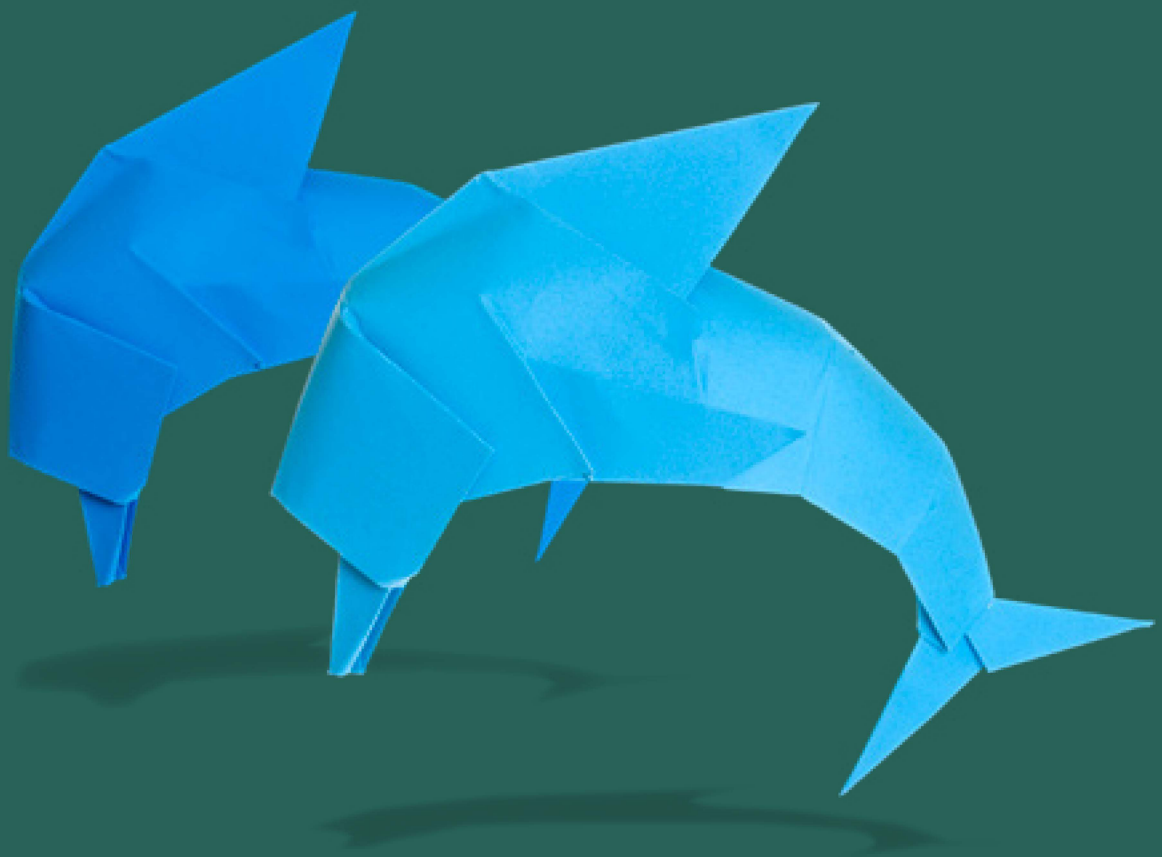
Pearson Edexcel

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

Mathematics (1MA1)



November 2021 - Exemplar

Student answers with examiner comments

Foundation

First certification 2017

Contents

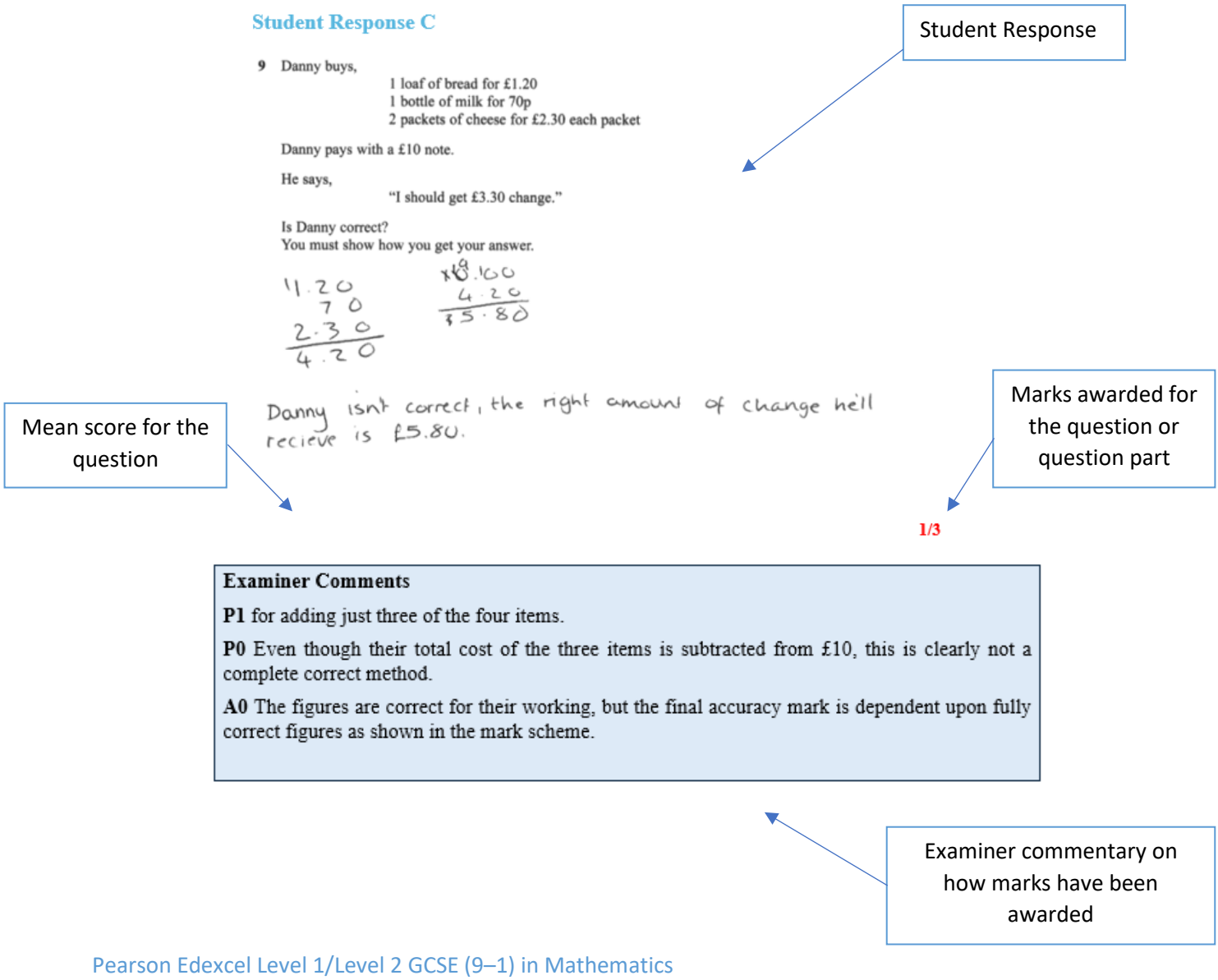
About this booklet

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 November 2021 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 November 2021 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.



Paper 1F (non – calculator)

Exemplar Question 1

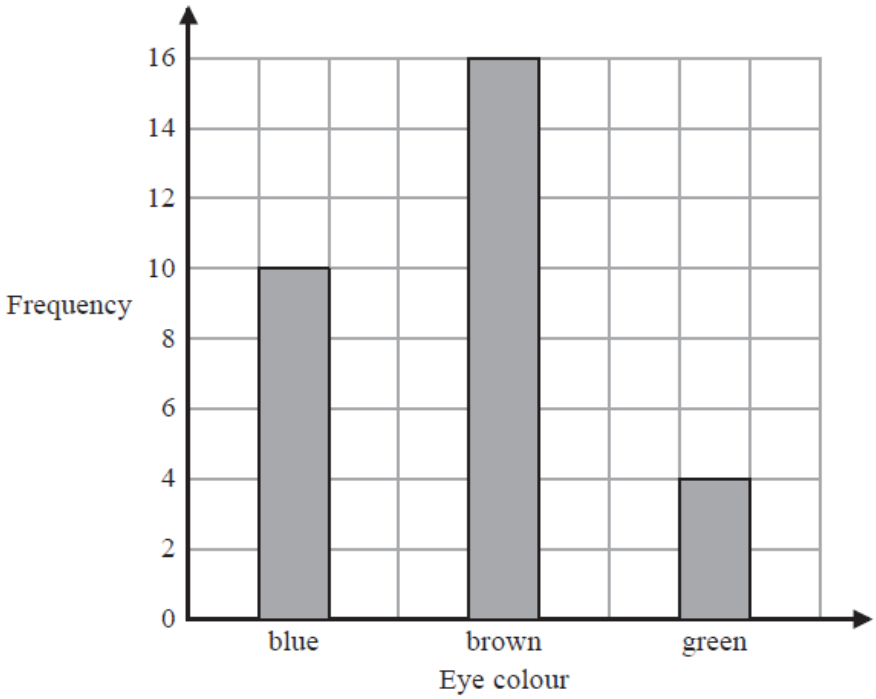
Foundation tier Paper 1

8 Grace recorded the eye colour of each of the students in her class.

The frequency table below shows her results.

Eye colour	Frequency
blue	10
brown	15
green	4

Grace then drew the bar chart below for this information.



Write down one thing that is wrong with this bar chart.

.....

.....

.....

(Total for Question 8 is 1 mark)

Mean Score: 0.94

Examiner Comments

The great majority of students were able to interpret the bar chart spotting the error in. Quantifying their response was not required.

Common incorrect responses included: 'no title on the bar chart', 'the x and y axes are not labelled' and 'the frequency axis should not go up in 2s'

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
8	Error identified	C1	error correctly identified **Acceptable examples** bar for brown is too high 16 should be 15 brown needs to be one less brown is wrong the graph does not match the table **Not acceptable examples** no title the gaps between the bars are wrong	

Mark Scheme

Examiner Comments

This mark scheme is quite generous in that it does not demand the student to quantify the actual error made, it is sufficient to explain that 'the thing wrong with this bar chart' is that the information given for the students with brown eye colour is incorrect.

Student Response A

Write down one thing that is wrong with this bar chart.

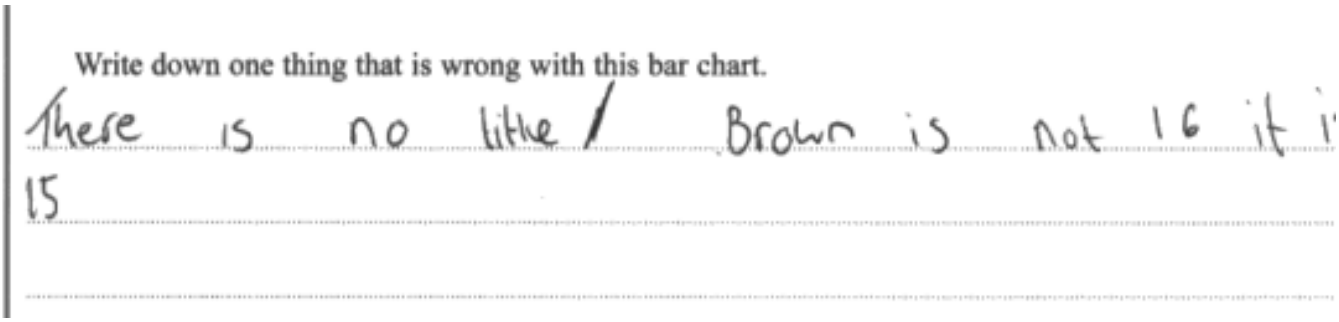
The brown eye colour bar is drawn to 16 not 15.

1/1

Examiner Comments

C1 is awarded for identifying the eye colour brown being at fault and quantifying their response by recognising that the frequency of 16 drawn should be 15

Student Response B


Write down one thing that is wrong with this bar chart.

There is no title / Brown is not 16 it is 15

1/1

Examiner Comments

C1 This is not seen as a choice of answer since "there is no title" does not contradict a correct response that "brown is not 16 it is 15"

Note: An answer alone of "there is no title" would not gain any credit, since having a title on a bar chart is not essential and therefore the absence of one is not a mistake.

Student Response C

Write down one thing that is wrong with this bar chart.

it goes up in 2's and is isn't in the 2x tables.

0/1

Examiner Comments

C0 This was a common incorrect response where the student believed that scaling the frequency axis in increments of two instead of one was a fault.

Exemplar Question 2

Foundation tier Paper 1

9 Danny buys,

1 loaf of bread for £1.20
1 bottle of milk for 70p
2 packets of cheese for £2.30 each packet

Danny pays with a £10 note.

He says,

"I should get £3.30 change."

Is Danny correct?
You must show how you get your answer.

(Total for Question 9 is 3 marks)

Mean Score: 2.47

Examiner Comments

Failure to gain full marks in this question was usually a result of considering just one packet of cheese instead of two. Students should read questions carefully then this sort of error can be avoided.

Far too often, arithmetical errors were made in either the addition of three or four items or in subtracting £6.50 from £10, £4.50 being a common incorrect value given.

Incorrect monetary notation is not penalised throughout all solutions as this is not being assessed.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
9	No with correct figures	P1	for 1.20 + 0.70 + 2.30 + 2.30 (= 6.5(0)) **or** for adding 3 correct costs **or** for 2 correct costs plus change **or** for 10 – 2 correct costs	Could work in £ or p for P marks Accept 2.30 + 2.30 (= 4.60) as 2 costs
		P1	for a complete correct method, eg 10 – "6.50" **or** 10 – 1.20 – 0.70 – 2.30 – 2.30 (=3.50) **or** 1.20 + 0.70 + 2.30 + 2.30 + 3.30 (=9.80)	Accept absence of "0" in pence column
		A1	for No with correct figures, eg 3.5(0) **or** 9.8(0)	

Examiner Comments

The first process mark is basically for dealing correctly with at least three of the values given. The second process mark is for a fully correct process that could lead to a correct answer. It must be noted that arithmetical errors are not penalised when awarding the process (P) marks; clearly accuracy marks will be lost later.

The final accuracy mark is awarded for a clear indication that £3.30 given in change is incorrect, supported by fully accurate working.

Student Response A

9 Danny buys,

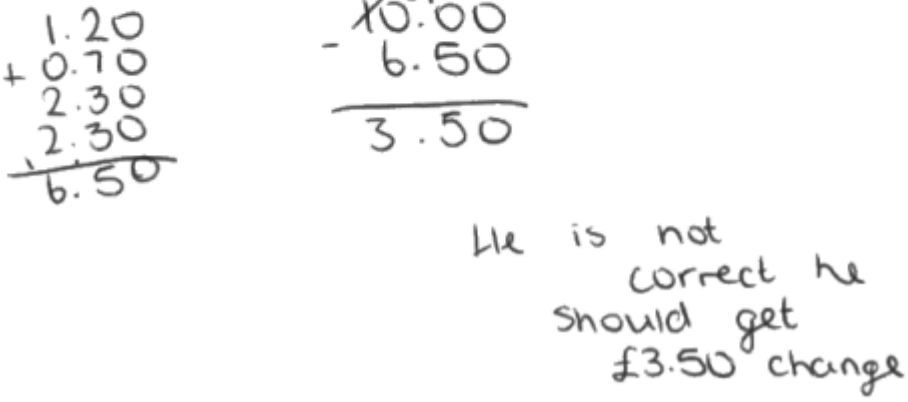
1 loaf of bread for £1.20
1 bottle of milk for 70p
2 packets of cheese for £2.30 each packet

Danny pays with a £10 note.

He says,

"I should get £3.30 change."

Is Danny correct?
You must show how you get your answer.



3/3

Examiner Comments

P1 for adding together the 4 items that Danny buys. The answer of 6.50 is correct but this is not required for the award of this mark.

P1 for subtracting their total cost of the 4 items (£6.50) from £10

A1 for a correct conclusion supported by fully correct arithmetic throughout.

Note: It is clear that this student is working in pounds; the actual £ sign is not required.

Student Response B

9 Danny buys,

1 loaf of bread for £1.20
1 bottle of milk for 70p
2 packets of cheese for £2.30 each packet
£4.60

Danny pays with a £10 note.

He says,

"I should get £3.30 change."

Is Danny correct?
You must show how you get your answer.

£10 − 4.60 = 6.40

6.40 − 70 = 5.70

5.70 − 1.20 = 4.50

~~+0.3.7~~

~~7 + 1.20 = 6.80~~

Danny is wrong

~~£6.80~~

~~[illegible]~~

2/3

Examiner Comments

P1 is awarded for sight of '£10 – 4.60' This is for subtracting two correct costs from £10 Note: the two correct costs can be for the costs of the two packets of cheese.

P1 for a fully correct method of subtracting 70p and then £1.20 giving a final amount of 4.50

A0 "Danny is wrong" is a correct conclusion, however it is not supported by correct arithmetic. The initial subtraction of 4.60 from 10 (giving 6.40) is incorrect and is the only error preventing the award of full marks.

Student Response C

9 Danny buys,

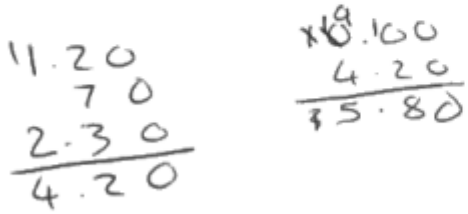
1 loaf of bread for £1.20
1 bottle of milk for 70p
2 packets of cheese for £2.30 each packet

Danny pays with a £10 note.

He says,

"I should get £3.30 change."

Is Danny correct?
You must show how you get your answer.



Danny isn't correct, the right amount of change he'll recieve is £5.80.

1/3

Examiner Comments

P1 for adding just three of the four items.

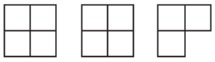
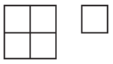
P0 Even though their total cost of the three items is subtracted from £10, this is clearly not a complete correct method.

A0 The figures are correct for their working, but the final accuracy mark is dependent upon fully correct figures as shown in the mark scheme.

Exemplar Question 3

Foundation tier Paper 1

11 The pictogram shows information about the number of video games sold in a shop on

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Key:
 represents 8 video games

(*a*) How many video games were sold on Monday?

.....

(1)

More video games were sold on Tuesday than on Wednesday.

(*b*) How many more?

.....

(2)

On Thursday and Friday, a total of 32 video games were sold in the shop.

$\frac{1}{4}$ of these 32 video games were sold in the shop on Thursday.

(*c*) Complete the pictogram for Thursday and Friday.

(3)

(Total for Question 11 is 6 marks)

Mean Scores:
Part (a) 0.98
Part (b) 1.52
Part (c) 2.35

Examiner Comments

Part (b) was not answered well with many students happy to count the complete symbol as 8 but then, in the part diagrams, counting the smaller squares as representing 1 video game giving 19 and 9 for Tuesday and Wednesday respectively. Some ignored the key entirely and just counted the small squares giving Tuesday as 11 and Wednesday as 5.

In part (c), there were very many correct solutions. Some reversed their diagrams for Thursday and Friday, some simply shared the 32 video games equally between the two days. Other errors were usually a result of arithmetical errors in finding one quarter of 32.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
11 (b)	12	M1	for 22 **or** 10 **or** (11 – 5) × 2 oe **or** 1.5 × 8 oe	If the scale is misread in part (a), allow ft marks in parts (b) and (c) for all marks provided consistently used.
		A1	cao	
(c)	Pictogram	C3	for Thursday = 8 drawn oe **and** Friday = 24 drawn oe	Some interpretation of shapes will be needed
		(C2	for Thursday = 8 drawn oe **or** for Friday = 24 drawn oe **or** Thursday = 8 **and** Friday = 24 **or** for Thursday = 24 drawn oe **and** Friday= 8 drawn oe)	
		(C1	for 32 ÷ 4 (= 8) **or** 32 ÷ 4 × 3 (= 24) **or** 32 ÷ 8 **or** for a total of 32 drawn for Thursday and Friday)	

Examiner Comments

(b) The method mark is awarded for correctly quoting the number of video games sold either on Tuesday (22) or Wednesday (10); only one correct value is required. Alternatively, the mark could also be earned for a complete correct method to find the actual difference.

(c) Here the demand is to "complete the pictogram for Thursday and Friday" and so, when marking this part of the question it is important to look initially at the pictogram for Thursday and Friday.

If both are correct, the full three marks are awarded.

If just one day is correct, two marks are awarded.

If the correct diagrams are reversed, two marks are awarded.

If both are incorrect, award one mark if the diagrams shown for Thursday and Friday total 32 video games.

If no marks have been awarded thus far, look at the working in the body of the script. Two marks are awarded if it is clear that Thursday = 8 and Friday = 24. If not, one mark is awarded for correct working showing the method to find one quarter or three quarters of 32 or for 32 ÷ 8 for an attempt to find the number of symbols required.

Student Response A

11 The pictogram shows information about the number of video games sold in a shop on Monday, on Tuesday and on Wednesday.

Monday	
Tuesday	22
Wednesday	10
Thursday	
Friday	

Key:
represents 8 video game

8, 16, 24, 32, 40, 48, 56, 64, 72 80,

(a) How many video games were sold on Monday?

16

(1)

More video games were sold on Tuesday than on Wednesday.

(b) How many more?

22 - 10 = 12

12

(2)

On Thursday and Friday, a total of 32 video games were sold in the shop.

$\frac{1}{4}$ of these 32 video games were sold in the shop on Thursday.

(c) Complete the pictogram for Thursday and Friday.

4 ÷ 32 = 8 8 x 1 = 8

32 - 8 = 24

(3)

5/5

Examiner Comments

Part (b) **M1** for either 22 (Tuesday) or 10 (Wednesday) shown on the diagram or in the working.
A1 for a correct answer of 12

Part (c) **C3** for a fully correct pictogram. There is no need to check the working in the body of the script since the pictogram has been completed correctly.

Student Response B

11 The pictogram shows information about the number of video games sold in a shop on Monday, on Tuesday and on Wednesday.

Monday	16
Tuesday	24
Wednesday	10
Thursday	8
Friday	26

Key: represents 8 video gam

(a) How many video games were sold on Monday?

16

(1)

More video games were sold on Tuesday than on Wednesday.

(b) How many more?

14

(2)

On Thursday and Friday, a total of 32 video games were sold in the shop.

$\frac{1}{4}$ of these 32 video games were sold in the shop on Thursday.

(c) Complete the pictogram for Thursday and Friday.

32 ÷ 4 = 8

8 - 32 = 26

(3)

3/5

Examiner Comments

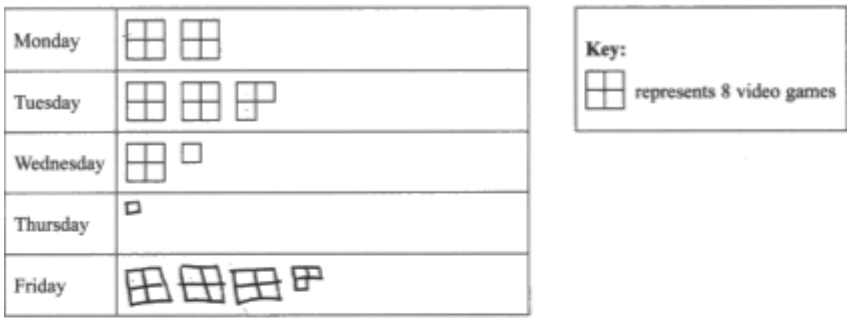
Part (b) **M1** for Wednesday = 10 on the pictogram

A0 for an incorrect answer since Tuesday = 24 is incorrect

Part (c) **C2** The pictogram shows a correct diagram for Thursday (= 8). Again, poor arithmetic, subtracting 8 from 32, prevents the award of full marks.

Student Response C

11 The pictogram shows information about the number of video games sold in a shop on Monday, on Tuesday and on Wednesday.



(a) How many video games were sold on Monday?

16.

(1)

More video games were sold on Tuesday than on Wednesday.

(b) How many more?

22 - 16 = 6

6.

(2)

On Thursday and Friday, a total of 32 video games were sold in the shop.

$\frac{1}{4}$ of these 32 video games were sold in the shop on Thursday.

(c) Complete the pictogram for Thursday and Friday.

32 ÷ 4 = 8 ÷ 4 = 2

2/5

Examiner Comments

Part (b) **M1** for 22 (Tuesday)

A0 for an incorrect answer since 16 (Wednesday) is incorrect.

Part (c) **C1** The diagrams drawn on the pictogram are incorrect, but the total shown for Thursday and Friday does equate to 32. Alternatively, this mark could have been given for 32 ÷ 8

Exemplar Question 4

Foundation tier Paper 1

12 There are two drama groups in a school.

In one group there are 36 boys and 48 girls.

In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls.

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?
You must show how you get your answer.

(Total for Question 12 is 3 marks)

Mean Score: 0.64

Examiner Comments

This question was very poorly answered with only a few understanding what was being asked in the question. Many did not realise that they had to find the ratio of boys to girls for each of the two drama groups. A common approach was to find 3/7 and in some cases 4/7 of 84 (36 + 48) concluding that there were 36 boys and 48 girls also in the second group and therefore Ann must be correct. This was not enough to get full marks without ratios (or fractions) being considered. Very few wrote 3/7 : 4/7 for the second group. Those that did usually went on to gain full marks.

Many students found it difficult to make it clear which group their working was referring to.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
12	Yes, supported by correct working	P1	for 36 : 48 oe **OR** $\frac{36}{84}$ oe **or** $\frac{48}{84}$ oe	Relating to drama group 1
		P1	for $\frac{4}{7}$ **or** 3 : 4 oe (for group 2) **OR** $(\frac{36}{84}=\frac{3}{7})$ **or** $(\frac{48}{84}=\frac{4}{7})$ **or** 84 × 3 ÷ 7 (= 36 boys) **or** 84 × 4 ÷ 7 (= 48 girls) **or** N × 3 ÷ 7 and N × 4 ÷ 7	Relating to drama group 2 N can be any number (other than 84) of students in the 2nd group
		A1	for Yes with both ratios 3 : 4 oe **or** for a correct pair of fractions and stating they are equivalent.	Both equivalent forms of the ratios (fractions) must be the same "Yes" may be implied from working

Examiner Comments

To gain full marks, it is important for the student to show a ratio of boys to girls for **both** groups usually reduced to 3 : 4. Alternatively the ratios can be given as fractions, usually showing the fraction of boys in group 1 being 3/7.

The two process marks are independent of each other and the order of the award depends upon which drama group is considered first.

Student Response A

12 There are two drama groups in a school.

In one group there are 36 boys and 48 girls.

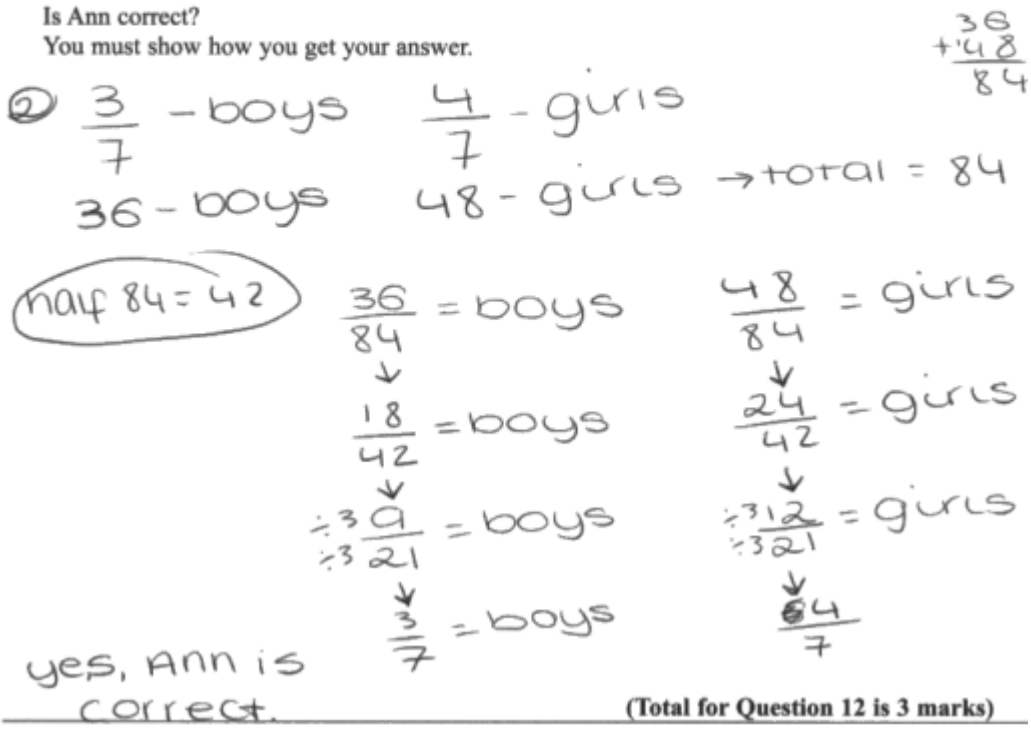
In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls.

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?

You must show how you get your answer.



(Total for Question 12 is 3 marks)

3/3

Examiner Comments

P1 This solution starts with the second drama group and the award is made for sight of 4/7. We don't have to see the working 1 – 3/7

P1 Although we are not explicitly told that the first drama group is now being considered, 36/84 and 48/84 make it clear that this is the case. The process mark is awarded for either, even though 36/84 is sufficient.

A1 36/84 is then shown to be equal to 3/7 and with the correct conclusion stated, the final accuracy mark is scored.

Student Response B

12 There are two drama groups in a school.

In one group there are 36 boys and 48 girls.

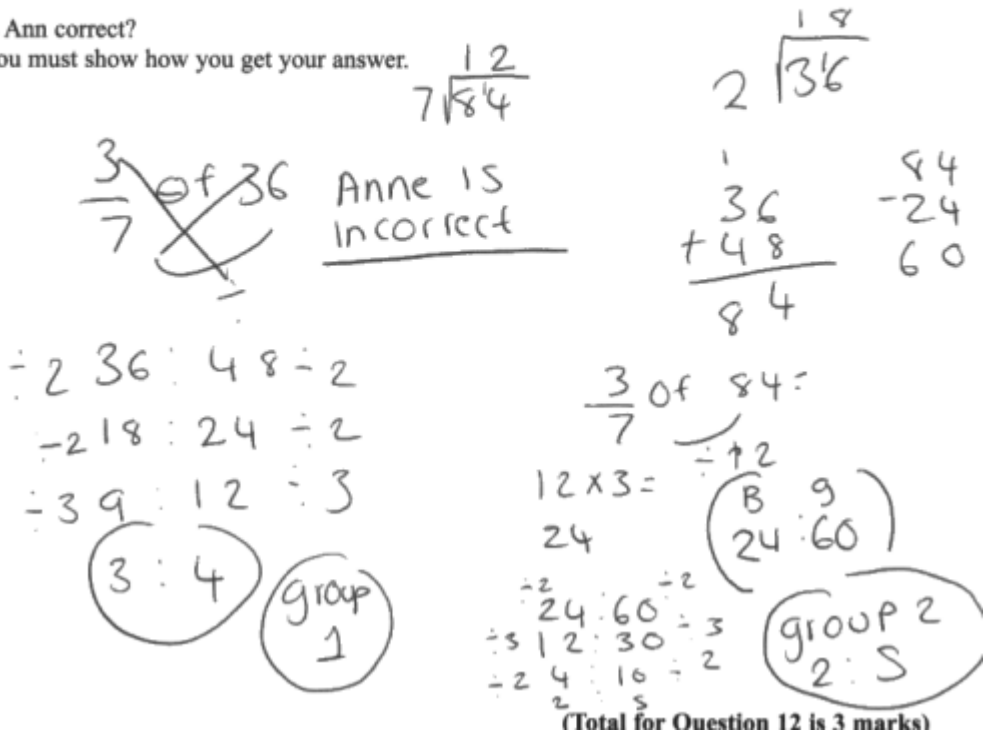
In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls.

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?

You must show how you get your answer.



(Total for Question 12 is 3 marks)

2/3

Examiner Comments

P1 Here it is clear which working that relates to each of the two groups. 36 : 48 for the first group gets this award.

P1 Working on the second group. A correct method to find a number of boys, 3/7 of 84 (this could have been any number) and subsequently a number of girls gets the second process mark. An arithmetical error in multiplying 12 by 3 results in an incorrect ratio for this second group.

A0 Even though a correct conclusion is drawn from their incorrect figures.

Student Response C

12 There are two drama groups in a school.

In one group there are 36 boys and 48 girls.

In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls.

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?
You must show how you get your answer.

g1 = B 36 G 48

g2 = B $\frac{3}{7}$ = 36 G $\frac{4}{7}$ = 48

36 + 48 = 84

84 ÷ 7 = 12

7 | 84 (12)

$\frac{1}{7}$ = 12

Ann is right

12 × 3 = 36

12 × 4 = 48

(Total for Question 12 is 3 marks)

1/3

Examiner Comments

P0 since for the first drama group, no ratio or fraction is given.

P1 3/7 of 84 is shown to be equal to 36 and gains this process mark. This could have been awarded for sight of 4/7. The student now believes that there are 36 boys and 48 girls in the second drama group. This is not true and even though "Ann is right" is a correct conclusion, there is insufficient evidence to support this.

A0 No ratios or fractions are seen to be able to make a comparison.

Exemplar Question 5

Foundation tier Paper 1

14 3 kg of carrots cost £1.80
2 kg of carrots and 5 kg of potatoes cost a total of £3.45

Work out the total cost of 4 kg of carrots and 2 kg of potatoes.
You must show all your working.

£.....

(Total for Question 14 is 4 marks)

Mean Score: 2.21

Examiner Comments

Most students were able to calculate the cost of one kilogram of carrots by dividing £1.80 by 3 and subsequently secure a second mark for working out the cost of four kilograms. Problems arose when trying to work out the cost of one kilogram of potatoes. Many subtracted £1.80 (instead of £1.20) from £3.45 and then divided by 5. Some subtracted £1.20 but then made an arithmetical error, usually resulting in a value of £2.20 giving 44p as the cost of one kilogram of potatoes. A considerable number ignored the 2kg of carrots and divided 3.45 by 5 to find the cost of 1 kg potatoes as 69p. This gained no credit.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
14	3.3(0)	P1	for a process to find cost of 1 kg of carrots, eg 1.80 ÷ 3 (= 0.60)	Could work in £ or p for P marks Condone incorrect money notation
		P1	for a start to a process to find cost of 1kg of potatoes, eg 3.45 – 2 × "0.60" (= 2.25) **or** (1.80 + 3.45) ÷ 5 (= 1.05) **OR** for a process to find the cost of 4 kg of carrots, eg "0.60" × 4 (= 2.40)	1 kg of potatoes = (£)0.45 or 45p
		P1	(dep on P2) for a complete process to find the cost of 4 kg of carrots **and** the cost of 2 kg of potatoes, eg "0.60" × 4 (= 2.40) **and** ("2.25" ÷ 5) × 2 (= 0.90) **or** "0.60" × 4 (= 2.40) **and** ("1.05 – "0.60") × 2 (= 0.90)	
		A1	cao	Award 0 marks for a correct answer with no supportive working.

Examiner Comments

The first process mark is for dividing £1.80 by 3 to determine the cost of 1 kg of carrots.

The second process can be gained independent of the first by the alternative approach shown in the mark scheme. However, it is more usually awarded for using their cost of 4 kg of carrots (= £2.40).

The third process mark is dependent upon the first two being earned. It must be noted here that this can be awarded for the cost of 4 kg of carrots and the cost of 2 kg of potatoes. These maybe seen in discrete calculations; there is no requirement to find the sum at this stage.

Students may work in £ or p or even in mixed units if their processes are clear.

Student Response A

14 3 kg of carrots cost £1.80
2 kg of carrots and 5 kg of potatoes cost a total of £3.45

Work out the total cost of 4 kg of carrots and 2 kg of potatoes.
You must show all your working.

£1·80 ÷ 3kg carrots 1.80 ÷ 3 = 60
1kg carrots = £0.60

£3.45 − £1.20 = £2.25
5kg potatoes £2.25 £2.25 ÷ 5 = £0.45
1 kg potatoes = £0.45

4 kg carrots 4 × £0.60 = £2.40 −
2kg potatoes 2 × £0.45 = £0.90 −

£2.40
0.90 +
3.30

£3.30

4/4

Examiner Comments

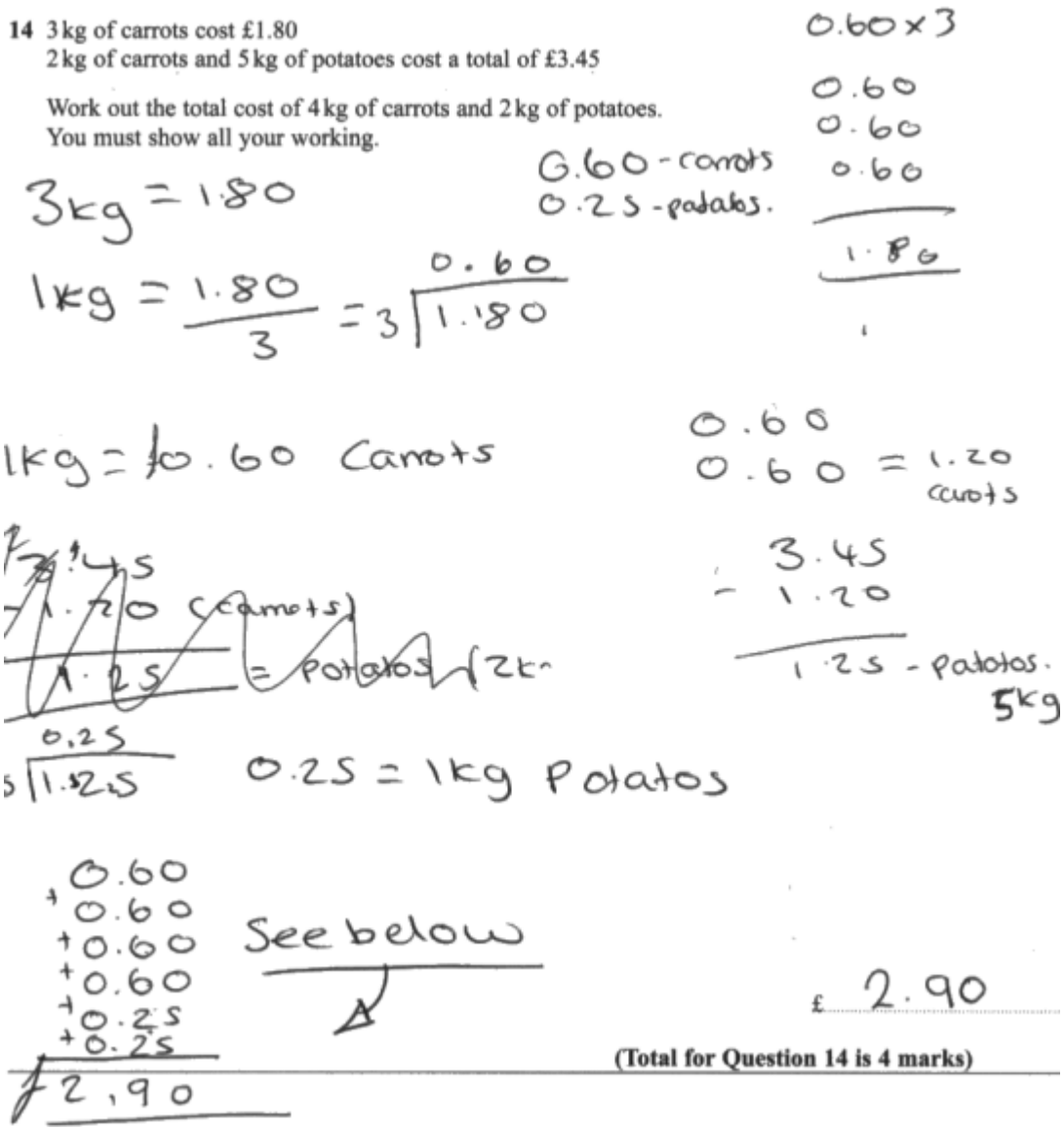
P1 This is a very typical fully correct solution, finding the cost of 1 kg of carrots for the first mark.

P1 for correctly starting a process to find the cost of 1 kg of potatoes; sight of 3.45 – 1.20 is sufficient for this. This mark could also have been awarded for 4 × £0.60, the cost of 4 kg of carrots.

P1 for 4 × £0.60 and 2 × £0.45

A1 for a correct answer from fully correct working.

Student Response B



3/4

Examiner Comments

P1 for 1.80 divided by 3

P1 for 3.45 – 1.20. An arithmetical error, of subtracting 1 from 3, results in an incorrect cost of 1 kg of potatoes.

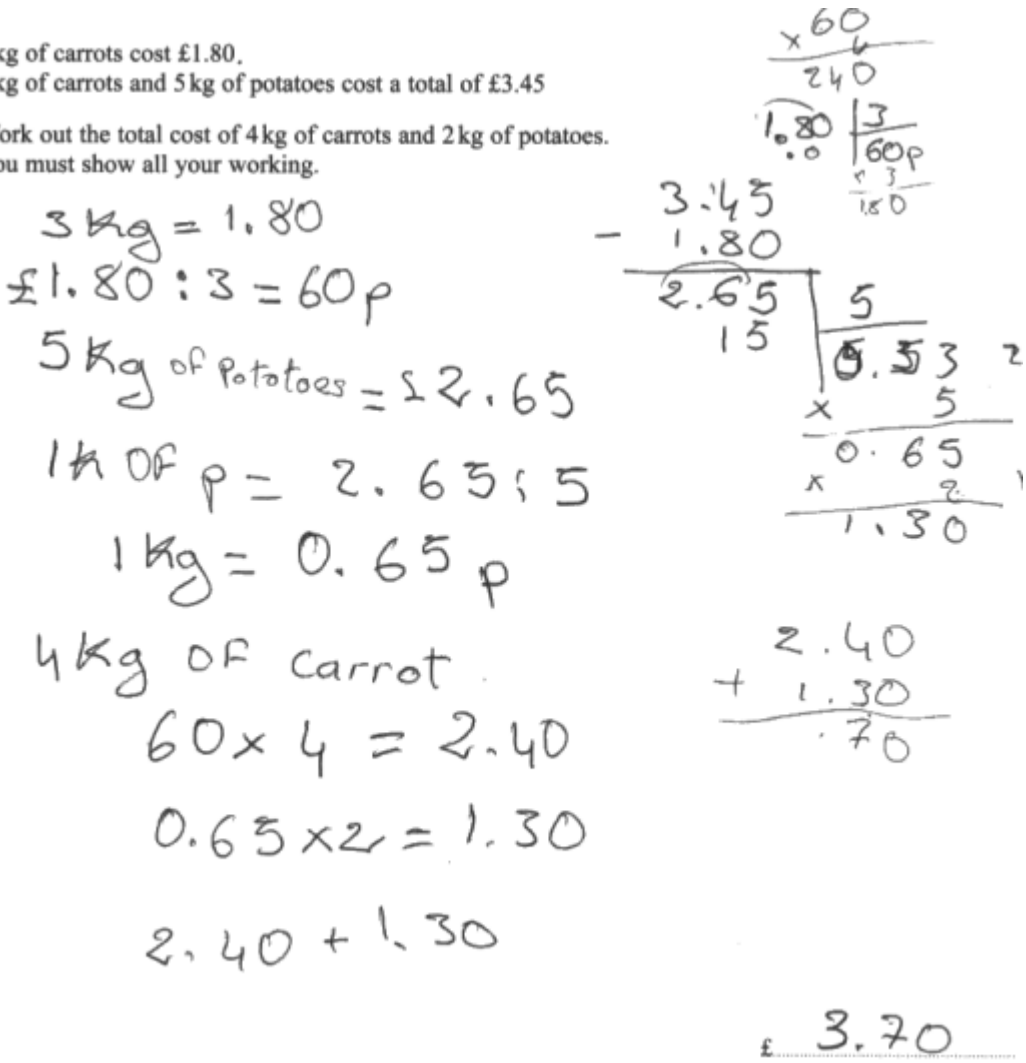
P1 The process is fully correct and but for the previous error, a fully correct solution would have been possible.

A0 as the answer is correct answer only (cao).

Student Response C

14 3 kg of carrots cost £1.80.
2 kg of carrots and 5 kg of potatoes cost a total of £3.45

Work out the total cost of 4 kg of carrots and 2 kg of potatoes.
You must show all your working.



2/4

Examiner Comments

P1 for 1.80 divided by 3

P1 Here we see a very common error in subtracting 1.80 from 3.45 instead of 1.20 (cost of 2 kg of carrots). This mark is awarded for 60 × 4 to find the cost of 4 kg of carrots.

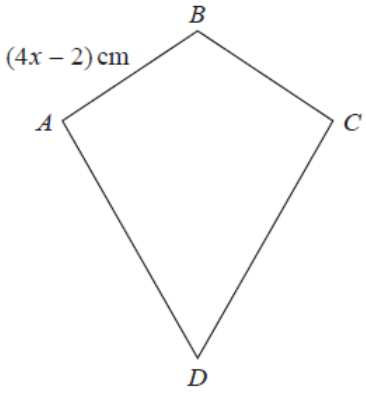
P0 Even though P2 has been awarded, no further credit is given as the process to find the cost of 1 kg of potatoes was incorrect.

A0 as the answer is correct answer only (cao).

Exemplar Question 6

Foundation tier Paper 1

16 *ABCD* is a kite.



$AB = (4x - 2)$ cm

Jasper says that x could be 0.5

(*a*) Explain why Jasper cannot be correct.

.....

.....

.....

(1)

$AD = 3AB$
The kite has a perimeter of 64 cm.

(*b*) Find the value of x.

$x =$.....

(3)

(Total for Question 16 is 4 marks)

Mean Scores

Part (a) 0.15

Part (b) 0.16

Examiner Comments

In part (a), it is expected that the value of x is substituted into the expression for AB, resulting in a value of zero which is clearly impossible. However, many argued that Jasper was not correct because x could not be a decimal. The few who did substitute $x = 0.5$ into the given expression usually got the right idea and correctly explained the error.

Only a very small minority gained any credit in part (b). Use of algebra was very nearly non-existent, preferring instead to attempt numerical methods which were generally doomed to failure.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	Explanation	C1	for explanation, eg AB cannot be zero (cm) **or** shows AB to be zero, eg $4 \times 0.5 - 2 = 0$	Accept say 'AB would then be 0'
(b)	2.5	P1	for a correct expression for AD, eg $3(4x - 2)$ **or** $12x - 6$ **OR** $2(3AB + AB) = 64$ oe **or** $3AB + AB = 32$ oe **or** $AB = 8$ **OR** for an equation with mixed variables, eg. $6AB + 2(4x - 2) = 64$	May be seen on diagram
		P1	for forming a correct equation in x, eg $4x - 2 + 4x - 2 + 3(4x - 2) + 3(4x - 2) = 64$ **or** $4x - 2 = 8$ **or** $4x - 2 + 3(4x - 2) = 32$	
		A1	cao	

Examiner Comments

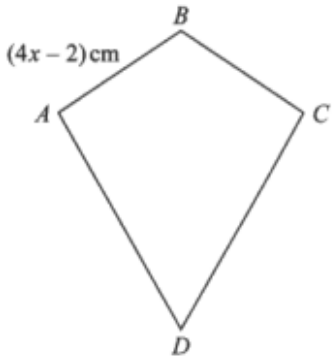
In part (a) it is acceptable to simply see the substitution leading to a value for $AB = 0$.

In part (b), expressions of $3(4x - 2)$ or $12x - 6$ are often seen only on the diagram; it is therefore important not just to look at the working in the working space. Note that for the first process mark, an expression can have a mixture of algebraic terms.

Whilst the first process mark is quite generous in the alternative possibilities, the second mark must see the derivation of a correct equation in x.

Student Response A

16 $ABCD$ is a kite.



$AB = (4x - 2)$ cm

$x = 0.5$ $(4 \times 0.5) - 2 = 2 - 2 = 0$

Jasper says that x could be 0.5

(a) Explain why Jasper cannot be correct.

Jasper cant be correct as the lengh of AB cannot be 0.

(1)

$AD = 3AB$

The kite has a perimeter of 64 cm.

(b) Find the value of x.

~~x = 0.5 (4x0.5) - 2 = 2 - 2 = 0~~

AD = 3AB , CD = 3AB , BC = AB , AB

3AB + 3AB + AB + 8AB

8AB = 64cm AB = 8cm

4x - 2 = 8, 4x = 10 x = 2.5

$x =$ 2.5

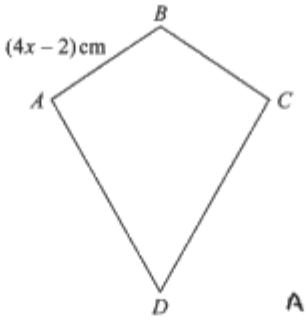
(3)

4/4

Examiner Comments	
Part (a)	**C1** for a complete solution, showing the substitution leading to a value of zero. Here we also see a correct explanation.
Part (b)	**P1** for $8AB = 64$ **P1** for the equation $4x - 2 = 8$ **A1** for a correct answer of 2.5

Student Response B

16 *ABCD* is a kite.



AB = 4 × 0.5 − 2 = 0

$AB = (4x - 2)$ cm

Jasper says that x could be 0.5

(a) Explain why Jasper cannot be correct.

THE EQUATION IS '4 TIMES x − 2', IF x = 0.5, THE SUM WILL BE AB = 2 − 2, WHICH IS ZERO. THE LENGTH OF AB CANNOT BE ZERO.

(1)

$AD = 3AB$

The kite has a perimeter of 64 cm.

(b) Find the value of x.

64 ÷ 2 = 32 (SAME SIDE)

32 ÷ 4 = 8

AB = $\frac{1}{4}$ = 8

AD = $\frac{3}{4}$: 24 (3 × AB).

AB = 2.5 × 4 = 10 − 2

AD = 3 × AB (3 × 8)

x = 8

(3)

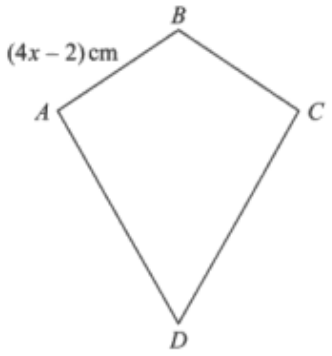
3/4

Examiner Comments

Part (a)
C1 for a fully correct explanation supported by correct algebra.
Part (b)
P1 for AB = 8
P1 Here we see the correct answer of 2.5 embedded in their working: AB = 2.5 × 4 = 10 from which 2 is then subtracted for their know value of AB (8)
A0 since the correct answer seen is then contradicted by the answer given on the answer line.

Student Response C

16 *ABCD* is a kite.



$AB = (4x - 2)$ cm

Jasper says that x could be 0.5

(a) Explain why Jasper cannot be correct.

(4x - 2) cm 4 × 0.5 - 2 = Because values of a kite cannot be less than 1

(1)

$AD = 3AB$

The kite has a perimeter of 64 cm.

(b) Find the value of x.

AD = 3AB = 3 × (4x - 2) cm

3(4x - 2)

12x - 6

12 × 7 = 84

12 × 6 = 72

12 × 5 = 60

72 - 6 =

$x =$ .....

(3)

1/4

Examiner Comments
Part (a)
C0 Correct substitution is seen but there is no completion of their calculation, so no mark is awarded.
Part (b)
P1 for $3 \times (4x - 2)$
A0 since there is no attempt to move forward.

Exemplar Question 7

Foundation tier Paper 1

17 Heidi wants to make some biscuits using this recipe.

Makes 12 biscuits
125 g butter 200 g flour 50 g sugar

Heidi thinks that she has,

500 g butter
700 g flour
250 g sugar

Assuming that these weights are correct,

(*a*) work out the greatest number of biscuits Heidi can make.
You must show all your working.

.....

(4)

Heidi is wrong.
She has more than 250 g of sugar.

(*b*) Does this affect the greatest number of biscuits Heidi can make?
Give a reason for your answer.

…….....

(1)

(Total for Question 17 is 5 marks)

Mean Scores: Part (a) 2.01
Part (b) 0.28

Examiner Comments

Whilst the context of this question was not unfamiliar, the majority of students worked purely on complete batches of 12 biscuits in part (a), not realising that additional biscuits could be made from the remaining ingredients. Consequently, an answer of 36 was the modal answer given, gaining 3 of the 4 marks available for a correct process. A variety of processes were seen in determining the greatest number of biscuits (or batches), build-up methods being most prominent. Very few set out to find the amount of each ingredient required to make just one biscuit. Those that did, found it difficult to deal with the fractions involved to complete the process.

In part (b) it was important to identify 'flour' as the only critical ingredient preventing more biscuits (or batches) being made.

Mark Scheme

Question	Answer	Mark	Mark scheme
17 (a)	42	P1	for a correct start to the process by finding the number of batches for one ingredient, eg 500 ÷ 125 (= 4) **or** 700 ÷ 200 (= 3.5 or 3) **or** 250 ÷ 50 (= 5) **OR** for a correct start to building up number of batches of **all** ingredients, eg. (24 biscuits or 2 batches =) 250 (butter), 400 (flour) and 100 (sugar) **OR** for a start to the process by finding the amount of one ingredient needed to make 1 biscuit, eg 125 ÷ 12 (= $10\frac{5}{12}$) **or** 200 ÷ 12 (= $16\frac{8}{12}$) **or** 50 ÷ 12 (= $4\frac{2}{12}$)
		P1	for a correct process to find the number of batches for all 3 ingredients, eg 500 ÷ 125 (= 4) **and** 700 ÷ 200 (= 3.5 or 3) **and** 250 ÷ 50 (= 5) **OR** for a build-up process reaching a point where there is not enough of one ingredient, eg. (36 biscuits or 3 batches =) 375 (butter), 600 (flour) and 150 (sugar) **or** (48 biscuits or 4 batches =) 500 (butter), 800 (flour) and 200 (sugar) **OR** for a correct process to find the amount of each ingredient needed to make 1 biscuit, eg 125 ÷ 12 (= $10\frac{5}{12}$) **and** 200 ÷ 12 (= $16\frac{8}{12}$) **and** 50 ÷ 12 (= $4\frac{2}{12}$)
		P1	(dep on P2) for a process to find the number of biscuits, eg "4" × 12 (= 48) **or** "3.5" × 12 (= 42) **or** "3" × 12 (= 36) **or** "5" × 12 (= 60) **OR** (dep on P2) for (700 – 600) ÷ 200 × 12 (= 6) or "3" × 12 (= 36) **OR** (dep on P2) for a process to find the number of biscuits, eg 500 ÷ "$10\frac{5}{12}$" (= 48) **or** 700 ÷ $16\frac{8}{12}$ (= 42) **or** 250 ÷ "$4\frac{2}{12}$" (= 60)
		A1	cao

Question	Answer	Mark	Mark scheme
(b)	Explanation	C1	(dep on P3) for a correct explanation, ft (a) for the critical ingredient identified **Acceptable examples** No, since flour is the critical value No, since flour gives you the least number of batches No since she needs more flour to make more biscuits. **Not acceptable examples** Yes … No (no reason given) No, since we would need more of the other ingredients too

Examiner Comments

The first two process marks, in part (a), relate directly to the challenge of working out the number of batches (or part batches) that can be made using the ingredients available. Build-up methods are acceptable, but repeated subtraction must go further than just finding the amount of ingredients left after making just one batch; at least two are required for the award of the first process mark.

The third process mark is dependent upon the award of the first two and is for a correct process to find the number of biscuits that can be made. For solutions were only complete batches of 12 are considered, $3 \times 12 = 36$ is sufficient for this mark.

For the award of the final accuracy mark, the answer must be 42.

In part (b) the communication mark is dependent upon the award of all three process marks in (a). This is generally for identifying the need for more flour, but it can be awarded following through the student's correct identification of their critical ingredient.

Student Response A

(a) work out the greatest number of biscuits Heidi can make.
You must show all your working.

4 lots butter.

125 + 125 = 250 × 2 = 500

200 × 3 = 600 + 100 6 biscuits

50g × 5 = 250g

12
24
36 + 6 = 42.

42

(4)

Heidi is wrong.
She has more than 250 g of sugar.

(b) Does this affect the greatest number of biscuits Heidi can make?
Give a reason for your answer.

No, because ~~She's~~ She has no more flour left.

(1)

5/5

Examiner Comments

Part (a)

P1 for calculating the number of batches that can be made from just one of the ingredients. Here this is achieved by a build-up approach, eg. 125 + 125 = 250 × 2 = 500 giving '4 lots' (batches)

P1 for using the same method correctly for all three ingredients

P1 for working out the greatest number of biscuits that can be made. Here the student identifies that flour is the critical ingredient and just works out the number of biscuits that there is enough flour for.

A1 for a correct answer.

Part (b)

C1 for again identifying flour as the critical ingredient.

Student Response B

(a) work out the greatest number of biscuits Heidi can make.
You must show all your working.

B 500g = 125 x 4
F 700g = 200 x 3
S 250g = ~~250 x~~ 50 x 5

12 x 3 = 36

36 biscuits

(4)

Heidi is wrong.
She has more than 250 g of sugar.

(b) Does this affect the greatest number of biscuits Heidi can make?
Give a reason for your answer.

no because their isnt enough flour

(1)

4/5

Examiner Comments

Part (a)
Here the student believes that only complete batches of 12 biscuits are required.
P1 for, say 500 = 125 × 4 clearly implying division of 500 by 125
P1 for correctly working out the number of batches for each ingredient.
P1 for 12 × 3 = 36
A0 since the answer is correct answer only of 42

Part (b)
C1 for identifying flour as the critical ingredient.

Student Response C

(a) work out the greatest number of biscuits Heidi can make.
You must show all your working.

500g 125g
700g 200g = 12 biscuits
250g 50g

most she can make is 5 lots of 12 cookies

12 x 5 = 60

60 cookies.

(4)

Heidi is wrong.
She has more than 250 g of sugar.

(b) Does this affect the greatest number of biscuits Heidi can make?
Give a reason for your answer.

yes as sugar is her lowest amount of an ingredient, if she had more sugar she could make more cookies.

(1)

1/5

Examiner Comments

Part (a)

P1 for 50g × 5 linked to 250g (of sugar)

P0 P0 Unfortunately, the student does not apply the same process to the other ingredients, and so no more marks are available.

A0 incorrect answer.

Part (b)

C0 An answer of 'Yes' is always going to gain no mark.

Exemplar Question 8

Foundation tier Paper 1

20 (*a*) Work out 3.67 × 4.2

.....

(3)

(*b*) Work out 59.84 ÷ 1.6

.....

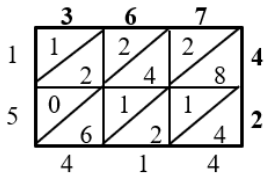
(3)

(Total for Question 20 is 6 marks)

Mean Scores: **Part (a) 0.94**
Part (b) 0.48

Examiner Comments
Fully complete and correct solutions of this long multiplication of two decimal numbers in part (a) were scarce. With whichever method adopted, students need to be aware that initially ignoring the decimal points and multiplying, in this case, 367 by 42, gives them a greater chance of success. Far too many students made place value errors in their chosen method largely by trying to include the decimal parts in their calculation.
In part (b), again fully correct solutions were few and far between. Simply dividing 59 by 16 was too great a demand for many.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
20 (a)	15.414	M1	for a complete method with relative place value correct including an intention to add all the appropriate elements of the calculation eg, 2 lines of the 1st method, internal numbers of grids, or complete structure shown of partitioning methods.	14680 734 15414  | | 300 | 60 | 7 | | 40 | 12000 | 2400 | 280 | | 2 | 600 | 120 | 14 | 12000 + 2400 + 280 + 600 + 120 + 14 = 15414
		A1	for digits 15414	
		A1	(ft) dep on M1 for correct placement of the decimal point into their final answer	
(b)	37.4	M1	for a start to a method, eg 598.4 ÷ 16 (or 59.84 ÷ 1.6) = 3 (as a first digit)	A start to a repeated subtraction method or build-up method is acceptable if a correct first digit of 3 is found
		A1	for digits 374	
		A1	(ft) dep on M1 for correct placement of the decimal point into their final answer	

Examiner Comments

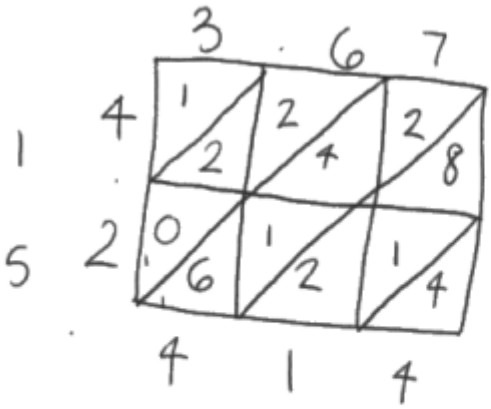
In part (a), whichever method of long multiplication is chosen, it is important the student shows an intent to add the appropriate elements of the calculation, for the award of the method mark. Place value errors are the usual reason for failure to score any marks; for example: leaving the 0 from 14680 and just adding 1468 and 734 or using 3, 60 and 7 and 4 and 20 in the table method or simply adding the 6 numbers, say 12, 24, 28, 06, 12 and 14 in the partitioning method.

In part (b), the method mark is awarded for a start to a division of the digits 5984 by the digits 16 with a correct first digit of 3 in the dividend.

The second accuracy mark, in both parts, is available even if the calculation is incorrect, provided M1 is awarded and the decimal point is placed in the correct position for their values.

Student Response A

20 (a) Work out 3.67×4.2



15.414

(3)

3/3

Examiner Comments

Part (a)

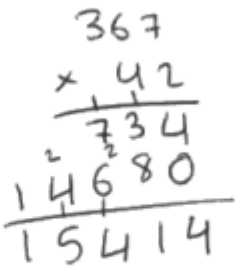
M1 for a fully correct solution using the partitioning method. Though there are decimal points shown on the diagram, it is clear that these have not been used in their multiplications and inserted once a final value has been found

A1 for the correct digits 15414

A1 for a correct placement of the decimal point.

Student Response B

20 (a) Work out 3.67×4.2



154·14

(3)

2/3

Examiner Comments

Part (a)

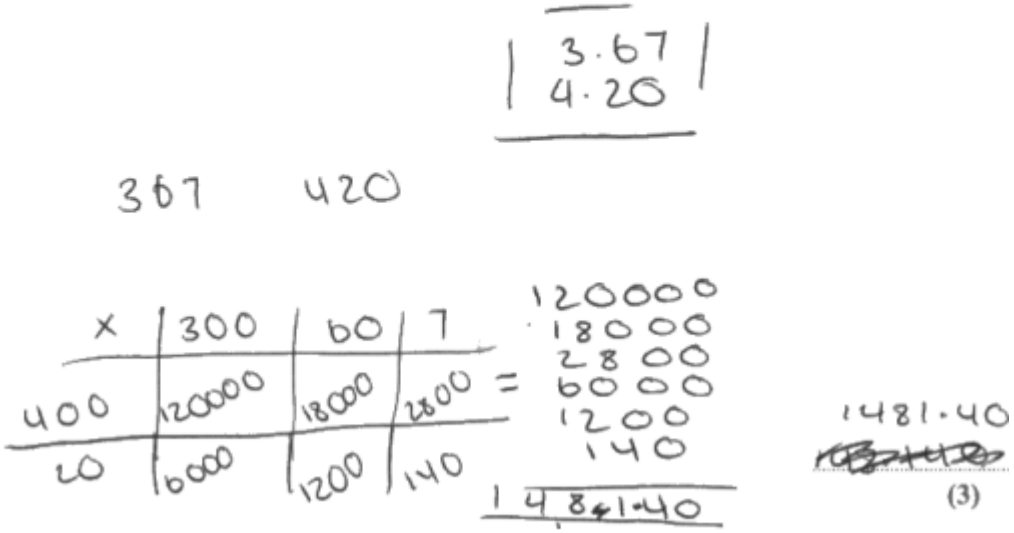
M1 The 'traditional' method is carried out correctly with no place value error.

A1 for digits 15414 seen

A0 for the decimal point in the wrong place.

Student Response C

20 (a) Work out $3.67 \times 4.2\,0$



1/3

Examiner Comments

Part (a)

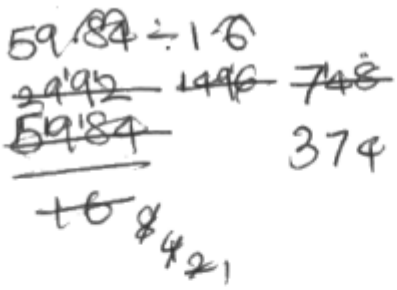
M1 The table is set out correctly, values in the table have been found by multiplying the correct pairs of numbers and the six elements are added. Note that we can ignore arithmetical errors (eg. 400 × 60 = 18000), this mark is for a complete method.

A0 for incorrect digits 14814

A0 for an incorrect placement of the decimal point in 14814

Student Response A

(b) Work out 59.84 ÷ 1.6



374

37.4

(3)

(Total for Question 20 is 6 marks)

3/3

Examiner Comments

Part (b)

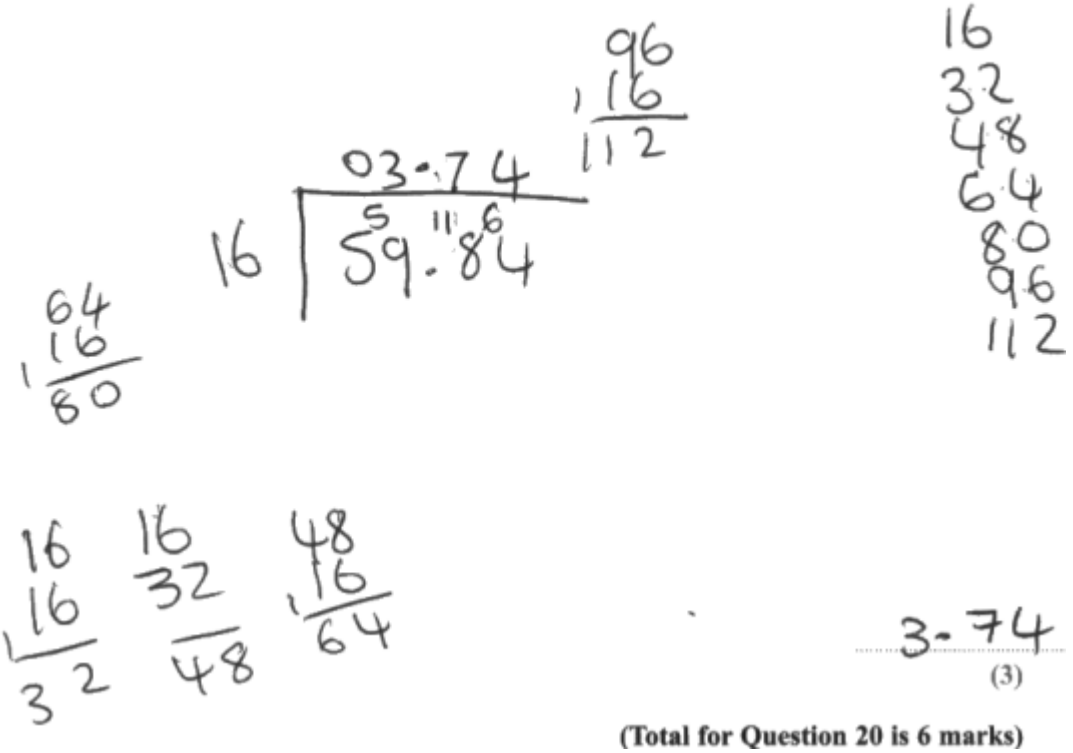
M1 Not perhaps a conventional method of long division, but a very accurate one cancelling down the fraction 5984/16 resulting in a value with the first digit of 3

A1 for digits 374

A1 for correct placement of the decimal point.

Student Response B

(b) Work out 59.84 ÷ 1.6



(Total for Question 20 is 6 marks)

2/3

Examiner Comments

Part (b)

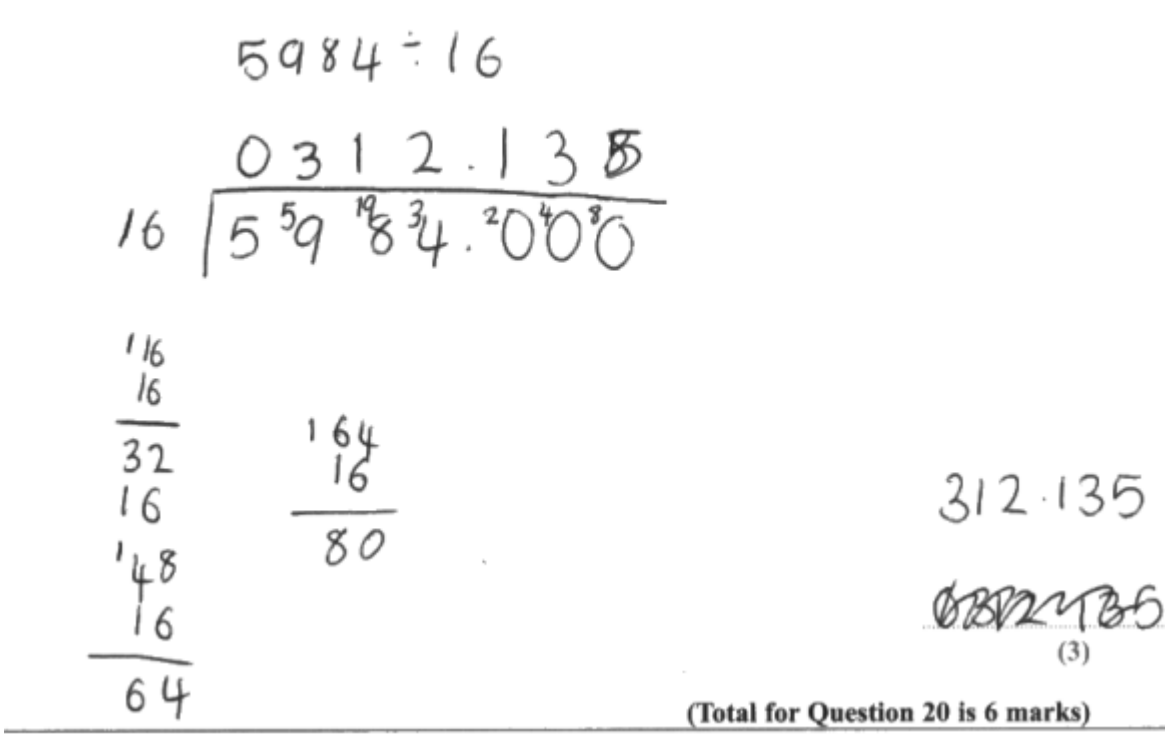
M1 for division of 59.84 by 16 resulting in a value with the first digit of 3.

A1 for correct digits 374

A0 since the decimal point has been placed incorrectly.

Student Response C

(b) Work out 59.84 ÷ 1.6



1/3

Examiner Comments

Part (b)

M1 for a division of 5984 by 16 with 3 as the first digit of their answer

A0 for incorrect digits.

A0 for incorrect placement of the decimal point in their result of 31213

Exemplar Question 9

Foundation tier Paper 1

23 At the end of 2017

the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019

the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.

(Total for Question 23 is 4 marks)

Mean Score: 1.38

Examiner Comments
Whilst some students were able to fully complete a solution for this problem, many disappointingly were unable to find 20% or 30% of the required value, often getting confused with the numbers of 'zeros' involved. It was not uncommon to see 10% of 220 000 given as 2200 or 220. A great many students lost marks because they did not show a mathematical method, simply writing 20% of 220000 gains no credit whereas 20/100 × £220000 gets the method mark. Many students found the correct decrease or increase of £44 000 and £48 000 respectively and went no further. Students must read the questions carefully.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
23	Rahim (supported)	P1	for start to the process to find 20% for Tamara, eg 220000 × 0.2 oe (= 44000) **or** 30% for Rahim, eg 160000 × 0.3 oe (= 48000) **OR** for 1 – 0.2 (= 0.8) **or** 100 – 20 (= 80) **or** 1 + 0.3 (= 1.3) **or** 100 + 30 (= 130)	Build up processes are acceptable but must be complete and correct
		P1	for a complete process to find at least one new value, eg 220000 – "44000" (= 176 000) **or** 160000 + "48000" (= 208000) **OR** 220000 × 0.8 (=176000) **or** 160000 × 1.3 (=208000)	
		A1	for one correct value, 176 000 or 208 000	
		C1	for correct conclusion supported by correct figures eg Rahim, 176 000 and 208 000	Award 0 marks for a correct answer with no supportive working.

Examiner Comments

The first process mark is for demonstrating a correct method for finding a percentage of a quantity or for acknowledging that a decrease in 20% results in 80% or an increase of 30% results in 130% or simply quoting the multiplication factors of 1 – 0.2 or 1 + 0.3

Any build up method must be complete; it is not sufficient to just say that 10% of 220 000 is 22 000. If arithmetical errors are made, the method must still be complete.

The second process mark is for a method that would lead to the reduced value or the increased value with the accuracy mark being awarded for just **one** correct value, 176 000 or 208 000

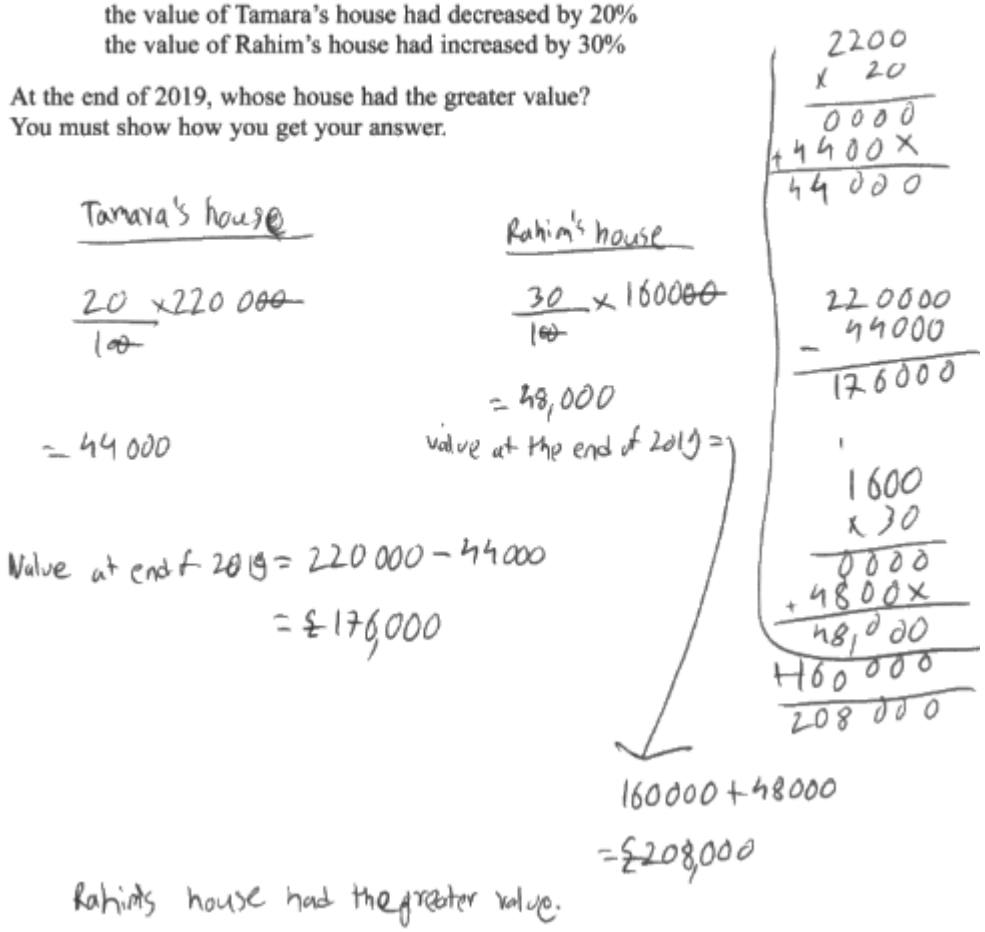
The final communication mark is for identifying Rahim's house as having the greater value, supported by fully correct arithmetic. Note that it is not sufficient to simply underline Rahim's name.

Student Response A

23 At the end of 2017
the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019
the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.



4/4

Examiner Comments

P1 for either 20/100 × 220 000 or 30/100 × 160 000 This shows the complete method irrespective of each result.

P1 for either 220 000 – 44 000 or 160 000 + 48 000

A1 for either 176 000 or 208 000 seen

C1 for identifying Rahim's house has having the greater value supported by fully correct arithmetic for both houses.

Student Response B

23 At the end of 2017
the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019
the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.

22000
22000+
44000

Tamara:
10% of 220000 = 22000
20% of 220000 = 44000
220000 − 44000 = £176000

220000
44000 -
176000

Ranims:
10% of £160000 = 16000
30% of 160000 = 480000
160000 + 480000 = £650 000

16000
16000
16000 +
48000

480000
160000 +
650000

Rahim's house
has greater value
by 2019

3/4

Examiner Comments

P1 Even though the exact method is not shown for either percentage calculation, the 44 000 seen for Tamara's house is sufficient for this award. The correct increase in value of 48 000 is seen for Rahim's house but this has subsequently been incorrectly transcribed as 480 000.

P1 for 220 000 – 44 000

A1 for 176 000; only one correct value is required.

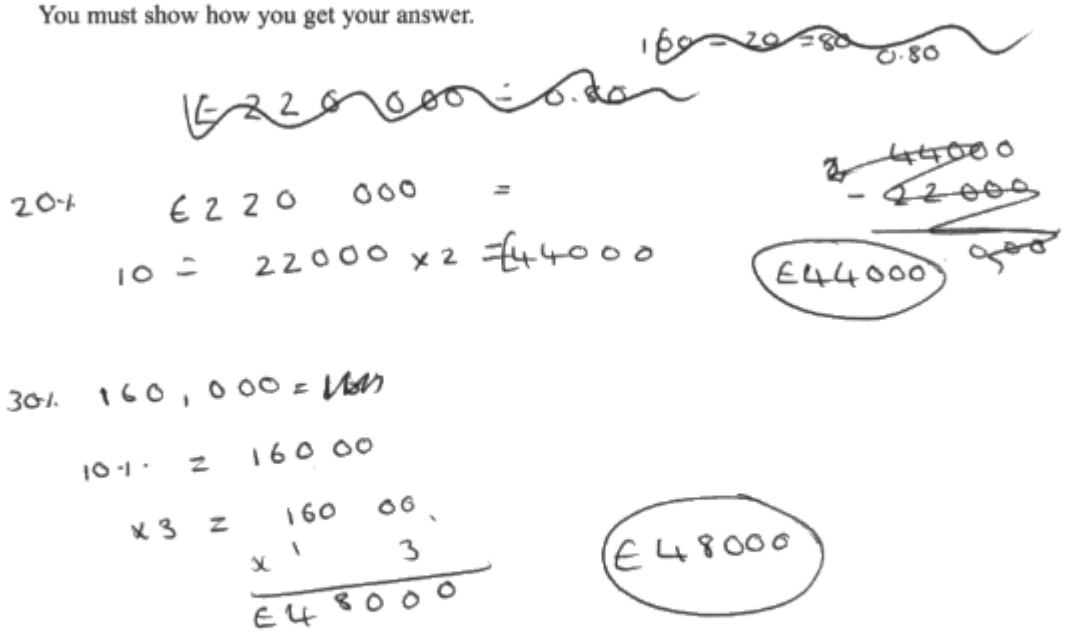
C0 Rahim's house value has been identified as the greater amount but because of the transcription error, the answer is not supported by fully correct figures.

Student Response C

23 At the end of 2017
the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019
the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.



Rahims house has greater value

1/4

Examiner Comments

P1 for 22 000 × 2 or 16 000 × 3

P0 A0 C0 This is a very common mistake where the student has not read the question carefully and believes that they are only required to compare the actual decrease or increase. Even though these figures are correct, no more credit is awarded.

Exemplar Question 10

Foundation tier Paper 1

24 Rosie, Matilda and Ibrahim collect stickers.

number of stickers Rosie has	:	: number of stickers Matilda has	:	number of stickers Ibrahim has	= 4 : 7 : 15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?

.....

(Total for Question 24 is 3 marks)

Mean Score: 0.42

Examiner Comments
The essence of this question is to relate the 24 to the difference in shares of 7 and 15 and then use the information to compute the number of stickers of Rosie and Ibrahim.
Many students were unable to make any sensible start to a process to solve this problem, many simply 'playing' with the numbers given. Many students found the sum of the ratios (26) perhaps thinking that they were required to share an amount with the given ratio. Some ignored the 24 and simply subtracted 4 from 15 for their answer. Marks were available for build-up methods of finding equivalent ratios, but 12 (:21) : 45 was required for both method marks.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
24	33	P1	for relating 24 to 8 parts, **or** (1 part =) 24 ÷ 8 (= 3) **or** 15 – 7 (= 8) **or** starts to use a build-up method, eg (8 :) 14 : 30	8 parts = 24
		P1	for (15 – 4) **and** (24 ÷ 8) **or** 15 × 3 (= 45) **and** 4 × 3 (= 12) **or** for 12 (: 21) : 45	
		A1	cao	

Examiner Comments

The first process mark is for relating the 24 to the 8, the part difference between 7 and 15 or for simply finding the 8 part difference. The second mark is for a process that leaves a simple calculation to find the final answer, ie finding 11 and 3 or 45 and 12

Build up methods are acceptable, (8) : 14 : 30 for the first mark and 12 : (21) : 45 for the second mark. Solutions are not penalised for going further in this process.

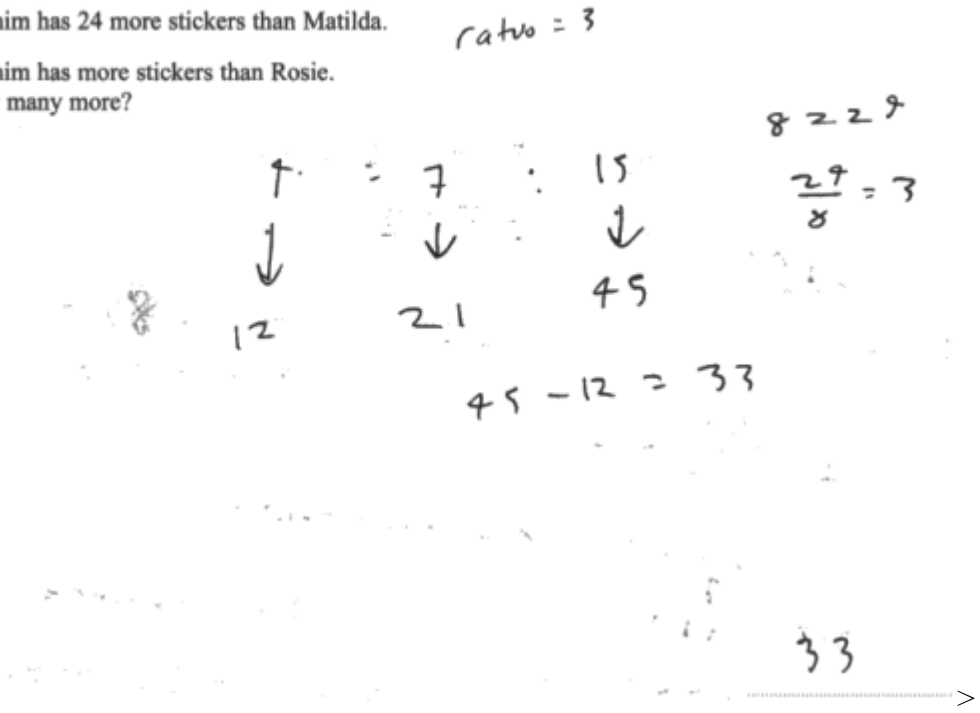
Student Response A

24 Rosie, Matilda and Ibrahim collect stickers.

number of stickers Rosie has : number of stickers Matilda has : number of stickers Ibrahim has = 4 : 7 : 15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?



3/3

Examiner Comments

P1 "8 = 24" is clearly relating 24 to the 8 parts and this gets the mark.

P1 for correctly using the 3 stickers per part calculated to calculate the number of stickers of each person (only Rosie and Ibrahim is required)

A1 for a correct answer of 33

Student Response B

24 Rosie, Matilda and Ibrahim collect stickers.

number of stickers Rosie has : number of stickers Matilda has : number of stickers Ibrahim has = 4:7:15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?

4+7+15=26

15−7=8

~~8~~ 24÷8=3

3x15=45

3x7=21

3x4=12

45
21
12
78

78

2/3

Examiner Comments

Note: initially we see 4 + 7 + 15 = 26 a start made by many students, but this is never used in their working which results in their answer of 78 on the answer line. We can therefore ignore it.

P1 for 15 – 7 or 24 ÷ 8

P1 for 15 × 3 and 4 × 3 seen

A0 The student has added the three values, clearly not having read the question carefully and no accuracy mark is awarded for an incorrect answer.

Student Response C

24 Rosie, Matilda and Ibrahim collect stickers.

$$\frac{\text{number of stickers Rosie has}}{:}\ :\ \frac{\text{number of stickers Matilda has}}{:}\ :\ \frac{\text{number of stickers Ibrahim has}}{} = 4:7:15$$

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?

24 more
4 : 7 : 15

15
− 4
11

11

0/3

Examiner Comments

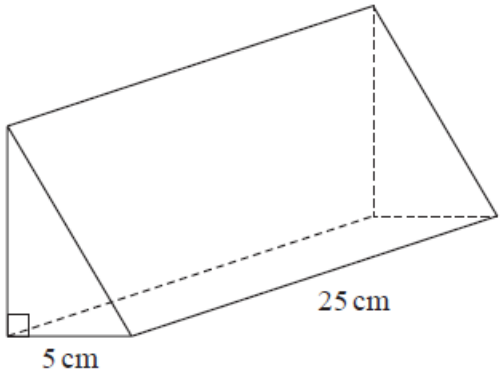
P0 P0 A0 This is a very common misconception, thinking that the ratios given were the actual number of stickers of each of Rosie, Matilda and Ibrahim.

No marks are awarded.

Exemplar Question 11

Foundation tier Paper 1

25 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm^3

Work out the height of the prism.

..... cm

(Total for Question 25 is 3 marks)

Mean Score: 0.19

Examiner Comments
Very poorly answered indeed. Many, gaining some reward for dividing the volume (750) by the length (25) but were then unable to equate their result to the area of the cross-section. It was rare to find any formula used for the area of the cross-section or any volume formula.
Fully correct solutions were few and far between.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
25	12	P1	for a process to find the area of cross section, eg $750 \div 25$ (= 30) oe **or** $\frac{1}{2} \times 5 \times h$ oe	May use any letter for h or may use ?
		P1	for a correct equation in h, eg $750 \div 25 = \frac{1}{2} \times 5 \times h$ oe **or** $\frac{1}{2} \times 5 \times h \times 25 = 750$ oe **or** for a complete process to find h, eg. $\frac{750}{25} \times \frac{2}{5}$ oe **or** "30" $\times 2 \div 5$	
		A1	cao SC B1 for answer of 6 if P0 scored	

Examiner Comments

The first process mark is for an expression for, or a calculation leading to, the area of the triangular cross-section.

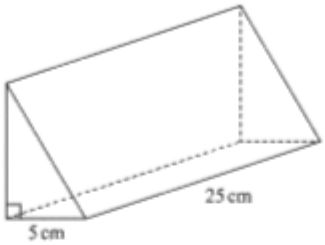
For the award of the second process mark, a fully correct equation in h (the height of the prism) must be given. Alternatively, numerical processes that could lead to a correct answer will get this mark.

The final answer is correct answer only.

A very common misconception here is treating the prism as a cuboid resulting in a height of 6 cm. A special case covering this, awards one mark (B1) for an answer of 6 if no previous process marks have been awarded.

Student Response A

25 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm³

Work out the height of the prism.

$V = \frac{1}{2} \times b \times l \times h$.

$750\text{cm}^3 = \frac{1}{2} \times 5 \times 25 \times h$.

$750\text{cm}^3 = \frac{1}{2} \times 125h$.

$2(750\text{cm}^3) = 125h$

$1500\text{cm}^3 = 125h\text{cm}^2$

$\frac{1500\text{cm}}{125} = \frac{125h}{125}$

$12\text{cm} = h$

$h = 12\text{cm}$.

$V = \frac{1}{2} \times 12 \times 5 \times 25$

$V = 6 \times 125$

$V = 750\text{cm}^3$.

12 cm

3/3

Examiner Comments

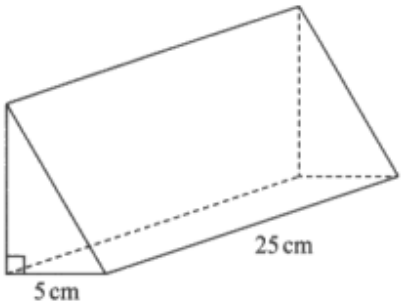
P1 for a correct expression for the area of the cross-section with the value of 5 substituted. This is embedded in the expression for the complete volume but is still acceptable.

P1 for a fully correct equation in *h*.

A1 for a correct answer.

Student Response B

25 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm³

Work out the height of the prism.

$V = (\frac{1}{2} \times b \times h) \times 25 = 750$

$V = (\frac{1}{2} \times 5 \times h) \times 25 = 750$

$V = (2.5 \times h) \times 25 = 750$

$(2.5 \times h) = 30$

$2.5 \times h = 30$

$h = 18\text{cm}$

$2.5 \overline{)30}$

~~30 ÷ 2 = 15~~

~~30 ÷ 0.5 =~~

30 ÷ 2 = 15

30 ÷ 0.5 = 3

15 + 3 = 18

18 cm

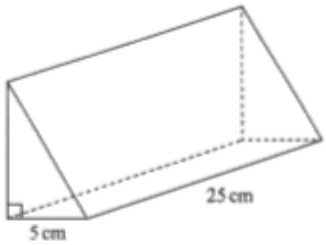
2/3

Examiner Comments

P1 for ½ × 5 × *h*
P1 for a correct equation in *h*.
A0 since the answer of 18 is incorrect. The error here is in dividing 30 by 2.5

Student Response C

25 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm³

Work out the height of the prism.

volume = w x h x l

750 = 25 x 5 x h
750 = 125h
750/125h = 125h/125h
h = 6

6 cm

1/3

Examiner Comments

In this solution, the student is using the formula for the volume of a cuboid and is treating the cross-section as a rectangle.

P0 for $5 \times h$ instead of $\frac{1}{2} \times 5 \times h$

P0 since the equation in h is incorrect.

Special Case: B1 for an answer of 6 The special case is employed here as no process marks have been awarded.

Paper 2F (Calculator)

Exemplar Question 1

Foundation tier Paper 2

7 A baker has three bags of flour, **A**, **B** and **C**.

Bag **A** and bag **B** contain the same amount of flour.
Bag **C** contains 940 g of flour.

In the three bags, there is a total of 2500 g of flour.

Work out the amount of flour in bag **A**.

..... g

(Total for Question 7 is 3 marks)

Mean Score 2.70

Examiner Comments
This question is a small problem near the beginning of the paper. Students are expected to subtract the amount of flour in bag C from the total amount given. As both bags A and B contain the same amount, students are then expected to half the amount left.
Two steps of working are expected.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
7	780	P1	for 2500 – 940 (= 1560) **or** 2500 ÷ 2 (=1250) and 940 ÷ 2 (=470)	
		P1	for "1560" ÷ 2 **or** "1250" – "470"	
		A1	cao	

Examiner Comments

<The marks scheme requires a correct first step 2500 – 940 was almost always seen.

The candidate can only score the second mark if the second step follows a correct process, this is indicated by the use of speech marks around the figures.

The last accuracy mark is for 780.

Student Response A

7 A baker has three bags of flour, **A**, **B** and **C**.

Bag **A** and bag **B** contain the same amount of flour.
Bag **C** contains 940 g of flour.

In the three bags, there is a total of 2500 g of flour.

Work out the amount of flour in bag **A**.

2500 − 940 = 1560 g in A & B

1560 ÷ 2 = 780 g in A

780 g in B

940 + 780 + 780 = 2500

A = 780 g

780 ..... g

(Total for Question 7 is 3 marks)

3/3

Examiner Comments

A fully correct response with clear working.

P1 for 2500 – 940 (= 1560)

P1 for 1560 ÷2

A1 for 780

Note this student also checks that their three figures add to the total given. This is not required but is good practice.

Student Response B

7 A baker has three bags of flour, **A**, **B** and **C**.

Bag **A** and bag **B** contain the same amount of flour.
Bag **C** contains 940 g of flour.

In the three bags, there is a total of 2500 g of flour.

Work out the amount of flour in bag **A**.

2500
− 940
1640

1640 ÷ 2 = 820

820
~~1640~~ g

(Total for Question 7 is 3 marks)

2/3

Examiner Comments

There is an arithmetic error here but a fully correct method can be seen.

P1 for 2500 – 940, 1640 is incorrect.

P1 for 1640 ÷2 because 1640 is the result of their subtraction and so is "1560"

A0 incorrect answer

Student Response C

7 A baker has three bags of flour, **A**, **B** and **C**.

Bag **A** and bag **B** contain the same amount of flour.
Bag **C** contains 940 g of flour.

In the three bags, there is a total of 2500 g of flour.

Work out the amount of flour in bag **A**.

2500g - 940g = 1560
Bag A : 1560g of flour

1560 g

(Total for Question 7 is 3 marks)

1/3

Examiner Comments

The student shows a correct first step but then goes no further.

P1 for 2500 – 940

P0 as no second step is shown

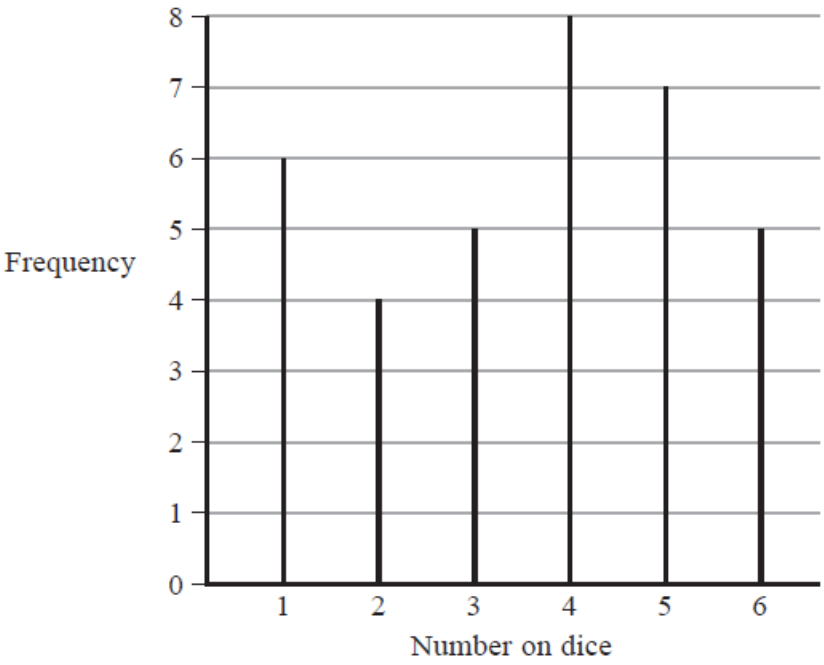
A0 as the answer is incorrect

Exemplar Question 2

Foundation tier Paper 2

8 5 students throw a dice.
They each throw the dice the same number of times.

The diagram gives information about the number of times the dice lands on each number.



Work out how many times each student throws the dice.

.....

(Total for Question 8 is 3 marks)

Mean Score 1.74

Examiner Comments

This question requires the interpretation if the graph and careful reading. The question asks how many times each student threw the dice but many students divided by 6 rather than 5.

Because both axes used numbers many students felt they must use all the numbers given to answer the question rather than see the numbers on the x-axis as labels from a dice.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
8	7	P1	for 6 + 4 + 5 + 8 + 7 + 5 (= 35)	Working may be seen on the diagram Allow one error in the 6 readings; intention to add must be clear.
		P1	for "35" ÷ 5	
		A1	cao	

Examiner Comments

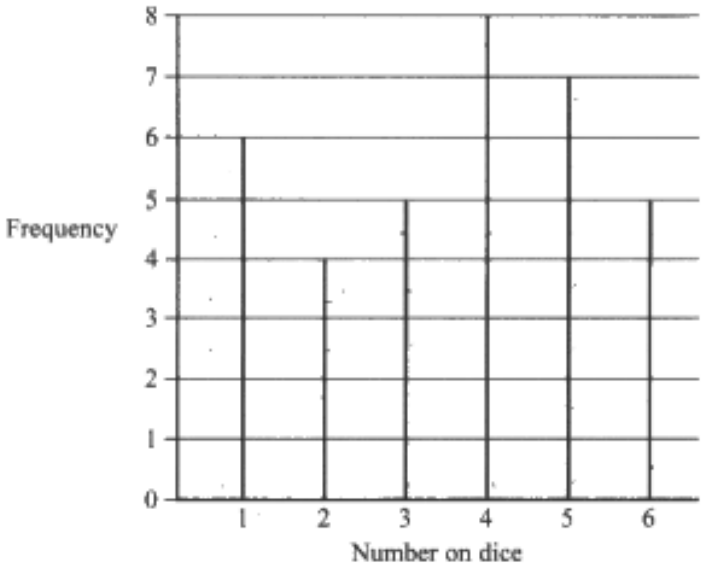
The second process mark is dependent upon the first process mark (indicated by the use of speech marks). The final mark is for the correct answer of 7 which must come from correct processes.

Note that the first mark can be awarded even if one error in the readings is seen BUT there must be 6 readings seen or used.

Student Response A

8 5 students throw a dice.
They each throw the dice the same number of times.

The diagram gives information about the number of times the dice lands on each number.



Work out how many times each student throws the dice.

6 + 4 + 5 + 8 + 7 + 5 = 35

35 ÷ 5 = 7

7

(Total for Question 8 is 3 marks)

3/3

Examiner Comments

P1 for the clear addition seen

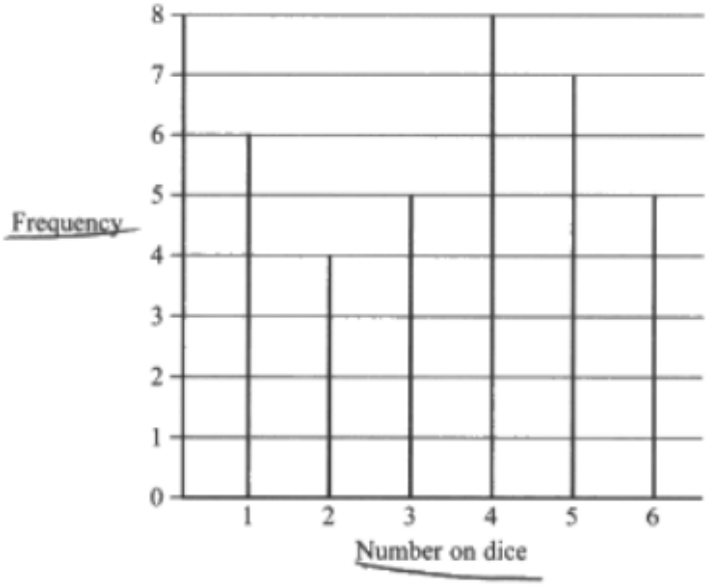
P1 for 35÷5

A1 for a fully correct answer from correct working of 7

Student Response B

8 5 students throw a dice.
They each throw the dice the same number of times.

The diagram gives information about the number of times the dice lands on each number.



Work out how many times each student throws the dice.

6 + 4 + 5 + 8 + 7 + 5 = 30

30 ÷ 5 = 6

6 times

(Total for Question 8 is 3 marks)

2/3

Examiner Comments

P1 Here the six readings are correct and added, the answer is incorrect but this is enough to award the first process mark.

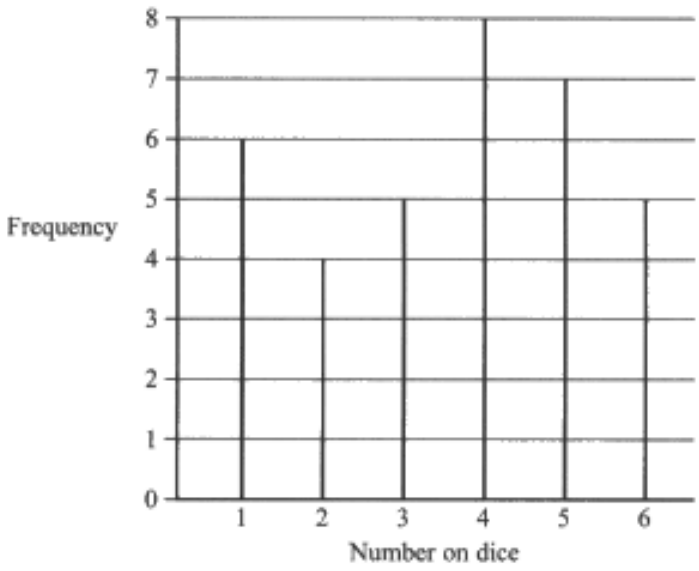
P1 The student then continues with the correct process and divides by 5 so the second process mark can be awarded

A0 Although 30 ÷5=6 this is not the correct answer to the question asked because of the earlier arithmetic error so no accuracy mark can be given.

Student Response C

8 5 students throw a dice.
They each throw the dice the same number of times.

The diagram gives information about the number of times the dice lands on each number.



Work out how many times each student throws the dice.

$6+4+5+8+7+5$

$= \frac{35}{6} = 5$

5

(Total for Question 8 is 3 marks)

1/3

Examiner Comments

P1 The student clearly adds the correct readings

P0 unfortunately they then divide by 6 instead of 5.

A0 The answer is incorrect for both the calculation shown and the question asked. The accuracy mark can only be awarded for the correct answer to the question ie 7.

Exemplar Question 3

Foundation tier Paper 2

9 Alec needs to work out the value of $2 + 3 \times 4$

He writes

$$2 + 3 = 5 \text{ and } 5 \times 4 = 20, \text{ so } 2 + 3 \times 4 = 20$$

Alec is wrong.
Explain why.

.....

.....

.....

(Total for Question 9 is 1 mark)

Mean Score 0.90

Examiner Comments

This question requires an explanation. The explanation must be clear, fully correct and not contradicted for the mark to be awarded.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
9	Explanation	C1	for explanation, **Acceptable examples** Answer should be 14 Should work out 3 × 4 first Alec should times first instead of adding Not used BIDMAS/BODMAS BIDMAS/BODMAS He has done it in the wrong order Alec needs to use brackets so 2 + (3 × 4) Because you always do multiplication or division first **Not acceptable examples** Because the answer is wrong It is 2 + (3×4) = 15 It needs brackets Because working out should only be one sum	

Examiner Comments

A variety of explanations will be seen, and guidance of acceptable and unacceptable answers are always given in the mark scheme.

Student Response A

9 Alec needs to work out the value of $2 + 3 \times 4$

BIDMAS

He writes

$2 + 3 = 5$ and $5 \times 4 = 20$, so $2 + 3 \times 4 = 20$

Alec is wrong.
Explain why.

Because he should have used BIDMAS or BODMAS and done the multiplication first e.g

3x4 = 12 12 + 2 = 14 = 14

(Total for Question 9 is 1 mark)

1/1

Examiner Comments

C1 The use of the 'phrase' BIDMAS or BODMAS is sufficient to award the mark.

Here we clearly see the calculation correct as well.

Student Response B

9 Alec needs to work out the value of $2 + 3 \times 4$

He writes

$$2 + 3 = 5 \text{ and } 5 \times 4 = 20, \text{ so } 2 + 3 \times 4 = 20$$

Alec is wrong.
Explain why.

because he shouldve done 3x4 first

1/1

Examiner Comments

C1 can be awarded as this is sufficient to indicate that the order of operation is the key error made.

Student Response C

9 Alec needs to work out the value of $2 + 3 \times 4$

He writes

$2 + 3 = 5$ and $5 \times 4 = 20$, so $2 + 3 \times 4 = 20$

Alec is wrong.
Explain why.

Alec is wrong because you have to include BODNAS, you have to do 5 x 3 = 15 then add the 2 which the answer would be 17.

(Total for Question 9 is 1 mark)

0/1

Examiner Comments

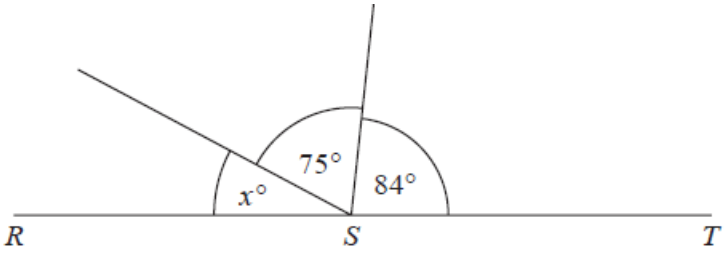
C0 Here the explanation begins correctly but it is not fully correct 5×3 is wrong as is the final answer of 17 and so the communication mark cannot be awarded.

We need a fully correct statement not contradicted to be able to award any communication mark.

Exemplar Question 4

Foundation tier Paper 2

13



RST is a straight line.

(i) Work out the value of *x*.

.....

(2)

(ii) Give a reason for your answer.

.....

.....

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

(Total for Question 13 is 3 marks)

Mean Scores: Part (i) 1.82

Part (ii) 0.57

Examiner Comments

This question assesses the concept of angles in a straight line. The student needs to calculate a missing angle and then give the reasoning behind their answer.

Some students do not give geometric reasons but only giving working out. When reasoning is requested then a sentence is required.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
13 (i)	21	M1	for 180 – 75 – 84	
		A1	cao	Angle may be indicated on the diagram
(ii)	Reason given	C1	for reason that Angles on a straight line add up to 180	The key words underlined must be present There should be no incorrect reasons given

Examiner Comments

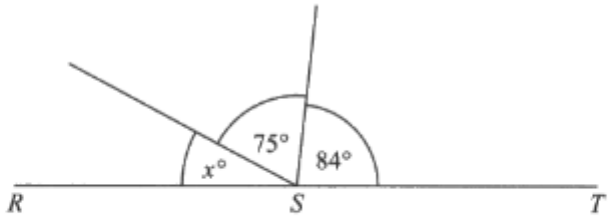
This mark scheme is standard for this kind of question.

M1 is for full method and the accuracy is for the correct answer.

There is one communication mark which can be awarded for the correct reasoning.

Student Response A

13



RST is a straight line.

(i) Work out the value of *x*.

21

(2)

(ii) Give a reason for your answer.

A straight line is half a circle which give an angle of 180°. You must add 75° & 84° which = 159 which means that x must add to get to 180°.

(1)

3/3

Examiner Comments

Part (i)

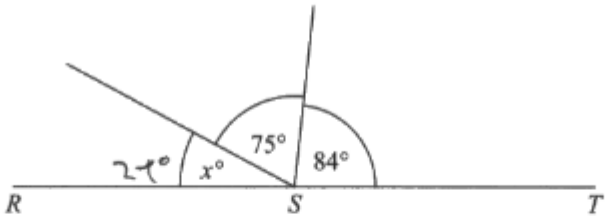
M1 A1 The correct answer is seen but without working. This is acceptable in this case and both marks can be awarded. The method mark is implied by the correct answer being seen.

Part (ii)

C1 This explanation includes the key words required, nothing else is contradictory and so we can award the communication mark.

Student Response B

13



RST is a straight line.

(i) Work out the value of x.

$180 - 75 - 84 = 21$

21°

(2)

(ii) Give a reason for your answer.

The circle is 180° degree, you subtract to find the missing degree

2/3

Examiner Comments

Part (i)

M1 A1 the answer is fully correct with clear working.

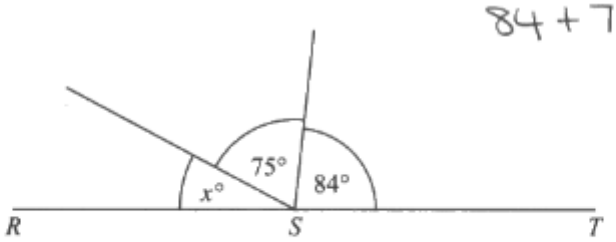
Part (ii)

C0 the reason given is incorrect and does not contain the underlined words

Student Response C

13

84 + 75 = 159



RST is a straight line. = 180°

(i) Work out the value of *x*.

180 - 159 = 21

x = 21°

(2)

(ii) Give a reason for your answer.

84 + 75 = 159

180 - 159 = 21

So therefore x = 21°.

(1)

2/3

Examiner Comments

Part (i)

M1 A1 for a fully correct method and answer

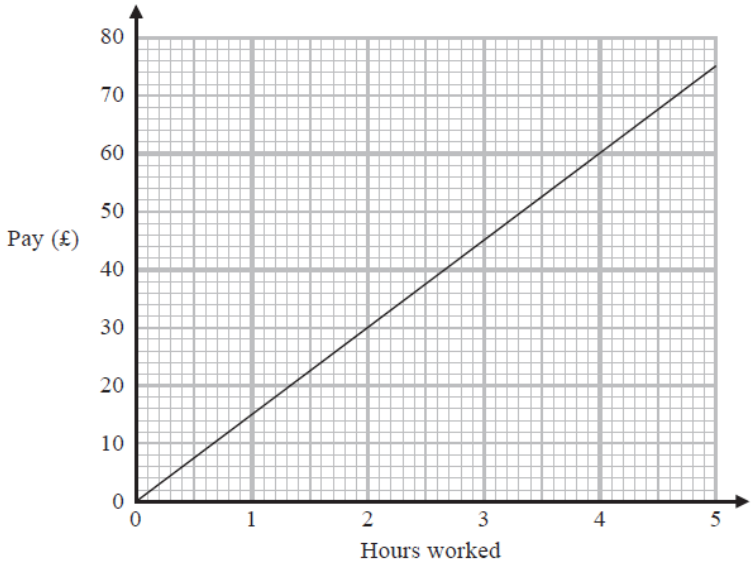
Part (ii)

C0 just working is given here and no reason so no marks can be awarded

Exemplar Question 5

Foundation tier Paper 2

14 Nazima uses this graph to find out how much money she is paid for the number of hours she has worked.



(*a*) How much money is Nazima paid for each hour she works?

£.....

(1)

Last week Nazima worked for 36 hours.

(*b*) How much money was Nazima paid?

£.....

(2)

(Total for Question 14 is 3 marks)

Mean Scores: **Part (a) 0.72**
Part (b) 1.67

Examiner Comments

In part (a) students need to read from the scale and the first mark was awarded for stating an answer within the range of 14 to 16. A common error seen was to read off the value of 75 for 5 hours but not make the adjustment to a payment for one hour or not being able to interpret the divisions on the scale correctly as £2 per square, with £10.60 being seen frequently.

For part (b) students were expected to use their hourly rate found in part (a) and multiply by 36. However a build up method was sometimes seen but was less successful, particularly as many using this method only found the pay for 35 hours by using the reading at 5 hours and not adding an extra hour of pay to show a complete build-up.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
14 (a)	15	B1	14 to 16	
(b)	540	M1	for a complete method, eg 30 × (36 ÷ 2) **or** 45 × (36 ÷ 3) **or** 60 × (36 ÷ 4) **or** ft "hourly rate from (a)" × 36	May be seen using a complete build up method for "45" allow 44 to 46 ft for accuracy
		A1	for 540 **or** ft (a)	Condone use of mixed rates eg 75×7 + 16 =541

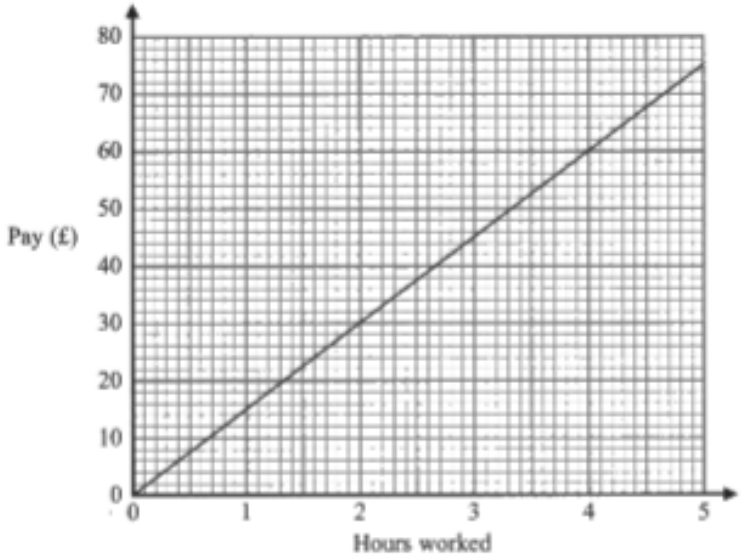
Examiner Comments

The first mark is for a correct reading form the graph, some tolerance has been allowed.

The second part requires a complete method to find the amount paid, here we can allow a ft from part (a)

Student Response A

Nazima uses this graph to find out how much money she is paid for the number of hours she has worked.



(a) How much money is Nazima paid for each hour she works?

£ 14.50

(1)

Last week Nazima worked for 36 hours.

(b) How much money was Nazima paid?

4 hours work = £60

36 hours ÷ 4 = 9

60 × 9 = £540

£ 540

(2)

3/3

Examiner Comments

Part (a)

B1 This answer is within the given range

Part (b)

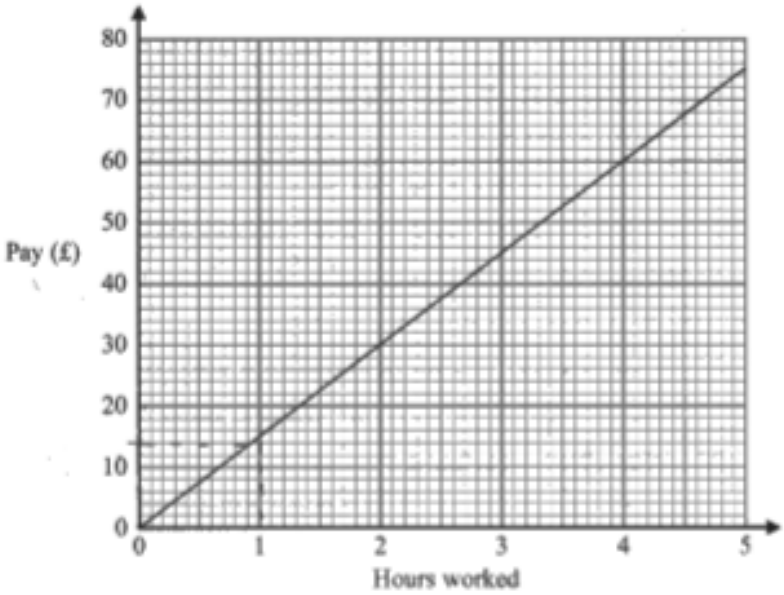
The students 'starts again' with a different reading from the graph.

M1 They use 4 hours is £60 and correctly multiply 60 by 9 to show a complete method

A1 for the correct answer of £540

Student Response B

Nazima uses this graph to find out how much money she is paid for the number of hours she has worked.



(a) How much money is Nazima paid for each hour she works?

£ 10·40

(1)

Last week Nazima worked for 36 hours.

(b) How much money was Nazima paid?

10·40×36 = 374·40

£ 374·40

(2)

2/3

Examiner Comments

Part (a)

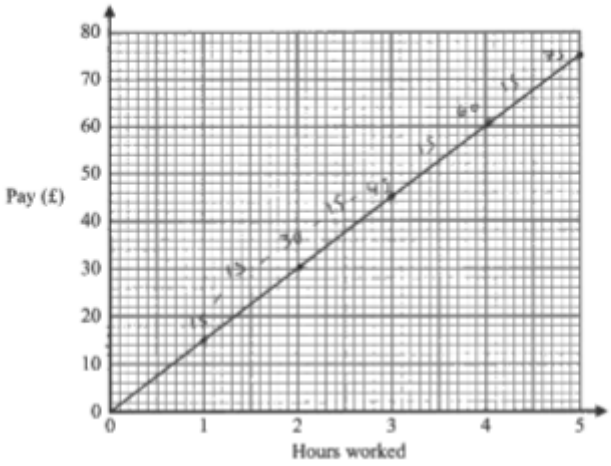
B0 is awarded, as the figure is incorrectly read, the incorrect scale has been used

Part (b)

M1 and A1 follow through can be awarded as the answer to part (a) has been correctly used in part (b)

Student Response C

14 Nazima uses this graph to find out how much money she is paid for the number of hours she has worked.



(a) How much money is Nazima paid for each hour she works?

£ 15

(1)

Last week Nazima worked for 36 hours.

(b) How much money was Nazima paid?

36 x 15 = 560

£15/hour

£ 560

(2)

1 /3

Examiner Comments

Part (a)

B1 for a fully correct figure

Part (b)

M1 for a correct and complete method

A0 as the answer is inaccurate.

Exemplar Question 6

Foundation tier Paper 2

18 The incomplete table gives some information about the lengths of the planks of wood in Ben's workshop.

Length of plank (metres)	Number of planks
3	5
2.5	8
2	
1.5	14
1	10

The total length of these planks is 92 metres.

Work out the number of planks of length 2 metres in Ben's workshop.

.....

(Total for Question 18 is 3 marks)

Mean Score 1.19

Examiner Comments

This mini problem presented students with a slightly different approach to testing frequency tables and the question was well answered by many. With full marks often awarded for a fully correct answer of 13 seen on the answer line or in the table.

When partial marks were awarded it was often for finding the total length of the planks represented in the table, continuing to subtract from 92 to find that the 2m lengths equated to 26m and then losing the final mark due to either forgetting to divide by 2 or because of arithmetic errors.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
18	13	P1	for at least two of 3×5 (=15) or 2.5×8 (=20) or 1.5×14 (=21) or 1×10 (=10) **or** for 3×5 + 2.5×8 + 1.5×14 + 1×10 (=66)	Note 66 on its own will score this mark
		P1	for process to find length of all 2m planks, eg. 92 – (3×5 + 2.5×8 + 1.5×14 + 1×10) (= 26) or 92 – "15" – "20" – "21" – "10" (= 26)	If no calculations are seen for products allow one error in "15", "20", "21", "10"
		A1	cao	13 in the correct place in the table should be accepted as the final answer

Examiner Comments

The first mark is for two correct products seen or the addition of the products to find 66. Note 66 on its own is enough to imply this mark.
The second mark if for subtracting their total from 92 or the intention to do so.
This second mark is not a fill process to 13 but can be awarded if 26 is seen. (Unless from clear incorrect working).
The final accuracy mark was awarded for 13, which may be seen in the table.

Student Response A

The incomplete table gives some information about the lengths of the planks of wood in Ben's workshop.

Length of plank (metres)	Number of planks
3	5
2.5	8
2	13
1.5	14
1	10

15
20
26
21
10
66

The total length of these planks is 92 metres.

Work out the number of planks of length 2 metres in Ben's workshop.

92 − 66 = 26

26 ÷ 2 = 13

13

3/3

Examiner Comments

P1 for clear products seen (only two required)
P1 for subtracting the sum of the frequencies from 92
A1 for 13, shown on the answer line and in the table.

Student Response B

The incomplete table gives some information about the lengths of the planks of wood in Ben's workshop.

Length of plank (metres)		Number of planks	
3	×	5	= 30
2.5	×	8	= 20
2	×	11	
1.5	×	14	= 21
1	×	10	= 10

The total length of these planks is 92 metres.

Work out the number of planks of length 2 metres in Ben's workshop.

total = 92m

3 + 2·5 + 2 + 1·5 + 1 = 10

3 × 5 =
2·5 × 8
2 ×
1·5 × 14
1 × 10

30 + 20 + 21 + 10
= 81 total
92 − 81
= 11

11 planks

2/3

Examiner Comments

The answer on the answer line is 11 and we use this to decide which method to mark.

P1 award for at least two products shown (they show all the products with an arithmetic error). Working back from 11 we see 92-81 and 81 is 30+20+21+10, these figures come from the side of the table and 2.5 × 8 = 20 correct, 1.5 × 14= 21 correct and 1 × 10 =10 is also correct.

P1 as 81 is their addition of the products and subtracted from 92

A0 as the answer is incorrect

Student Response C

The incomplete table gives some information about the lengths of the planks of wood in Ben's workshop.

Length of plank (metres)	Number of planks	Frequency
3	5	3×5 = 15
2.5	8	2.5 × 8 = 20
2		2 × . =
1.5	14	1.5 × 14 = 14
1	10	10

The total length of these planks is 92 metres.

Work out the number of planks of length 2 metres in Ben's workshop.

1/3

Examiner Comments

P1 The student shows the products at the side of the table
P0 A0 no more working is shown, and no answer given

Exemplar Question 7

Foundation tier Paper 2

19 Rachel, Samina and Tom share £600 between them.

Rachel gets $\frac{2}{5}$ of the £600

Samina gets $\frac{1}{4}$ of the money that is left over.

Tom gets the rest of the money.

Tom says,

"I would have got more money if we had shared the £600 equally between us."

Is Tom correct?
You must show how you get your answer.

(Total for Question 19 is 4 marks)

Mean Score 2.17

Examiner Comments

This was a very accessible problem and allowed students to score a range of the available marks. The modal score was full marks.

The student was expected to work with fractions and the main error arose from not reading the question thoroughly enough.

Almost all students showed some working out for this question,

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
19	No (supported)	P1	for a process to find Rachel's share, eg 600 ÷ 5 × 2 (= 240)	
		P1	for process to find Samina's share eg (600 – "240") ÷ 4 (= 90)	
		P1	for a process to find either of Tom's share, eg 600 – "240" – "90" (= 270) **or** 3 × "90" (=270) **or** 600 ÷ 3 (= 200) for comparison purposes	Note This mark, if awarded for 200, may be the only mark awarded
		C1	for "No" and accurate figures eg 270 and 200 **or** 270 and 70 (difference)	"No" may be implied by a statement Answer only with no working, no marks

Examiner Comments

The first mark is awarded for 600 ÷ 5 × 2 and then the next mark is dependent upon that process being correct.
The third mark is for calculating one of Tom's figures so if the learner finds a third of 600 this is an independent mark.
The last mark is a communication mark with the accuracy contained.

Answer only with no working, no marks is stated on the mark scheme as the question says you must show how you get your answer.

Student Response A

19 Rachel, Samina and Tom share £600 between them.

Rachel gets $\frac{2}{5}$ of the £600

Samina gets $\frac{1}{4}$ of the money that is left over.

Tom gets the rest of the money.

Tom says,

"I would have got more money if we had shared the £600 equally between us."

Is Tom correct?
You must show how you get your answer.

1. $\frac{1}{5}$ of £600 = £120
2. $\frac{2}{5}$ of £600 = $\frac{1}{5}$ + $\frac{1}{5}$ = £240
3. £600 − £240 = £360
4. $\frac{1}{4}$ of £360 = £90
5. £360 − £90 = £270

In the end

Rachel = £240
Samina = £90
Tom = £270

£600 ÷ 3 = £200

3 | 600 = 200

Tom is not correct as if they'd divided it equally, he would've lost £70.

4/4

Examiner Comments

P1 P1 P1 We can see working leading to the figures of 240, 90, and 270 this allows us to award all the process marks. We also see the figure and working for £200 and £70

C1 for a correct conclusion.

Student Response B

Rachel, Samina and Tom share £600 between them.

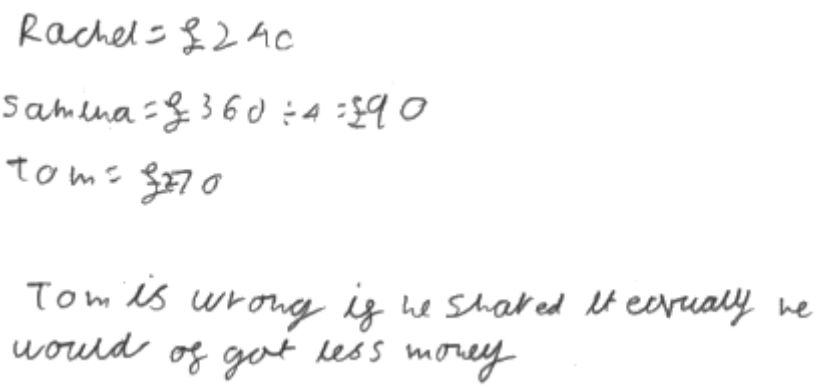
Rachel gets $\frac{2}{5}$ of the £600

Samina gets $\frac{1}{4}$ of the money that is left over.

Tom gets the rest of the money.

Tom says,
"I would have got more money if we had shared the £600 equally between us."

Is Tom correct?
You must show how you get your answer.



3/4

Examiner Comments

P1 Rachel = £240 is sufficient for the first mark.

P1 Working shown to arrive at Samina's share is £90 so award the second process mark.

P1 Tom = £270 is sufficient for the 3rd process mark.

C0 As 200 is not seen so we cannot award the last mark.

Note: This question requires some working for marks to be awarded and this was deemed to be minimally acceptable, but more working should be encouraged.

Student Response C

19 Rachel, Samina and Tom share £600 between them.

Rachel gets $\frac{2}{5}$ of the £600

Samina gets $\frac{1}{4}$ of the money that is left over.

Tom gets the rest of the money.

Tom says,
"I would have got more money if we had shared the £600 equally between us."

Is Tom correct?
You must show how you get your answer.

£600 equally = £200 each.

$\frac{2}{5}$ of £600 = £240

$\frac{1}{4}$ of £240 = 60

240+60 = 300

Tom gets £300

So he is wrong. If they split equally Tom gets less money.

2/4

Examiner Comments

P1 for 2/5 of 600 = 240 being correct

P0 however the second process mark cannot be awarded as they find a quarter of 240 and not a quarter of 600 subtract 240 so the process is incorrect.

P1 Here we can see 600/3 implied with the figure 200 so the third process mark can be awarded.

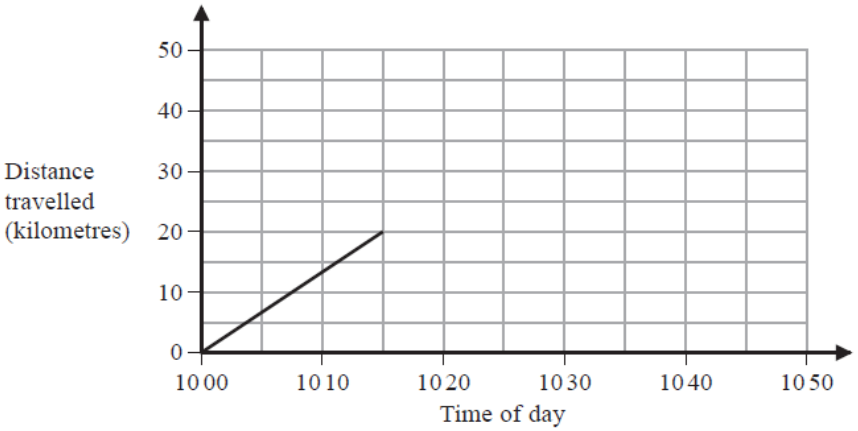
A0 The figure for Tom is given as £300 from this method and is not correct.

Because this is not fully correct, we cannot award the final mark.

Exemplar Question 8

Foundation tier Paper 2

23 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(*a*) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

..... km/h
(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(*b*) On the grid, complete the travel graph for Sam's journey.

(3)

(Total for Question 23 is 5 marks)

Mean Scores: **Part (a) 0.23**
Part (b) 0.82

Examiner Comments

Part (a) assessed the use of gradient as the measure of speed for a journey. Many students were able to correctly identify that they needed to divide distance by time to arrive at the answer but very few went on to convert minutes into hours. Common incorrect responses were often 1.3 or 20. Those students that obtained the correct answer of 80 often did so by scaling ie multiplying 20 by 4.

Part (b) was often awarded part marks with only a few students scoring all the marks for a fully correct graph. Those who scored one mark often did so by drawing the correct horizontal line for the stop in Sam's journey. A few students who scored two marks for drawing a line representing the correct distance travelled in the last 20 minutes but forgetting to put the stop on the graph.

Although the majority of the marks in part (b) were for displaying information on a graph there was one method mark for using time and speed to work out distance. But rarely was 25 seen as part of calculations and very little working was shown by students.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
23 (a)	80	M1	for a complete method eg $\frac{20}{15} \times 60$ **or** 20×4 **or** $20 \div \frac{1}{4}$	
		A1	cao	
(b)	Travel graph	M1	for method to find distance travelled in last 20 minutes, eg $75 \times \frac{20}{60}$ (= 25)	Can be implied by a distance of 25km drawn on the graph
		C2	for a fully correct travel graph	
		(C1	for horizontal straight line from (10 15, 20) to (10 25, 20) **or** for a line of the correct length and gradient to indicate a speed of 75km/h eg straight line from (10 25, 20) to (10 45, 45))	

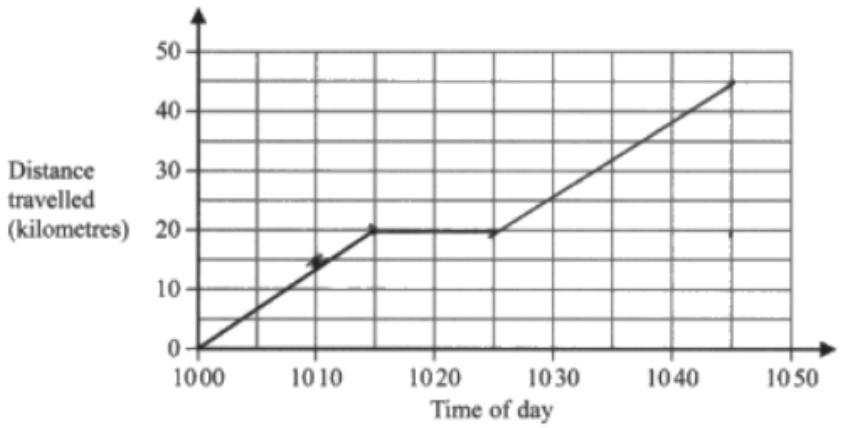
Examiner Comments

The first part was a complete method mark followed by an accuracy mark.

The second part is an independent section where there was a method mark for finding the distance, if this was not seen as working the mark could be implied by the distance shown correctly on the graph. The communication marks were for drawing the two pieces of information on the grid given.

Student Response A

23 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

20 km travelled 60 minutes = 1 hour

20km every 15 minutes

15x4=60 20x4=80

80 km/h

(2)

At 1015 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(b) On the grid, complete the travel graph for Sam's journey.

75 ~~N/A~~ $\frac{75}{3} = 25$

20+25=45

3 because

20/60 = 3 thirds

(3)

(Total for Question 23 is 5 marks)

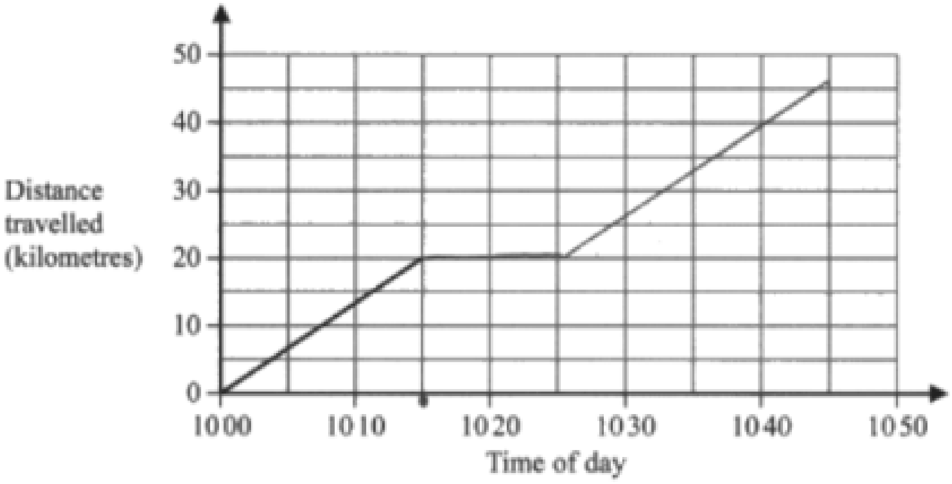
5/5

Examiner Comments

Part (a)
M1 A1 Both marks can be awarded. There is clear working and 20 × 4 was the most successful method seen. Working with 15 minutes being a quarter of an hour is clearly seen here.
Part (b)
M1 Here we can see working that 20 minutes is one third of an hour and using this to calculate the distance travelled.
C2 All the information is displayed on the graph correctly.

Student Response B

23 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

20 x 15 = 300

time / speed =

or distance / speed

1015 ÷ 20 =

20 ÷ 15 = 1.3

.................1.3................. km/h
(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

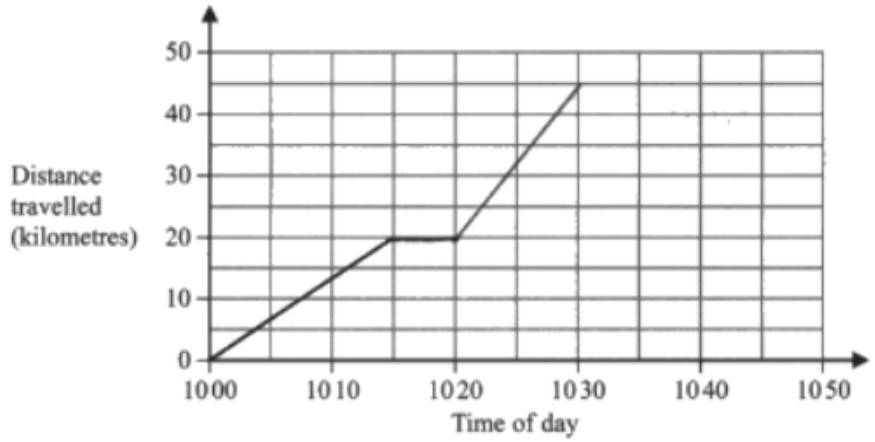
(b) On the grid, complete the travel graph for Sam's journey.

3/5

Examiner Comments
Part (a)
M0 A0 In part (a) the student knows they need to use 20 and 15 but try a variety of incorrect approaches and do not use 60 minutes in an hour and so the method is incomplete, the answer is incorrect and no marks can be awarded.
Part (b)
M1 C2 Although no working is shown the graph is fully correct. We can award M1C2 as the correct distance on the graph is enough to imply the method mark.
Note the accuracy of the end point is acceptable.

Student Response C

Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

20 / 1/4

60/15 = 4

4 × 20 = 80

80 km/h

(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(b) On the grid, complete the travel graph for Sam's journey.

75 km/h 60 min / 20 min = 3

75/3 = 25

(3)

(Total for Question 23 is 5 marks)

3/5

Examiner Comments

Part (a)
M1 A1 A complete method with the correct answer is seen and so full marks can be awarded.

Part (b)
M1 Here the working is correct arriving at 25 km travelled.
C0 However the graph is incorrect the wrong time frames used for both 'parts' of the journey.

Exemplar Question 9

Foundation tier Paper 2

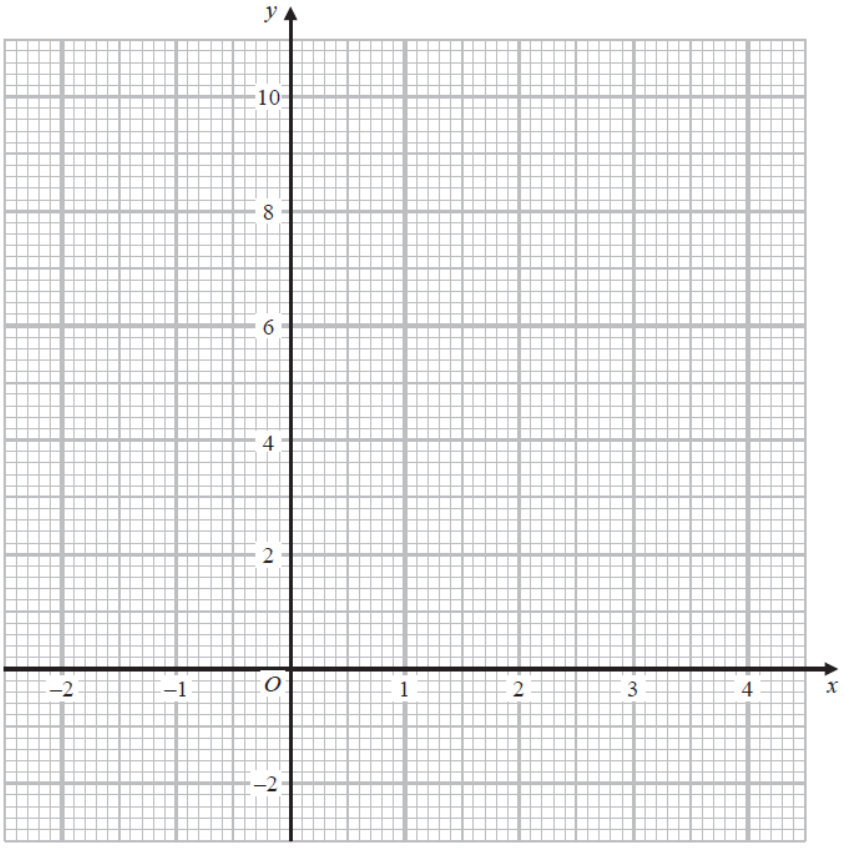
24 (*a*) Complete the table of values for $y = x^2 - 2x + 2$

x	–2	–1	0	1	2	3	4
y	10		2			5	

(2)

(*b*) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from –2 to 4

(2)



(*c*) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

.....

(2)

(Total for Question 24 is 6 marks)

Mean Scores: **Part (a) 0.44**
Part (b) 0.35
Part (c) 0.03

Examiner Comments

This question was not well answered the main problem being, many students continue to find working with negative numbers difficult and hence 5 was rarely seen in the correct place in the table, 3 was the most popular incorrect answer.

Students are usually able to plot their points if they have completed the first part of the question but far too many do not join them with any form of a curve

Because few quadratic graphs were drawn the answer to part (c) was often blank. The most successful method seen was to draw the line $y=4$.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
24 (a)	(10), 5, (2), 1, 2, (5), 10	B2	for all 4 values correct	
		(B1	for 2 or 3 correct values)	
(b)	Graph	M1	ft (dep on B1) for plotting at least 5 of their points correctly	
		A1	for a fully correct curve drawn	Accept a freehand curve drawn that is not made of line segments
(c)	–0.65 to –0.8 and 2.65 to 2.8	M1	for $y = 4$ drawn **or** intersection with $y = 4$ **or** $y = x^2 – 2x – 2$ drawn **or** 1 correct value (ft a quadratic)	If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate
		A1	ft a quadratic graph **or** for answers in the range 2.65 to 2.8 **and** –0.65 to –0.8	

Examiner Comments

This is the standard mark scheme for these types of questions. The first mark is for the correct values required to complete the table. The second part is for drawing the graph. The method mark here can be given for plotting at least 5 of their points correctly even if the table is not fully correct provided B1 has been scored.
The third part is for reading off from their graph. Again, for readings we can follow through their quadratic graph and this time this is for both marks.

Student Response A

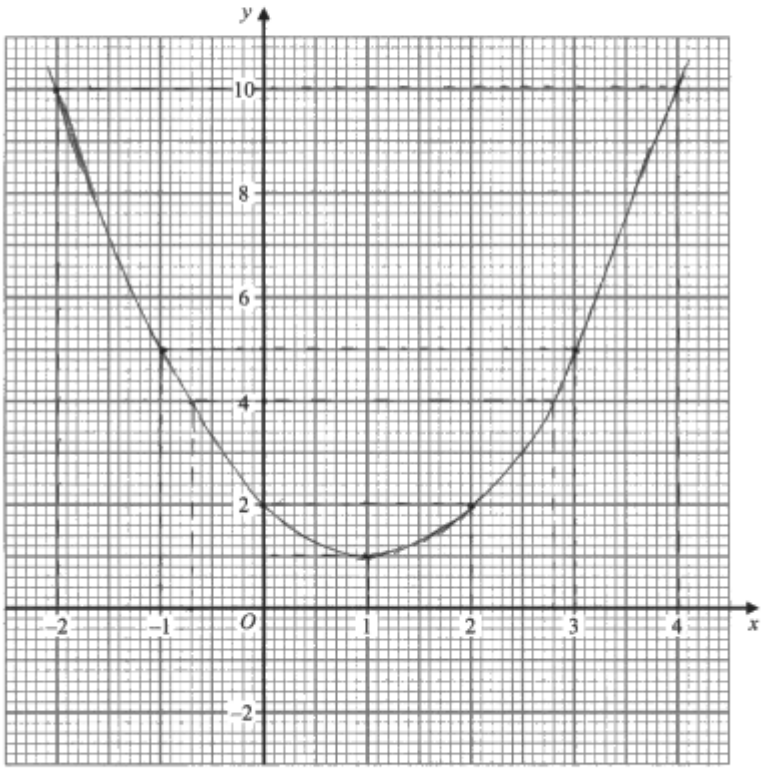
(a) Complete the table of values for $y = x^2 - 2x + 2$

x	–2	–1	0	1	2	3	4
y	10	5	2	1	2	5	10

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from –2 to 4

(2)



(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

$x^2 - 2x + 2 = 0$

$x_1 = -0.7$; $x_2 = 2.8$

(2)

6/6

Examiner Comments

Part (a)
B2 For 4 values correct
Part (b)
M1 and A1 Fully correct graph with a clear curve used
Part (c)
M1 and A1 There is a choice of lines drawn on the graph but the correct values have been given on the answer line so we can award both marks.

Student Response B

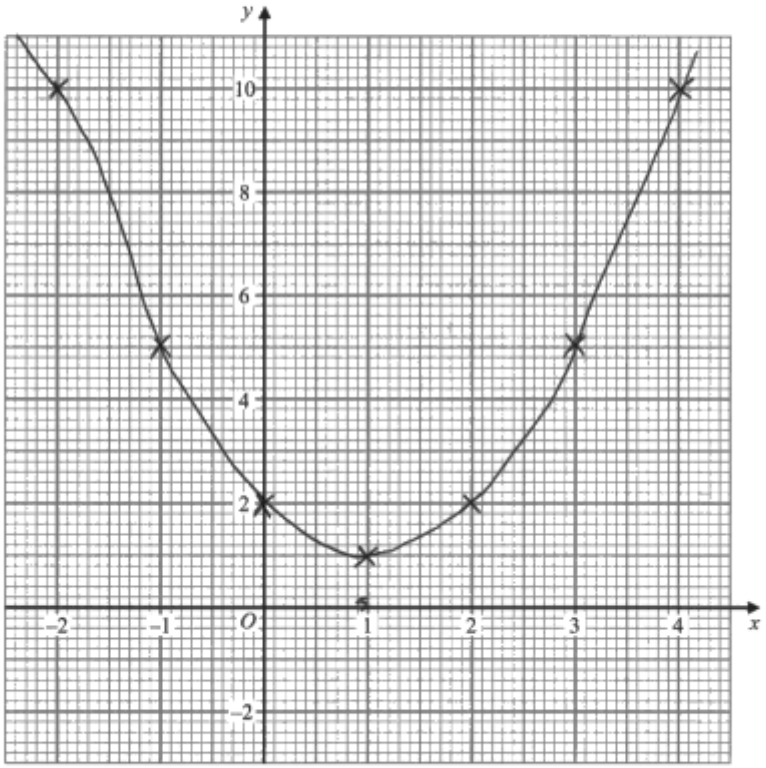
(a) Complete the table of values for $y = x^2 - 2x + 2$

x	−2	−1	0	1	2	3	4
y	10	5	2	1	2	5	10

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from −2 to 4

(2)



(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

x = 3 -2

(2)

4/6

Examiner Comments

Part (a)
B2 All the value sin the table are correct.

Part (b)
M1 A1 The points are plotted correctly and joined by a curve.

Part (c)
M0 A0 There is no working shown for part (c) and the answer is incorrect.

Student Response C

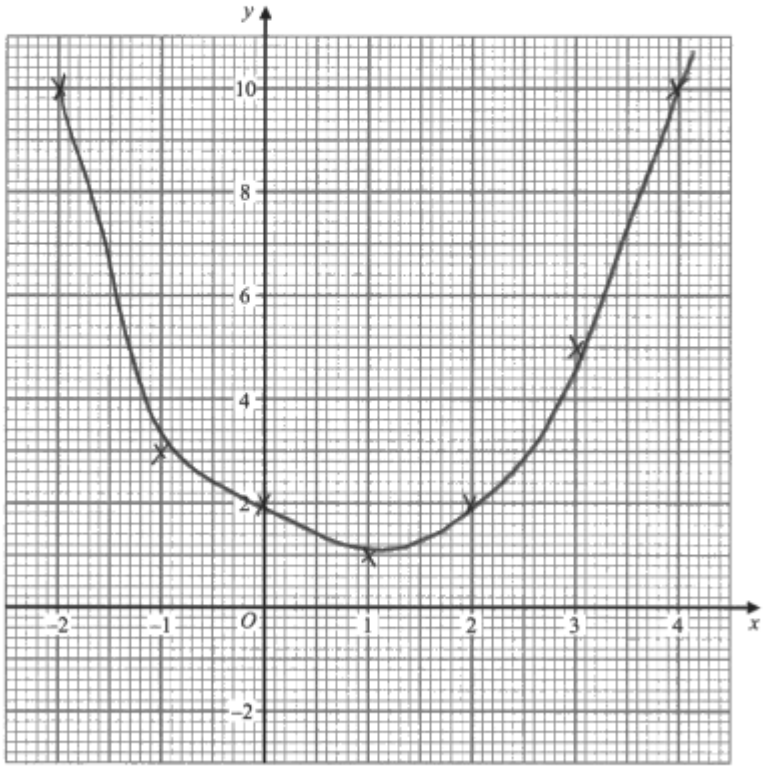
24 (a) Complete the table of values for $y = x^2 - 2x + 2$

x	−2	−1	0	1	2	3	4
y	10	3	2	1	2	5	10

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from −2 to 4

(2)



(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

5

(2)

2/6

Examiner Comments

Part (a)
B1 This is the common error seen on this question. The value for -1 is incorrect and so only B1 can be awarded.

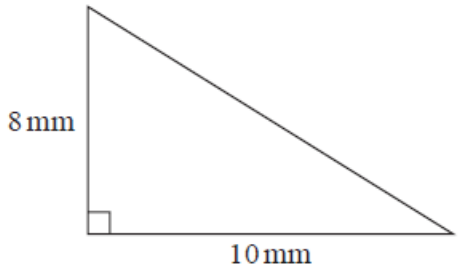
Part (b)
M1 A0 They correctly plot their points and so can score M1 but the correct curve is not drawn so no accuracy mark can be awarded.

Part (c)
M0 A0 No working is seen and the answer is incorrect, even with follow through being applied.

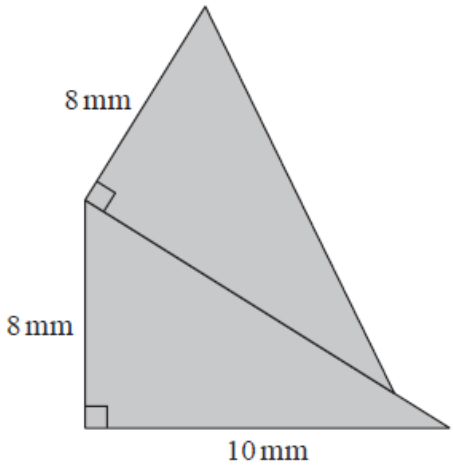
Exemplar Question 10

Foundation tier Paper 2

25 Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... mm

(Total for Question 25 is 4 marks)

Mean Score 0.21

Examiner Comments

This multi-stage problem proved challenging for the majority of students, with very few scoring any marks.

A small proportion recognised that the application of Pythagoras' Theorem was required, and if this occurred the most successful students wrote the lengths on the diagram.

Mark Scheme

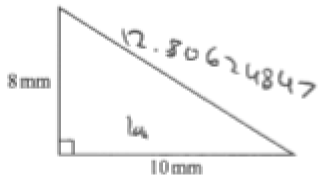
Question	Answer	Mark	Mark scheme	Additional guidance
25	41.6	P1	for start of process to find the length of the hypotenuse, eg (hyp^2 =) $8^2 + 10^2$ (= 164)	Note lengths may be seen on the diagram
		P1	for complete process to find hypotenuse, eg $\sqrt{8^2+10^2}$ **or** $\sqrt{64+100}$ **or** $2\sqrt{41}$ **or** $\sqrt{164}$ (= 12.8…)	
		P1	(dep P2) for complete process to find the required perimeter, eg 8 + 8 + 10 + "12.8" + "12.8 – 10" **or** $16 + 4\sqrt{41}$	8 + 8+ "12.8" + "12.8" oe is acceptable for this mark
		A1	for answer in the range 41 to 42	If an answer in the range 41 to 42 is given in the working space then incorrectly rounded, award full marks.

Examiner Comments

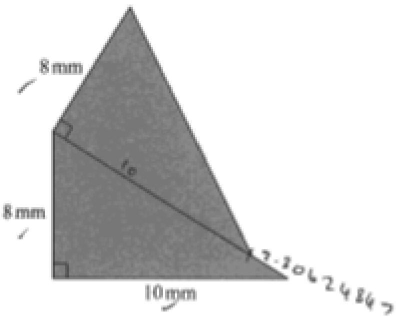
The first two marks are for the use of Pythagoras' Theorem leading to the length of the hypotenuse. The next mark is dependent upon the first two marks and is for the correct summation.
The last accuracy mark is for an answer within a given range and the request for 3 significant figures is advisory in this case.

Student Response A

Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

8 + 8 + 10 + 12.8062487
+ 2.8062487
26
=
26 + 12.... = 38.80624847
+ 2.8.... = 41.61249717

41.6 mm

(Total for Question 25 is 4 marks)

4/4

Examiner Comments

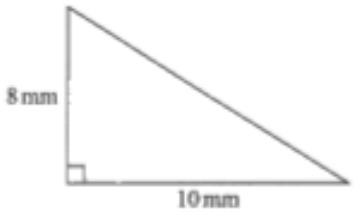
This answer is fully correct.

P1 P1 The length of the hypotenuse is given on the diagram and so we can award both process marks at this stage.

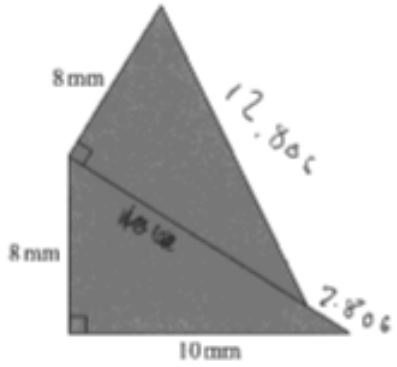
P1 A1 The addition is correct as is the final answer so P1A1 can also be awarded.

Student Response B

5 Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

$8^2 = 64$ +
$10^2 = 100$
$\sqrt{164} = 12.8$

8 +
8 +
10 +
12.806
2.806 +

61.934

61.934 mm

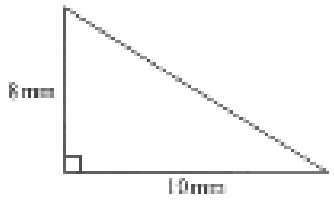
3/4

Examiner Comments

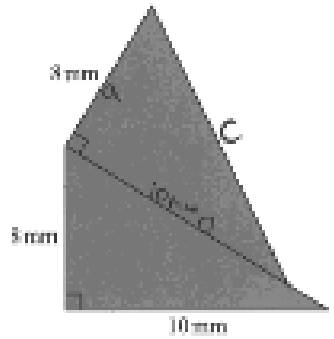
P1 can be awarded for 64 + 100
P1 can be awarded for √164
P1 The addition is correct with 12.8 - 10 already evaluated as 2.806 and this can be seen on the diagram.
A0 However the final answer is incorrect and so no accuracy mark can be awarded.

Student Response C

Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

$a^2+b^2=c^2$

$8^2+10^2=c^2$

$64+100=c^2$

164

$\sqrt{164}=12.806$

12.806 mm

2/4

Examiner Comments

P1 P1 can be awarded for the correct use of Pythagoras' theorem to find the hypotenuse.
P0 A0 The student does no more work and so cannot be awarded any more marks.

Paper 3F (Calculator)

Exemplar Question 1

Foundation tier Paper 3

8 On Monday, Sandy pays for 2 plane tickets, 7 nights in a hotel and 2 theme park tickets.

	dollars
each plane ticket	600
each night in a hotel	120
each theme park ticket	250

Show that Sandy pays more than 2500 dollars on Monday.

(Total for Question 8 is 3 marks)

Mean Score: 2.90

Examiner Comments
This question has a primary assessment objective of AO2 assessing content reference N2 for applying the four operations. It was written to assess candidates' ability to solve a problem set in a realistic context using appropriate operations and techniques. It was not necessary for candidates to give a written response; showing (using figures) that the total was more than 2500 was sufficient, but for full marks the correct figures need to be shown eg 2540. A small number of candidates failed to show the 2540, but did show the difference of +40 or −40 which was an alternative to getting the A mark.

Mark Scheme

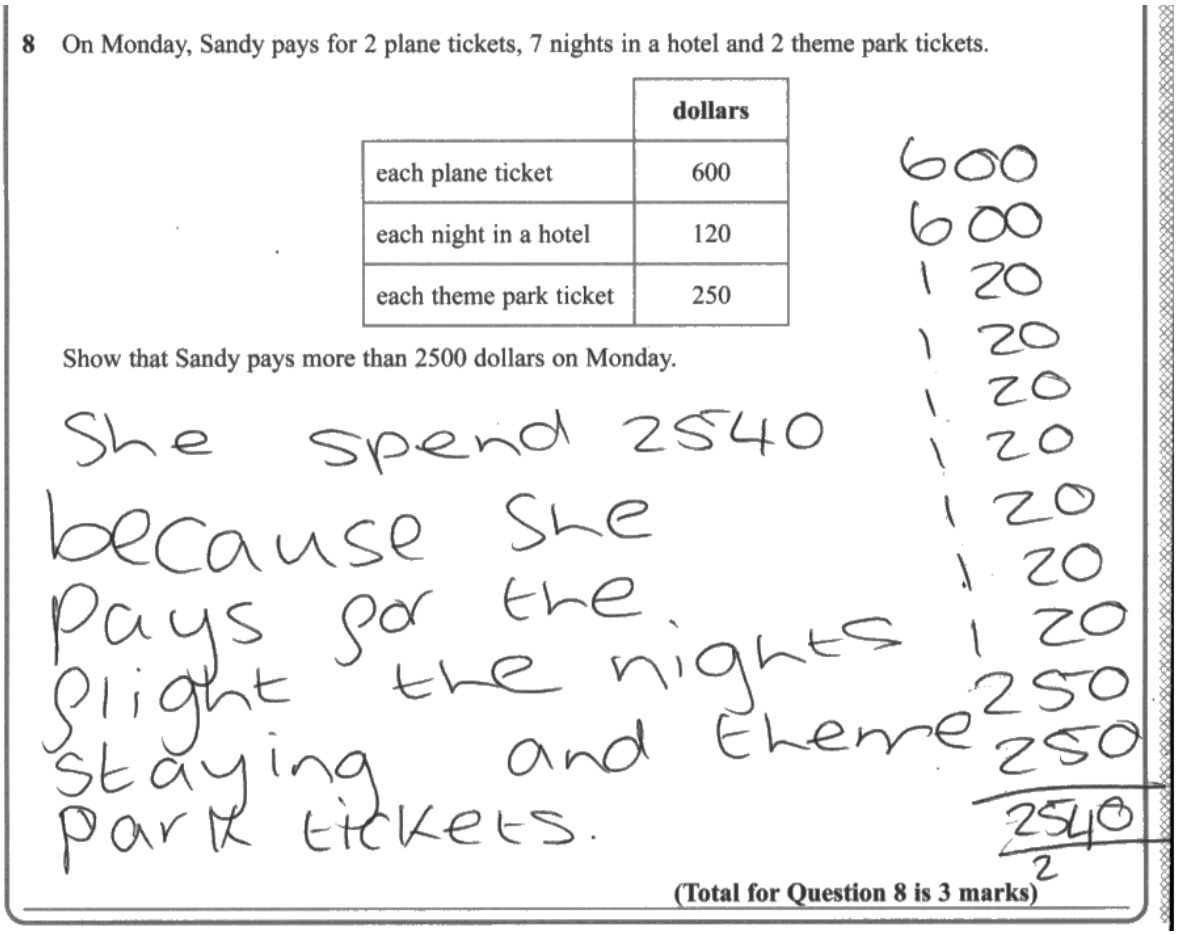
Question	Answer	Mark	Mark scheme	Additional guidance
8	2540 shown	M1	for finding the cost of one item eg 2 × 600 (=1200) or 7 × 120 (=840) or 2 × 250 (=500)	
		M1	full process eg "1200" + "840" + "500" (=2540) **or** 2500 − "1200" − "840" − "500" (= ±40)	
		A1	for 2540 or ±40	Ignore written statements as long as the correct figures are shown

Examiner Comments

Notation was ignored; it was not necessary to show $ signs; £ signs were ignored.

Working was frequently seen next to the text box.

Student Response A



8 On Monday, Sandy pays for 2 plane tickets, 7 nights in a hotel and 2 theme park tickets.

	dollars
each plane ticket	600
each night in a hotel	120
each theme park ticket	250

Show that Sandy pays more than 2500 dollars on Monday.

She spend 2540 because she pays for the flight the nights staying and theme park tickets.

600
600
120
120
120
120
120
120
120
250
250
2540
2

(Total for Question 8 is 3 marks)

3/3

Examiner Comments

M1 Awarded for sight of 2×600 or 7×120 or 2×250, which in this case is shown by writing out the figures in full.

M1 for showing addition of the figures.

A1 for a correct figure shown of 2540

Note that a correct answer from no incorrect working gets full marks

Student Response B

8 On Monday, Sandy pays for 2 plane tickets, 7 nights in a hotel and 2 theme park tickets.

	dollars	
each plane ticket	600	x2
each night in a hotel	120	x7
each theme park ticket	250	x2

Show that Sandy pays more than 2500 dollars on Monday.

600 x 2 = 1200
120 x 7 = 840
250 x 2 = 500
2340

(Total for Question 8 is 3 marks)

2/3

Examiner Comments

M1 for finding the cost of one item. What is written next to the table would be sufficient for this mark.

M1 for a full process shown. That is, with an intention to add also shown. Writing 1200, 840, 500 as a column with a line underneath would be sufficient indication of this intention.

A1 for the correct figure of 2540 shown.

Student Response C

8 On Monday, Sandy pays for 2 plane tickets, 7 nights in a hotel and 2 theme park tickets.

	dollars
each plane ticket	600
each night in a hotel	120
each theme park ticket	250

$\times 2 = 1200$

$\times 2 = 240 \times 7 = 1680.$

$\times 2 = 500.$

Show that Sandy pays more than 2500 dollars on Monday.

1680
1200
+ 500
3380 dollars.

Sandy pays 3380 dollars.

(Total for Question 8 is 3 marks)

1/3

Examiner Comments

M1 for finding the cost of one item. In this case this is evidenced by 600×2 or 250×2, or sight of the figures 1200 or 500.

M1 would normally be awarded for finding the total of their figures, but "840" in the mark scheme suggests that the "840" has to come from correct method. In this case their figure of 1680 comes from an incorrect calculation of 240×2×7 so this method mark cannot therefore be awarded.

A0 since the final answer is incorrect.

Exemplar Question 2

Foundation tier Paper 3

9 Vadim has 56 clocks.
The clocks are only red, only blue or only black.

32 of the clocks are plastic.
5 of the 14 blue clocks are plastic.
8 of the 12 red clocks are **not** plastic.

Use this information to complete the two-way table.

	Red	Blue	Black	Total
Plastic				
Not plastic				
Total				

(Total for Question 9 is 3 marks)

Mean Score: 2.53

Examiner Comments

This question assesses the ability of candidates to complete a two-way table, as part of content reference S2, with an assessment objective of AO2. As such, it was insufficient to work out the figures: they had to be placed in the correct cell in the table. Common errors came from candidates putting numbers in the wrong cells or misinterpreting the given text.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
9	4 **5** 23 **32** **8** 9 7 24 **12** **14** 30 **56**	B3 (B2 (B1	for a fully correct table for at least 7 figures correctly placed) for the given values correctly placed in the table or one correct row or column)	Given values in bold Given values: 5, 32, 8, 12, 14, 56

Examiner Comments

See note above: As such, it was insufficient to work out the figures: they had to be placed in the correct cell in the table.

Student Response A

9 Vadim has 56 clocks.
The clocks are only red, only blue or only black.

32 of the clocks are plastic.
5 of the 14 blue clocks are plastic.
8 of the 12 red clocks are **not** plastic.

Use this information to complete the two-way table.

	Red	Blue	Black	Total
Plastic	4	9	19	32
Not plastic	8	5	11	24
Total	12	14	30	56

(Total for Question 9 is 3 marks)

2/3

Examiner Comments

B2 for 8 values correctly placed in the table (they need at least 7 for B2).

Student Response B

9 Vadim has 56 clocks.
The clocks are only red, only blue or only black.

32 of the clocks are plastic.
5 of the 14 blue clocks are plastic.
8 of the 12 red clocks are **not** plastic.

Use this information to complete the two-way table.

	Red	Blue	Black	Total
Plastic	8	9	15	32
Not plastic	4	5	15	24
Total	12	14	30	56

(Total for Question 9 is 3 marks)

1/3

Examiner Comments

B1 There are only 6 correct values correctly placed in the table (a minimum of 7 are needed for B2). However, both the total column and the total row are correct. The mark scheme awards B1 for either a single row or a single column correct.

Student Response C

9 Vadim has 56 clocks.
The clocks are only red, only blue or only black.

32 of the clocks are plastic.
5 of the 14 blue clocks are plastic.
8 of the 12 red clocks are **not** plastic.

Use this information to complete the two-way table.

	Red	Blue	Black	Total
Plastic	12	5	17	34
Not plastic	8	9	17	34
Total	20	14	34	68

(Total for Question 9 is 3 marks)

1/3

Examiner Comments

B1 There are only 4 correct values correctly placed in the table (a minimum of 7 are needed for B2). However, the second column is correct. The mark scheme awards B1 for either a single row or a single column correct.

Exemplar Question 3

Foundation tier Paper 3

10 Corina has £300 to spend on books.
Each book costs £4.85

Work out the greatest number of books Corina can buy.

.....

(Total for Question 10 is 3 marks)

Mean Score: 2.35

Examiner Comment

The primary assessment objective for this question is AO3 which assesses content references N13 (use standard units of money) and N15 (round numbers to an appropriate degree of accuracy). A such, they were required to work with remainders, and undertake rounding to the nearest whole number in the correct direction.
A common misconception is to round their figures in the wrong direction. The weakest candidates performed the wrong operation (300 × 4.85).

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
10	61	P1	for 300 ÷ 4.85 (= 61.8...)	This mark may be awarded for build-up methods that get to figures that are before or after 300
		A1	for 61.8... **or** 62	Embedded answers get −1 mark.
		A1	61	

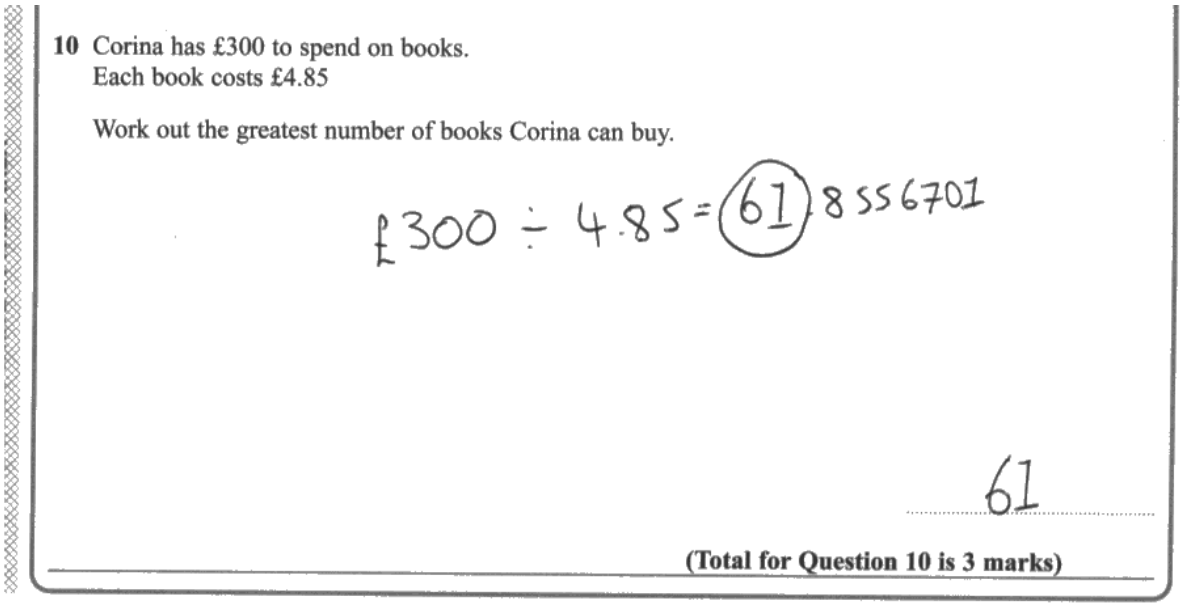
Examiner Comments

The mark scheme catered for those rounding in the wrong direction, and awarded 2 marks for 62 on the answer line.

Some candidates chose not to do the division calculation, but instead added up lots of 4.85 in an attempt to get to 300. This was acceptable, as long as their working showed them going all the way to 300; errors in addition were allowed, as long as they still worked towards 300 with their figures.

Some candidates gave their answers as embedded expressions, so (as long as there was no contradictory information on the answer line) a statement of 4.85 × 61 = 300 would get 2 marks, and 4.85 × 62 = 300 would get 1 mark. Unless of course they highlighted the 61 or 62 as being their answer.

Student Response A



10 Corina has £300 to spend on books.
Each book costs £4.85

Work out the greatest number of books Corina can buy.

£300 ÷ 4.85 = 61.8556701

61

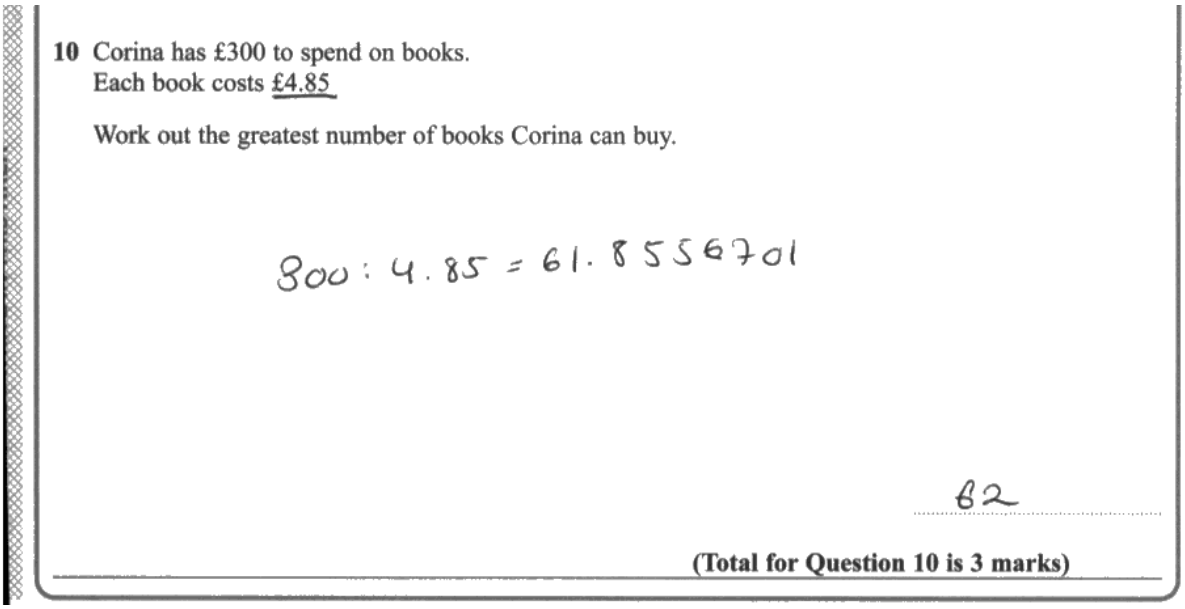
(Total for Question 10 is 3 marks)

3/3

Examiner Comments

P1 for 300 ÷ 4.85
A1 for 61.8 … (shown here as 61.8556701)
A1 for 61 given as the answer
Note that 61 on the answer line without working would get the full 3 marks.

Student Response B



10 Corina has £300 to spend on books.
Each book costs £4.85

Work out the greatest number of books Corina can buy.

300 : 4.85 = 61.8556701

62

(Total for Question 10 is 3 marks)

2/3

Examiner Comments

P1 for 300 ÷ 4.85
A1 for 6.18 … (shown here as 61.8556701)
A0 since an incorrect final answer of 62 was given.
Note that if 62 was given on the answer line without working 2 marks could be awarded.

Student Response C

10 Corina has £300 to spend on books.
Each book costs £4.85

Work out the greatest number of books Corina can buy.

£300. £4.85.

£4.85 × 61 = £295.85.

£295.85

(Total for Question 10 is 3 marks)

2/3

Examiner Comments

P1 / A1 / A0 The correct answer of 61 is indicated in an embedded expression. It has NOT been highlighted in some way as being the answer to the problem. However, the answer on the answer line is not a contradiction. According to the mark scheme, this embedded answer therefore gets −1, hence 2 marks.

Exemplar Question 4

Foundation tier Paper 3

14 A stadium cost £600 million.

$\frac{13}{15}$ of this cost was for the building.

The rest of the cost was for the land.

Work out the cost of the land.

£..... million

(Total for Question 14 is 3 marks)

Mean Score: 1.56

Examiner Comments

The primary assessment objective for this question is AO3 which also assesses content reference N8 (calculate exactly with fractions). Candidates need to work with the fraction 13/15 exactly. A common misconception is that the fraction needed to be converted to a decimal or percentage before using it, which could not then be given full marks since this would not give an exact answer.

Candidates who wrote all their figures out in full, using 6 zeros instead of the work "million" could find this problem difficult since they would have to keep track of all their zeros.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
14	80	P1	for $1-\frac{13}{15}\left(=\frac{2}{15}\right)$ **or** $\frac{13}{15}\times 600$ (million) (= 520 (million))	Condone no million or may see 000 000 used* *In this case condone up to two missing 0s for the award of the P marks. For P marks accept $\frac{13}{15}, \frac{2}{15}$ rounded or truncated to no less than 2dp.
		P1	for $"\frac{2}{15}"\times 600$ (million) (= 80 (million)) **or** 600 – "520" (=80) oe	
		A1	Accept 80 000 000	

Examiner Comments

Many candidates who chose to write out "millions" had difficulty tracking the number of zeros in their figures. To offer some compensation, examiners were told to condone up to two missing 0s from their figures (but no extras). With this compensation they could then gain up to two P marks but would probably lose the A mark.

Candidates who converted 13/15 to a decimal or percentage (0.86 or 86% seen regularly) could still gain the P marks, but would not gain the A mark since they were not working with the fraction "exactly", instead using a prematurely rounded figure.

Student Response A

14 A stadium cost £600 million.

$\frac{13}{15}$ of this cost was for the building.

The rest of the cost was for the land.

Work out the cost of the land.

Building:

$\frac{13}{15}$ of 600

600 ÷ 15 = 40

40 × 13 = 520

£520 mil

Land:

600 − 520 = £80 mil

£ 80 million

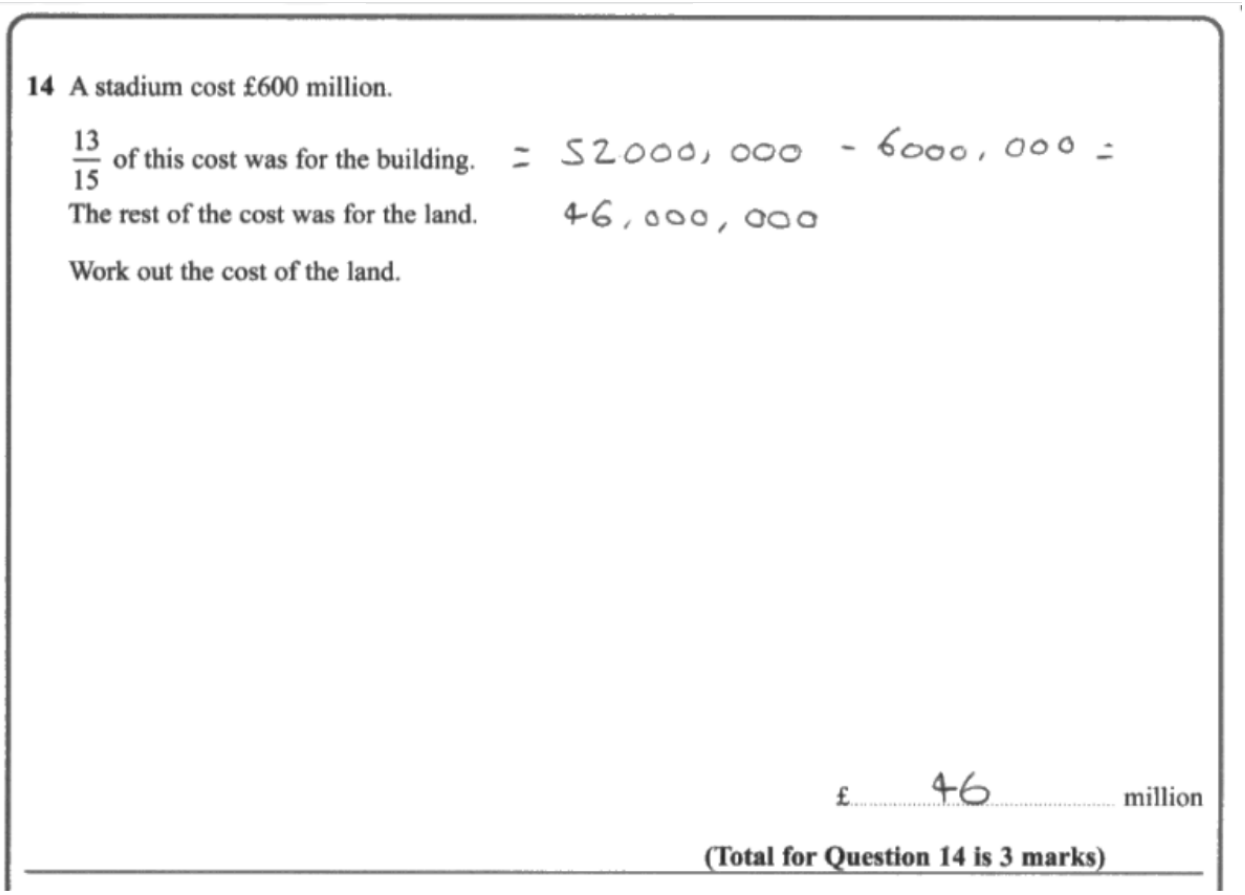
(Total for Question 14 is 3 marks)

3/3

Examiner Comments

P1 for the calculation 600 ÷ 15 × 13; note that just stating 13/15 of 600 would be insufficient: the correct operations need to be shown. Equally a figure of 520 would be sufficient for the award of this mark.
P1 for 600 − 520
A1 for the correct answer of 80. A correct answer without working would gain full marks.

Student Response B



14 A stadium cost £600 million.

$\frac{13}{15}$ of this cost was for the building. = 52000,000 - 6000,000 =

The rest of the cost was for the land. 46,000,000

Work out the cost of the land.

£ 46 million

(Total for Question 14 is 3 marks)

2/3

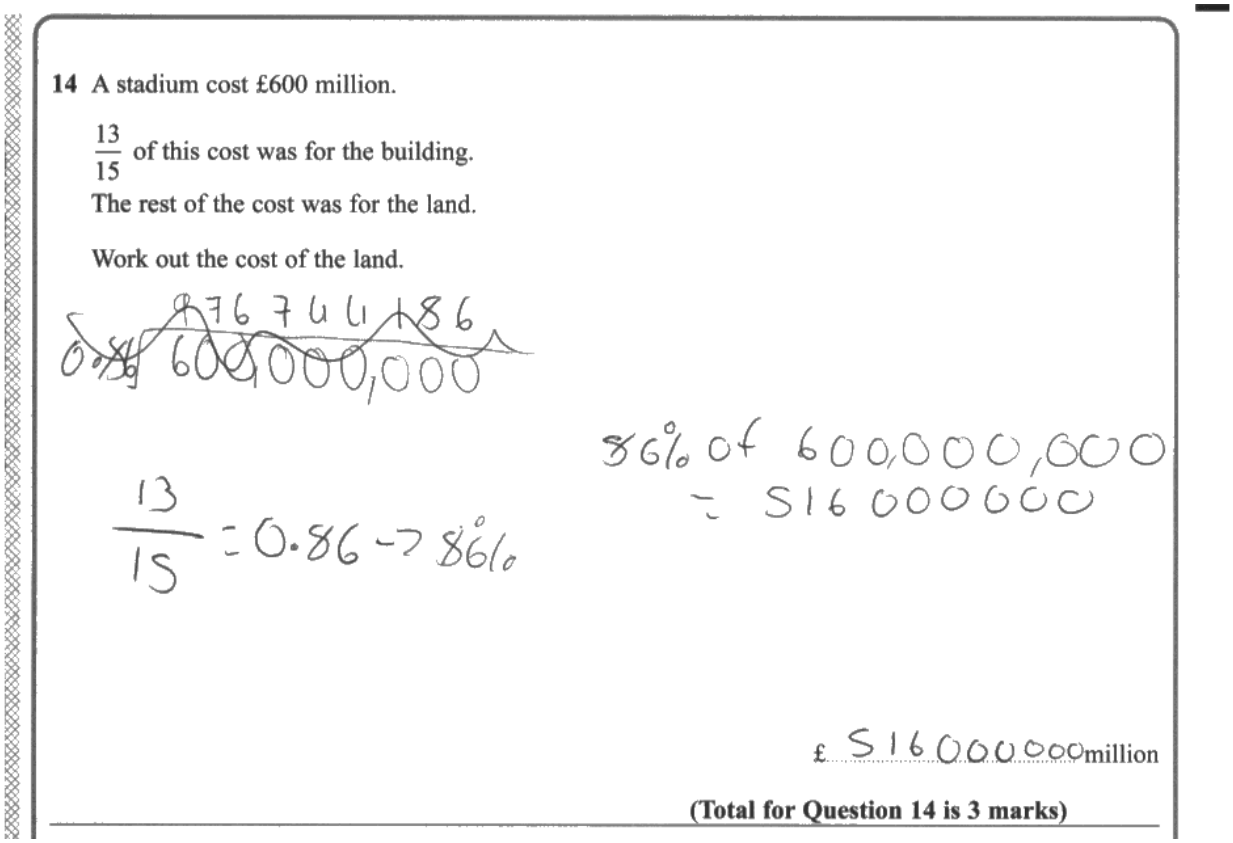
Examiner Comments

P1 for sight of the figure 52000,000 This figure should be compared to 520 (million) which can be awarded the first P mark on sight. The candidate has lost a zero in giving their figure, but this can be condoned (see additional guidance) when attempts are made to write the figures out in full.

P1 for the attempt to subtract "52000,000 − 6000,000" . This is written the wrong way around, but is sufficient to indicate an attempt to find the difference. Again missing up to two zeros (as in the 6000,000) can be condoned.

A0 since an incorrect answer is given.

Student Response C



14 A stadium cost £600 million.

$\frac{13}{15}$ of this cost was for the building.

The rest of the cost was for the land.

Work out the cost of the land.

876 744 186

0.86 600,000,000

$\frac{13}{15} = 0.86 \rightarrow 86\%$

86% of 600,000,000

= 516 000 000

£ 516 000 000 million

(Total for Question 14 is 3 marks)

1/3

Examiner Comments

P1 for the attempt to find 13/15 of 600 million. They do so by using a rounding figure of 86% which is their equivalent of the fraction 13/15, resulting in the figure 516 (million). Use of 86% as a truncated form of the fraction 13/15 is condoned (see additional guidance).

P0 since there is no attempt to subtract their figure of "516" from 600.

A0 since a correct answer is not provided.

Exemplar Question 5

Foundation tier Paper 3

15 Jenna measures all the angles around a point.

Her results are 23°, 145°, 23° and 69°

Explain why these results cannot be true.

.....

.....

.....

(Total for Question 15 is 1 mark)

Mean Score: 0.59

Examiner Comments

The assessment objective is AO3 with content reference G3 (properties of angles at a point). This was not necessarily reasoning but demonstrating the knowledge that there were 360º around a point.

Mark Scheme

Question	Answer	Mark	Mark scheme
15	Explanation	C1	for explanation **Acceptable examples** They do not add to 360 They add to 100 too least It is missing a 100 angle / It needs 100 more Because the total has to be 360 A whole circle is 360 **Not acceptable examples** They add up to 260 One of the angles is wrong A shape with 4 angles adds up to 360

Examiner Comments

The exemplar comments are not unique, but give an indication as to what was acceptable (or not acceptable) for an answer.

Note that this is a C mark: the marking guidance at the front of the mark scheme defines a C mark. Candidates should not include with their answer anything that is incorrect, ambiguous, or contradictory.

Student Response A

15 Jenna measures all the angles around a point.

Her results are 23°, 145°, 23° and 69°

Explain why these results cannot be true.

23 + 145 + 23 + 69 = 260°, It needs 100° more to be 360°

(Total for Question 15 is 1 mark)

500000063887 From practice pack

1/1

Examiner Comments

C1 for a an acceptable explanation. They have indicated that the angles need to add to 360; this is sufficient. "100 more" would also be sufficient as it implies the sum should be 360.

Student Response B

15 Jenna measures all the angles around a point.

Her results are 23°, 145°, 23° and 69°

Explain why these results cannot be true.

Because when measuring angles around a point, you can't have it adding up to 260

(Total for Question 15 is 1 mark)

0/1

Examiner Comments

C0 See mark scheme: simply stating the angles add to 260 is not sufficient, since this does not demonstrate the knowledge that the angles at a point add to 360.

Student Response C

15 Jenna measures all the angles around a point.

Her results are 23°, 145°, 23° and 69°

Explain why these results cannot be true.

These results can not be true as these angles add up to 260 and not 180 or 360.

(Total for Question 15 is 1 mark)

0/1

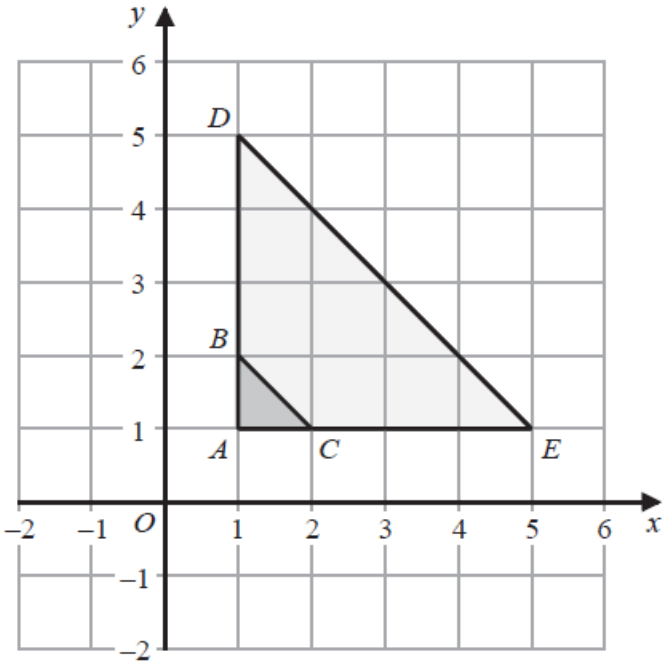
Examiner Comments

C0 The candidate has provided a statement that is ambiguous, by leaving their conclusion at 180 OR 360, which is a choice.

Exemplar Question 6

Foundation tier Paper 3

16 Here is a diagram showing triangle *ABC* and triangle *ADE*.



Describe fully the single transformation that maps triangle *ABC* onto triangle *ADE*.

.....

.....

.....

(Total for Question 16 is 2 marks)

Mean Score: 0.13

Examiner Comments

This question assesses content reference G7 of the specification relating to ".. describe … shapes, including on coordinate axes, by considering …. enlargement" and has an assessment objective of AO2.

Typically candidates will usually show some confusion between the correct scale factor 4, and an incorrect interpretation of a scale factor 3, since they count on another 3 squares on the diagram.

Mark Scheme

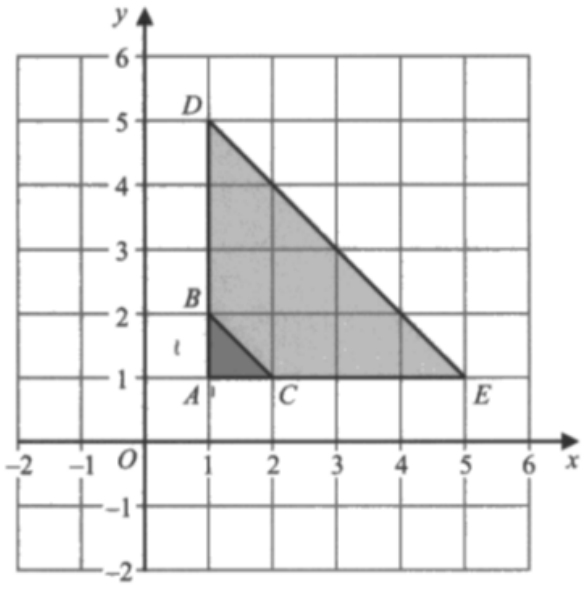
Question	Answer	Mark	Mark scheme	Additional guidance
16	Enlargement centre (1,1) scale factor 4	B2	Enlargement, centre (1,1) and scale factor 4	No extras. Accept *A* as centre.
		(B1	two of Enlargement, centre (1,1), scale factor 4 with nothing incorrect)	If there is a clear reference to a different transformation award no marks

Examiner Comments

Candidates are awarded 2 marks for all three aspects, and 1 mark for any two of the three aspects, but any reference to a different transformation means that no marks can be awarded.
For "enlargement" the words "enlarge", "enlarged" were accepted
For the point a simple coordinate of (1,1) stated is sufficient, as is use of the letter A.
For the scale factor a simple reference to "4", "x4", etc. was accepted.

Student Response A

16 Here is a diagram showing triangle *ABC* and triangle *ADE*.



Describe fully the single transformation that maps triangle *ABC* onto triangle *ADE*.

Centre point (1,1), enlargement, enlarged by ~~3~~ 4

(Total for Question 16 is 2 marks)

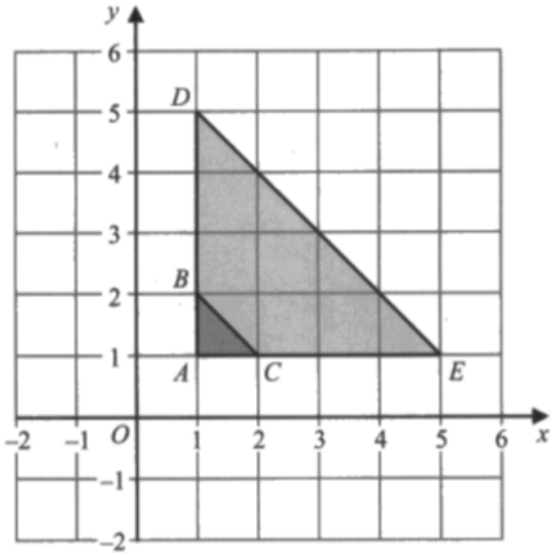
2/2

Examiner Comments

B2 We have all three aspects for 2 marks: "enlargement", "(1,1)", "4".
The words "centre point" and "scale factor" are not needed.

Student Response B

16 Here is a diagram showing triangle *ABC* and triangle *ADE*.



Describe fully the single transformation that maps triangle *ABC* onto triangle *ADE*.

Enlargement by x4

(Total for Question 16 is 2 marks)

1/2

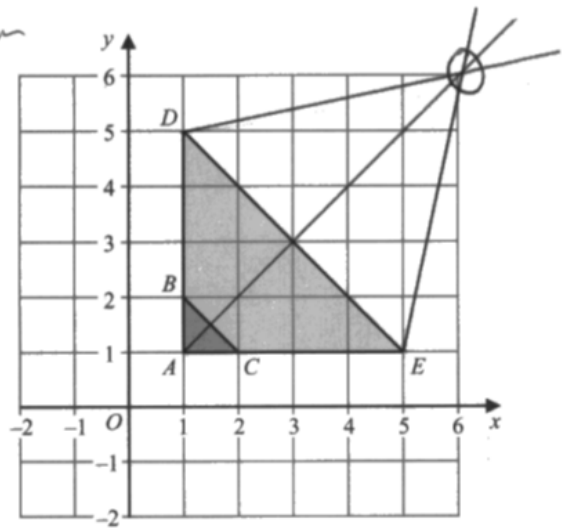
Examiner Comments

B1 for listing two aspects: "enlargement" and "×4". There is no mention of the centre point.

Student Response C

16 Here is a diagram showing triangle *ABC* and triangle *ADE*.

Translation
E
Reflexion
R
Yes!



Describe fully the single transformation that maps triangle *ABC* onto triangle *ADE*.

Translation, (6, 6)
SF:

(Total for Question 16 is 2 marks)

0/2

Examiner Comments

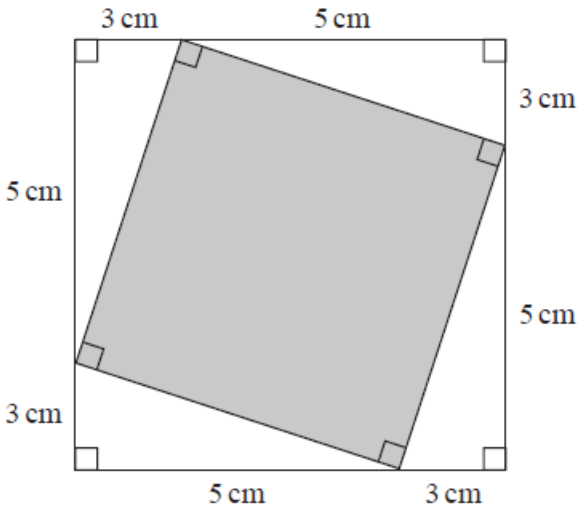
B0 Here there is a clear reference to a different transformation (translation).

Irrespective of what else might be written, this therefore scores 0 marks.

Exemplar Question 7

Foundation tier Paper 3

19 This diagram shows two squares.



Work out the area of the square shown shaded in the diagram.

.....

(Total for Question 19 is 4 marks)

Mean Score: 0.55

Examiner Comments

This question is designed to assess primarily G14 (use standard units of measurement) and G16 (know and apply formulae to calculate area of triangles…). It has an assessment objective of AO3. There are two main routes of solution. The first uses areas of triangles and rectangles; an alternative method uses Pythagoras theorem alongside areas.

Weaker students not understanding how to calculate the side of the shaded square will make false assumptions about the shape, perhaps deducing that length is slightly longer than 5cm (eg 8cm, 9cm). Those using Pythagoras could mis-quote and find the difference of the squares or forget to find the square root. Some working with areas of triangle will inevitably forget the "half".

Mark Scheme

Question	Answer	Mark	Mark scheme		Additional guidance
19	34 cm²	P1	for finding one area eg 8 × 8 (= 64) or 0.5 ×3 × 5 (=7.5)	for first stage in working with Pythagoras eg sight of $3^2 + 5^2$ or 9 + 25	
		P1	for a complete process to find the area eg "64" − 4 × "7.5" (=34)	for full use of Pythagoras eg $\sqrt{3^2+5^2}$ or $\sqrt{34}$ or 5.83…	Any figure used must come from a correct process
		A1	for an answer in the range 33.6 to 34		Can be awarded with incorrect units stated
		B1	(indep) for cm²		Can be awarded with an incorrect or absent numerical answer

Examiner Comments

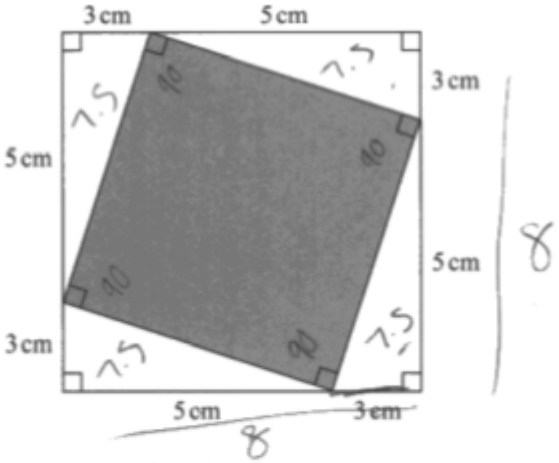
Since there are two common routes through this question, the mark scheme is divided into two columns. A decision must first be taken as to which route to follow when marking; work to the advantage of the candidate. The exact answer is 34, but (for either method) accept an answer in the given range; any answer given in this range should be awarded P1 P1 A1.

3^2+5^2 followed by the square root of 6+10 should be awarded P1P0

Note that the B1 units mark is given independent of the numerical answer (see additional guidance).

Student Response A

19 This diagram shows two squares.



Work out the area of the square shown shaded in the diagram.

$\frac{3\times5}{2} = 7.5$

$7.5\times4 = 30$

$8\times8 = 64$

$64 - 30 = 34$

34cm^2

(Total for Question 19 is 4 marks)

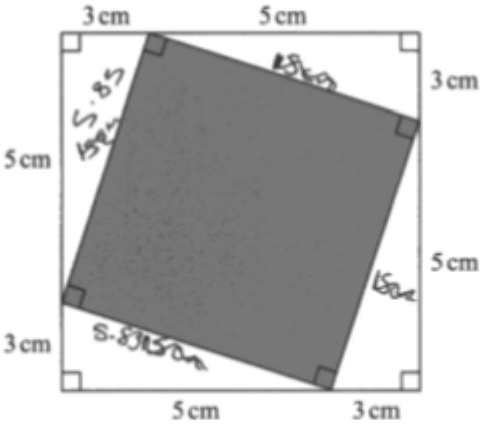
4/4

Examiner Comments

This candidate is using areas (rather than Pythagoras) to solve this problem, so that should be the route through the mark scheme.
P1 for finding the area of the square (8×8 or 64) OR for finding the area of a triangle (3×5/2 or 7.5)
P1 for a complete process to find the area (64 – 4×7.5)
A1 for 34, the correct answer.
B1 for the units given as cm^2

Student Response B

19 This diagram shows two squares.



Work out the area of the square shown shaded in the diagram.

$3^2 + 5^2 = 225$ $a^2 + b^2 = c^2$

$\sqrt{225} = 15\text{cm}$

$3^2 + 5^2 = 34$

$\sqrt{34} = 5.83$

area = Bah

$5.85 \times 5.85 = 34.2225\text{cm}^2$

34.2225cm^2

(Total for Question 19 is 4 marks)

3/4

Examiner Comments

This candidate is using Pythagoras rather than areas, so that is the route that must be followed through the mark scheme.

P1 for first stage working shown s 3^2+5^2 (ignore the $3^2\times5^2$ which is replaced, and does not lead to the answer on the answer line).

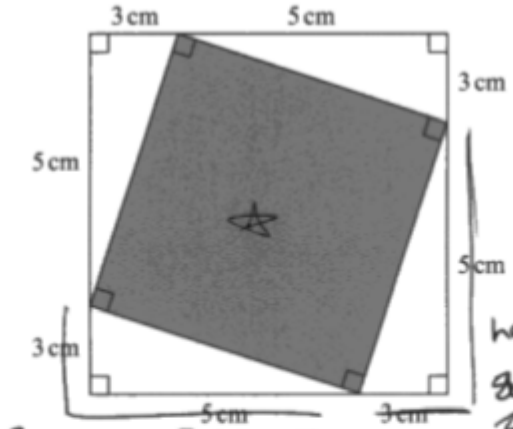
P1 for full use of Pythagoras, leading to the statement $\sqrt{34}$ or the figure of 5.83

A0 since the answer of 34.2225 is outside the range required (33.6 to 34). What this candidate has done is miscopy their figure of 5.83 and have used 5.85 instead, resulting in an unacceptable answer for the award of the A mark.

B1 since the correct units of cm^2 have been given with their answer.

Student Response C

19 This diagram shows two squares.



height

Base = 3+5 = 8

3+3=8

Work out the area of the square shown shaded in the diagram.

area = Base x height

3+5=8

area = 8 x 8 = 64 cm²

64cm²

(Total for Question 19 is 4 marks)

2/4

Examiner Comments

This candidate is using areas (rather than Pythagoras) to solve this problem, so that should be the route through the mark scheme.
P1 for finding one area, evidenced by 8×8 or the figure of 64.
P0 since they have not shown a complete process; it looks likely they do not know how to proceed beyond finding the first area.
A0 since the answer is incorrect.
B1 since the correct units of cm^2 have been given with their answer.

Exemplar Question 8

Foundation tier Paper 3

22 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

weight of potato : weight of cheese : weight of onion = 9 : 2 : 1

Natalie needs to make 6000 g of potato cakes.

Cheese costs £2.25 for 175 g.

Work out the cost of the cheese needed to make 6000 g of potato cakes.

£.....

(Total for Question 22 is 4 marks)

Mean Score: 0.89

Examiner Comments

This question was designed to assess the content references of R5 (apply ratio to real contexts) and R10 (solve problems involving direct and inverse proportion). It has an assessment objective of AO3.

In order to gain any marks candidates therefore had to show use of the ratio 9:2:1 given in the question. Candidates who are confused by ratio work could attempt calculations involving some of the other numbers in the question, which would not therefore attract any marks.

A common misconception is to deal with integer multiples of 175g of cheese, rather than considering that the weight of cheese could be accurately weighed; this misconception was condoned.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
	12.85 or 12.86 or 13.5(0)	P1	for 9 + 2 + 1 (=12)	Award this mark for sight of 4500, 1000 or 500
		P1	for working out how many lots of 175g are needed eg 6000 ÷ "12"× 2 ÷ 175 (=5.71..)	Process may lead to 5 or 6 instead of 5.71
		P1	for a complete process eg "5.71…" × 2.25 (=12.857..)	"5.71…" (ft) or a figure rounded or truncated eg "6"
		A1	for 12.85 or 12.86 or 13.5(0)	

Examiner Comments

The first process mark is for starting to use the ratio, evidence by 9+2+1, or the figure of 12, or figures 4500, 1000 or 500 which come from a multiple of 9 : 2 : 1

The second process mark is for working out how many lots of 175g are needed. Candidates may consider that only integer multiples of 175g can be used and will therefore round their answer to 5 or 6, which is condoned.

The third process mark is given for a complete process. If they are using integer values (5 or 6) then it must be clear where these figures have come from, eg by sight of 5.71… or the award of the previous P marks. Credit must not be awarded if the figures 5 or 6 merely appear without supportive working.

The accuracy mark is not given for a range of values. Rather they are given for three particular amounts of money (which comes from acceptable processes used).

Student Response A

22 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

weight of potato : weight of cheese : weight of onion = 9 : 2 : 1

Natalie needs to make 6000 g of potato cakes.

Cheese costs £2.25 for 175 g.

Work out the cost of the cheese needed to make 6000 g of potato cakes.

9:2:1 = 9+2+1 = 12

6000 ÷ 12 = 500g per share

9 x 500 = 4500

2 x 500 = 1000

1 x 500 = 500

= 6000g

£2.25 x 6 = £13.50

500g extra

cheese = 1000g

4500g : 1000g : 500g

6 lots of cheese costing £13.50 with a extra 500 gram left over

£ 13.50

(Total for Question 22 is 4 marks)

16

4/4

156

Examiner Comments

P1 for 9+2+1 or sight of the 12
P1 since this candidate has worked on figures, aiming towards the 6000g needed for the potato cakes, and get as near as 6 lots of 175g. It is clear where the 6 has come from. This is equivalent to the process stated in the mark scheme for arriving as 5.71…
P1 for showing a complete process leading to 6 × 2.25
A1 for giving one of the three acceptable answers (13.50).

Student Response B

22 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

weight of potato : weight of cheese : weight of onion = 9 : 2 : 1 12 parts

Natalie needs to make 6000 g of potato cakes.

Cheese costs £2.25 for 175 g.

Work out the cost of the cheese needed to make 6000 g of potato cakes.

6000 ÷ 12 = 500

~~6000 ÷ 175 =~~

500 x 2 = 1000

1000 ÷ 175 = 5.714285714

£2.25 x 5 = 11.25

£ 11.24

(Total for Question 22 is 4 marks)

16

P 6 4 6 3 3 A 0 1 6 2 4

3/4

Examiner Comments

P1 for sight of the 12. This was frequently seen written next to the ratio.
P1 for the full process shown to get to the figure 5.71 ….
P1 for showing 5 × 2.25 as a continuation of their process. The additional guidance states that candidates can use a figure rounded or truncated. Hence rounding 5.71… to 5 is condoned for the award of the process marks, even though it is inaccurate (rounding to 6 is more accurate).
A0 since the answer given is not one of the three acceptable answers.

Student Response C

22 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

weight of potato : weight of cheese : weight of onion = 9 : 2 : 1

Natalie needs to make 6000 g of potato cakes.

Cheese costs £2.25 for 175 g. 75g = £1

Work out the cost of the cheese needed to make 6000 g of potato cakes.

9 : 2 : 1

525g = £6.75

175x9 : 175 : $\frac{175}{2}$

600g = 7.75

1575 : 175 : 87.5

1837.5 = 12

x3

5512.5

6000
-5512.5
487.5

$\frac{487.5}{13} = 37.5$ x2

75 : 37.5

£ 7.75

(Total for Question 22 is 4 marks)

16

Examiner Comments

P1 can be awarded for sight of the "12" on the third line of working.
P0 since there is no correct use of the "12" to find how many lots of 175g.
P0 as we do not have a correct process.
A0 for an incorrect answer.

Exemplar Question 9

Foundation tier Paper 3

24 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

..... minutes

(Total for Question 24 is 4 marks)

Mean Score: 0.89

Examiner Comments

This question was designed to assess the ability of the candidate to use compound units (content reference R11). The assessment objective is AO3.

This is a multi-step problem which will be challenging for students. There are several different routes through to solution, requiring selection of the correct figures, the correct operations, and use of a fraction of an hour. Many candidates will mis-handle the fraction of hour, treating it as 1.6 or more commonly as 1.4 or even 140. Even though they have a calculator, candidates may also have a tendency to truncate or round their figures, introducing an element of premature rounding. Simplification of the question will also ben seen, eg using 2 gallons per minute instead of 2.2

Mark Scheme

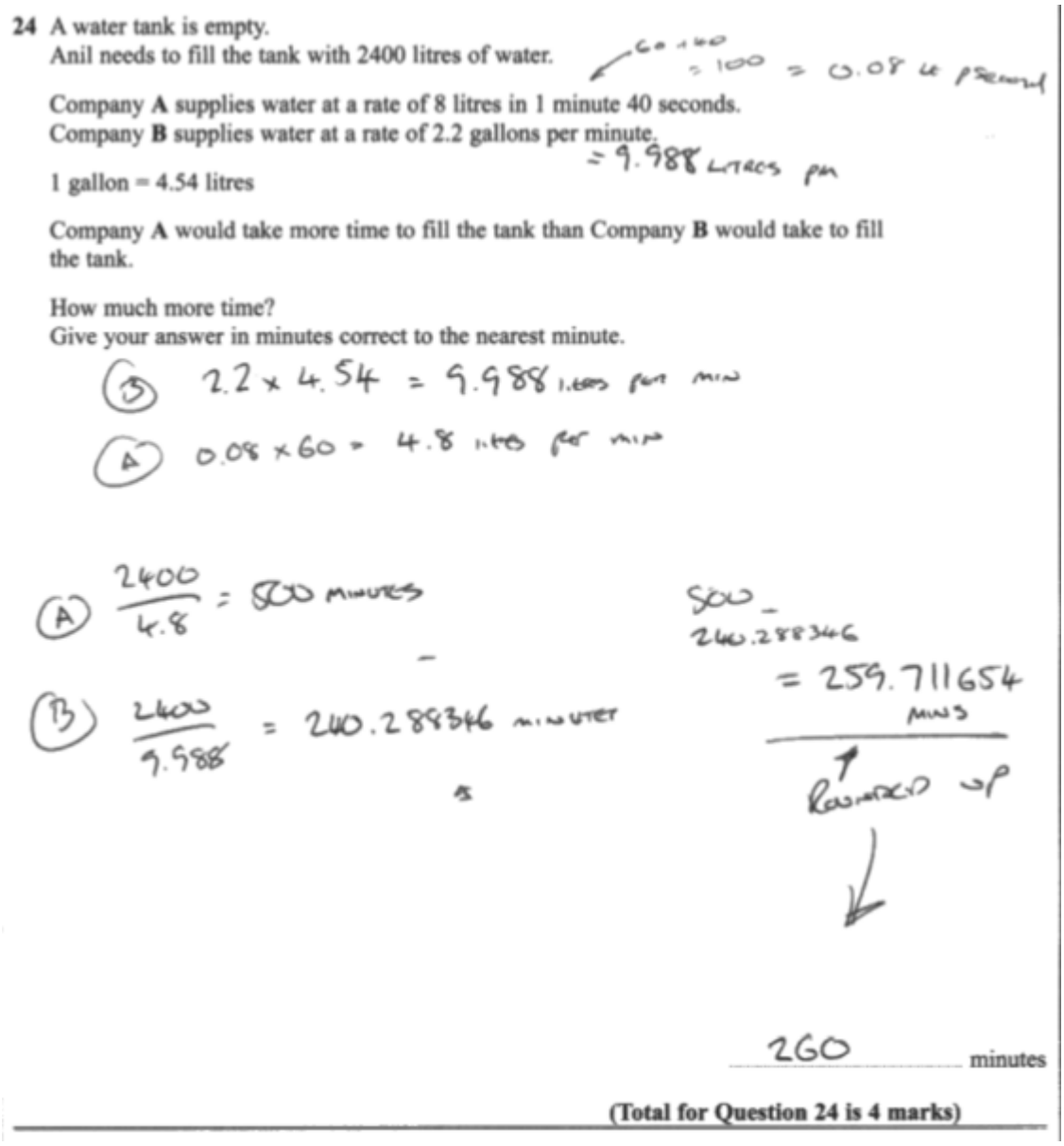
Question	Answer	Mark	Mark scheme	Additional guidance
24	260	P1	conversion to common units of capacity eg 2.2 × 4.54 (= 9.988) **or** 8 ÷ 4.54 (= 1.76...) **OR** **for company A** 2400 ÷ 4.54 (= 528.63...) **OR** 2400 ÷ 8 (= 300) **OR** a rate per minute 8 ÷ [time for Company A] (= 4.8…) oe	[time for Company A] could be 1 min 40 sec or 1.66… or 1.6 or 1.40 etc as long as it is clear it relates to 1 min 40 sec Results of calculations may be truncated or rounded.
		P1	for a complete process to find the time for one water rate in minutes. eg in litres Company A 2400 ÷ "4.8.." (= 500) or "300" × [1 min 40 sec] (= 500) **or** Company B 2400 ÷ "9.988" (= 240.28...) **OR** eg in gallons Company A "528.63.." ÷ ("1.76. .." ÷ [1 min 40 sec]) (= 500) **or** Company B "528.63…" ÷ 2.2 (= 240.28…)	
		P1	for complete processes to find the times for both company A and company B in minutes. Company A eg in litres 2400 ÷ "4.8…" (= 500) or "300" × [1 min 40 sec] (= 500) or in gallons "528.63.." ÷ ("1.76. .." ÷ [1 min 40 sec]) (= 500) **AND** Company B eg in litres 2400 ÷ "9.988" (= 240.28...) or in gallons "528.63…" ÷ 2.2 (= 240.28…)	
		A1	for an answer in the range 259 to 260	If the answer is given within the range but then rounded incorrectly award full marks.

Examiner Comments

In order to fairly assess candidates processes, candidates may express 1 hour 40 min in any format they choose to (eg commonly 1.4) for the award of nay of the process marks.

Since there are several routes through the problem it is important to check all working.

Student Response A



24 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

(B) 2.2 × 4.54 = 9.988 litres per min

(A) 0.08 × 60 = 4.8 litres per min

(A) 2400 / 4.8 = 500 minutes

(B) 2400 / 9.988 = 240.288346 minutes

500 − 240.288346 = 259.711654 mins

Rounded up

260 minutes

(Total for Question 24 is 4 marks)

4/4

Examiner Comments

P1 for 2.2×4.54 or the figure 9.988 OR a rate per min given as the figure 4.8
P1 for Company A 2400÷4.8 or the figure 500 OR Company B 2400÷9.988 or the figure 240.28..
P1 for complete process for both companies, as shown above.
A1 for a correct answer. This can be for 259.7… or for 260. Note that is the 259.7 had been rounded incorrectly this mark could still have been given (see additional guidance).

Student Response B

24 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

A = 8 litres : 1m 40se
240 litres = ? more

24,33 / 8, x 1m 40se
= 42 mins

A = 8 litres = 1m 40se
2400 = ? More
2400 / 8 x 1m 40s
= 420 mins

B = 4,54 litres = 1m
240 litres = ? more
240 litres / 4,54 x 1m
= 52 mins 86 sec

52 mins − 42 mins = 10 mins

420 mins − 266 mins = 154 mins

Company B will take more time

154 minutes

(Total for Question 24 is 4 marks)

B = 4,54 x 2
= 9,08 per minutes

9 litres per 1m
2400 = ? more

2400 / 9 = 266 minutes

18

P 6 4 6 3 3 A 0 1 8 2 4

2/4

Examiner Comments

P1 for Company A 2400÷8
P1 for Company A 2400÷8 × "1m 40 sec"; a clear intention to multiply by the time is sufficient, irrespective for the format of the time they are using. Here they actually use 1.4 which is a common approach seen, resulting in the figure of 420.
P0 since only their calculations for Company A are acceptable. For Company B they have used a rate of 2 gallons per minute (instead of 2.2 gallons per minute) which is an incorrect process, so no marks for Company B.
A0 for an incorrect answer.

Student Response C

24 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

4.54×2 = 9.08 +
4.54×0.2 = 0.908
8.2

8.2 per min = B

8 per 1min 40sec : A

8.2×293 = 2402.6
8 × 300 = 2400

300
293
7

7 minutes

(Total for Question 24 is 4 marks)

1/4

Examiner Comments

P1 for 4.54×2.2, shown as 4.54×2+4.54×0.2 OR for 8×300=2400 which is an equivalent statement of 2400÷8 or the figure 300.
P0 since there is no further progress in their work
P0 since no complete processes for shown
A0 since there is no correct answer given.

Exemplar Question 10

Foundation tier Paper 3

25 The first four terms of a Fibonacci sequence are

$$a \qquad 2a \qquad 3a \qquad 5a$$

The sum of the first five terms of this sequence is 228

Work out the value of a.

.....

(Total for Question 25 is 3 marks)

Mean Score: 0.22

Examiner Comments

This question assesses several aspects of algebraic content, namely A24 (recognise and use sequences), A17 (solve linear equations) and A21 (derive an equation). The assessment objective is AO3. Common misconceptions will revolve around how they interpret the sequence of numbers.

Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
	12	P1	for a process to find the fifth term eg 3a + 5a (=8a)	
		P1	for setting up the equation eg $a + 2a + 3a + 5a + [8a] = 228$	[8a] allow use of what is clearly indicated as the missing term
		A1	cao	$\frac{228}{19}$ or $\frac{228}{1+2+3+5+8}$ scores P1 P1 $\frac{228}{1+2+3+5+[8]}$ scores P0 P1

Examiner Comments

The first mark is related to sequences, and can be awarded where a candidate shows understanding of the Fibonacci sequence sufficient that they know how to arrive at the fifth term.

The second mark is for showing a process to use the figure of 228 with their **five** terms to find the missing value, or to set up an equation that can be used to find the missing value. For this mark they must have a fifth (not necessarily correct) term clearly identified.

Student Response A

25 The first four terms of a Fibonacci sequence are

$-a$ $\quad -1 \quad a \quad 2a \quad 3a \quad 5a$ $\quad$ 6a

The sum of the first five terms of this sequence is 228

Work out the value of a.

$2a + 3a + 5a = 10 + 1 = 11a$.

$11a = 228$ ÷11

$a = 20.72$

$19a = 228$ ÷19

$a = 12$

12

(Total for Question 25 is 3 marks)

3/3

Examiner Comments

P1 for 8a shown alongside the sequence. It is common to see their fifth term written in this position on the paper.

P1 There is a choice of processes here. On the left we have a process based on the sum of the first four terms. On the right we have a process based on the sum of the first five terms. Following general mark guidance point 4 if there is a choice of methods mark the working leading to the answer on the answer line (or if no answer mark both methods and give the lower mark). Fortunately, the candidate has shown that the answer on the answer line related to the method on the right, so it is this method which we attribute the second P mark, since it is the correct method.

A1 for the correct answer.

Student Response B

25 The first four terms of a Fibonacci sequence are

a $\quad$ $2a$ $\quad$ $3a$ $\quad$ $5a$ $\quad$ $6a$

The sum of the first five terms of this sequence is 228

Work out the value of a.

$a + 2a + 3a + 5a + 6a = 228$

3

(Total for Question 25 is 3 marks)

1/3

Examiner Comments

P0 since an incorrect fifth term has been given ($6a$ instead of $8a$).
P1 since they have taken their five terms and set up an otherwise correct equation. Note that this mark can only be awarded in these circumstances if it is clear that there are five terms being considered in setting up the equation.
A0 as we do not have the correct answer.

Student Response C

25 The first four terms of a Fibonacci sequence are

a $\quad 2a \quad 3a \quad 5a \quad a$

The sum of the first five terms of this sequence is 228

Work out the value of a.

$a + 2a + 3a + 5a = 228$

$5a + 3a + 2a + a = 11a$

$11a = 228$

$2a + a + 3a + 5a + a$

$= \frac{12a}{12} = \frac{228}{12} = 19$

$a = 19$

(Total for Question 25 is 3 marks)

1/3

Examiner Comments

P0 since they do not have the correct fifth term. They have added an "a" after the four given terms, so assume this if their fifth term for assessing the next stage in their process.

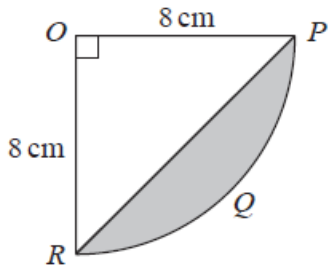
P1 can be awarded either for the equation 12a = 228 or for 228 ÷ (1+2+3+5+1)

A0 as we do not have the correct answer.

Exemplar Question 11

Foundation tier Paper 3

27 The diagram shows a sector *OPQR* of a circle, centre *O* and radius 8 cm.



OPR is a triangle.

Work out the area of the shaded segment *PQR*.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 27 is 4 marks)

Mean Score: 0.25

Examiner Comments

This question is designed to assess content reference G18 (calculate arc lengths .. areas of sectors of circles). It has an assessment objective of AO3.

Candidates may confuse circle formulae. They may fail to remember the "half" in working out the area of the triangle.

Mark Scheme

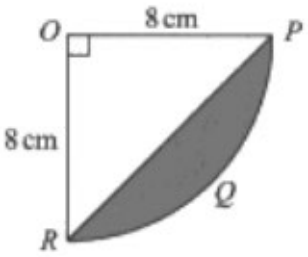
Question	Answer	Mark	Mark scheme	Additional guidance
27	18.3	P1	for finding the area of the triangle eg $0.5 \times 8 \times 8$ (=32)	Accept rounded or truncated figures
		P1	for finding the area of the circle $\pi \times 8 \times 8$ (= 201.06..)	
		P1	for finding the area of the sector eg $\frac{1}{4} \times \pi \times 8^2$ **or** "201.06.." ÷ 4 (= 50.26...)	
		A1	for an answer in the range 18.2 to 18.3	If the answer is given within the range but then rounded incorrectly award full marks.

Examiner Comments

Throughout it is accepted that candidate may round or truncate the answers to any calculations; this is condoned for the P marks.

Student Response A

27 The diagram shows a sector $OPQR$ of a circle, centre O and radius 8 cm.



area of circle = πr^2

area of triangle $\frac{b \times h}{2}$

OPR is a triangle.

Work out the area of the shaded segment PQR.
Give your answer correct to 3 significant figures.

$\pi \times 8^2 = 64\pi = 201.0619298$

$\frac{8 \times 8}{2} = 32$

$OPQR = \frac{201.0619298}{4} = 50.265\,48246$

$RQP = 50.265\,48246 - 32$

$= 18.265\,48246$

$= 18.265$

18.265 cm²

(Total for Question 27 is 4 marks)

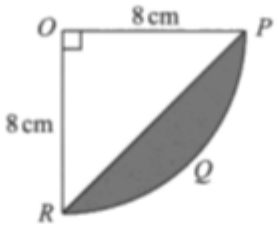
4/4

Examiner Comments

P1 for finding the area of the triangle, as evidence by $8 \times 8 \div 2$ or the number 32
P1 for finding the area of the circle, as evidenced by $\pi \times 8 \times 8$ or the number 201….
P1 for showing a complete process to find the area of the sector
A1 for providing an answer of 18.265 which is within the given range on the mark scheme.

Student Response B

27 The diagram shows a sector $OPQR$ of a circle, centre O and radius 8 cm.



OPR is a triangle.

Work out the area of the shaded segment PQR.
Give your answer correct to 3 significant figures.

πr^2

$\frac{1}{4} \times 8^2 \times \pi = 50.265\ 4824\ 6$

$= 50.265$

Giv 3 sig fig: 50.3

50.3 cm²

(Total for Question 27 is 4 marks)

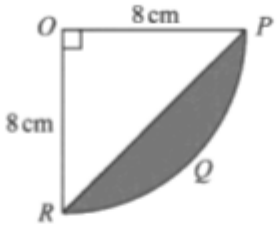
2/4

Examiner Comments

P0 since there is no calculation relating to the area of the triangle.
P1 Note that sight of πr^2 is insufficient without stating the value of the radius, but this can be implied from the next line "$8^2 \times \pi$"
P1 for a complete process to find the area of the sector, as shown by "$\frac{1}{4} \times 8^2 \times \pi$" or the number 50.26 …
A0 since the answer given in incorrect.

Student Response C

27 The diagram shows a sector $OPQR$ of a circle, centre O and radius 8 cm.



OPR is a triangle.

Work out the area of the shaded segment PQR.
Give your answer correct to 3 significant figures.

$a^2+b^2=c^2$

$8^2+8^2=c^2$

$\sqrt{128}=11.313708$

$h=11.3cm$

$\pi \times 8^2$

$=201.0619298$

$=201cm$

$11.3+201=212.3$

212 cm²

(Total for Question 27 is 4 marks)

1/4

Examiner Comments

P0 since there is no calculation relating to the area of the triangle. Pythagoras can be ignored.
P1 for $\pi \times 8^2$ or sight of the number 201. …
P0 since there is no complete process to find the area of the sector
A0 since the answer given in incorrect.