question 12

- 12 RS and TU are parallel lines.
 PQ is a straight line.



An angle of size 125° is shown on the diagram.

- (b) (i) Write down the letter of one other angle of size 125°
 Give a reason for your answer.

.....

 (2)

- (ii) Explain why $a + b + c = 235^\circ$

.....

 (1)

(Total for Question 12(b) is 3 marks)

Mean score: 3.39 (for the entire question)

Examiner comments

This question assessed students' ability to communicate mathematically.

Part (i): They were required to give reasons with their angle selection. Guidance was given on the mark scheme, by use of underlining, to show the minimum requirement for acceptable explanations. Only correct reasons gained credit; if extra reasons were given, this was seen as choice and no marks for the reasoning were given. This is in the guidance for describing the awarding of communication marks.

The main errors were confusing corresponding angles with alternate angles and trying to describe angles using two letters, e.g. *TU*.

Part (ii): This was testing angles around a point. Most candidates stated $360 - 125 = 235$, but they could have achieved the correct answer by using a straight line twice, e.g. $180 - 125 = 55$ and then stating $55 + 55 + 125 = 235$.

A numerical or a reasoning explanation was allowed in this question. Candidates who chose to use 360° around a point were generally more successful.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
12(b)(i)	b or d with reason	B1	for b or d (or both)	A correct answer can be implied by writing 125 immediately next to b or d (or both) as long as 125 is not written next to an incorrect angle.
		C1	(dep) for appropriate reason(s) vertically <u>opposite angles</u> are equal <u>vertically opposite angles</u> are equal <u>corresponding</u> angles are equal <u>alternate</u> angles are equal <u>angles</u> on a straight <u>line</u> add up to 180	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
(b)(ii)	reason	C1	for correct explanation using 360 or a full explanation using angles around a point Acceptable examples Because 360 around a point $360 - 125 = 235$ $125 + 235 = 360$ Because they add to 360 Not acceptable examples Because b is 125	Using 360 appropriately and not in an incorrect setting

Examiner comments

Note the requirement of correct angle notation or clear labelling on the diagram.

The underlined words w a general and consistent requirement and should be shared with students.

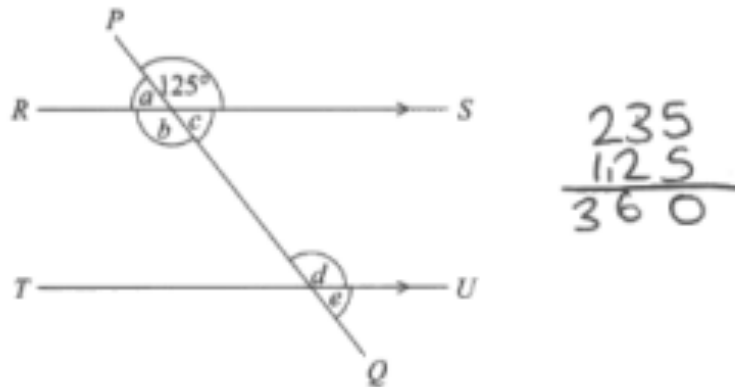
The examples given for acceptable answers are in ‘student speak’ and are usually typical of what is seen on initial script inspection.

Any reasons given must be relevant and not contradicted later.

Just listing all angle facts known was not an acceptable answer.

Student response A

- 12 RS and TU are parallel lines.
 PQ is a straight line.



An angle of size 125° is shown on the diagram.

- (b) (i) Write down the letter of one other angle of size 125°
 Give a reason for your answer.

D, because corresponding angles
 are equal

(2)

2/2

- (ii) Explain why $a + b + c = 235^\circ$

because angles around a point add up to
 360, and $235 + 125 = 360$.

(1)

1/1

Examiner comments

Part (b)(i): One of the two correct angles was given and the reasoning was correct for this answer.

Part (b)(ii): The reasoning was correct and clear.

Student response B

- 12 RS and TU are parallel lines.
 PQ is a straight line.



An angle of size 125° is shown on the diagram.

- (b) (i) Write down the letter of one other angle of size 125°
 Give a reason for your answer.

d

(2)

1/2

- (ii) Explain why $a + b + c = 235^\circ$

Because the angle adds up to 360° ,
 so if you add 125° and 235° , it will
 give you 360° .

(1)

1/1

Examiner comments

Part (b)(i): The student gave a correct angle but with no reasoning, so only B1 could be awarded.

Part (b)(ii): The concept of 360° around a point was discussed and the figures 125 and 235 used correctly.

Student response C

- 12 RS and TU are parallel lines.
 PQ is a straight line.



An angle of size 125° is shown on the diagram.

- (b) (i) Write down the letter of one other angle of size 125°
 Give a reason for your answer.

b because it is opposite

(2)

1/2

- (ii) Explain why $a + b + c = 235^\circ$

because a + c are the same
 and b and 125° is the
 same

(1)

0/1

Examiner comments

Part (b)(i): The student gave a correct angle but the reasoning was incomplete, so only B1 could be awarded.

Part (b)(ii): Although nothing in the statement was incorrect, it was incomplete. There was no reference to angles round a point and no marks could be awarded.

Exemplar question 4

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Foundation tier Question 14

- 14 Fiona has to work out the exact value of $48 \div \frac{1}{2}$

She writes

$$48 \div \frac{1}{2} = 24$$

Fiona's reason is,

“There are 2 halves in 1, so there will be 24 halves in 48”

- (b) Explain what is wrong with Fiona's reason.

.....

.....

(1)

(Total for Question 14(b) is 1 mark)

Mean score: 0.12

Examiner comments

This question assessed students' ability to evaluate a method given to them.

They needed to critique the method and in this case explain the error seen.

Some students corrected the reasoning given in the question, while others said what was wrong with the explanation. In this case, both were acceptable.

Mark scheme

Question	Answer	Mark	Mark scheme
14(b)	Explanation	C1	for explanation Acceptable examples she divided by 2 but should have multiplied by 2 there are 96 halves in 48 $48 \times 2 = 96$ Not acceptable examples $24 \times 2 = 48$

Examiner comments

Explanations should be clear and concise. Students who gave conflicting information did not score the mark.

Student response A

- 14 Fiona has to work out the exact value of $48 \div \frac{1}{2}$

She writes

$$48 \div \frac{1}{2} = 24$$

Fiona's reason is,

“There are 2 halves in 1, so there will be 24 halves in 48”

- (b) Explain what is wrong with Fiona's reason.

when dividing by a halve
you have to times it by
2 instead. of dividing by 2
(1)

1/1

Examiner comments

The student corrected the method given and stated what Fiona should have done to arrive at the correct answer. This explanation was sufficient for C1.

Student response B

- 14 Fiona has to work out the exact value of $48 \div \frac{1}{2}$

She writes

$$48 \div \frac{1}{2} = 24$$

Fiona's reason is,

“There are 2 halves in 1, so there will be 24 halves in 48”

- (b) Explain what is wrong with Fiona's reason.

Because if there is 2 halves in 1
there will be 96 halves in 48

(1)

1/1

Examiner comments

The student corrected the answer given by Fiona. In this question, this approach was acceptable.

Student response C

- 14 Fiona has to work out the exact value of $48 \div \frac{1}{2}$

She writes

$$48 \div \frac{1}{2} = 24$$

Fiona's reason is,

"There are 2 halves in 1, so there will be 24 halves in 48"

$$48 \div 2 = 24$$

- (b) Explain what is wrong with Fiona's reason.

is that ~~48 halved is 24~~ there are not two halves in one and when 48 is halved it is ~~48~~ 24 so there is not 24 halves in 48

(1)

0/1

Examiner comments

The student's explanation was confused. The first statement was incorrect, the next part was correct and then the third part did not follow the reasoning of the first two parts.

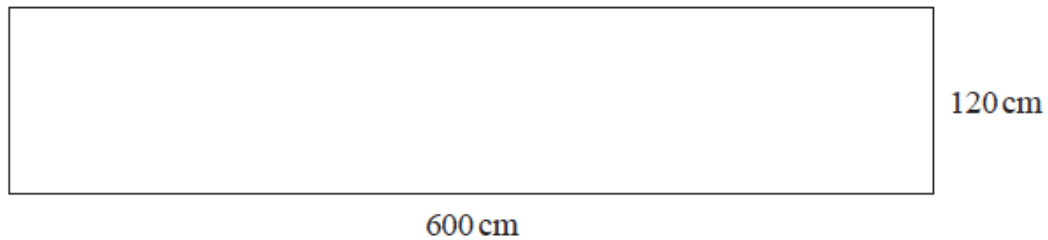
No mark could be awarded after the first part of this explanation.

Exemplar question 5

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Foundation tier Question 18

- 18 The diagram shows a rectangular garden path.



Wasim is going to cover the path with paving stones.

Each paving stone is a square of side 30 cm.

Each paving stone costs £2.50

Wasim has £220 to spend on paving stones.

Show that he has enough money to buy all the paving stones he needs.

(Total for Question 18 is 4 marks)

Mean score: 1.59

Examiner comments

This question examined communication to explain a given result. The student needed to provide sufficient evidence to show that Wasim is correct, hence full working was preferable.

A common mistake was to divide only by 30 instead of 30^2 .

Some students showed the rows of tiles on the diagram, and this did seem to scaffold their working and lead to fully correct reasoning.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
18	Accurate figures with supportive working	M1	for a correct first step e.g. $600 \div 30 (= 20)$ or $120 \div 30 (= 4)$ or $600 \times 120 (= 72\,000)$ or $30 \times 30 (= 900)$	Could work in m or cm
		M1	for finding an appropriate cost $2.5 \times "20" (= 50)$ or $2.5 \times "4" (= 10)$ OR number of tiles required $"72\,000" \div "900" (= 80)$ or $"4" \times "20" (= 80)$ OR number they can afford $220 \div 2.5 (= 88)$	Units must be consistent
		M1	for full method to get figures to compare e.g. cost to tile whole area e.g. $"80" \times 2.5$ OR number of tiles they need and number they can afford e.g. $"72\,000" \div "900"$ and $220 \div 2.5$	
		A1	for 200 OR 80 and 88 OR 72 000 and 79 200 OR 132 (cm) OR 660 (cm) SC B2 for answer of 60	

Examiner comments

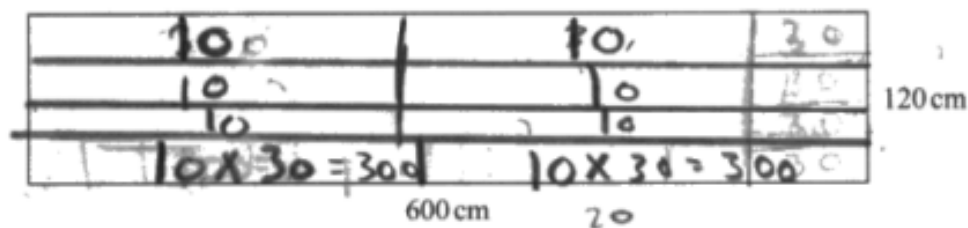
An initial first step was required. This step needed to be sensible and lead towards the correct answer. The working could be seen on the diagram.

Subsequent steps needed to use figures that came from a correct process; arithmetic errors were condoned for the award of process marks.

There are a number of ways to answer this question. Whichever method was chosen, all appropriate accurate figures were required to make a comparison.

Student response A

- 18 The diagram shows a rectangular garden path.



Wasim is going to cover the path with paving stones.

Each paving stone is a square of side 30 cm.

Each paving stone costs £2.50

Wasim has £220 to spend on paving stones.

Show that he has enough money to buy all the paving stones he needs.

$$80 \times 2.50 =$$

$$40 \times 5 = 200$$

$$\text{Budget} = £220$$

$$80 \times 2.50 = £200$$

She will have £20 left

4/4

Examiner comments

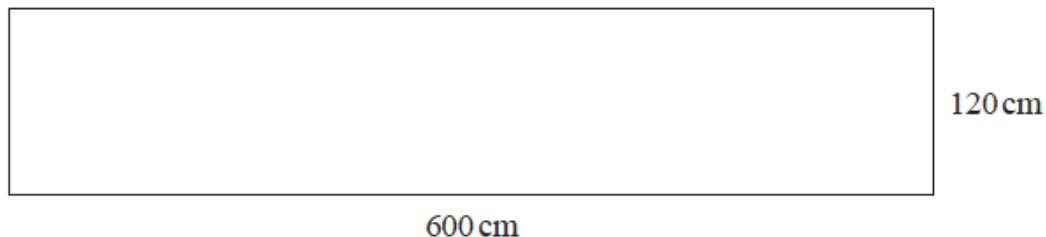
The student used the diagram to illustrate how to lay the paving stones and how many are needed. This was an acceptable approach.

They then calculated 80×2.50 by using 40×5 and compared this answer to £220.

They stated £20 is left, which is correct but not essential for full marks.

Student response B

- 18 The diagram shows a rectangular garden path.



Wasim is going to cover the path with paving stones.

Each paving stone is a square of side 30 cm.

Each paving stone costs £2.50

Wasim has £220 to spend on paving stones.

Show that he has enough money to buy all the paving stones he needs.

Area of garden path $\Rightarrow A = w \times l = 600 \text{ cm} \times 120 \text{ cm}$
 $= 72000 \text{ cm}^2$

$\pounds 220 \div \pounds 2.50 = 88$ paving stones

$88 \times (30)^2 \text{ cm}^2 \Rightarrow$ p. stone side $\downarrow$ 30 cm $\Rightarrow$ Area of p. stone
 $A = 30 \times 30 = 900 \text{ cm}^2$

$900 \text{ cm}^2 \text{ paving stone} \times 88 = 79200$

4/4

Examiner comments

This was an alternative approach to Student response A.

The student found the area to be covered and the area Wasim can afford to cover. These two figures were sufficient to show that Wasim has enough money to cover the path.

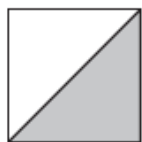
The use of 'path' and 'paving stone' also added to the explanation.

Exemplar question 6

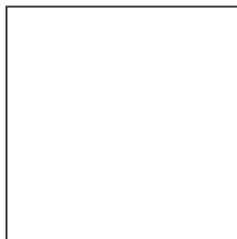
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Foundation tier Question 20

20 Here are two squares, **A** and **B**.



A



B

The length of the side of square **A** is 50% of the length of the side of square **B**.

Express the area of the shaded region of square **A** as a percentage of the area of square **B**.

..... %

(Total for Question 20 is 3 marks)

Mean score: 0.37

Examiner comments

This question assessed the ability to use scale factors of area, given the scale of a length. It also assessed the conversion of either a fraction or a ratio to a percentage.

Many students made the mistake of comparing lengths only. Many students found this question difficult, which was surprising given that the diagrams could have been used to get to the answer.

Mark scheme

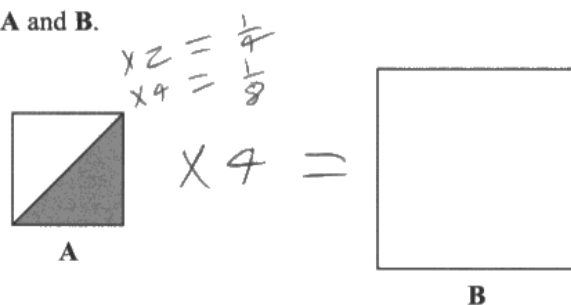
Question	Answer	Mark	Mark scheme	Additional guidance
20	12.5	P1	starts to process the problem, e.g. assigns lengths of sides to squares A and B in the ratio 1 : 2 oe and calculates at least one area OR fits 4 of square A into square B OR for ratio of areas of squares e.g. 1 : 4 oe	May be seen in a diagram
		P1	for process to express relationship between area of shaded triangle and area of square B, e.g. 1 : 8, $\frac{1}{8}$ OR 0.125	May be seen in a diagram with figure given
		A1	for 12.5 oe	

Examiner comments

The final answer required was a percentage. Comparisons using length rather than area did not gain any credit.

Student response B

20 Here are two squares, A and B.



The length of the side of square A is 50% of the length of the side of square B.

Express the area of the shaded region of square A as a percentage of the area of square B.

Hypothetically square A = 5cm sides

meaning square B = 10cm sides

area of shape A = (5×5) 25cm²

area of shape B = (10×10) 100cm²

Half of shape A is shaded

anyway shape B would always equal

four times the size of shape A

meaning 1/2 of shape A is 13.5%

Shaded - $\frac{1}{8}$ of square B (Total for Question 20 is 3 marks)

would be 1 or

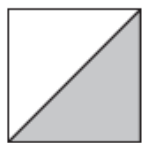
2/3

Examiner comments

This student worked in areas, having given nominal values to the side lengths for each square. They arrived at the correct fractional value but made an error when converting from a fraction to a percentage, so losing the final 1.

Student response C

20 Here are two squares, A and B.



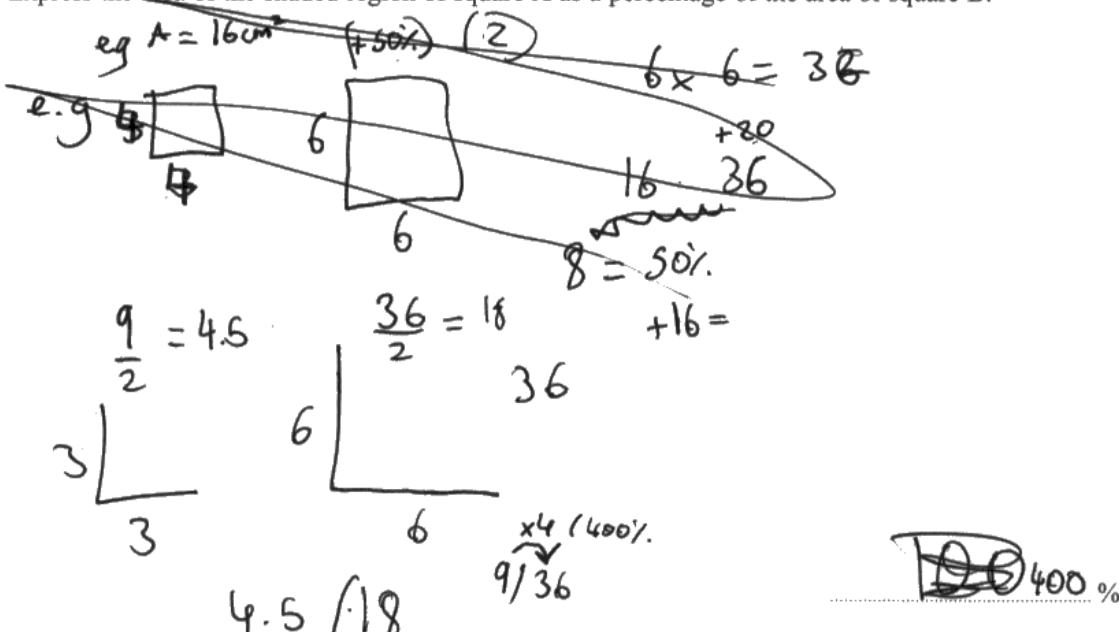
A



B

The length of the side of square A is 50% of the length of the side of square B.

Express the area of the shaded region of square A as a percentage of the area of square B.



1/3

Examiner comments

This student assigned side lengths in the correct ratio. They started to work with area but could not produce a correct relationship and then gave 400% as the final answer. The use of $\frac{9}{36}$ or $\frac{4.5}{18}$ showed that the student is working with the area of both squares or half of both squares, possibly suggesting that the question had not been read carefully enough.

As the final shading is not bigger than the area of shape B, this answer was not sensible and students should always check that their final answer is sensible in a practical situation. If it is not, they should then review their work for errors.

Exemplar question 7[\[back to Contents page\]](#)**Foundation tier Question 21**

- 21** There are 40 students in a class.
Each student walks to school or cycles to school or gets the bus to school.
- There are 22 girls in the class.
9 of the girls walk to school.
7 of the boys cycle to school.
6 of the 10 students who get the bus to school are boys.
- Find the number of these students who walk to school.

.....

(Total for Question 21 is 4 marks)

Mean score: 2.89**Examiner comments**

This question assessed students' ability to deal with information – both gender and travel mode, in this instance. Many successful students used two-way tables or frequency trees. Students who could not organise their work or use sufficient labels often got lost in their own working.

A common misconception was to just subtract all figures in the question from the total given.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance				
21	14	P1	for process to find total number of boys, $40 - 22 (= 18)$		W	C	B	
			OR the number of girls who travel by bus, $10 - 6 (= 4)$	boy	5	(7)	(6)	18
		P1	for process to find the number of girls who cycle to school, $22 - "4" - 9 (= 9)$	girl	(9)	9	4	(22)
			OR the number of boys who walk to school $"18" - 6 - 7 (= 5)$		14	16	(10)	(40)
P1	full process to find the total number of students who walk to school e.g. $"5" + 9$ or $40 - (6 + 7 + "4" + "9")$	Note 16 is $7 + 9$ and 10 is $6 + 4$ $6 + 7$ is 13 and $4 + 9 = 13$ may be seen as intermediate steps						
A1	cao							

Examiner comments

The second P1 and subsequent marks were dependent upon a first correct step. Students needed a process to find the number of boys or the number of girls travelling by bus to be able to score on this question.

All other marks were dependent upon these first processes.

Correct figures imply the process, unless an incorrect process is seen.

Student response A

21 There are 40 students in a class.

Each student walks to school or cycles to school or gets the bus to school.

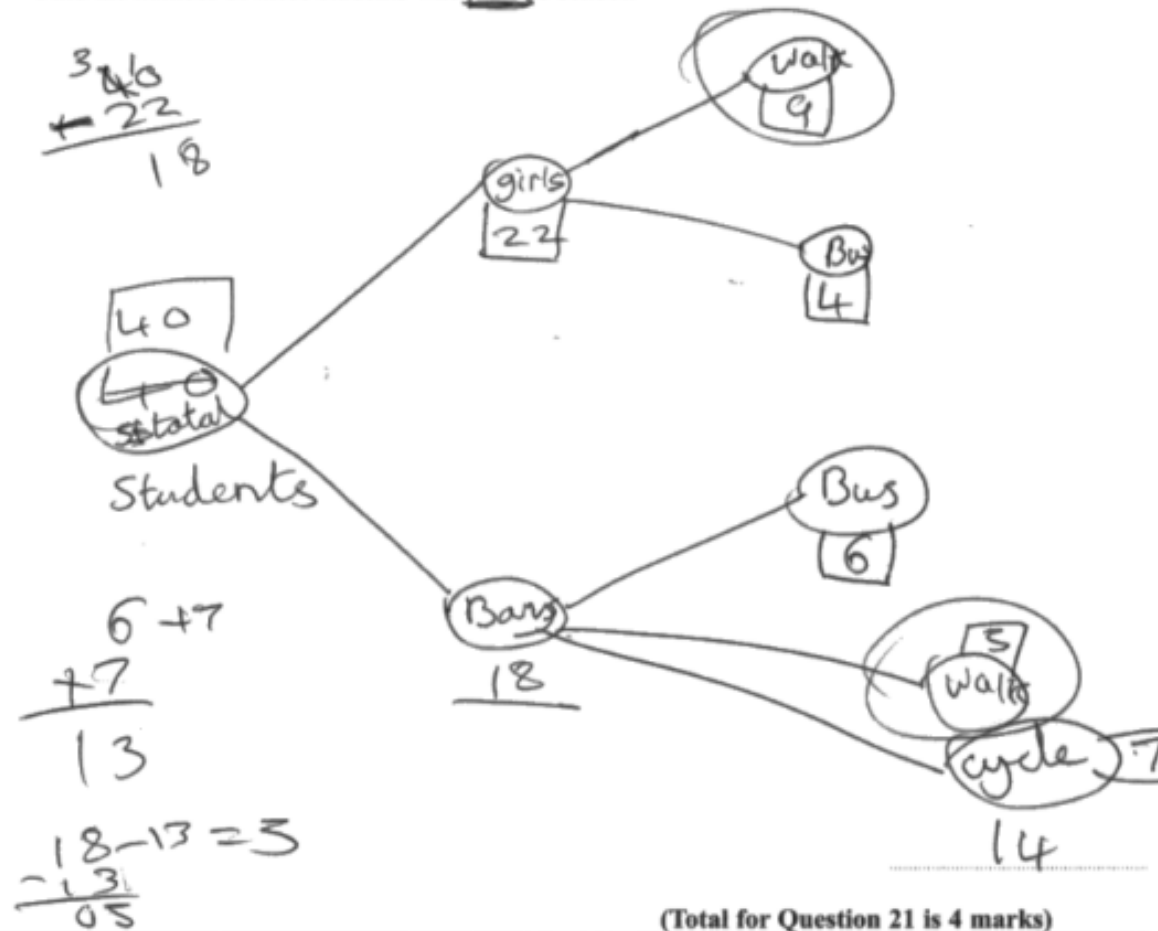
There are 22 girls in the class.

9 of the girls walk to school.

7 of the boys cycle to school.

6 of the 10 students who get the bus to school are boys.

Find the number of these students who walk to school.



4/4

Examiner comments

This was a fully correct answer using a frequency tree method.

There was working shown and the labels were very clear.

The final calculation was shown and the answer placed on the answer line.

Student response B

- 21 There are 40 students in a class.
Each student walks to school or cycles to school or gets the bus to school.

There are 22 girls in the class.
9 of the girls walk to school.
7 of the boys cycle to school.
6 of the 10 students who get the bus to school are boys.

4 girls get the bus

Find the number of these students who walk to school.

Handwritten work in a circle:

$$\begin{aligned}
 &40 - 22 = 18 \\
 &18 - 7 = 11 \\
 &11 - 6 = 5
 \end{aligned}$$

boys
 $18 - 7 = 11$
 $11 - 6 = 5$

$$40 - 22 = 18$$

18 boys

girls

$$\begin{aligned}
 &22 - 4 = 18 \\
 &18 -
 \end{aligned}$$

2/4

Examiner comments

This response started correctly. It showed that there are 18 boys and then $18 - 7 - 6$, in two steps, arriving at an answer of 5; this was worth the first two P1 marks. The student stopped at this point and no more marks could be awarded.

Student response C

- 21 There are 40 students in a class.
Each student walks to school or cycles to school or gets the bus to school.

There are 22 girls in the class.
9 of the girls walk to school.
7 of the boys cycle to school.
6 of the 10 students who get the bus to school are boys.
Find the number of these students who walk to school.

Handwritten student work:

$$13 + 19 = 32$$

18 b
9 GW
7 BC
6 BB 22
10 B
32
17 Students
~~8 Students~~

1/4

Examiner comments

This student found the number of boys in the class, so was awarded the first P1.

The rest of the figures given in the answer were really only a rewrite of the question and no more meaningful calculations were seen.

Exemplar question 8

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Foundation tier Question 22 / Higher tier Question 1

- 22 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2		

The number of red cubes in the box is the same as the number of yellow cubes in the box.

- (a) Complete the table.

(2)

There are 12 blue cubes in the box.

- (b) Work out the total number of cubes in the box.

(2)

(Total for Question 22 is 4 marks)

Mean score: Foundation tier 2.84, Higher tier 3.82

Examiner comments

Part (a): This assessed the ability to use the fact that the probabilities of exhaustive events sum to 1 and also that equally likely events have an equal probability.

The main error was not to half 0.8, so summing to 1 was understood but not the equal sharing of this probability.

Part (b): Students needed to link the probabilities with events and this proved difficult for some. The main misconception was to add 2 to the number of blue blocks rather than times this number by 2 to find the number of yellow or red blocks.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
22(a)	0.4, 0.4	P1	for process to find sum of unknown probabilities, e.g. $1 - 0.2 (= 0.8)$	Award mark for any two probabilities given that sum to 0.8, e.g. given in the table
		A1	oe	Accept any equivalent fraction or 40%
(b)	60	P1	for complete process to find total number of cubes, e.g. $12 \div 0.2$ or 12×5 or $(“0.4” \div 0.2) \times 12 +$ $(“0.4” \div 0.2) \times 12 + 12$ OR states $0.1 = 6$ or $0.4 = 24$	
		A1	cao	

Examiner comments

Part (a): The P1 was for $1 - 0.2$, so answers which add to 0.8 could imply this mark.

Part (b): 60 was often seen without working and in this case both marks could be awarded. The statement of a correct answer implied the correct process and so full marks could be awarded. However, this method is not recommended as if any other number is written, possibly the result of incorrect arithmetic (carried out mentally), this would result in no marks.

Student response A

- 22 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2	0.4	0.4

$$\begin{array}{r} 0.4 \\ 0.4 \\ 0.2 \\ \hline 1.0 \\ 1 \end{array}$$

The number of red cubes in the box is the same as the number of yellow cubes in the box.

- (a) Complete the table.

(2)

2/2

There are 12 blue cubes in the box.

- (b) Work out the total number of cubes in the box.

$$\begin{array}{r} 0.2 = 12 \\ 0.4 = 24 \\ 0.4 = 24 \\ \hline 60 \\ 1 \end{array}$$

$$\begin{array}{r} 60 \\ (2) \end{array}$$

2/2

Examiner comments

Part (a): The student showed little working other than a check that the given answers add to 1. However, the answers in the table were fully correct so both marks were awarded.

Part (b): The student stated $0.4 = 24$ and used it alongside $0.2 = 12$ to obtain the correct final answer, so all marks were awarded.

2/2

Student response B

- 22 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2	0.4	0.4

The number of red cubes in the box is the same as the number of yellow cubes in the box.

- (a) Complete the table.

(2)

2/2

There are 12 blue cubes in the box.

- (b) Work out the total number of cubes in the box.

$$\begin{aligned} 0.2 &= 12 \\ 0.4 &= 16 \\ 0.4 &= 16 \end{aligned}$$

$$12 + 16 + 16 = 44$$

$$\begin{array}{r} 16 \\ 16 \\ 12 \\ \hline 44 \end{array}$$

$$\underline{44} \quad (2)$$

0/2

Examiner comments

Part (a): No working was shown, but as the figures in the table were correct both marks were awarded. This strategy is not advisable as if the answer is incorrect then no marks can be awarded.

Part (b): The student stated $0.2 = 12$ but didn't use it to show that 0.1 is 6 or 0.4 is 24. The 44 on the answer line came from incorrect working so no marks could be awarded.

Student response C

- 22 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2	0.8	0.8

The number of red cubes in the box is the same as the number of yellow cubes in the box.

- (a) Complete the table.

1 is whole so $1 - 0.2$ would be 0.8. Both the red and yellow have the same amount of cubes in so it's 0.8%

(2)

1/2

There are 12 blue cubes in the box.

- (b) Work out the total number of cubes in the box.

$$12 + 4 = 16$$

$$12 + 8 = 20$$

$$\begin{array}{r} 20 \\ \times 20 \\ 12 \\ \hline 62 \end{array}$$

52 cubes

(2)

0/2

Examiner comments

Part (a): The initial step to find 0.8 was seen, giving P1, but there was some confusion between decimals and percentage. 0.8 was placed twice in the table, so did not get the A1.

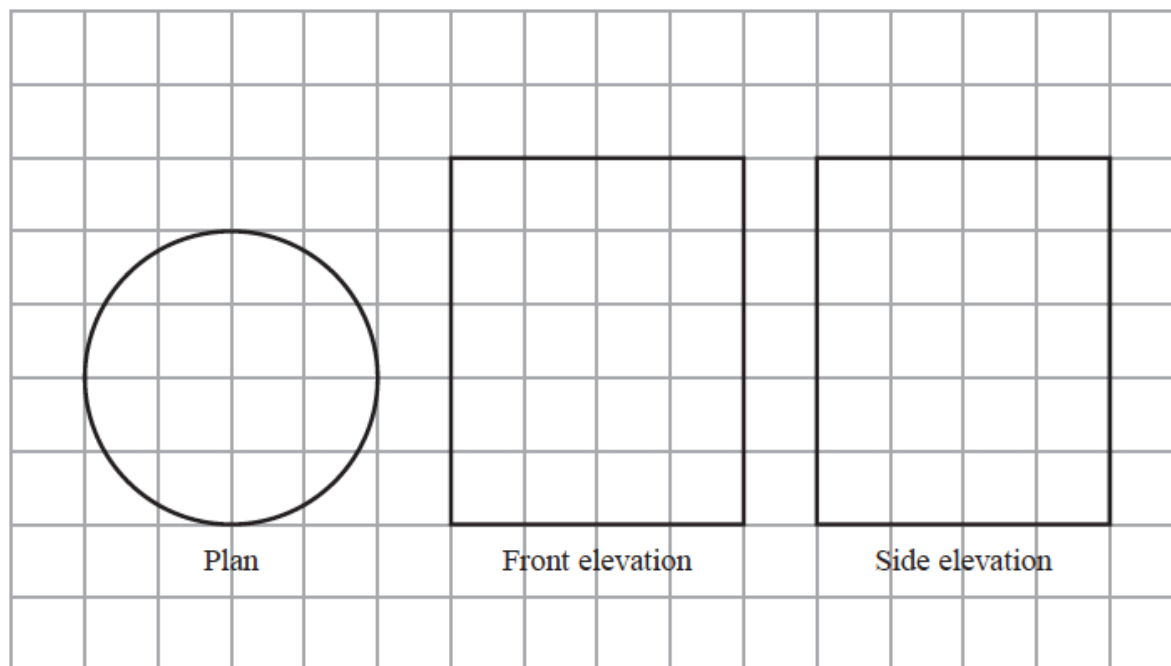
Part (b): The working was incorrect and so no marks could be awarded.

Exemplar question 9

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Foundation tier Question 25 / Higher tier Question 4

- 25 The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.

(Total for Question 25 is 2 marks)

Mean score: Foundation tier 0.51, Higher tier 1.35

Examiner comments

This question assessed the interpretation of plans and elevations.

The correct answer was a cylinder, but many drawings seen were not a representation of a 3D shape but a series of three 2D shapes, e.g. a circle above two distinct rectangles. A common misconception was to start by drawing the base of a cuboid and then try to place a circle ‘on top’.

Mark scheme

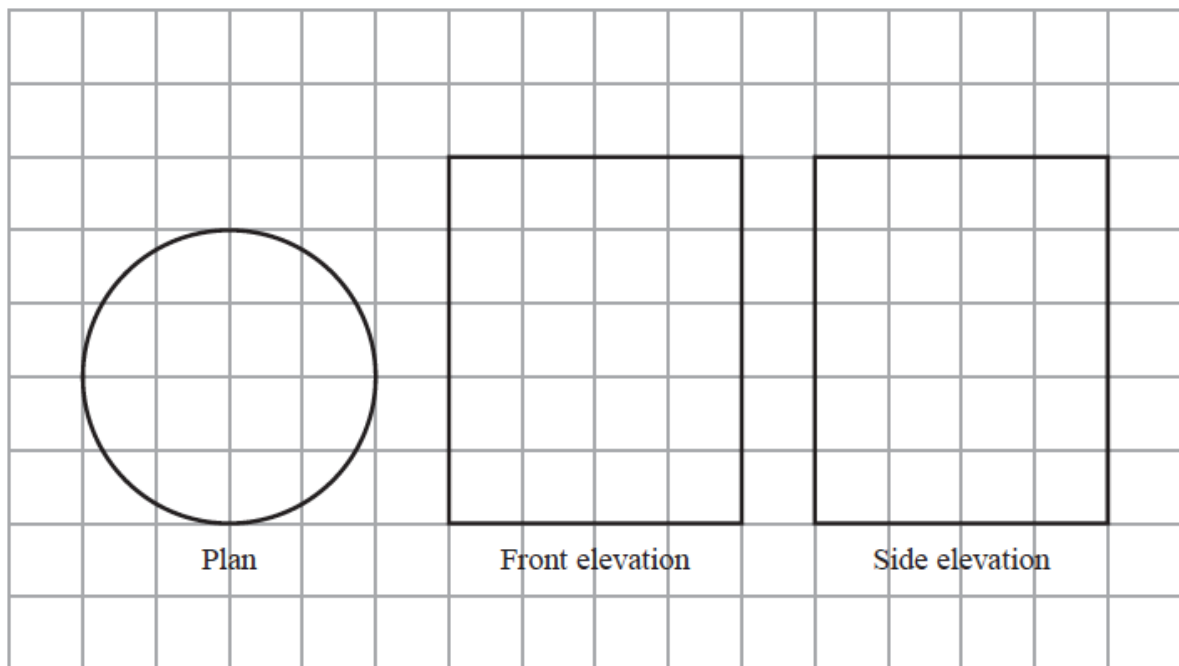
Question	Answer	Mark	Mark scheme	Additional guidance
25	sketch	M1	for sketch of a cylinder	Hidden edges may or may not be shown
		A1	sketch of cylinder, with dimensions shown	2 (cm) for radius or 4 (cm) for diameter and 5 (cm) for height

Examiner comments

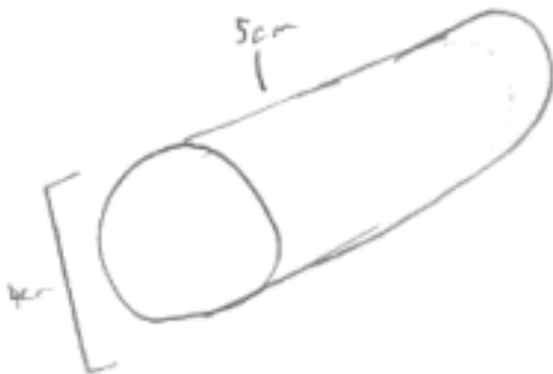
The diagram needed to be drawn for M1 and the correct dimensions added for A1.

Student response A

- 25 The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.



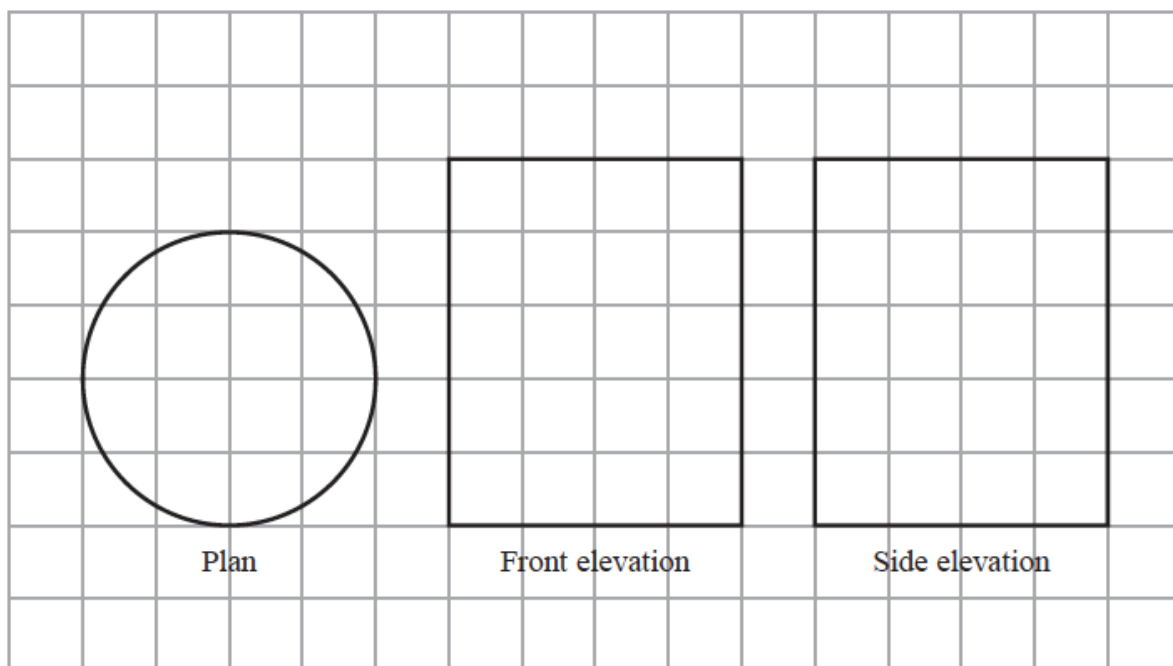
2/2

Examiner comments

This was an acceptable sketch of a cylinder. The orientation was acceptable and the correct dimensions shown.

Student response B

- 25 The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.



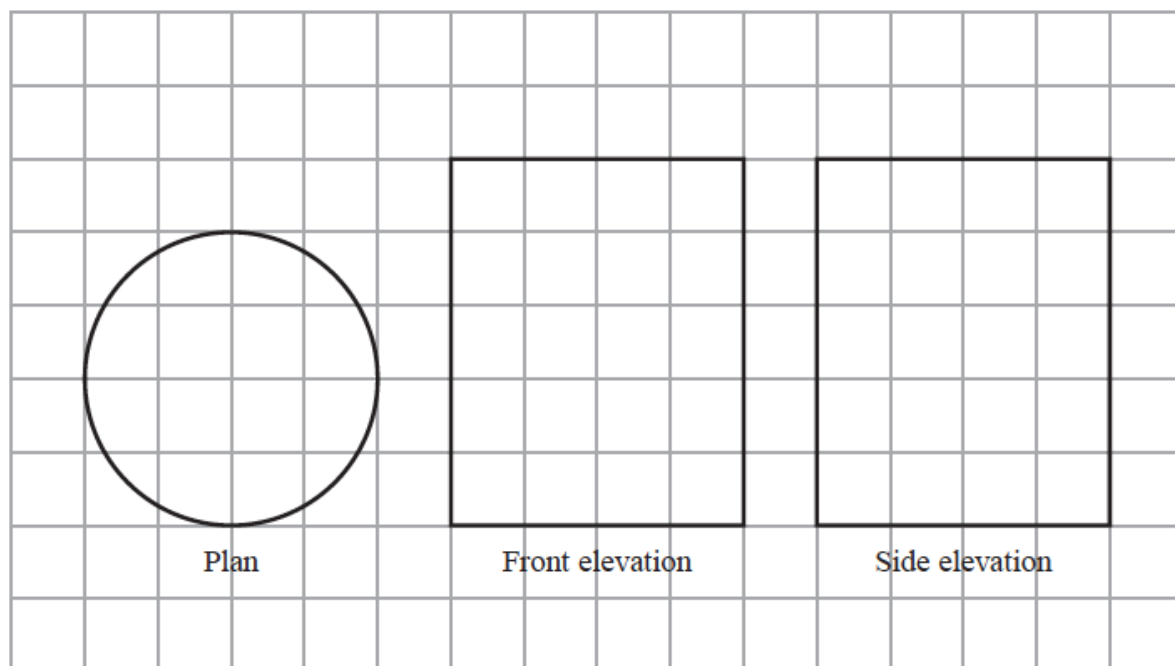
1/2

Examiner comments

This was deemed an acceptable sketch for the cylinder for M1. However, no dimensions were shown so A0 for the second mark.

Student response C

- 25 The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.



0/2

Examiner comments

The left-hand side of this diagram would have been accepted as a sketch of a cylinder. However, the student then added to the right-hand side and appeared to be trying to add a cuboid. This full diagram was not a sketch of a cylinder and so no marks could be awarded.

Exemplar question 10

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Foundation tier Question 27 / Higher tier Question 6

- 27 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

$$\begin{array}{ccccc} \text{number of packs} & & \text{number of packs} & & \text{number of packs} \\ \text{of black pens sold} & : & \text{of red pens sold} & : & \text{of green pens sold} \end{array} = 7 : 3 : 4$$

A total of 212 pens were sold.

Work out the number of green pens sold.

.....
(Total for Question 27 is 4 marks)

Mean score: Foundation tier 0.63, Higher tier 2.35

Examiner comments

This question assessed the understanding of ratio and multiplicative relationships.

Many students saw a ratio question involving $a : b : c$ and just added the three figures and then found another number in the question to divide by this sum. Students should read the question carefully and make a decision about how to proceed.

As with all multi-step questions, students should be encouraged to write down working out and to check through calculations.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
27	96	P1	for process to find the ratio of the number of pens of each colour sold, e.g. $2 \times 7 : 5 \times 3 : 6 \times 4 (= 14 : 15 : 24)$	Does not have to be seen as a ratio but all three needed P3 can be implied by the values 56, 60 and 96
		P1	for process to find the proportion of green pens sold, e.g. $\frac{212}{\text{"14"} + \text{"15"} + \text{"24"}}$ or $\frac{\text{"24"}}{\text{"14"} + \text{"15"} + \text{"24"}}$	
		P1	for a complete process to find the number of green pens sold, e.g. $\frac{212}{\text{"14"} + \text{"15"} + \text{"24"}} \times \text{"24"}$ or $\frac{\text{"24"}}{\text{"14"} + \text{"15"} + \text{"24"}} \times 212$	
		A1	cao	

Examiner comments

Note that all subsequent marks were dependent on gaining the first mark.

All three numbers, 14, 15 and 24, were required for the first P1 **and** these must not have come from obviously incorrect working. Once a correct process was seen for these numbers, then 212 divided by $(14 + 15 + 24)$ or 212 divided by 53 would get the next P1 **but** $\frac{212}{4} = 53$ on its own would not, as this is incorrect working.

The final answer for this question is 96; the correct answer would normally gain full marks **but** it did not gain marks if the answer had come from incorrect processes.

Student response A

27 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 7:3:4

14 15 24

A total of 212 pens were sold.

Work out the number of green pens sold.

$7 + 3 + 4 = 14$ packs were sold.

$14 + 15 + 24 = 53$ pen

~~$212 \div 14 = 15$~~

~~$15 \times 4 = 60$~~

~~$60 \times 6 = 360$~~

$212 \div 53 = 4$

$4 \times 4 = 16$

$16 \times 6 = 96$

$$\begin{array}{r} 0 \\ 53 \overline{) 212} \\ \underline{53} \\ 152 \\ \underline{152} \\ 00 \end{array}$$

$$\begin{array}{r} 4 \\ 53 \overline{) 212} \\ \underline{212} \\ 00 \end{array}$$

$$\begin{array}{r} 16 \\ 3 \overline{) 48} \\ \underline{48} \\ 00 \end{array}$$

$$\begin{array}{r} 14 \\ 15 \\ 24 \\ \hline 53 \end{array}$$

96 pens

4/4

Examiner comments

Looking down the left-hand side of this response, the student gave a fully correct method. The final answer was correct and the right-hand side was the set of calculations to support the statements on the left-hand side.

Student response B

- 27 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 7 : 3 : 4

A total of 212 pens were sold.

Work out the number of green pens sold.

$$\begin{array}{l}
 2 \times 7 = 14 \\
 5 \times 3 = 15 \\
 6 \times 4 = 20 \\
 14 + 15 + 20 = 49 \\
 212 \div 49 \approx 4 \times 4 = 16 \\
 \uparrow \\
 \text{remainder} = 16
 \end{array}$$

$$\begin{array}{l}
 1 = 14 \\
 2 = 98 \\
 3 = 147 \\
 4 = 196
 \end{array}$$

2/4

Examiner comments

$6 \times 4 = 20$ was written in this response and then used as “24”.

14, 15 and 6×4 was sufficient for the first P1.

$14 + 15 + \text{“24”} = 49$ and $212 \div (14 + 15 + \text{“24”})$ was sufficient for the second P1.

After this 4×4 was used which, even with follow through, was incorrect, so no more marks can be awarded

Student response C

27 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 7 : 3 : 4

A total of 212 pens were sold.

Work out the number of green pens sold.

b: R: G
2: 5: 6

7 x 2 = 14 packs sold
5 x 3 = 15 packs sold
4 x 6 = 24 packs sold

1/4

Examiner comments

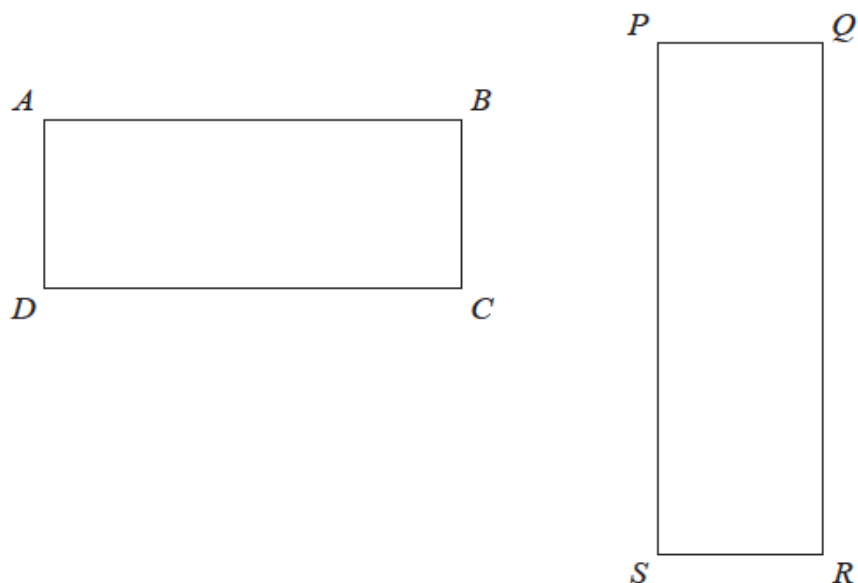
The first step was correct. 14, 15, 24 all came from correct processes, for the first P1, but no more work was shown so no more marks could be awarded.

Exemplar question 11

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Foundation tier Question 28 / Higher tier Question 7

28 Here are two rectangles.



$$QR = 10 \text{ cm}$$

$$BC = PQ$$

The perimeter of $ABCD$ is 26 cm

The area of $PQRS$ is 45 cm^2

Find the length of AB .

..... cm

(Total for Question 28 is 4 marks)

Mean score: Foundation tier 1.42, Higher tier 3.67

Examiner comments

This question tested area and perimeter and also the comprehension of notation.

Students could use their understanding of either area or perimeter to gain one or two marks but needed to connect the two concepts to gain more marks.

Both algebraic and numerical approaches were shown in the mark scheme; both were equally valid.

Students who failed to score on this question frequently just tried random numbers. It is worth noting that if a trial and improvement approach is used, then usually either all marks or no marks will be awarded, and so it is not recommended as a method.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
28	8.5	P1	for process to use the area of $PQRS$ to find the length of PQ , e.g. $10y = 45$ or $45 \div 10 (= 4.5)$	Sets up equation for area
		P1	for process to use the perimeter of $ABCD$, e.g. $2x + 2 \times "4.5" = 26$ or $26 - 2 \times "4.5" (= 17)$ or $26 \div 2 (= 13)$	Uses perimeter of $ABCD$
		P1	for process to use length of BC to find length of AB , e.g. solves $2x + 2 \times "4.5" = 26$ or $(26 - 2 \times "4.5") \div 2$ or $"13" - "4.5"$	
		A1	for 8.5 or $8\frac{1}{2}$	Accept $\frac{17}{2}$

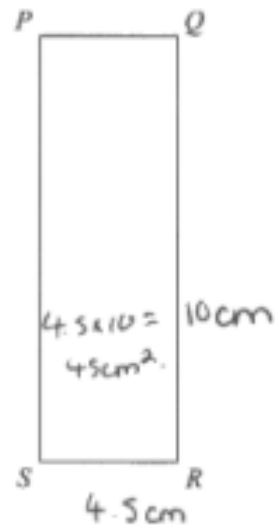
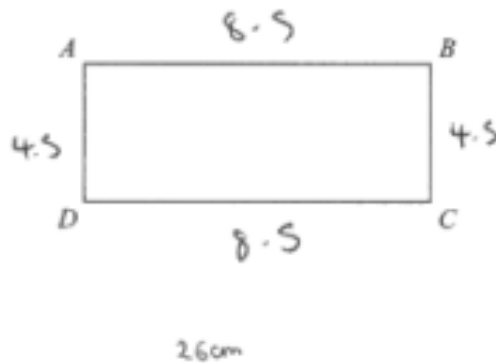
Examiner comments

Finding 4.5 or 13 from a correct process was worthy of P1, but the figures could not come from incorrect processes.

Answers of 8.5 or $8\frac{1}{2}$ were expected but the fraction $\frac{17}{2}$ was also allowed.

Student response A

28 Here are two rectangles.



$$QR = 10 \text{ cm}$$

$$BC = PQ$$

The perimeter of ABCD is 26 cm

The area of PQRS is 45 cm^2

Find the length of AB.

$$\begin{array}{r} 4.5 + \\ 4.5 \\ \hline 9.0 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 126 - \\ 9 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 8.5 + \\ 8.5 + \\ 4.5 + \\ 4.5 + \\ \hline 26.0 - \\ 2 \end{array}$$

$$\frac{17}{2} = 8.5$$

$$\begin{array}{l} 10 \div 2 = 5 \\ 7 \div 2 = 3.5 \\ 5 + 3.5 = 8.5 \end{array}$$

8.5 cm

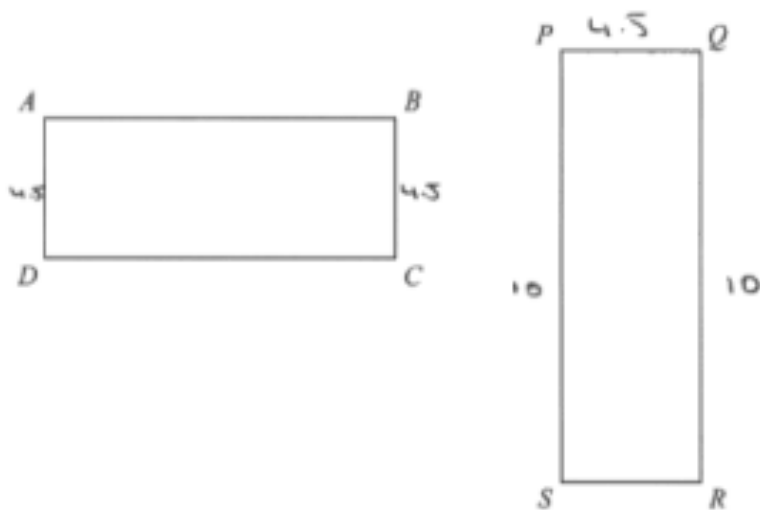
4/4

Examiner comments

This answer was fully correct and showed the division split into two parts but re-joined to give the final answer.

Student response B

28 Here are two rectangles.



$$QR = 10 \text{ cm}$$

$$BC = PQ$$

The perimeter of $ABCD$ is 26 cm

The area of $PQRS$ is 45 cm^2

Find the length of AB .

$$\begin{array}{r} 26 \\ - 9 \\ \hline 17 \end{array}$$

$$26 - 9$$

$$\begin{array}{r} 0.75 \\ 2 \overline{) 1.50} \\ \underline{140} \\ 10 \\ \underline{100} \\ 0 \end{array}$$

$$\text{area} = \text{width} \times \text{height}$$

$$45 = \text{width} \times 10$$

$$\frac{45}{10} = 4.5$$

7.5 cm

3/4

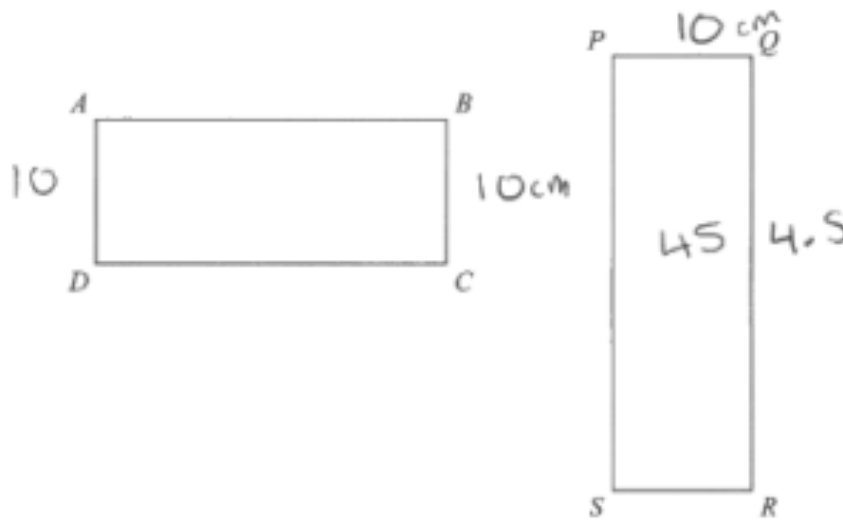
Examiner comments

This was a fully correct method to the point where the student tried to divide 17 by 2. The answer was incorrect, as they gave 7.5 instead of 8.5

This answer gained all the P1 marks and only lost the A1.

Student response C

28 Here are two rectangles.



$$QR = 10 \text{ cm}$$

$$BC = PQ$$

The perimeter of $ABCD$ is 26 cm

The area of $PQRS$ is 45 cm^2

Find the length of AB .

1/4

Examiner comments

The first step was correct. No method was seen but the correct answer of 4.5 was placed on the diagram and so the first P1 could be awarded. The placement of the 4.5 could be condoned as the mark would be awarded if this was seen in the working space.

There was no further working, so no more marks could be given.

Paper 2F (calculator)

Exemplar question 1

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Foundation tier Question 6

- 6 Dave goes into a cafe and buys 2 cups of coffee and a piece of cake.

Each cup of coffee costs £2.75

The cake costs £2.90

Dave pays with a £10 note.

He thinks he will get more than £1.50 in change.

Is Dave correct?

You must show how you get your answer.

(Total for Question 6 is 3 marks)

Mean score: 2.70

Examiner comment

Students needed to carry out an appropriate calculation and then provide a statement agreeing or disagreeing with Dave's assertion that he will get more than £1.50 in change. Students needed to be aware that they had to answer the question, either with a 'yes' or 'no' response or with a statement that implied this. Students often completed the working correctly and then failed to answer the question posed.

Mark scheme

Question	Answer	Mark	Mark scheme
6	Yes and statement	P1	for a first step towards solution, e.g. $2 \times 2.75 (= 5.5)$ or $2.75 + 2.9 (= 5.65)$ OR $10 - 1.5 (= 8.5)$ or $10 - 2.9 (= 7.1)$ or $10 - 2.75 (= 7.25)$
		P1	for a complete process to find figures to compare e.g. $2 \times 2.75 + 2.9 + 1.5 (= 9.90)$ or $10 - (2 \times 2.75 + 2.9) (= 1.60)$ OR $2 \times 2.75 + 2.9 (= 8.40)$ and $10 - 1.5 (= 8.5)$
		C1	for correct conclusion with accurate figure(s) e.g. Yes and (£) 1.6(0) or Yes and (£) 9.9(0) or Yes and (£) 8.4(0) and (£) 8.5(0)

Examiner comment

The first P1 was for any calculation using a minimum of two monetary values that could lead to a fully correct process. This question was not assessing monetary notation and so incorrect notation, omitting the '£' sign or the 0 in pence, was condoned.

Student response A

- 6 Dave goes into a cafe and buys 2 cups of coffee and a piece of cake.

Each cup of coffee costs £2.75

The cake costs £2.90

Dave pays with a £10 note.

He thinks he will get more than £1.50 in change.

Is Dave correct?

You must show how you get your answer.

$$£2.90 + £2.75 + £2.75 = £8.40$$

$$£10.00 - £8.40 = £1.60$$

Yes he will by extra 10p

3/3

Examiner comment

The student clearly used their calculator for all calculations but still wrote exactly what calculations were computed. Their final statement answered the question, as well as giving additional correct information: 'extra 10p' was not required.

Student response B

- 6 Dave goes into a cafe and buys 2 cups of coffee and a piece of cake.

Each cup of coffee costs £2.75

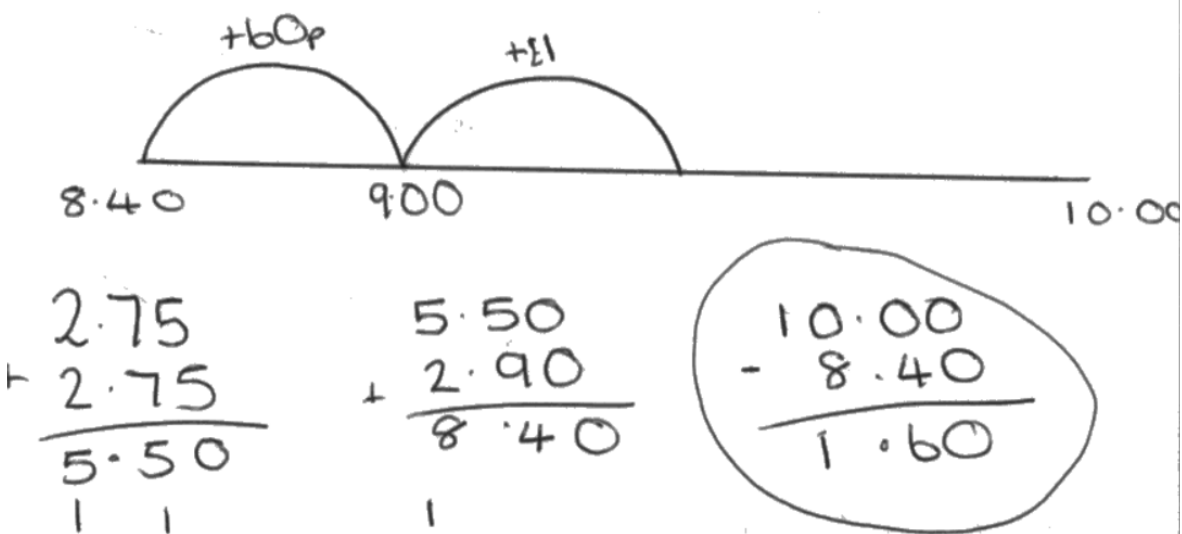
The cake costs £2.90

Dave pays with a £10 note.

He thinks he will get more than £1.50 in change.

Is Dave correct?

You must show how you get your answer.



2/3

Examiner comment

All the correct calculations were carried out, giving a correct result of 1.60 (£ sign not required). This student does not seem to have used their calculator, thus perhaps taking a little more time than necessary. Unfortunately, the question posed was not answered. The student did circle their final result, but this is not an acceptable means of communicating their answer.

Student response C

- 6 Dave goes into a cafe and buys 2 cups of coffee and a piece of cake.

Each cup of coffee costs £2.75

The cake costs £2.90

Dave pays with a £10 note.

He thinks he will get more than £1.50 in change.

Is Dave correct?

You must show how you get your answer.

coffee

$$\begin{array}{r} 2.75 \\ + 2.75 \\ \hline 5.50 \\ \hline \end{array}$$

cake

$$\begin{array}{r} 5.50 \\ + 2.90 \\ \hline 8.40 \\ \hline \end{array}$$

£10

1/3

Examiner comment

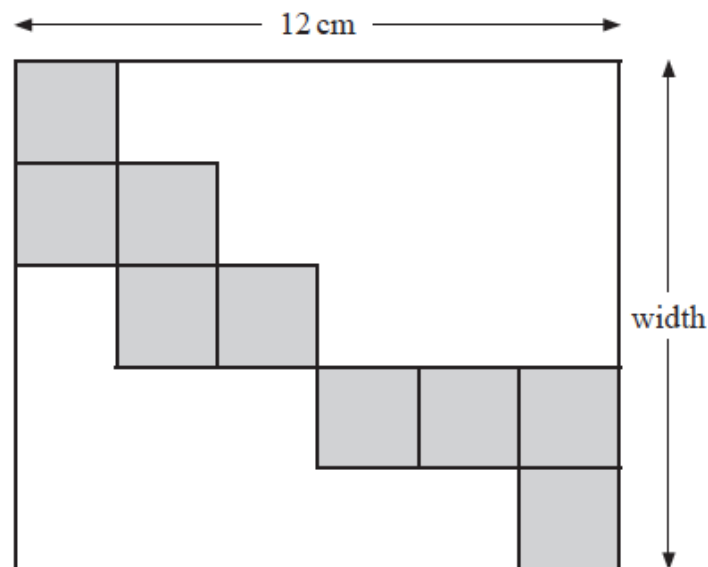
The student made a very good start, earning the first P1 for summing the three elements of the bill. They then failed to continue. They wrote '10', but then crossed it out, not knowing how to complete the solution.

Exemplar question 2

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Foundation tier Question 13

- 13 The diagram shows nine identical squares inside a rectangle.



The length of the rectangle is 12 cm.

Work out the width of the rectangle.

.....cm

(Total for Question 13 is 3 marks)

Mean score: 1.81

Examiner comment

A typical mistake was to consider the rectangle to be a square or to divide the 12 cm by 9 (number of small squares).

Mark scheme

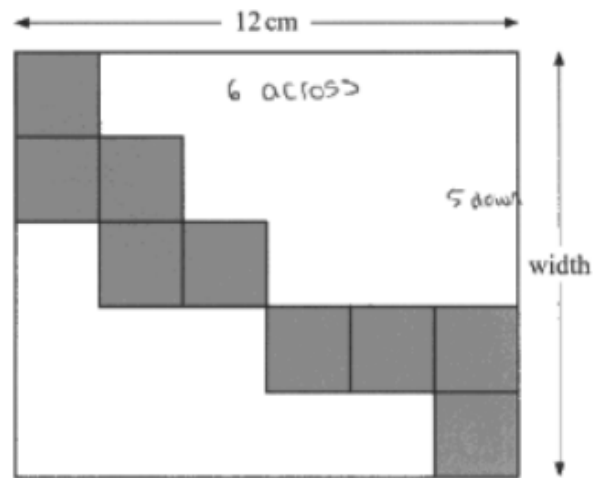
Question	Answer	Mark	Mark scheme	Additional guidance
13	10	P1	for starting the problem, $12 \div 6 (= 2)$	The square of side 2 cm may be just seen on the diagram
		P1	for a complete process to find width “2” $\times 5$	
		A1	cao	

Examiner comment

Students were expected to use the length of 12 cm to determine the dimensions of each square, $12 \div 6 = 2$ cm. This could then be used to find the width of the rectangle, $2 \text{ cm} \times 5 = 10 \text{ cm}$.

Student response A

- 13 The diagram shows nine identical squares inside a rectangle.



The length of the rectangle is 12 cm.

Work out the width of the rectangle.

$$12 \div 6 = 2$$

$$5 \times 2 = 10$$

$$\text{width} = 10$$

10 cm

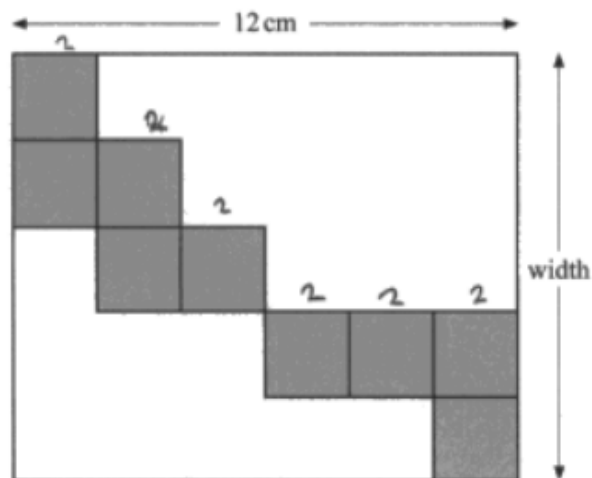
3/3

Examiner comment

On the diagram, the student clearly recognised that there are 6 squares across and 5 squares down. The calculations in the working space were fully correct and the answer of width = 10 cm gained full marks.

Student response B

- 13 The diagram shows nine identical squares inside a rectangle.



The length of the rectangle is 12 cm.

Work out the width of the rectangle.

$$12 \div 6 = 2$$

$$12 \times 2 = 24$$

24 cm

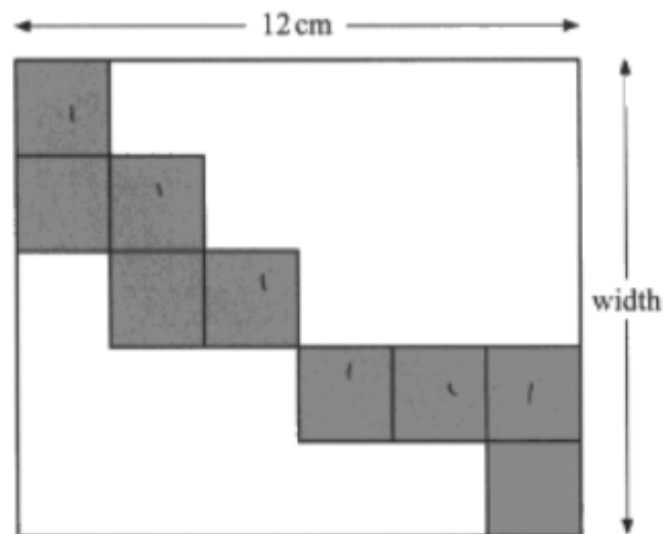
1/3

Examiner comment

The student correctly worked out the length of the side of each small square, 2 cm, but then mistakenly multiplied this by 12 instead of 5.

Student response C

- 13 The diagram shows nine identical squares inside a rectangle.



The length of the rectangle is 12 cm.

Work out the width of the rectangle.

72 cm

0/3

Examiner comment

The student clearly counted the number of squares across but then did nothing with it.

Exemplar question 3

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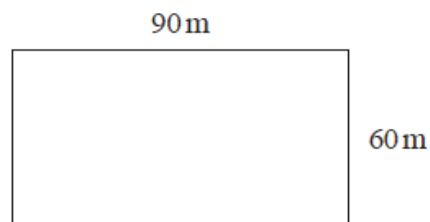
Foundation tier Question 15

- 15 A garden is in the shape of a rectangle 90 m by 60 m.

Flowers are grown in 40% of the garden.

The rest of the garden is grass.

Work out the area of the garden that is grass.



.....m²

(Total for Question 15 is 4 marks)

Mean score: 2.34

Examiner comment

This assessed area of a rectangle and the ability to find a percentage of a quantity.

Ideally, students should have realised that the grass area is 60% of the whole garden and proceeded to work out 60% of 90×60 . Typical mistakes were to simply find 40% only of the area of the garden or 60% of both dimensions prior to working out an area.

Mark scheme

Question	Answer	Mark	Mark scheme
15	3240	P1	for $90 \times 60 (= 5400)$ OR $40 \div 100 \times 90 (= 36)$ OR $40 \div 100 \times 60 (= 24)$
		P1	for a process to work out area that is flowers e.g. $40 \div 100 \times "5400" (= 2160)$ OR $"36" \times 60 (= 2160)$ OR $90 \times "24" (= 2160)$
		P1	for a full process to find the area that is grass e.g. $"5400" - "2160" (= 3240)$
		A1	cao
			ALTERNATIVE
		P1	for $100 - 40 (= 60)$
		P1	(indep) for $90 \times 60 (= 5400)$ OR $90 \times 60 \div 100 (= 54)$ or $60 \times 60 \div 100 (= 36)$
		P1	for a full process to find the area that is grass e.g. $"60" \div 100 \times "5400" (= 3240)$ OR $"54" \times 60 (= 3240)$ or $"36" \times 90 (= 3240)$
		A1	cao

Examiner comment

There are two mark schemes. Solutions were marked using just one of these schemes with no attempt to take elements from both. The alternative scheme was for those who started by realising that 60% of the area was required.

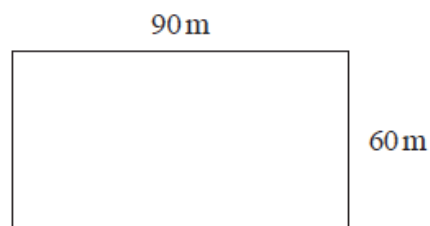
Student response A

15 A garden is in the shape of a rectangle 90 m by 60 m.

Flowers are grown in 40% of the garden.

The rest of the garden is grass.

Work out the area of the garden that is grass.



$$\begin{aligned}
 90 \times 60 &= 5400 = \text{area} \\
 10\% &= 540 \times 5 = 2700 \text{ E } 80 \\
 &\quad \text{5400} \quad 270 \\
 540 \times 4 &= 2160 = 40\% \\
 5400 - 2160 &= 3240
 \end{aligned}$$

4/4

Examiner comment

This response demonstrated a clear efficient use of a calculator to work out all correct calculations.

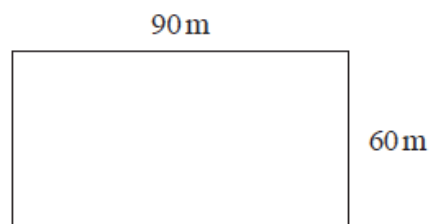
Student response B

- 15 A garden is in the shape of a rectangle 90 m by 60 m.

Flowers are grown in 40% of the garden.

The rest of the garden is grass.

Work out the area of the garden that is grass.



$$\begin{array}{r}
 90 \times 60 \\
 \hline
 5400 \\
 \hline
 100
 \end{array}
 = 54 \times 60 = 3246$$

$100 - 40 = 60$

$$3246 \text{ m}^2$$

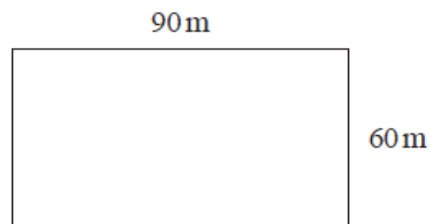
3/4

Examiner comment

All the correct working out was shown, following the most efficient process. This response was marked using the alternative scheme. The only error, costing the A1, was an apparent misread of their calculator, giving an answer of 3246 instead of 3240.

Student response C

- 15 A garden is in the shape of a rectangle 90 m by 60 m.
Flowers are grown in 40% of the garden.
The rest of the garden is grass.
Work out the area of the garden that is grass.



$$\cancel{90 \times 90 \times 60 \times 60 =}$$

$$90 \times 60 = 5400$$

$$5400 \div 40 =$$

$$135 \text{ m}^2$$

1/4

Examiner comment

The students found the correct area of the whole garden correctly by multiplying 90 by 60. In an attempt to find 40%, the student then divided 5400 by 40 and so no further marks were available.

Exemplar question 4

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Foundation tier Question 16

- 16 Four biased coins, A, B, C and D are thrown.

The probability that each coin will land on Heads is shown in the table.

Coin	Probability
A	0.33
B	0.033
C	$\frac{1}{3}$
D	30%

Julie says,

“The probability that coin C will land on Heads is the same as the probability that coin C will land on Tails.”

- (b) Is she correct?
Give a reason for your answer.

.....

.....

.....

(1)

(Total for Question 16(b) is 1 mark)

Mean score: 0.47

Examiner comment

Students were required to base their reasoning on the probability that coin C landing on heads is one third (not any of the other probabilities quoted in the table) and therefore that the probability of it landing on tails can't be the same. Simply saying that the coin is biased was insufficient, since this was given in the question.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
16(b)	Statement	C1	e.g. No with $\left(\frac{1}{3}\right)$ and $\frac{2}{3}$ or No, probabilities would need to be $\frac{1}{2}$ or No since $\frac{1}{3} + \frac{1}{3}$ does not equal 1 or No since tails is 67% (or 0.67)	Accept rounded conversions seen to decimals or percentages if the reasoning is correct

Examiner comment

Students needed to provide quantitative evidence in their reasoning to gain this mark. Any conversions to decimals or percentages needed to be correct to 2 significant figures.

Student response A

Julie says,

“The probability that coin C will land on Heads is the same as the probability that coin C will land on Tails.”

(b) Is she correct?

Give a reason for your answer.

No because if ~~to~~ Heads is $\frac{1}{3}$ then
tails must be $\frac{2}{3}$

(1)

1/1

Examiner comment

Answer of ‘No’ was correct, with correct reasoning of what the probability of tails would be. Students were not required to explicitly state that one third is not equal to two thirds.

Student response B

Julie says,

“The probability that coin C will land on Heads is the same as the probability that coin C will land on Tails.”

(b) Is she correct?

Give a reason for your answer.

no because probability adds up to 100% - this is
only 0.3, so the probability of tails must be
0.76
(1)

0/1

Examiner comment

The student quoted the incorrect value 0.76 recurring instead of 0.66 recurring, so the mark could not be awarded for otherwise correct reasoning.

Student response C

Julie says,

“The probability that coin C will land on Heads is the same as the probability that coin C will land on Tails.”

(b) Is she correct?

Give a reason for your answer.

NO as its 0.3 to land on heads so it
would mean its 9.7 to land on tails.

(1)

0/1

Examiner comment

‘No’ was correct, but it was not clear what 0.3 refers to (the student didn’t say that they think it was equal to one third). They have then subtracted their probability from 10 instead of 1.

Exemplar question 5

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Foundation tier Question 17

- 17 There are 84 calories in 100 g of banana.
There are 87 calories in 100 g of yogurt.
Priti has 60 g of banana and 150 g of yogurt for breakfast.
Work out the total number of calories in this breakfast.

.....
(Total for Question 17 is 4 marks)

Mean score: 2.50

Examiner comment

This question assessed understanding of direct proportion.

Some students got confused when trying to work out grams per calorie. They also often rounded decimal values and so introduced numerical errors.

Mark scheme

Question	Answer	Mark	Mark scheme
17	180.9	P1	for starting to work with proportion e.g. $60 \div 100 (= 0.6)$ or $150 \div 100 (= 1.5)$ OR $100 \div 60 (= 1.66\dots)$ or $100 \div 150 (= 0.66\dots)$ OR $84 \div 100 (= 0.84)$ or $87 \div 100 (= 0.87)$ or $84 \div 10 (= 8.4)$ or $87 \div 10 (= 8.7)$ or $84 \div 2 (= 42)$ or $87 \div 2 (= 43.5)$ OR $100 \div 84 (= 1.19\dots)$ or $100 \div 87 (= 1.14\dots)$
		P1	for a complete process to work out the calories in either item e.g. $"0.6" \times 84 (= 50.4)$ or $"1.5" \times 87 (= 130.5)$ OR $84 \div "1.66\dots" (= 50.4)$ or $87 \div "0.66\dots" (= 130.5)$ OR $"0.84" \times 60 (= 50.4)$ or $"0.87" \times 150 (= 130.5)$ or $"8.4" \times 6 (= 50.4)$ or $"8.7" \times 15 (= 130.5)$ or $"42" \times 6 \div 5 (= 50.4)$ or $"43.5" \times 3 (= 130.5)$ OR $60 \div "1.19\dots" (= 50.4)$ or $150 \div "1.14\dots" (= 130.5)$
		P1	(dep on P2) for a complete process to find total number of calories in the breakfast, e.g. $"50.4" + "130.5"$
		A1	for 180.9 or 181

Examiner comment

There are a number of ways students could start to solve this problem and all valid starts gained the first P1. This mark scheme shows some examples, but the list is not exhaustive. The third P1 for finding the total number of calories was dependent upon the award of the previous two P1 marks.

Student response A

- 17 There are 84 calories in 100 g of banana.
There are 87 calories in 100 g of yogurt.
Priti has 60 g of banana and 150 g of yogurt for breakfast.
Work out the total number of calories in this breakfast.

$$\begin{array}{l}
 \text{B}^{\wedge} \\
 84_c = 100g \\
 84 \div 100 \\
 1g = 0.84 \\
 84 = 100g \\
 60g B \\
 50.4g C \\
 87_c = 100g \\
 87 \div 100 = 0.87 \\
 1g = 0.87 \\
 0.87 \times 150 \\
 = 130.5g C \\
 \begin{array}{r}
 50.4 \\
 + 130.5 \\
 \hline
 180.9
 \end{array}
 \end{array}$$

4/4

Examiner comment

It was clear which calculations related to bananas and which to yogurt. The student showed the calculations and used their calculator accurately to get to the correct answer.

Student response B

- 17 There are 84 calories in 100 g of banana.
There are 87 calories in 100 g of yogurt.
Priti has 60 g of banana and 150 g of yogurt for breakfast.
Work out the total number of calories in this breakfast.

$$\begin{array}{l}
 87 \div 2 = 43.5 \\
 87 + 43.5 = 130.5 \\
 \cancel{84 \div \frac{2}{5} = 83.6} \\
 84 \div 2 = 42 \\
 42 \div 5 = 8.4 \\
 130.5 + \overset{58}{\cancel{8.4}} = \\
 188.5
 \end{array}$$

$$188.5$$

2/4

Examiner comment

The first two P1 marks were awarded for a correct process (and answer) for the number of calories in the 87 g of yogurt.

In working out the number of calories in the banana, the student started well: 8.4 is the number of calories in 10 g but there is no explanation where the 58 has come from, so no further marks could be awarded.

Student response C

- 17 There are 84 calories in 100 g of banana.
There are 87 calories in 100 g of yogurt.
Priti has 60 g of banana and 150 g of yogurt for breakfast.
Work out the total number of calories in this breakfast.

$$\begin{array}{l}
 100\text{g yogurt} = 87 \text{ calories} \\
 50\text{g yogurt} = 87 \div 2 = 43.5 \text{ calories} \\
 \hline
 100\text{g banana} = 84 \text{ calories} \\
 60\text{g banana} = \rightarrow 60\text{g} = \text{---} 40\text{g} = \\
 50\text{g} = 84 \div 2 = 42 \\
 42 \div 5 = 8.4 \\
 42 + 8.4 \times 2 = 58.8 \\
 \hline
 43.5 + 58.8 = 102.3 \text{ calories}
 \end{array}$$

102.3 calories

1/4

Examiner comment

The students started well and the first P1 was awarded for either $87 \div 2$ or $84 \div 2$, but the correct full process was not seen to find the total number of calories for either food.

Exemplar question 6

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Foundation tier Question 18

- 18 Machine A and machine B both make car parts.

Machine A makes 6 parts every 10 minutes.

Machine B makes 13 parts every 15 minutes.

On Monday

machine A makes parts for 12 hours

machine B makes parts for 10 hours

Work out the total number of parts made by the two machines on Monday.

.....
(Total for Question 18 is 4 marks)

Mean score: 2.71

Examiner comment

This question assessed direct proportion, with the additional aspect of time conversion between hours and minutes.

To gain credit for a sensible start, students needed to work with both time and number of parts. Ideally, they would work out the number of 10 minutes in 12 hours and 15 minutes in 10 hours and multiply by the relative number of parts in each machine.

A common mistake was for students to mix up the information for each machine or work with the time taken to make one part.

Mark scheme

Question	Answer	Mark	Mark scheme
18	952	P1	for starting to work with parts, e.g. $6 \times 60 \div 10 (= 36)$ or $10 \div 6 (= 1.66\dots)$ or $6 \div 10 (= 0.6)$ or $13 \times 60 \div 15 (= 52)$ or $15 \div 13 (= 1.15\dots)$ or $13 \div 15 (= 0.866\dots)$ OR for $60 \div 10 \times 12 (= 72)$ or $10 \times 60 \div 15 (= 40)$
		P1	for a full process to find the number of parts made by machine A e.g. $"36" \times 12 (= 432)$ or $12 \times 60 \div "1.66\dots" (= 432)$ or $12 \times 60 \times "0.6" (= 432)$ OR $"72" \times 6 (= 432)$
		P1	for a full process to find the number of parts made by machine B e.g. $"52" \times 10 (= 520)$ or $10 \times 60 \div "1.15\dots" (= 520)$ or $10 \times 60 \times "0.866\dots" (= 520)$ OR $"40" \times 13 (= 520)$
		A1	for 952 or 432 and 520

Examiner comment

The first P1 was for a sensible start linking time and number of parts of either machine. The second and third P1 marks were dependent upon the first, but were independent of each other as they related to the two machines in turn.

Even though the question asked for the total number of parts, the final mark could also be given for both correct values.

Student response A

18 Machine A and machine B both make car parts.

Machine A makes 6 parts every 10 minutes.

Machine B makes 13 parts every 15 minutes.

On Monday

machine A makes parts for 12 hours

machine B makes parts for 10 hours

Work out the total number of parts made by the two machines on Monday.

$$\begin{array}{l}
 \text{A} \quad 60 \div 10 = 6 \\
 \quad \quad \text{1 hour} \\
 \quad 6 \times 6 = 36 \\
 \quad \times 12 \\
 12 \text{ hours} = 432
 \end{array}
 \quad
 \begin{array}{l}
 \text{B} \quad 13 \times 4 = 52 \quad 60 \div 15 = 4 \\
 \quad \times 10 \\
 \quad = 520
 \end{array}$$

$$432 + 520 = 952$$

4/4

Examiner comment

The student used the most efficient method to find the total number of parts.

Student response B

18 Machine A and machine B both make car parts.

Machine A makes 6 parts every 10 minutes.

Machine B makes 13 parts every 15 minutes.

On Monday

machine A makes parts for 12 hours

machine B makes parts for 10 hours

Work out the total number of parts made by the two machines on Monday.

$$6 \times 6 = 24 \text{ parts MA makes an hour}$$

$$13 \times 4 = 52 \text{ parts MB makes an hour}$$

~~52~~

$$24 \times 12 = 288 \text{ parts MA makes for 12 hours}$$

$$52 \times 10 = 520 \text{ parts MB makes for 10 hours}$$

$$\text{total number of parts made} = 288 + 520 = 808$$

3/4

Examiner comment

The only error here was in the calculation of 6×6 . Otherwise this was a perfect solution. The arithmetic error was penalised by the loss of the final A1.

Student response C

- 18 Machine A and machine B both make car parts.

Machine A makes 6 parts every 10 minutes.

Machine B makes 13 parts every 15 minutes.

On Monday

machine A makes parts for 12 hours

machine B makes parts for 10 hours

Work out the total number of parts made by the two machines on Monday.

$$\begin{array}{r} 6 \\ 6 \\ 6 \\ + 6 \\ 6 \\ 6 \\ 6 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 13 \\ 13 \\ + 13 \\ 13 \\ \hline 52 \end{array}$$

$$\begin{array}{r} 52 \\ + 36 \\ \hline 88 \end{array}$$

1/4

Examiner comment

The first P1 was awarded for either the sum of six lots of 6 seconds or the sum of four lots of 13 seconds.

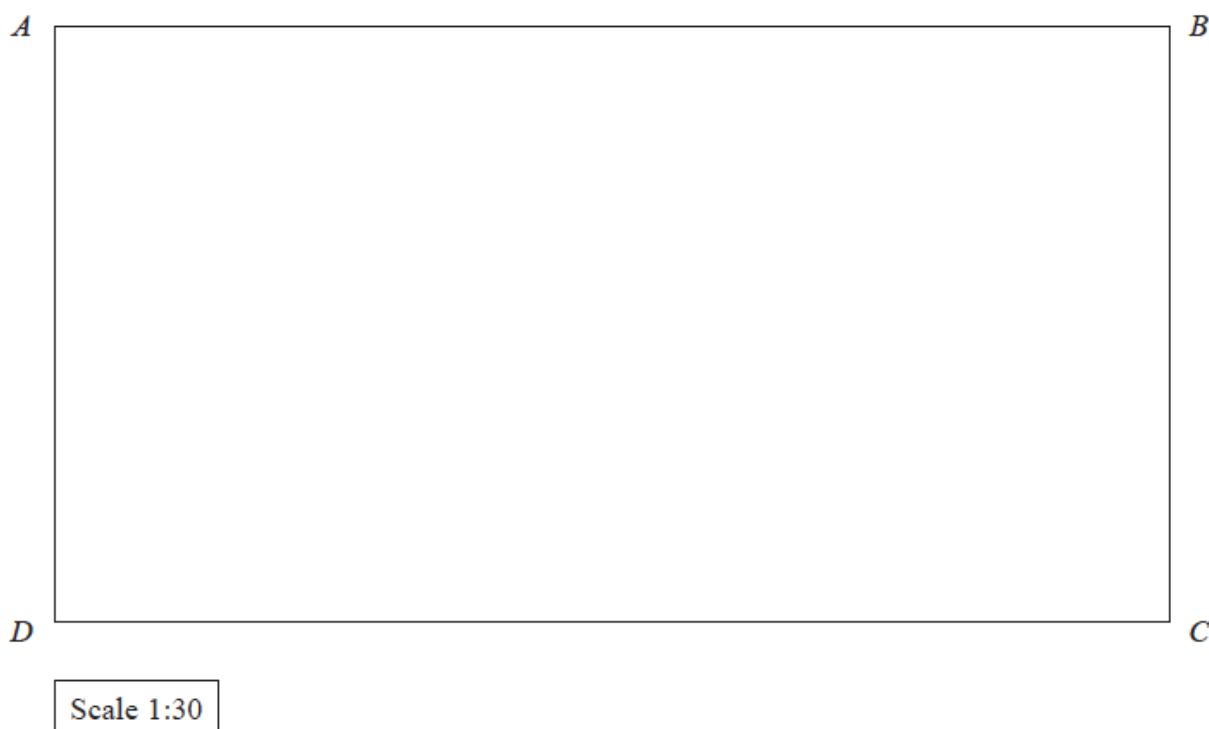
The student then assumed that these values were the ones required, without any reference to the time spent making parts on Monday.

Exemplar question 7

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Foundation tier Question 19

- 19 Here is a plan of a kitchen drawn to a scale of 1 : 30



Sam is going to put a small table in the kitchen.

The table has to be

more than 180 cm from A

more than 150 cm from BC

Show, by shading on the diagram, the region where Sam can put the table.

(Total for Question 19 is 4 marks)

Mean score: 0.87

Examiner comment

Students were assessed on their understanding of scale and locus and their ability to construct loci using the given scale.

Many students thought that they were required to actually draw a table, as opposed to the region where it could be.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
19	Shaded region	M1	for $180 \div 30 (= 6)$ or $150 \div 30 (= 5)$	This may be just used in a correct locus drawn on the diagram
		M1	draws an arc of radius “6 cm” centre <i>A</i> or draws a line segment parallel to <i>BC</i> and “5 cm” away	Ignore any additional arcs or lines drawn
		M1	for an arc of radius “6 cm” centre <i>A</i> and a line parallel to <i>BC</i> and “5 cm” away with no additional arcs or lines drawn	
		A1	Answer within tolerance with region shaded	Accept shading out leaving the required region unshaded

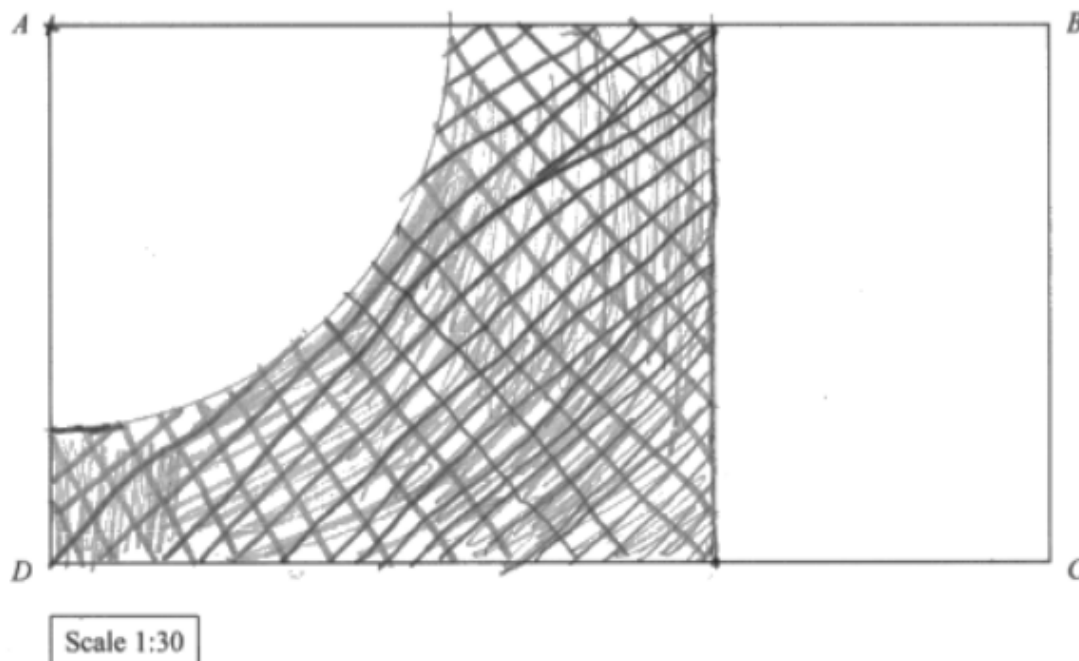
Examiner comment

The first M1 could be either explicitly seen or simply implied by a correct loci drawn on the diagram. For the second M1, the arc or the line segment did not need to be the complete respective locus.

All loci could be just dotted lines and possibly drawn freehand if they were within the bounds of the overlay provided for examiner use.

Student response A

19 Here is a plan of a kitchen drawn to a scale of 1 : 30



Sam is going to put a small table in the kitchen.

The table has to be
 more than 180 cm from $A = 6\text{ cm}$
 more than 150 cm from $BC = 5\text{ cm}$

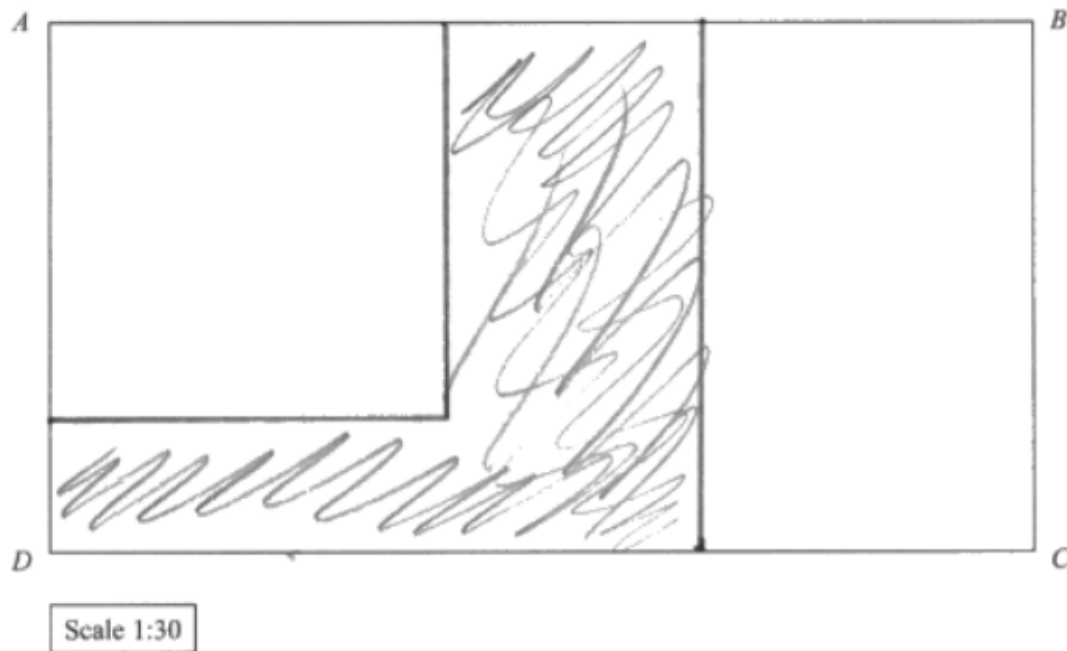
4/4

Examiner comment

The student demonstrated clear use of the scale, quoting 6 cm and 5 cm. They then drew both loci very accurately, with the required region shaded.

Student response B

19 Here is a plan of a kitchen drawn to a scale of 1 : 30



Sam is going to put a small table in the kitchen.

The table has to be

more than 180 cm from A

more than 150 cm from BC

Show, by shading on the diagram, the region where Sam can put the table.

$$180 \div 30 = 6 \text{ cm}$$

$$150 \div 30 = 5 \text{ cm}$$

2/4

Examiner comment

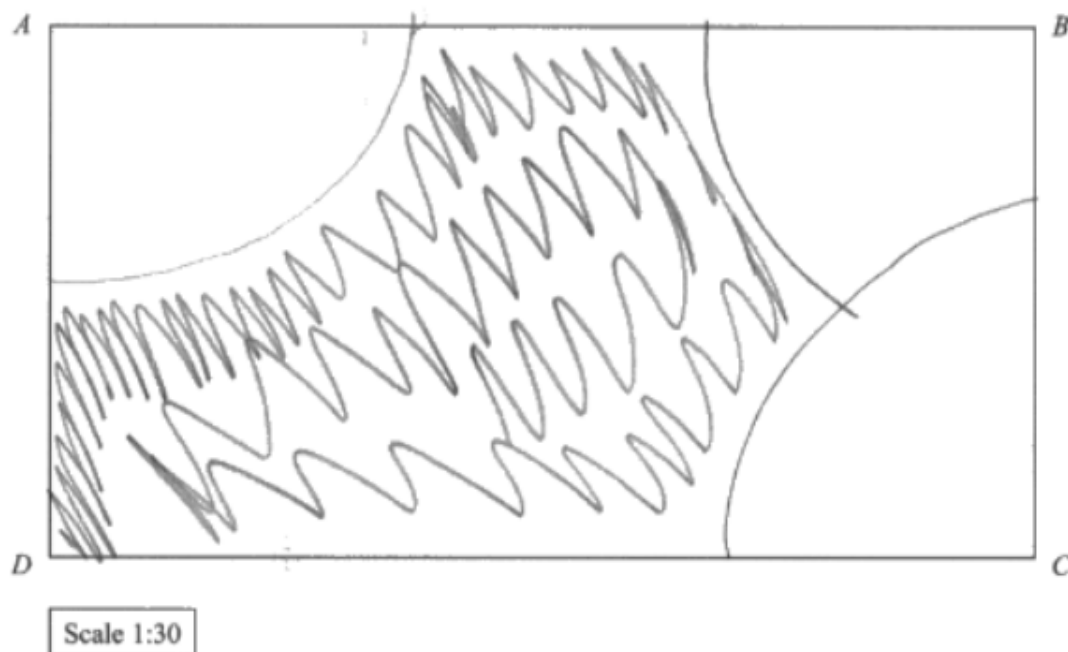
The student demonstrated clear use of the scale, quoting 6 cm and 5 cm.

Accurately drawn locus showing points more than 150 cm from BC .

The locus from A is incorrect; they have drawn a square of side 6 cm instead of an arc.

Student response C

19 Here is a plan of a kitchen drawn to a scale of 1 : 30



Sam is going to put a small table in the kitchen.

The table has to be

more than 180 cm from A

more than 150 cm from BC

Show, by shading on the diagram, the region where Sam can put the table.

1/4

Examiner comment

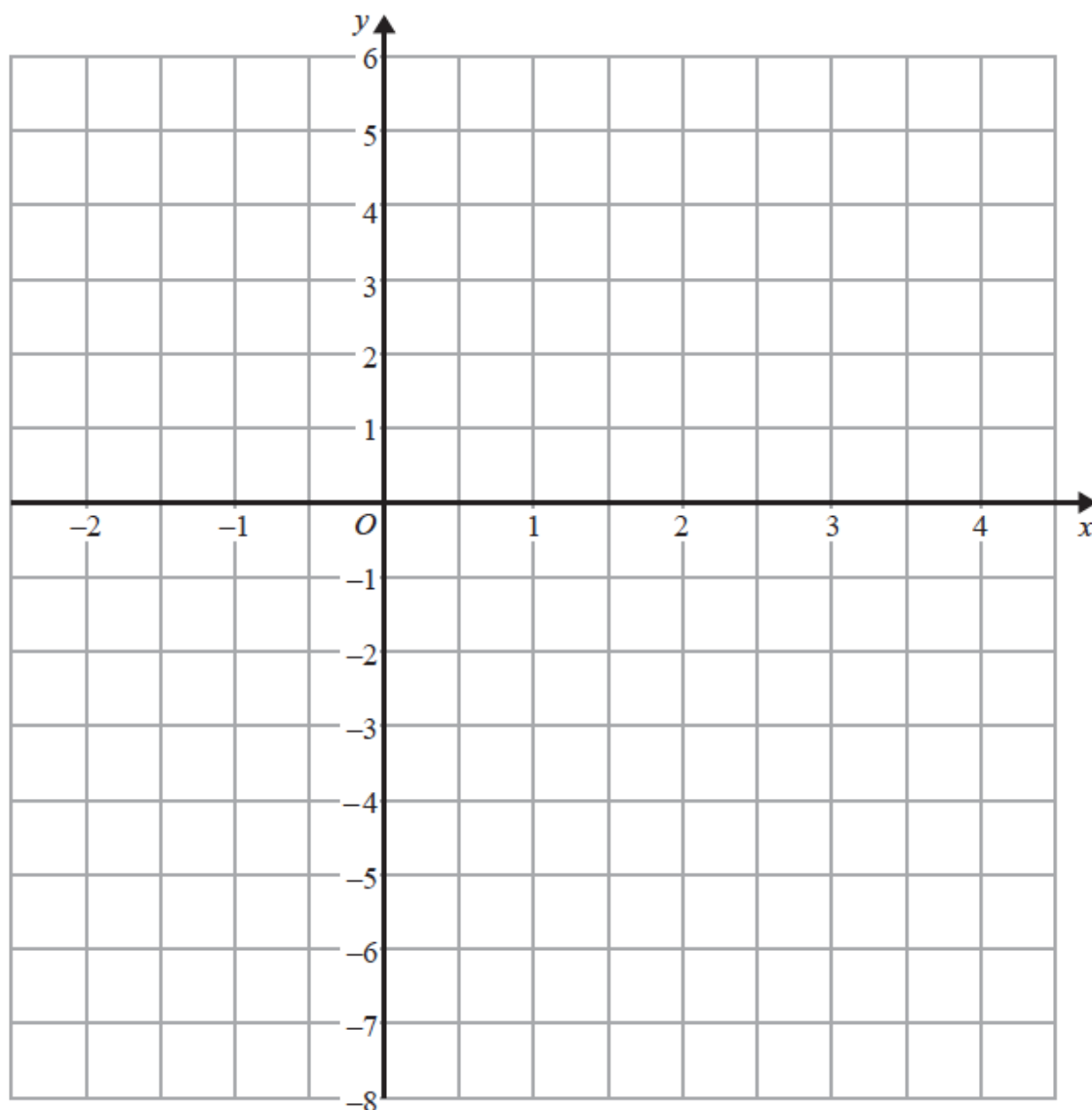
The student has made a good start, accurately using the scale to find 6 cm and 5 cm and so gaining the first M1. The arcs of radius 5 cm drawn from B and C are good, but the intercepts with AB and DC should be joined to give the line 5 cm from BC . There is an arc, centre A , but the radius is incorrect so no marks could be awarded.

Exemplar question 8

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Foundation tier Question 21 / Higher tier Question 2

- 21 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4



(Total for Question 21 is 3 marks)

Mean score: Foundation tier 1.54, Higher tier 2.68

Examiner comment

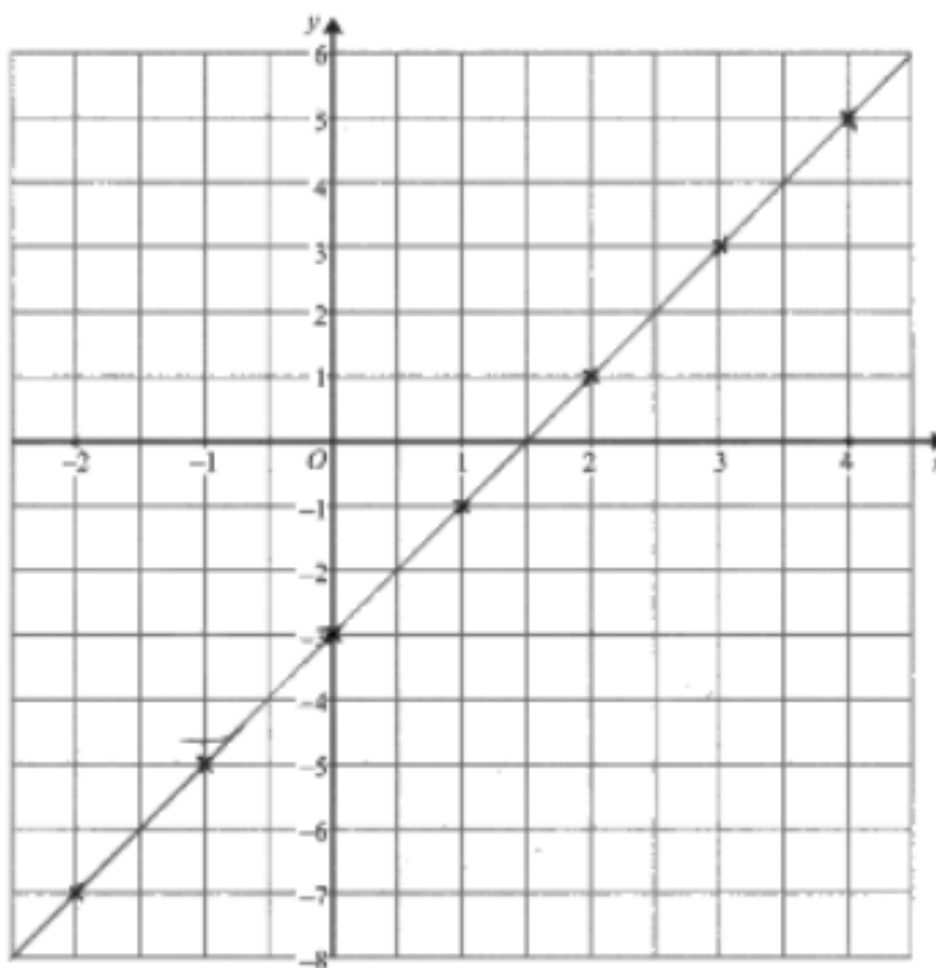
Students needed to find the coordinates of at least two points on the given line in order to gain at least one mark. Many students struggled when substituting negative values for x into the given equation. Students also needed to be aware of the different scales on the axes.

A straight line, drawn from $x = -2$ to $x = 4$, was required.

Student response A

- 21 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4

-2	-1	0	1	2	3	4	x
-7	-5	-3	-1	1	3	5	y



3/3

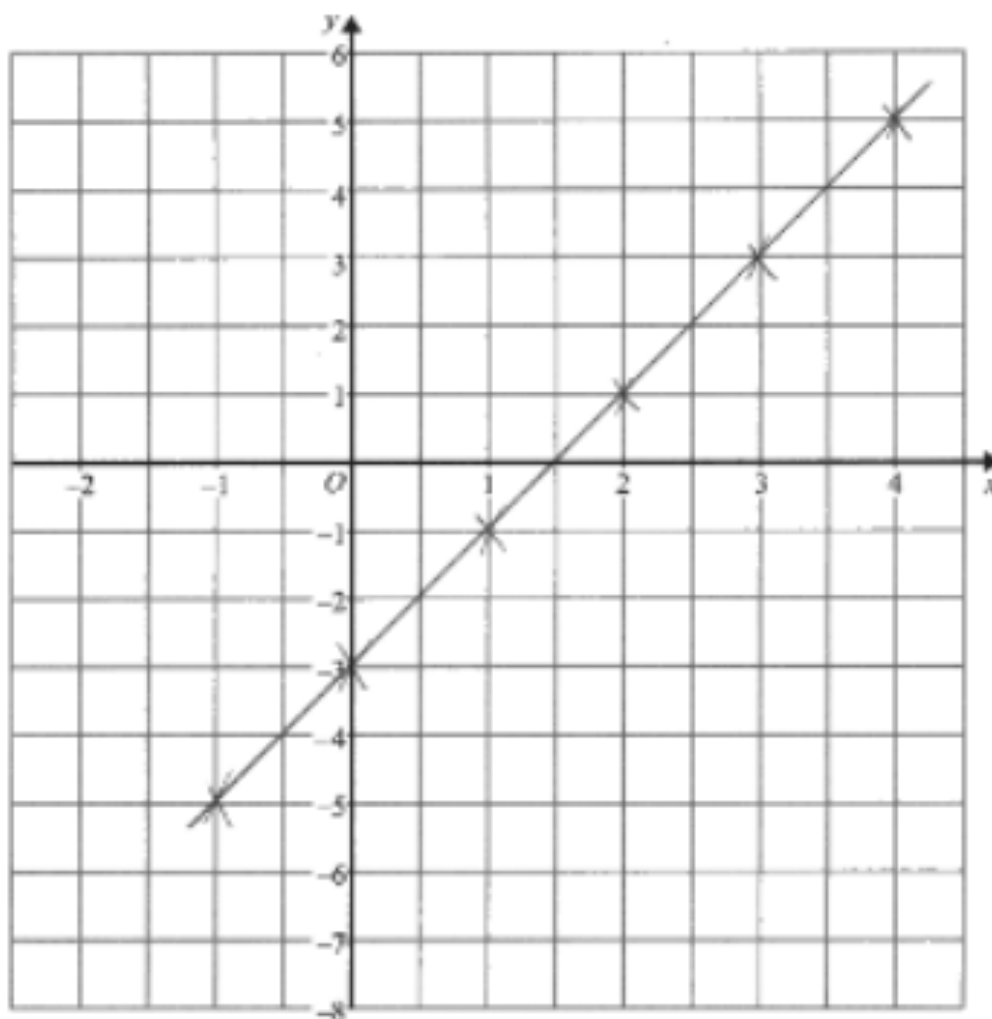
Examiner comment

The student drew a table of values with fully correct entries. All 7 points were plotted accurately and joined with a ruled straight line.

Student response B

- 21 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4

x	-2	-1	0	1	2	3	4
y	-7	-5	-3	-1	1	3	5



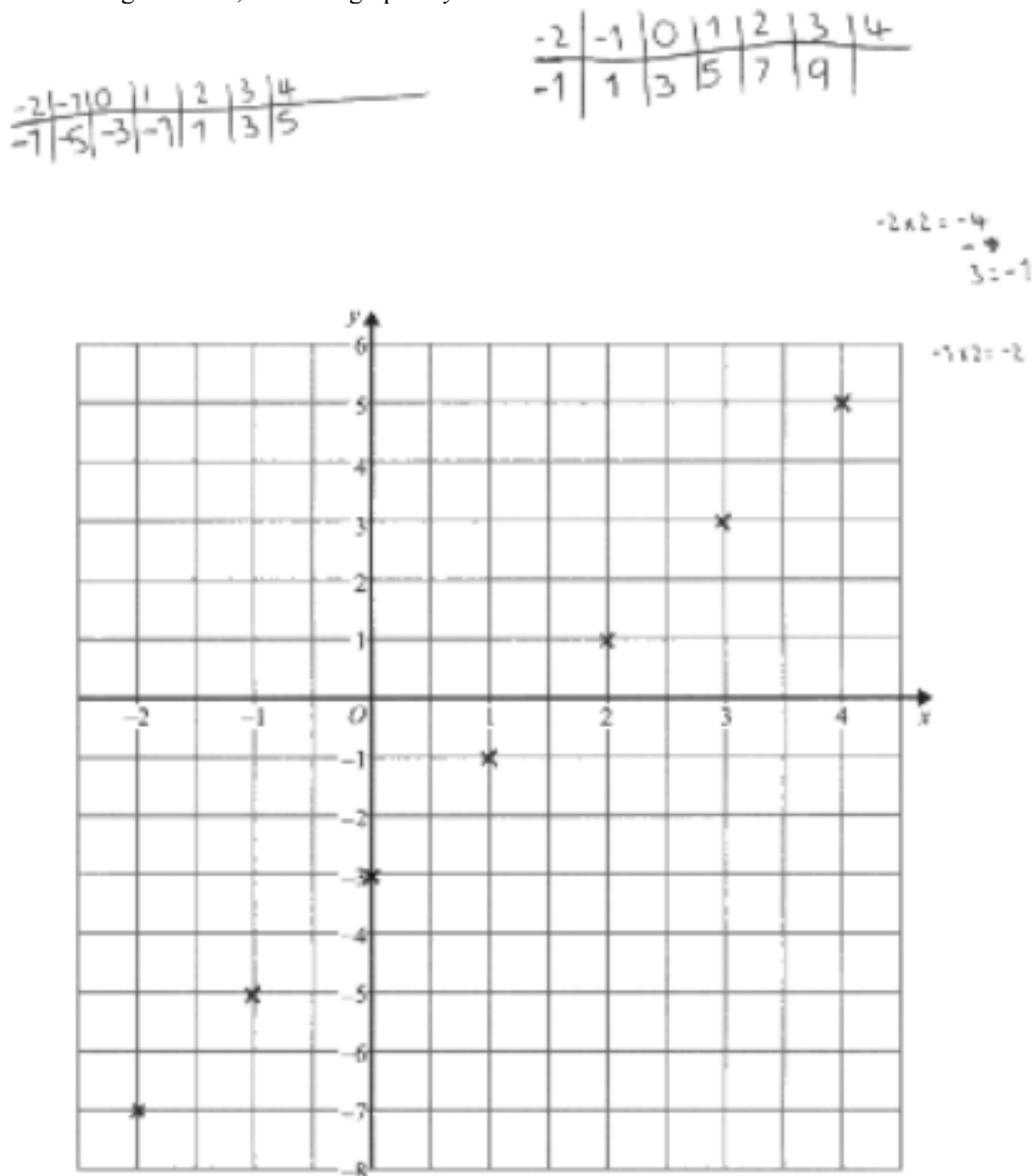
2/3

Examiner comment

The student drew a fully correct table of values, with all 7 points correctly evaluated. But then they plotted only 6 of the points and joined with a ruled line, so only gained B2 as the line did not extend as far as $x = -2$.

Student response C

- 21 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4



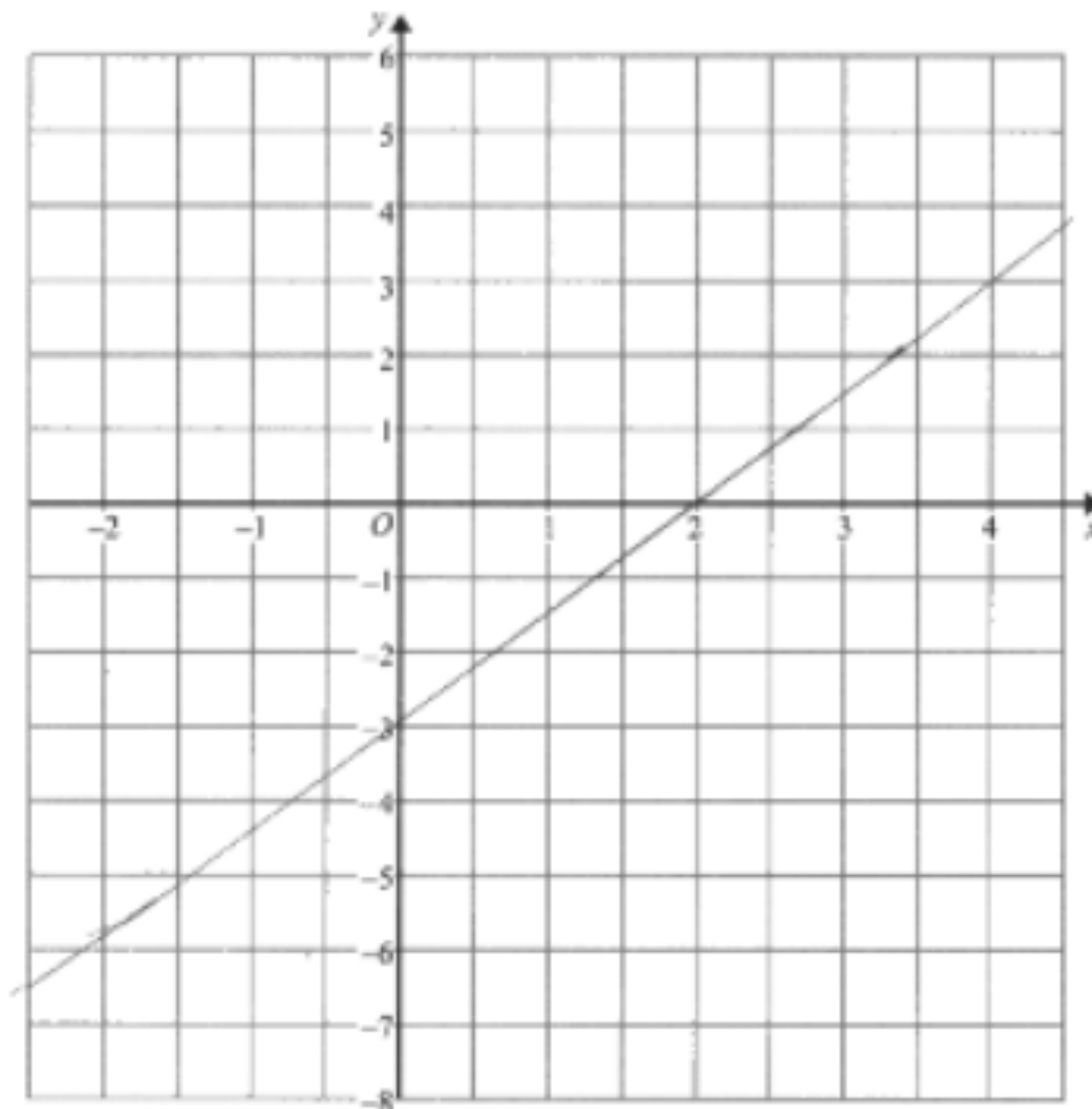
2/3

Examiner comment

The student drew a fully correct table of values, with all 7 points correctly evaluated and plotted. They then failed to join the points and so only B2 was awarded.

Student response D

21 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4



1/3

Examiner comment

The student knew that the y -intercept was at -3 but failed to understand the significance of the coefficient 2.

Exemplar question 9

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Foundation tier Question 22 / Higher tier Question 3

- 22 Hannah is planning a day trip for 195 students.
 She asks a sample of 30 students where they want to go.
 Each student chooses one place.
 The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

- (i) Work out how many of the 195 students you think will want to go to the Theme Park.

.....
 (2)

- (ii) State any assumption you made **and** explain how this may affect your answer.

.....

 (1)

(Total for Question 22 is 3 marks)

Mean score: Foundation tier 1.25, Higher tier 2.54

Examiner comment

Students were assessed on their understanding of the use of a sample to infer the properties of a population and an explanation of any assumptions made.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
22(i)	65	M1	for working with proportion e.g. $10 \div 30 \times 195 (= 65)$	Condone use of 200 for 195
(ii)	statement	A1 C1	cao for statement Acceptable examples sample is representative (otherwise answer wrong) random sample (otherwise answer will be different) the 30 students are from the 195 (otherwise not accurate) 10 out of every 30 want to go to the Theme Park (otherwise answer will be different/wrong) there is no bias Not acceptable examples There would be more than 10 people who want to go to the Theme Park I rounded my answer	

Examiner comment

Part (i): students were required to find one third of 195. A common approach, which often led to errors, was the use of a ‘build up’ method: $10 = 30$, $20 = 60$, $30 = 90$, etc. This was fine until $60 = 180$, when often the student did not go any further.

Part (ii): A recognition that this sample can be assumed to be representative of the whole cohort was required.

Student response A

22 Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.

Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

$$195 \div 30 = 6.5$$

$$6.5 \times 10 = 65$$

65
(2)

2/2

(ii) State any assumption you made **and** explain how this may affect your answer.

I assumed that for every 30 students, 10 would want to go. This ^{means} ~~notes~~ my estimate could be higher or lower than the true value

(1)

1/1

Examiner comment

Part (i): The student has explicitly stated a fully correct method with the correct answer.

Part (ii): 'for every 30 students, 10 would want to go' was sufficient for C1.

Student response B

- 22 Hannah is planning a day trip for 195 students.
 She asks a sample of 30 students where they want to go.
 Each student chooses one place.
 The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

- (i) Work out how many of the 195 students you think will want to go to the Theme Park.

$$195$$

$$195 \div 30 = 6.5 \times 10 = 65$$

65
(2)

2/2

- (ii) State any assumption you made **and** explain how this may affect your answer.

$195 \div 30 = 6.5 \times 10 = 65$. If you round the
 numbers of ^{students} ~~students~~ to 200 it will affect the answer.

(1)

0/1

Examiner comment

Part (i): The student used a fully correct method and their answer gained full marks.

Part (ii): The student did not state any assumption made and talked only of how rounding values would change their answer.

Student response C

22 Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.

Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10 $\times 6 = 60$
Theatre	5 $\times 6 = 30$
Sports Centre	8 $\times 6 = 48$
Seaside	7 $\times 6 = 42$
	<u>30</u> $\times 6 = 195$

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

$$10 + 5 + 8 + 7 = 30$$

$$195 \div 30 = 6.5$$

(6)

60
(2)

1/2

(ii) State any assumption you made **and** explain how this may affect your answer.

I rounded down or assumed that the number 6.5 would be rounded down so it will effect the number of people wanting to go places.
(1)

0/1

Examiner comment

Part (i): The student used the correct method to work out the number of students, so gaining M1, but they prematurely rounded 6.5 to 6, preventing the possibility of an accurate result.

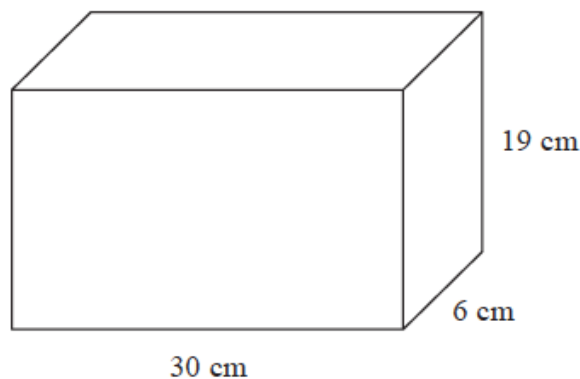
Part (ii): The student did not address the issue relating to the choice of sample.

Exemplar question 10

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Foundation tier Question 23 / Higher tier Question 4

- 23 A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

.....
(Total for Question 23 is 4 marks)

Mean score: Foundation tier 1.51, Higher tier 3.42

Examiner comment

This question assessed volume of a cuboid, fraction of a quantity and the recognition that an integer answer is required. It was important for students to read the question carefully since many either found the number of cups that filled the container from empty or the number of cups required to fill the top third of the container. These misinterpretations were dealt with in the mark scheme.

Students needed to be careful not to convert $\frac{2}{3}$ to an inaccurate decimal or percentage since this affected the final accuracy of their answer.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
23	8	P1	for working with volume of the cuboid, e.g. $30 \times 6 \times 19 (= 420)$ OR for using $\frac{2}{3}$ with one dimension, e.g. $30 \times 2 \div 3 (= 20)$	For P marks, ignore attempts at unit conversion
		P1	for “3420” $\times 2 \div 3 (= 2280)$ or “3420” $\div 3 (= 1140)$ OR “20” $\times 6 \times 19 (= 2280)$ OR “3420” $\div 275 (= 12.4... = 12 \text{ cups})$	
		P1	(dep on P2) for “2280” $\div 275 (= 8.29...)$ or “1140” $\div 275 (= 4.14..)$ OR “12” $\times 2 \div 3$ OR for $275 \times 8 (= 2200)$ or $275 \times 9 (= 2475)$	
		A1	cao	

Examiner comment

The third P1 was dependent upon the award of the previous two.

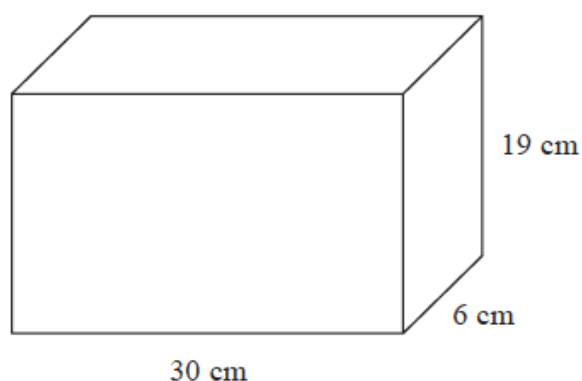
There was a maximum of 3 P1 marks for a correct process to find the number of cups needed to fill the top third of the container.

There was a maximum of 2 P1 marks for a correct process to find the number of cups need to fill the whole container.

Note: This question was not assessing conversion between units of capacity and units of volume.

Student response A

- 23 A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

$$30 \times 6 \times 19 = 3420$$

~~$$3420 \times 2$$~~

$$3420 \div 3 = 1140$$

$$1140 \times 2 = 2280$$

$$2280 \div 275 = 8.290909091$$

$$= 8$$

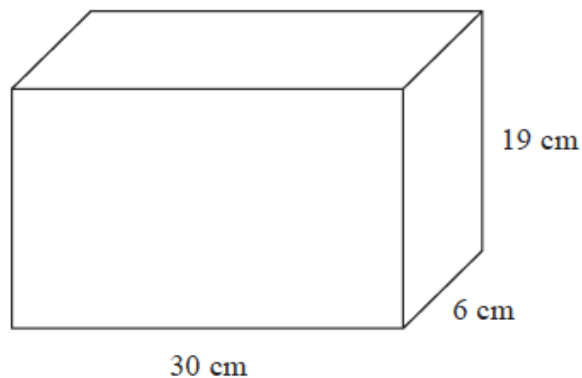
4/4

Examiner comment

The student showed a clear and correct method to find the volume of the cuboid. Working is shown for the process to find two thirds of the volume. The student correctly truncates their value of 8.29... for the required number of cups.

Student response B

- 23 A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

$$\begin{aligned}
 30 \times 6 \times 19 &= 3420 \\
 \frac{2}{3} \times 3420 &= 2280 \\
 \div 275 &= 8.290 \\
 &= 9
 \end{aligned}$$

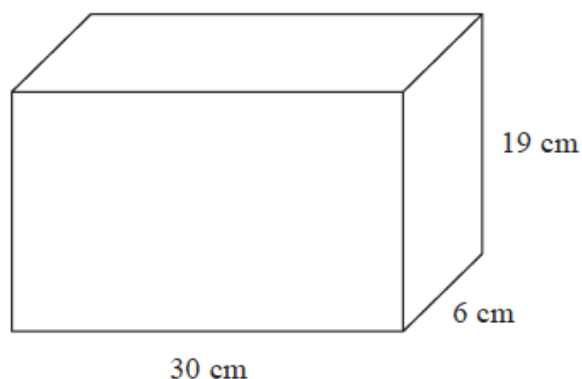
3/4

Examiner comment

The student's working was fully correct, showing all three processes required. The final result was then rounded up instead of down, so losing the final A1.

Student response C

- 23 A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

$$30 \times 19 \times 6 = 3420$$

$$3420 \div 0.6 = 5700$$

1/4

Examiner comment

The student made a correct start finding the volume of the cuboid, gaining the first P1. They converted $\frac{2}{3}$ to a correct recurring decimal but then divided it into the volume instead of multiplying the volume by it, so no further marks could be awarded.

Exemplar question 11

[\[back to Contents page\]](#)

Foundation tier Question 26 / Higher tier Question 7

26 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2 : 7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

£.....

(Total for Question 26 is 4 marks)

Mean score: Foundation tier 0.96, Higher tier 3.16

Examiner comment

The question assessed the division of a quantity by a ratio. However, before this could be done students needed to find the proportion of the total shared by Chloe and Denesh.

Many students, seeing a ratio quoted and an amount, immediately wanted to divide that amount by the ratio given. This was an incorrect start to the process.

Many students did not read the question carefully enough and quoted 1.5 as the proportional share of Chloe and Denesh.

Mark scheme

Question	Answer	Mark	Mark scheme
26	168	P1	for working with ratio to find the amount for C or D e.g. $1.5 \times 2 (= 3)$ or (A, B, C, D =) 2, 7, 3, 3 oe OR for suitable expressions linking A with C or D, e.g. $A = x$, $C = 1.5x$
		P1	for “ $2 + 3 + 3 + 7$ ” (= 15) OR adds 4 suitable expressions, e.g. “ $x + 3.5x + 1.5x + 1.5x$ ” (= $7.5x$)
		P1	for a complete process to find the amount of money e.g. $360 \div “15” \times 7$ OR $360 \div “7.5” \times 3.5$
		A1	cao

Examiner comment

For the award of the first P1, (A, B, C, D =) 2, 7, 3, 3 (or equivalent) meant that respective values such as 20, 70, 30, 30 or 40, 140, 60, 60 etc. would be accepted. However, if the 40 for A came from $360 \div (2 + 7)$ this award was not made.

Student response A

26 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2 : 7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

$$A : B : C : D \\ 2 : 7 : 3 : 3 = 15$$

$$\frac{360}{15} = 24$$

~~$$2 \times 24 = 48$$~~

$$A : B : C : D \\ 48 : 168 : 72 : 72$$

$$\begin{aligned} 2 \times 24 &= 48 \\ 7 \times 24 &= 168 \\ 3 \times 24 &= 72 \end{aligned}$$

$$\pounds 168$$

4/4

Examiner comment

The student has given a fully correct solution that is well laid out and easy to follow.

Student response B

26 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2 : 7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

$$\begin{array}{l}
 A : \textcircled{B} : C : D \\
 2 : \underline{7} : 1.5 \times 2 : 1.5 \times 2 \\
 \\
 2 : 7 : 3 : 3 = 18 \\
 \\
 360 \div 18 = 20 \\
 \\
 \therefore 20 \times 7 = 140 \\
 \\
 \text{£ } \underline{140}
 \end{array}$$

3/4

Examiner comment

The student explained all their working except for the derivation of '18', which it can be assumed comes from an incorrect addition of 2, 7, 3 and 3. Following through this arithmetic error, the process was otherwise correct and so all P1 marks were awarded but not the final A1.

Student response C

26 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2 : 7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

$$\begin{array}{cc} A & B \\ 2 & 7 \\ 180 & 51.42 \\ \hline \pounds 360 \end{array}$$

$$\text{Chloe \& Denesh} = \pounds 270$$

$$\begin{array}{ccccccc} A & : & B & : & C & : & D \\ 2 & : & 7 & : & 3 & : & 3 \end{array} \begin{array}{l} \pounds 30 \\ \pounds 30 \end{array} = \pounds 360$$

$$\times \begin{array}{l} 1.5 \\ 2 = 3 \end{array}$$

$$\pounds 360 \div 6 = \pounds 60$$

$$300 \div 2 = \pounds 150$$

$$\begin{array}{r} 360 \\ - 180 \\ \hline \end{array}$$

£

1/4

Examiner comment

The student gave the correct ratio, 2 : 7 : 3 : 3, so the first P1 was awarded. No other marks could be awarded.

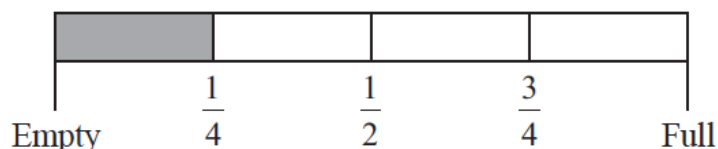
Paper 3F (calculator)

Exemplar question 1

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Foundation tier Question 8

- 8 Here is the gauge for the fuel tank of a car.



The fuel tank holds 52 litres of fuel when the tank is full.

The tank is $\frac{1}{4}$ full of fuel.

Work out how many more litres of fuel are needed to fill the tank.

..... litres

(Total for Question 8 is 3 marks)

Mean score: 2.32

Examiner comment

This question assessed simple problem-solving within the context of Number.

Students needed to show understanding of simple fractions and carry out some calculations. Some students confused the use of $\frac{1}{4}$ and $\frac{3}{4}$ and needed to understand the difference between the full tank, and how many more litres were needed to fill the tank.

Mark scheme

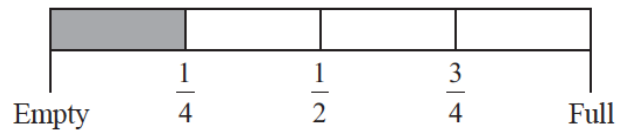
Question	Answer	Mark	Mark scheme	Additional guidance
8	39	M1	for finding one quarter of 52, e.g. $52 \div 4 (= 13)$ OR for finding the fraction to be filled, e.g. $1 - \frac{1}{4} \left(= \frac{3}{4} \right)$ oe	Accept equivalent decimals or percentages
		M1	for a complete method e.g. $52 - "13"$ or $"13" \times 3$ OR for $\frac{3}{4} \times 52$	
		A1	cao	

Examiner comment

There was more than one route through this question. For the first M1, students could either demonstrate their understanding of fractions by showing the need to find $\frac{3}{4}$ or start by finding $\frac{1}{4}$ of 52.

Student response A

- 8 Here is the gauge for the fuel tank of a car.



The fuel tank holds 52 litres of fuel when the tank is full.

The tank is $\frac{1}{4}$ full of fuel.

Work out how many more litres of fuel are needed to fill the tank.

$\frac{1}{4}$ full, $\frac{3}{4}$ needed $52 \div 4 = 13$

$\frac{1}{4} = 13$ $13 \times 3 = 39$

39 litres

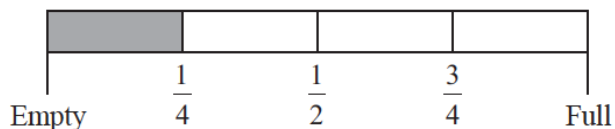
3/3

Examiner comment

This is a perfect solution that gains full marks.

Student response B

- 8 Here is the gauge for the fuel tank of a car.



The fuel tank holds 52 litres of fuel when the tank is full.

The tank is $\frac{1}{4}$ full of fuel.

Work out how many more litres of fuel are needed to fill the tank.

$$52 \div 4 = 12$$

$$\begin{array}{r} 52 - \\ 12 \\ \hline 40 \end{array}$$

40 litres

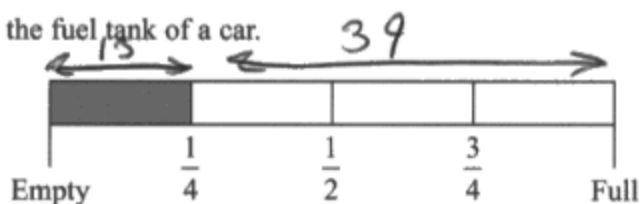
2/3

Examiner comment

The student used the correct method for $52 \div 4 (= 12)$, gaining the first M1. The arithmetic error was penalised subsequently by the loss of the A1. They were awarded the second M1 for $52 - 12 (= 40)$; this mark can be awarded as the value of 12 has come from a correct method. They fail to get the A1, due to the earlier arithmetic error.

Student response C

8 Here is the gauge for the fuel tank of a car.



The fuel tank holds 52 litres of fuel when the tank is full.

The tank is $\frac{1}{4}$ full of fuel.

Work out how many more litres of fuel are needed to fill the tank.

~~$\frac{1}{4} \times 52 = 13$~~

$$\frac{3}{4} \times 39 = 29.25$$

29.25 litres

1/3

Examiner comment

The student was awarded the first M1 for $\frac{1}{4} = 13$ and 39 litres, which was shown clearly on the diagram, where some of the working could be found for this question. The working of $\frac{3}{4} \times 39$ is incorrect, so no further marks were awarded.

Exemplar question 2

[\[back to Contents page\]](#)

Foundation tier Question 10

10 Bill has 400 counters in a bag.

He gives

35 of the counters to Sameena

50 of the counters to Henry

75 of the counters to Lucas

What fraction of the 400 counters is left in Bill's bag?

Give your fraction in its simplest form.

.....

(Total for Question 10 is 3 marks)

Mean score: 1.63

Examiner comment

This question assessed students' understanding of expressing numbers in fraction form, within a context. Some students missed the need to simplify their fraction, or gave their answer in some form other than a fraction.

Mark scheme

Question	Answer	Mark	Mark scheme
10	$\frac{3}{5}$	M1	for a start in the method e.g. $35 + 50 + 75 (= 160)$ or $400 - 35 - 50 - 75 (= 240)$ or $\frac{160}{400}$ oe
		M1	for e.g. $\frac{400 - "160"}{400}$ or $\frac{2}{5}$ or $1 - \frac{160}{400}$ or for an unsimplified answer e.g. $\frac{"240"}{400}$ oe or as 60 % oe
		A1	cao

Examiner comment

Some calculations could be given as a first step, or students could start to give their numbers in fraction form. The second M1 was for progressing to a simplified answer, or to within one step of the final answer.

Student response A

10 Bill has 400 counters in a bag.

He gives

35 of the counters to Sameena

50 of the counters to Henry

75 of the counters to Lucas

What fraction of the 400 counters is left in Bill's bag?

Give your fraction in its simplest form.

$$400 - 35 - 50 - 75 = 240$$

$$\frac{240}{400} \rightarrow \frac{24}{40} \rightarrow \frac{12}{20} \rightarrow \frac{6}{10} \rightarrow \frac{3}{5}$$

$$\frac{3}{5}$$

3/3

Examiner comment

The student has given their full working for a correct solution. A correct answer on its own would also have gained full marks.

Student response B

10 Bill has 400 counters in a bag.

He gives

35 of the counters to Sameena

50 of the counters to Henry

75 of the counters to Lucas

What fraction of the 400 counters is left in Bill's bag?

Give your fraction in its simplest form.

$$35 + 50 + 75 = 160$$

$$400 - 160 = 242$$

$$\frac{242}{400} \downarrow \div 2 \quad \frac{121}{200}$$

$$121/200$$

2/3

Examiner comment

The student gained the first M1 for $35 + 50 + 75 (= 160)$ and the second M1 for $(400 - "160") \div 400$. Even though they subtracted incorrectly, they showed that they believed 242 was the answer to $400 - 160$. However, due to the arithmetic error they failed to gain the final A1.

Student response C

10 Bill has 400 counters in a bag.

He gives

35 of the counters to Sameena

50 of the counters to Henry

75 of the counters to Lucas

What fraction of the 400 counters is left in Bill's bag?

Give your fraction in its simplest form.

~~35 + 70 +~~

$$35 + 50 + 75 = 160 - \text{gave out}$$

$$400 - 160 = 240 - \text{left}$$

$$\frac{240}{600} = \frac{24}{60} = \frac{12}{30} = \frac{2}{5}$$

left

$$\frac{2}{5}$$

(Total for Question 10 is 3 marks)

1/3

Examiner comment

The student could have been awarded the first M1 for either $35 + 50 + 75 (= 160)$ or $400 - "160" (= 240)$. They then divided "240" has been divided by an incorrect denominator (600), so did not get the second M1; note that even though the fraction $\frac{2}{5}$ has been shown, the second M1 could not be awarded since the $\frac{2}{5}$ has come from the incorrect working of $240 \div 600$. The final answer is incorrect, so they could not be awarded the A1.

Exemplar question 3

[\[back to Contents page\]](#)

Foundation tier Question 11

- 11 The table shows the costs of sending a parcel by the Express service and by the Rapid service.

Type of service	Cost
Express	£15.25
Rapid	£35.38

Brendan has to send 12 parcels.

It will be cheaper to send the parcels by the Express service than by the Rapid service.

- (a) How much cheaper?

£.....
(3)

Luke wants to send 21 parcels by the Express service.

He does the calculation $20 \times £15 = £300$ to estimate the cost.

- (b) Explain why Luke's calculation shows the actual cost will be more than £300

.....

 (1)

(Total for Question 11 is 4 marks)

Mean score: (a) 2.68, (b) 0.20

Examiner comment

Part (a): This was a problem within a real-life context involving application of Number and Money.

Part (b): This question assessed a specific objective: A03.4b “evaluate results obtained”, which has to be assessed at least once in each series. In this case, it was within the context of estimating answers.

Mark scheme

Question	Answer	Mark	Mark scheme
11(a)	241.56	P1	for difference for 1 parcel e.g. $35.38 - 15.25 (= 20.13)$ OR for total cost for 12 parcels by either service e.g. $35.38 \times 12 (= 424.56)$ or $15.25 \times 12 (= 183)$
		P1	for a complete process e.g. “20.13” $\times$ 12 or “424.56” – “183”
		A1	cao
(b)	Explanation	C1	for explanation Acceptable examples both figures rounded down (refers to both figures) 20 is less than 21 and 15 is less than 15.25 Not acceptable examples both figures rounded (up); rounded down either 20 is less than 21 or 15 is less than 15.25 (refers to just one figure) the cost is 320.25 (more than 300); multiplying with bigger numbers

Examiner comment

Part (a): The mark scheme awarded an early mark for the extraction of figures from the given table and use of those in an early calculation.

Part (b): The answer had to meet the criteria for a C (Communication) mark – see the general marking guidance, which can be found at the front of each all mark schemes. A fully complete answer referred to the rounding down of both numbers. Some exemplar statements were given in the mark scheme, but these were only for illustration and in no way did these constitute a complete list of possible answers. Students needed to avoid ambiguity, contradiction, lack of clarity or incomplete explanations.

Student response A

- 11 The table shows the costs of sending a parcel by the Express service and by the Rapid service.

Type of service	Cost
Express	£15.25
Rapid	£35.38

= 183
= 424.56

Brendan has to send 12 parcels.

It will be cheaper to send the parcels by the Express service than by the Rapid service.

- (a) How much cheaper?

$$\begin{array}{r} 424.56 \\ - 183 \\ \hline 241.56 \end{array}$$

$$£ 241.56_p \quad (3)$$

3/3

Luke wants to send 21 parcels by the Express service.

He does the calculation $20 \times £15 = £300$ to estimate the cost.

- (b) Explain why Luke's calculation shows the actual cost will be more than £300

Because he has rounded the amount of parcels and the cost down so that it is an underestimate.

(1)

1/1

Examiner comment

Part (a): The student has provided a correct solution, gaining full marks. The answer could be accepted written as either £241.56 or £241.56p.

Part (b): The student correctly referred to both figures being rounded down.

Student response B

- 11 The table shows the costs of sending a parcel by the Express service and by the Rapid service.

Type of service	Cost
Express	£15.25
Rapid	£35.38

Brendan has to send 12 parcels.

It will be cheaper to send the parcels by the Express service than by the Rapid service.

- (a) How much cheaper?

$$E = £183$$

$$R = £424.56$$

$$424 - 183 = 241$$

$$£241 \quad (3)$$

2/3

Luke wants to send 21 parcels by the Express service.

He does the calculation $20 \times £15 = £300$ to estimate the cost.

- (b) Explain why Luke's calculation shows the actual cost will be more than £300

because he made the number of parcels and the price of service smaller so he hasn't taken into account the other parcel and each 25p so it'll be more than what he thought
(1)

1/1

Examiner comment

Part (a): The student was awarded the first P1 for either 183 or 424.56. They then rounded 424.56 down, but show the correct method, so were awarded the second P1. Due to the rounding the final answer was incorrect, losing the final mark.

Part (b): The mark can be awarded since the student has referred to both figures being made smaller.

Student response C

- 11 The table shows the costs of sending a parcel by the Express service and by the Rapid service.

Type of service	Cost
Express	£15.25
Rapid	£35.38

Brendan has to send 12 parcels.

It will be cheaper to send the parcels by the Express service than by the Rapid service.

- (a) How much cheaper?

~~Exp~~ $15.25 \times 12 = 183$

Express — $15.25 \times 12 = 183$

Rapid — $35.38 \times 12 = 424.56$

Express is cheaper.

£
(3)

1/3

Luke wants to send 21 parcels by the Express service.

He does the calculation $20 \times £15 = £300$ to estimate the cost.

- (b) Explain why Luke's calculation shows the actual cost will be more than £300

He hasn't rounded the cost up. The cost will be more as he has not included the 25p so it will add up to be more.

(1)

0/1

Examiner comment

Part (a): The student was awarded the first P1 for either 183 or for 424.56. No further working or the final correct answer were shown, so they were not awarded any further marks. Their final answer suggested that they may have misread the question.

Part (b): The mark cannot be awarded since there was only a reference to cost. Both of the figures needed to be referred to, so this answer was incomplete.

Exemplar question 4

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Foundation tier Question 13

- 13** The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is ‘add 8’

Josie says,

“No number in this sequence is in the 5 times table.”

- (a) Give an example to show that Josie is wrong.

.....
(1)

- (b) Is 85 a number in this sequence?
Give a reason for your answer.

.....
.....
(1)

(Total for Question 13 is 2 marks)

Mean score: 1.59

Examiner comment

This assessed students’ ability to reason, interpret and communicate (AO2), in this case within the context of sequencing.

Students had to read the question carefully to ensure that they answer the question as set. Some mis-read the question or gave an answer that was ambiguous or lacked clarity.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
13(a)	example	C1	Example given e.g. 40, 80, etc.	
(b)	No with reason	C1	for No with reason Acceptable examples 80 and 88 are both in the sequence 80 is in the sequence and 85 is 5 more 24, 32, ... 80, 88, ... 85 is not in the 8 times table 85 is an odd number $8n + 16 = 85$ so n is not a whole number. Not acceptable examples adding 8 each time will not lead to 85 (insufficient) it goes past 85 Yes ...	No can be implied from their statement

Examiner comment

Part (a): Students had to give an example, which could be 40 or 80. If any other numbers were included then the required number of 40 or 80 needed to be highlighted or isolated in some way.

Part (b): Some exemplar statements were provided in the mark scheme. However, these are only examples and are not the only cases where the marks could be awarded.

Student response A

- 13 The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is 'add 8'

Josie says,

"No number in this sequence is in the 5 times table."

- (a) Give an example to show that Josie is wrong.

$$24 + 8 = 32 + 8 = 40$$

$$1 \dots \dots \dots 40 \quad (1)$$

1/1

- (b) Is 85 a number in this sequence?
Give a reason for your answer.

$$\begin{array}{r} 16 \quad 21 \quad 28 \\ +5 \\ \hline 5n+11 \quad 24n+8 \\ 8n+16 \end{array}$$

$$\begin{array}{r} 8n + 16 = 85 \\ -16 \quad -16 \\ \hline 8n \quad 69 \\ \hline n = 8.625 \end{array}$$

The 85 is not in the sequence because when you work it out it isn't a whole number.

(Total for Question 13 is 2 marks)

1/1

Examiner comment

Part (a): The student gave a correct answer of 40.

Part (b): The student used $8n + 16 = 85$ and got $n = 8.625$, and then correctly went on to say that n needs to be a whole number or n cannot be a fraction or decimal. Without the conclusion from the algebra, they would not have been awarded the mark. If using algebra in this way, the algebra must be fully correct.

Student response B

- 13 The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is 'add 8'

Josie says,

"No number in this sequence is in the 5 times table."

- (a) Give an example to show that Josie is wrong.

$$5 \times 5 = 25$$

(1)

0/1

- (b) Is 85 a number in this sequence?
Give a reason for your answer.

no it isn't because 85 is an odd number
and in this sequence, there are no odd numbers.

(1)

1/1

Examiner comment

Part (a): The student gave an incorrect answer, providing a wrong example.

Part (b): The mark was given for answers that showed an understanding that 85 is an odd number (having recognised that the series is made of even numbers). Equally acceptable would have been a statement that all the numbers in the sequence are even (having recognised that 85 is an odd number).

Student response C

- 13 The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is ‘add 8’

Josie says,

“No number in this sequence is in the 5 times table.”

- (a) Give an example to show that Josie is wrong.

$$24 + 8 = 22 + 8 = 30$$

30
(1)

0/1

- (b) Is 85 a number in this sequence?
Give a reason for your answer.

No because no number ends with a 5.

(1)

0/1

Examiner comment

Part (a): The student added 8 incorrectly, so produced a number that was not in the sequence.

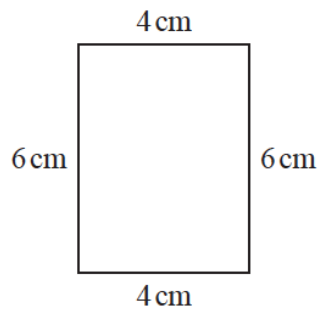
Part (b): The student failed to explain why no number ended with a 5, so the answer was insufficient.

Exemplar question 5

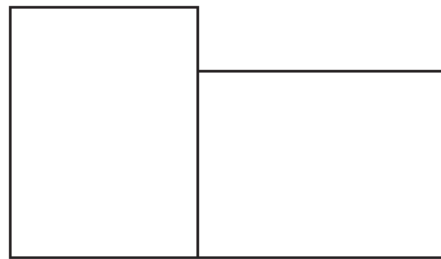
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Foundation tier Question 16

- 16 Here is a rectangle.



The 6-sided shape below is made from two of these rectangles.



Work out the perimeter of this 6-sided shape.

..... cm

(Total for Question 16 is 3 marks)

Mean score: 1.80

Examiner comment

This was a problem-solving question in the context of Geometry.

Some students struggled to isolate the correct lengths and then find those lengths not specifically given. Some students ignored the missing lengths in finding the perimeter or mis-counted the figures.

Mark scheme

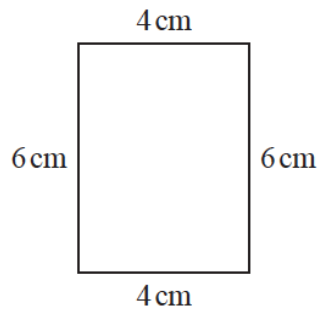
Question	Answer	Mark	Mark scheme	Additional guidance
16	32	P1	for a process to work out the missing length e.g. $6 - 4 (= 2)$ or for a process to work out the length of the base e.g. $4 + 6 (= 10)$ OR for finding total perimeter of 2 rectangles, e.g. $2(6 + 4 + 6 + 4) (= 40)$ OR for writing at least 5 figures correctly on the diagram	May be seen on the diagram
		P1	for a process to work out the perimeter e.g. $4 + "2" + 6 + 4 + 6 + 4 + 6$ or $20 + 20 - 2 \times 4$ or $16 + 14 + "2"$	May be seen in different forms
		A1	cao SC B1 for 30	

Examiner comment

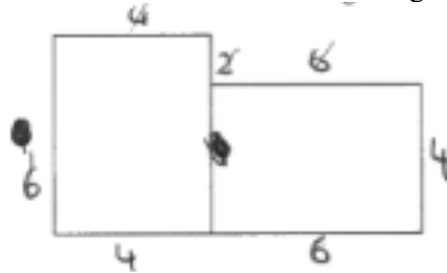
The first P1 could be given for an attempt to find one of the missing lengths, or finding the length of the base. It could also be given for writing at least 5 of the lengths correctly on the diagram. For the second P1, a complete process needed to be shown. This second P1 could not be given if students missed out any of the lengths that make up the perimeter.

Student response A

16 Here is a rectangle.



The 6-sided shape below is made from two of these rectangles.



Work out the perimeter of this 6-sided shape.

$$6 + 4 + 2 + 6 + 4 + 6 + 4 = 32$$

32 cm

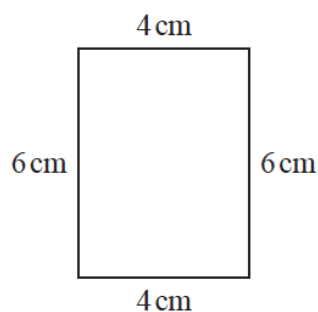
3/3

Examiner comment

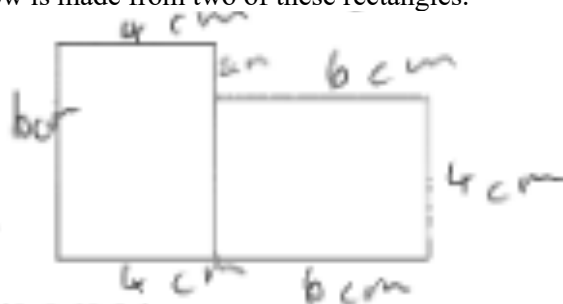
The student gave a fully correct response for all 3 marks.

Student response B

16 Here is a rectangle.



The 6-sided shape below is made from two of these rectangles.



Work out the perimeter of this 6-sided shape.

$$12 + 20 = 22$$

22

cm

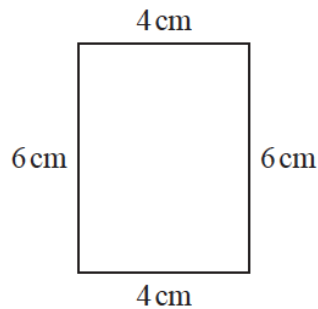
2/3

Examiner comment

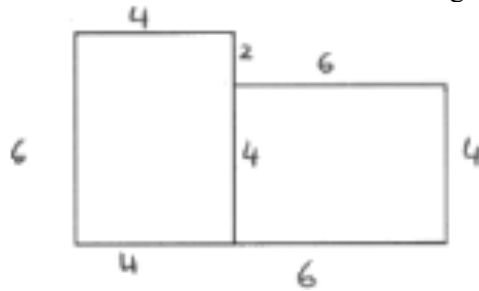
The student could be awarded the first P1 either for finding the missing length 2 or for showing at least 5 correct figures on the diagram. They then showed a complete process for adding up all 7 lengths ($6 + 6 + 6 + 2 (= 20)$ and $4 + 4 + 4 (= 12)$ implied by $20 + 12$), so gained the second P1. However, an arithmetic error meant that their final answer was wrong, so they did not get the final A1.

Student response C

16 Here is a rectangle.



The 6-sided shape below is made from two of these rectangles.



Work out the perimeter of this 6-sided shape.

$$4 + 2 + 6 + 4 + 6 + 4 + 6 + 4 + 6 = 36$$

36 cm

1/3

Examiner comment

The student could be awarded the first P1 either for finding the missing length 2 or for showing at least 5 correct figures on the diagram. In their calculation of perimeter, the student included the inner measurement of 4, so no further marks could be awarded.

Note that the correct addition was crossed out and replaced, and it is this replacement answer that was marked. See the general marking guidance at the front of the mark scheme.

Exemplar question 6

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Foundation tier Question 21

- 21 Liz goes on holiday to South Africa.

Liz wants to change £850 into South African rand.
She wants to get as many 200 rand notes as possible.

The exchange rate is £1 = 18.53 rand.

Work out the greatest number of 200 rand notes that Liz can get for £850

.....
(Total for Question 21 is 3 marks)

Mean score: 1.88

Examiner comment

This was a problem-solving question. Students needed to show their working and which process was followed to find a solution. The answer needed to be given as a whole number of notes.

Mark scheme

Question	Answer	Mark	Mark scheme
21	78	P1	for process to find the number of rand, e.g. $850 \times 18.53 (= 15750.5)$ OR for process to find number of £, e.g. $200 \div 18.53 (= 10.79 \dots)$
		P1	(dep P1) for process to find the number of rand notes, e.g. $"15750.5" \div 200 (= 78.7\dots)$ OR $850 \div "10.79\dots" (= 78.7\dots)$
		A1	cao

Examiner comment

Marks were awarded for correct operations. Some students confused their working by giving a number of contradictory statements. The general guidance of the mark scheme should be followed in awarding marks for these types of situation.

Student response A

21 Liz goes on holiday to South Africa.

Liz wants to change £850 into South African rand.

She wants to get as many 200 rand notes as possible.

The exchange rate is £1 = 18.53 rand.

Work out the greatest number of 200 rand notes that Liz can get for £850

$$\begin{array}{l} \text{£1} = 18.53 \text{ rand} \\ \times 850 \quad \quad \quad \times 850 \\ \hline 850 = 15750.50 \end{array}$$

$$\begin{array}{r} 15750.50 \\ \underline{200} \\ = 78.75 \\ = 78 \end{array}$$

78

3/3

Examiner comment

The student gave a fully correct solution for full marks.

Student response B

21 Liz goes on holiday to South Africa.

Liz wants to change £850 into South African rand.
She wants to get as many 200 rand notes as possible.

The exchange rate is £1 = 18.53 rand.

Work out the greatest number of 200 rand notes that Liz can get for £850

$$\begin{array}{r} \text{£ } 850 \times 18.53 = \frac{810900}{200} = 4054.5 \end{array}$$

4054

2/3

Examiner comment

The student showed the correct process, gaining both P1 marks. An early arithmetic error meant the final mark was not be awarded.

Student response C

21 Liz goes on holiday to South Africa.

Liz wants to change £850 into South African rand.

She wants to get as many 200 rand notes as possible.

The exchange rate is £1 = 18.53 rand.

Work out the greatest number of 200 rand notes that Liz can get for £850

$$200 \div 18.53 = \cancel{10.79} \\ 10.80.$$

~~18.53~~

$$\begin{aligned} \pounds 850 \div 18.53 &= 45.87 \\ 18.53 \times 45.87 &= 849.97 \end{aligned}$$

10.

1/3

Examiner comment

The student presented a choice of processes, not uncommon in this type of question. General guidance in the mark scheme makes it clear how the mark scheme should be applied in these cases.

The answer on the answer line came from the first line of working, so it was this that the examiner applied the marks to, disregarding the alternative working presented. The first line was awarded P1, but there were no further marks.

Exemplar question 7

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Foundation tier Question 22

- 22** In October Sally drove 560 miles in her car.
The car travelled 34.5 miles for each gallon of petrol used.
Petrol cost £1.08 per litre.
1 gallon = 4.55 litres.
Work out the cost of the petrol the car used in October.

£.....

(Total for Question 22 is 4 marks)

Mean score: 1.59

Examiner comment

This problem-solving question assessed students' ability to answer a question in the context of Number and Ratio, including correct use of units. There were several possible routes through the problem; students needed to be careful in copying their own figures from one stage to the next. The final answer needed to be given in correct money notation, that is to the nearest penny.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
22	79.76	P1	process to find number of gallons e.g. $560 \div 34.5 (= 16.23\dots)$ OR finding the miles per litre e.g. $34.5 \div 4.55 (= 7.582\dots)$	For P marks allow use of truncated/rounded values
		P1	process to convert from gallons to litres e.g. $"16.23" \times 4.55 (= 73.855\dots)$ OR to work out the cost per gallon e.g. $4.55 \times 1.08 (= 4.914)$ OR finding the number of litres e.g. $560 \div "7.582\dots" (= 73.859\dots)$	
		P1	(dep P2) for a complete process to work out the cost using the operations $(560 \div 34.5) \times 4.55 \times 1.08$ e.g. $"73.855\dots" \times 1.08 (= 79.763\dots)$ or $"4.914" \times "16.23\dots" (= 79.763\dots)$ or $"73.859\dots" \times 1.08 (= 79.763\dots)$	
		A1	for 79.69 to 79.79	To 2 dp but accept 79.7

Examiner comment

There were many cases of students prematurely rounding their calculations. As the additional guidance states, it is permitted to truncate and round values. A range was given for the answer, to allow for some rounding by students of their calculations, but those who performed truncating or rounding which will make their calculations inaccurate could have arrived at an answer that was outside the range and so lost the final mark. As such, this mark scheme was not only about applying the correct processes to their solution, but also about trying to keep their answer accurate by using figures that were not unduly rounded.

Student response A

- 22 In October Sally drove 560 miles in her car.
The car travelled 34.5 miles for each gallon of petrol used.

Petrol cost £1.08 per litre.

1 gallon = 4.55 litres.

Work out the cost of the petrol the car used in October.

$$560 \div 34.5 = 16.23 \text{ gallons}$$

£1.08 per litre!

$$1.08 \times 4.55 = \text{£}4.914 = 1 \text{ gallon}$$

$$4.914 \times 16.23 = \text{£}79.75$$

£ 79.75

4/4

Examiner comment

The student provided a fully correct solution. The answer had to be in the range given in the mark scheme to get the final mark. Examiners focus on the process that is shown in working and use the rounded/truncated figures as a guide.

Student response B

- 22 In October Sally drove 560 miles in her car.
The car travelled 34.5 miles for each gallon of petrol used.

Petrol cost £1.08 per litre.

1 gallon = 4.55 litres.

Work out the cost of the petrol the car used in October.

$$\begin{array}{l}
 34.5 \text{ miles for 1 gallon} \\
 560 \div 34.5 = 16.23 \\
 1.08 \times 4 = 4.32 \\
 0.55 \times 1.08 = 0.594 \\
 4.32 + 0.594 = 4.914 \\
 1 \text{ gallon} = £4.914 \\
 16.23 \times 4.914 = 148.359 \\
 = 148.36 \\
 \text{£ } 148.36
 \end{array}$$

3/4

Examiner comment

The student showed a correct process for solving the problem, so was awarded all the P1 marks. The second P1 was awarded for the calculation $1.08 \times (4 + 0.55)$ carried out in two separate stages and then combined. The final answer was incorrect, so they failed to get the final mark.

- Work out the cost of the petrol the car used in October.

£ 68.38

Pearson Edexcel Level 1/Level 2 GCSE (9–1) in Mathematics
Exemplification of the Summer 2019 examination
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Exemplar question 8

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Foundation tier Question 23

- 23 Costcorp sells packets of mints to shop owners.

On Monday three shop owners buy mints from Costcorp.

Each shop owner buys small packets, medium packets and large packets of mints.

Alan buys 400 packets of mints.

32% are small packets.

40% are large packets.

Beryl buys 500 packets of mints.

$\frac{3}{10}$ are small packets.

$\frac{1}{10}$ are large packets.

Charlie buys 150 small packets of mints so that

number of small packets : number of medium packets = 3 : 4

Work out the total number of medium packets of mints these shop owners buy.

You must show all your working.

.....

(Total for Question 23 is 5 marks)

Mean score: 2.25

Examiner comment

This was a problem-solving question in the context of Number and Ratio. The question was structured in order to aid students in dealing with the three shop owners. This could be done by finding remainders in the case of the first two, and undertaking a division by ratio for the third, which is the more challenging aspect of the question.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
23	612	P1	Alan: for $100 - 32 - 40 (= 28)$ or for finding “28”% of 400 e.g. $400 \times 0.28 (= 112)$	Answers only (without working) award 0 marks.
		P1	Beryl: for $1 - \frac{3}{10} - \frac{1}{10} \left(= \frac{6}{10} = 60\% \right)$ “ ” or for finding $\frac{6}{10} \times 500 (= 300)$	
		P1	Charlie: for starting to use the ratio 3 : 4 e.g. $150 \div 3 (= 50)$	
		P1	for complete ratio process “ ” e.g. $\frac{150}{3} \times 4 (= 200)$	
		A1	cao	

Examiner comment

There were a number of ways through the question, any of which gains marks. Students who arrived at the key numbers of 112, 300 or 200 were awarded the process marks for implied process. Some students wrote these figures alongside the relevant text in the question.

Student response A

23 Costcorp sells packets of mints to shop owners.

On Monday three shop owners buy mints from Costcorp.

Each shop owner buys small packets, medium packets and large packets of mints.

Alan buys 400 packets of mints.

32% are small packets.

40% are large packets.

Beryl buys 500 packets of mints.

$\frac{3}{10}$ are small packets.

$\frac{1}{10}$ are large packets.

Charlie buys 150 small packets of mints so that

number of small packets : number of medium packets = 3 : 4

Work out the total number of medium packets of mints these shop owners buy.

You must show all your working.

Alan buys 400

32% of 400 =

10% = 40 × 3 = 120

20% = 40 × 2 = 80 = 120

40% = 160

10% = 40 × 4 = 160

Alan = 112 medium

Beryl = 500 packs

$\frac{3}{10}$ of 500 = 150 +

$\frac{1}{10}$ of 500 = 50 = 200

300 medium packs

Charlie = 150 (3 : 4 = 7

150 : ? = ?

200 medium packs

112 + 300 + 200 = 612

612.

5/5

Examiner comment

The student gave a perfect solution showing full working leading to the answer.

Student response B

23 Costcorp sells packets of mints to shop owners.

On Monday three shop owners buy mints from Costcorp.

Each shop owner buys small packets, medium packets and large packets of mints.

Alan buys 400 packets of mints.

32% are small packets.

40% are large packets. *288 medium.*

Beryl buys 500 packets of mints.

$\frac{3}{10}$ are small packets. *150*

$\frac{1}{10}$ are large packets. *50 300 medium.*

Charlie buys 150 small packets of mints so that

number of small packets : number of medium packets = 3 : 4 *medium = 400 200*

Work out the total number of medium packets of mints these shop owners buy.

You must show all your working.

$$32\% \text{ of } 400 = 40 + 40 + 40 + 8 = 128 = \text{small}$$

$$10\% = 40$$

$$40\% \text{ of } 400 = 160 = \text{large}$$

$$1\% = 4$$

$$160 + 128 = 288 \text{ medium.}$$

$$2\% = 8$$

$$300 + 288 + 200 = 788$$

788

3/5

Examiner comment

The working for Alan is incomplete (228 is not subtracted from 400), so the student was not awarded the first P1. The second P1 was awarded for the correct working for Beryl. A figure of 200 was shown for Charlie, which was accepted as implied correct method, so both the third and fourth P1 were awarded. The final answer is wrong, so the final mark could not be awarded.

Student response C

23 Costcorp sells packets of mints to shop owners.

On Monday three shop owners buy mints from Costcorp.

Each shop owner buys small packets, medium packets and large packets of mints.

Alan buys 400 packets of mints.
32% are small packets.
40% are large packets.

Beryl buys 500 packets of mints.
 $\frac{3}{10}$ are small packets.
 $\frac{1}{10}$ are large packets.

Charlie buys 150 small packets of mints so that

number of small packets : number of medium packets = 3 : 4

Work out the total number of medium packets of mints these shop owners buy.

You must show all your working.

Alan = 112 medium packets

400 packets total

10% of 400 = 40

1% = 4

$40 \times 3 = 120$

$4 \times 2 = 8$

$120 + 8 = 128$ Small packets

$40 \times 4 = 160$ Large packets

$160 + 128 = 288$ ~~1200 packets~~

$400 - 288 = 112$ medium packets.

~~112 + 300 + 84 = 496~~

Beryl = 300 medium packets

500 packets total

10% of 500 = 50

$50 \times 3 = 150$ small packets

$1 \times 50 = 50$ large packets

$150 + 50 = 200$

$500 - 200 = 300$ medium packets

Charlie = 84 medium packets

150 packets total

~~150~~ ~~150~~

~~150~~

$3 + 4 = 7$

$150 \div 7 = 21$

$21 \times 4 = 84$

84 medium packets

496

2/5

Examiner comment

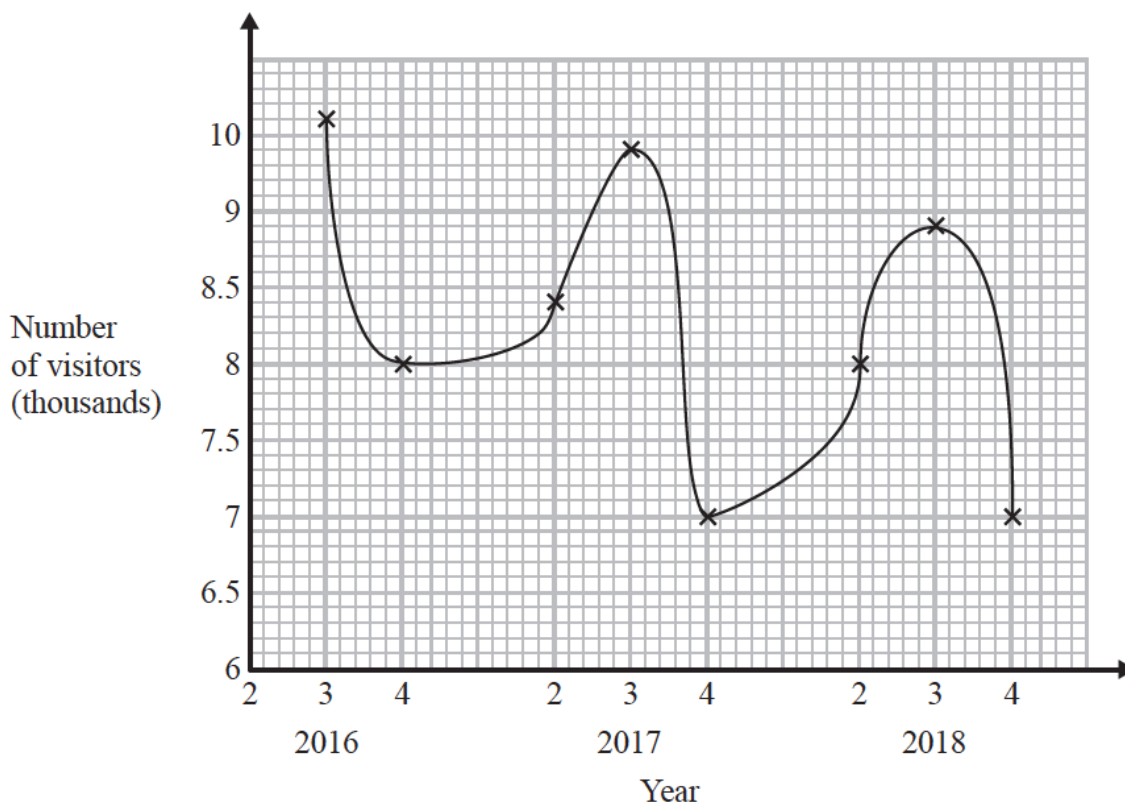
The first two P1 were awarded since the values calculated for Alan and Beryl were correct. However, the student was unable to do the correct ratio calculation, so gained no further marks.

Exemplar question 9

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Foundation tier Question 27 / Higher tier Question 4

- 27 Sean has drawn a time series graph to show the numbers, in thousands, of visitors to a fun park.



Write down two things that are wrong or could be misleading with this graph.

- 1
-
-
- 2
-
-

(Total for Question 27 is 2 marks)

Mean score: Foundation tier 0.59, Higher tier 1.00

Examiner comment

This question assessed objective 2.5b “critically evaluate a given way of presenting information”. Students needed to address issues that were wrong or misleading. As such, suggesting improvements did not answer the question (e.g. it does not necessarily need a title).

Mark scheme

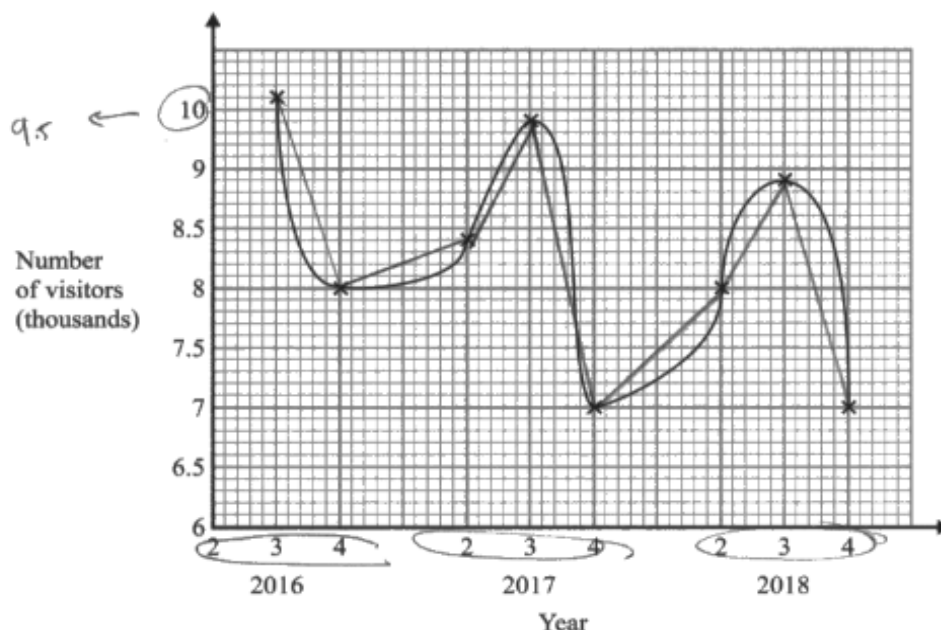
Question	Answer	Mark	Mark scheme	Additional guidance
27	statement	B2	Two different statements Acceptable e.g. should be joined with straight lines (not curve)/should use a ruler 1st (quarter) not shown/plotted/labelled/ not all quarters labelled does not show all 4 seasons 9.5 missing from vertical axes/not linear vertical (number) axis does not start at 0/the y axis starts at 6 the graph does not begin at 0, it starts at 6 it is not clear what 2, 3, 4 on the x-axis mean the scale of years doesn't make sense there is lack of clarity about what the numbers on the x axis represent graph is curved line Not acceptable e.g. no value plotted for 2 in 2016 it does not start at 0 (no reference to vertical axis)/missing 0 they should not have connected the dots like that the numbers on the x axis are repeated the numbers along the x axis 2, 3, 4 the years on the x axis have not been written properly does not follow a sequence it needs a discontinuity wiggle on the axis no title	Ignore additional statements provided no contradiction
	statement	(B1)	One statement e.g. from those above.)	

Examiner comment

A list of exemplar statements were given in the mark scheme. This was not a comprehensive list, but was provided to aid in making judgements as to whether an answer provided should get a mark.

Student response A

- 27 Sean has drawn a time series graph to show the numbers, in thousands, of visitors to a fun park.



Write down two things that are wrong or could be misleading with this graph.

- 1 at the Number of visitors it has to be 9.5 instead of 10.
- 2 The frequency polygon should be done with a ruler not with hand.
also the year is not so clear what do they mean by 234

2/2

Examiner comment

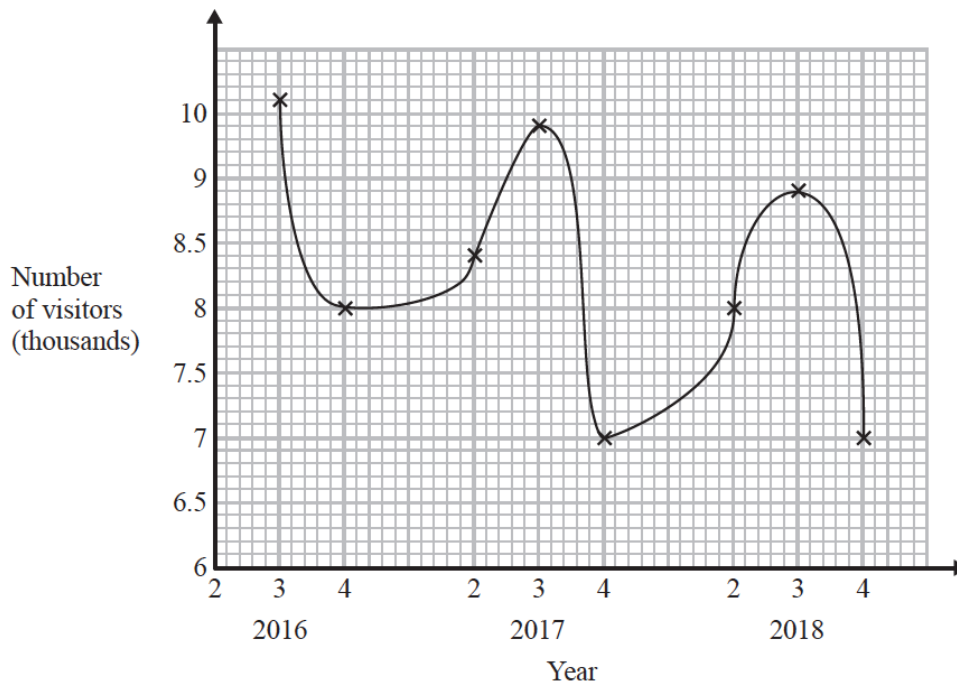
Both of these responses were acceptable for the two B1 marks.

The first response identified 9.5 as missing from the axis for the number of visitors.

The second response indicated that a ruler should be used; this was taken as indicating that the points should be joined with straight line segments. The last part of this response would also have got the mark, since it referred to the 2, 3, 4 on the x-axis (referenced by the year) not being clear.

Student response B

- 27 Sean has drawn a time series graph to show the numbers, in thousands, of visitors to a fun park.



Write down two things that are wrong or could be misleading with this graph.

1 the line is too curvy.

2 Only one straight line.

1/2

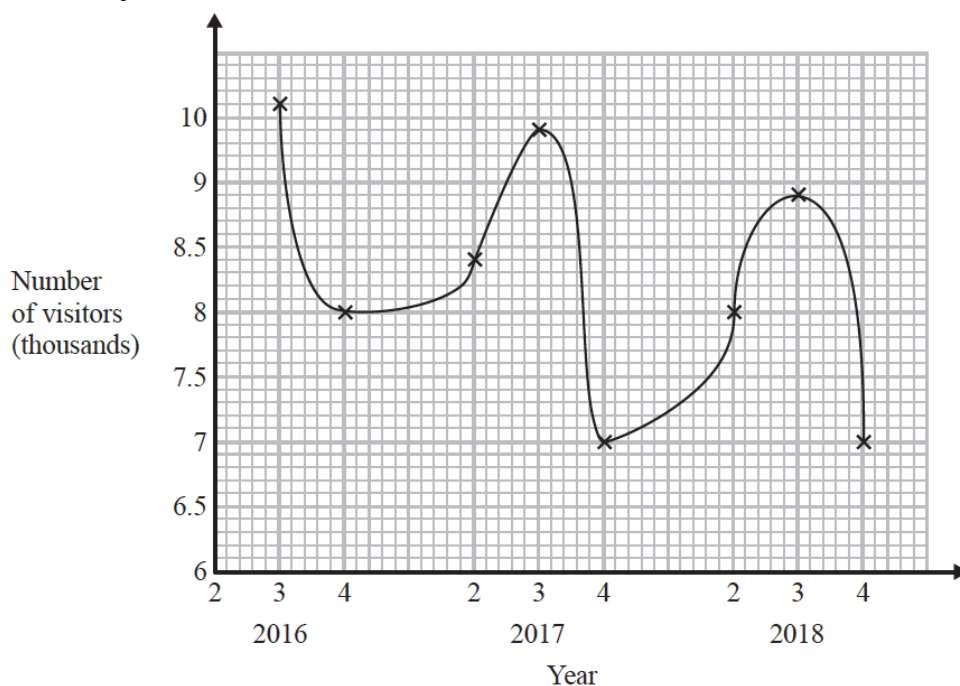
Examiner comment

The first response, “the line is too curvy”, was enough for the award of the first mark. This was considered equivalent to “graph is curved line”.

The second response, “only one straight line”, implied that they should be using straight lines. This would also have been worthy of a mark, but it was making the same point as the first statement, so could not be awarded the second mark.

Student response C

- 27 Sean has drawn a time series graph to show the numbers, in thousands, of visitors to a fun park.



Write down two things that are wrong or could be misleading with this graph.

1. it doesn't have a start or a finish
2. ~~it doesn't~~ The numbers don't start at zero.

0/2

Examiner comment

The first response was unacceptable: the student did not make clear what is meant; they could have been making the same point as the second response.

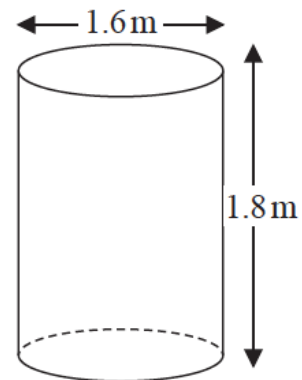
The second response was ambiguous: it would not be acceptable if it referred to the horizontal axis since this scale should not start at zero.

Exemplar question 10

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Foundation tier Question 29 / Higher tier Question 6

- 29 Jeremy has to cover 3 tanks completely with paint.
- Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 1.6 m and a height of 1.8 m.
- Jeremy has 7 tins of paint.
Each tin of paint covers 5 m^2
- Has Jeremy got enough paint to cover completely the 3 tanks?
You must show how you get your answer.



(Total for Question 29 is 5 marks)

Mean score: Foundation tier 0.55, Higher tier 2.66

Examiner comment

This problem-solving question assessed the ability of students to answer a multi-step question, in this case drawing on content that bridged several parts of the specification: Number, Ratio and Geometry.

Students found recall of the correct circle formulae a challenge. They also needed to differentiate between (surface) area and volume of the cylinder, ensuring that they worked with the area.

It was important for students to show their working legibly.

Mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
29	No Supported	P1	for finding the area of a circle e.g. $\pi \times 0.8^2 (= 2.01\dots)$	Must be area of circle and not part of a volume, e.g. $\pi r^2 h$ May be seen as $2\pi r^2$
		P1	for finding the curved surface area e.g. $2\pi \times 0.8 \times 1.8 (= 9.047\dots)$	May be seen from $2\pi r h$ or from $\pi d h$
		P1	for use of the coverage information with an area e.g. $"2.01\dots" \div 5 (= 0.402\dots)$ or $"4.02\dots" \div 5 (= 0.804\dots)$ or $"9.047\dots" \div 5 (= 1.8095\dots)$ or $"11.058" \div 5 (= 2.2116\dots)$ or $"13.069\dots" \div 5 (= 2.6138\dots)$ OR for process to find total coverage for comparison e.g. $5 \times 7 (= 35)$	Accept numbers without working written to no less than 2 dp Do not award if a volume has been used as part of the calculation An independent mark for 5×7
		P1	(dep P1) for finding total surface area for 3 tanks e.g. $[\text{total surface area}] \times 3 (= 39.2\dots)$ OR for complete process to find the number of tins needed for total area of 3 tanks e.g. $"13.069" \dots \times 3 \div 5 (= 7.84\dots)$ OR for complete process to find coverage needed from each tin e.g. $"13.069" \dots \times 3 \div 7 (= 5.6\dots)$	[Total surface area] must come from the addition of two attempts at area, but not from volume

Question	Answer	Mark	Mark scheme	Additional guidance
29 <i>continued</i>		C1	For conclusion “No” supported by accurate figures e.g. 8 tins or $7.84 (> 7)$ or $39.2 > 35$ or $5.6 (> 5)$	Clear statement that there is not enough paint supported by correct figures for comparison NB: $2.6 \times 3 = 9$ tins needed is inaccurate 8 or 7.84 tins is sufficient without restating the 7 5.6 m^2 is sufficient without restating the 5 but 39.2 and 35 are needed for comparison A statement of “No, 8 tins” alone gets 0 marks without supporting working

Examiner comment

The first two P1 marks were for recall of the correct circle formulae, which also needed substitution of correct values (e.g. radius instead of diameter). If the formula for area of a circle was subsequently converted into a volume by multiplication of 1.8 then this mark could not be given.

The third P1 could be awarded for division by 5, but not if volume had been used as part of the calculation (see additional guidance). But note that this mark could also be given for working out 5×7 (or sight of the number 35), which is an independent mark.

The fourth P1 was dependent on having gained at least one P1 previously, and could only be given where the total surface area was being used. Hence it needed to come after the addition of more than one area, but could be any area that the student thought was part of the surface area. A student who worked out the area 1.6×1.8 and added this to the area of the top met this criteria, and could then be awarded the mark for one of the calculations shown.

The final mark could only be awarded for a correct conclusion supported by accurate figures, that is with no error in the working. Note that an answer on its own would score 0 marks: students had to provide the supporting working.

Student response A

- 29** Jeremy has to cover 3 tanks completely with paint.

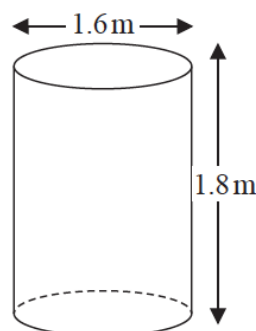
Each tank is in the shape of a cylinder with a top and a bottom. The tank has a diameter of 1.6 m and a height of 1.8 m.

Jeremy has 7 tins of paint.

Each tin of paint covers 5 m^2

Has Jeremy got enough paint to cover completely the 3 tanks?

You must show how you get your answer.



$$A = \pi r^2$$

$$Q = \pi d$$

$$1.6 \div 2 = 0.8$$

$$\begin{aligned} \pi \times 0.8^2 &= 2.010619298 && \text{top} \\ \times 2 &= 4.021238597 && \text{bottom} \end{aligned}$$

$$\text{middle} = \pi \times 1.6 = 5.026548246$$

$$= 9.047786842$$

$$+ 4021238597$$

$$= 13.06902544$$

$$\times 3 = 39.20707632$$

$$5 \times 7 = \underline{35 \text{ m}^2}$$

↑
Total Area.
of tanks.

No

5/5

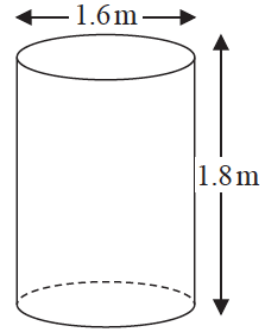
Examiner comment

The student has given a perfect solution, showing all the steps needed.

Student response B

29 Jeremy has to cover 3 tanks completely with paint.

Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 1.6 m and a height of 1.8 m.



Jeremy has 7 tins of paint.

Each tin of paint covers 5 m^2

Has Jeremy got enough paint to cover completely the 3 tanks?
You must show how you get your answer.

$$\frac{D}{m \times v}$$

$$\text{Area} = b \times h$$

$$A = \pi r^2$$

$$\begin{aligned} & \text{Diagram of a circle with diameter 1.6m} \\ & r = 0.8 \\ & \pi \times 0.8^2 = \pi \times 0.64 \\ & A = 2.010619298\pi \text{ m}^2 \end{aligned}$$

$$\begin{aligned} 1 \text{ tank} &= 2.010619298 \text{ m}^2 + 9.047786842 \text{ m}^2 \\ &= 11.05840614 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} 1 \text{ tin} &= 5 \text{ m}^2 \\ 7 \text{ tin} &= 35 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} 1 \text{ tank} &= 11.5840614 \\ 3 \text{ tank} &= 33.1752184 \end{aligned}$$

yes he has enough paint as 7 tins has 35 m^2 of paint and to cover 3 tanks is 33 m^2 .

4/5

Examiner comment

The student was awarded all the P1 marks for correct working for: the area of a circle (2.01...); the curved surface area (9.04...); $5 \times 7 (= 35)$; and [total surface area] $\times 3$. The total surface area was found by the addition of two attempts at area, that is 2.01... and 9.04... This is where the error occurred: the student failed to include two areas of circles, which was penalised in the final A1.

Student response C

29 Jeremy has to cover 3 tanks completely with paint.

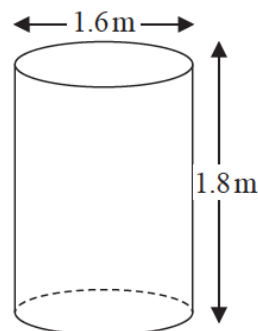
Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 1.6 m and a height of 1.8 m.

Jeremy has 7 tins of paint.

Each tin of paint covers 5 m^2

Has Jeremy got enough paint to cover completely the 3 tanks?

You must show how you get your answer.



$$1.6 \times 1.8 = 2.88$$

$$\pi \times d = 5.02 \text{ m}$$

$$\text{Circumference} = 5.02 \text{ m}$$

$$5.02 \times 1.8 = 9.03 \text{ m}^2$$

$$9.03 \times 3 = 27.1 \text{ m}^2$$

$$5 \times 7 = 35 \text{ m}^2$$

Yes, he has enough paint.

2/5

Examiner comment

The student made no attempt to find the area of a circle, so did not get the first P1. They did find the curved surface area ($\pi \times d \times 1.8$) by writing “circumference $\times 1.08$ ”, which is sufficient for the second P1, irrespective of the fact that the resulting figure of 5.02 is not quite right. The intention has been shown. They were awarded the third P1 for $5 \times 7 (= 35)$. However, they were not awarded the fourth P1, since it was for [total surface area] but their area figure was only one area, rather than the required minimum of two surfaces. The final answer was incorrect.