Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9–1)

Exemplar Candidate Work

MATHEMATICS

J560
For first teaching in 2015

J560/01 Summer 2018 examination series

Version 1

Contents

Introduction

These exemplar answers have been chosen from the summer 2018 examination series.

OCR is open to a wide variety of approaches and all answers are considered on their merits. These exemplars, therefore, should not be seen as the only way to answer questions but do illustrate how the mark scheme has been applied.

Please always refer to the specification https://www.ocr.org.uk/Images/168982-specification-gcse-mathematics-j560.pdf for full details of the assessment for this qualification. These exemplar answers should also be read in conjunction with the sample assessment materials and the June 2018 Examiners' report or Report to Centres available from Interchange https://interchange.ocr.org.uk/Home.mvc/Index

The question paper, mark scheme and any resource booklet(s) will be available on the OCR website from summer 2019. Until then, they are available on OCR Interchange (school exams officers will have a login for this and are able to set up teachers with specific logins – see the following link for further information http://www.ocr.org.uk/administration/support-and-tools/interchange/managing-user-accounts/).

It is important to note that approaches to question setting and marking will remain consistent. At the same time OCR reviews all its qualifications annually and may make small adjustments to improve the performance of its assessments. We will let you know of any substantive changes.

Question 1 (b)(ii)

1 Here is a list of numbers.

2 8 5 12 6

(b) Using the same list of numbers, work out

(ii) the range.

(ii) ..... **[2]**

Exemplar 1 — 1 mark

(ii) the range.

B1

2 + 12 = 14

(ii) 14 **[2]**

Examiner commentary

This response was credited B1 for correctly identifying 2 and 12 before adding rather than subtracting. A majority gave the correct answer of 10 but there were some who did not understand the idea of range and made further attempts at the mean or median.

Question 3 (c)

3 (c) Decrease 650 by 40%.

(c) ..... [3]

Exemplar 1 — 3 marks

(c) Decrease 650 by 40%.

650 x 0.60 = 390

(c) 390 [3]

Examiner commentary

This was credited 3 marks for correctly calculating 60% of 650. This direct approach, showing a good understanding of the problem, was usually employed by more able candidates.

Exemplar 2 — 1 mark

(c) Decrease 650 by 40%.

650 ÷ 100 = 6.5
6.5 x 40 = 260

(c) 260 [3]

Examiner commentary

This candidate has calculated 40% of 650 and M1 was credited for a correct first step. Those who chose this method often went on to subtract 260 from 650 and obtain 390 for full marks. The award of 2 marks was rarely an option as a complete correct method usually resulted in the right answer.

Despite the fact that the use of calculators was allowed many opted to find percentages by breaking the problem into a variety of parts often by adding 4 or 6 lots of 10%. Use of this process frequently produced errors of an arithmetic or conceptual nature in this and other similar questions throughout the paper.

Question 4

4 Patrick writes down a number.

He says

If I find the square root of that number and then add 15, I get 27.

What number did Patrick write down?

..... [2]

Exemplar 1 1 mark

4 Patrick writes down a number.

He says

If I find the square root of that number and then add 15, I get 27.

What number did Patrick write down?

$27 - 15 = 12$ M1

$\sqrt{12} = 3.5$

3.5 [2]

Examiner commentary

This example was credited M1 for 27 – 15 but, instead of squaring 12, they have made a common error by finding the square root.

Most candidates correctly arrived at an answer of 144 through either reversing the operations or by a process of trial and improvement. Use of algebra was rarely seen.

Question 5 (a)

5 **(a)** Write 12 : 54 as a ratio in its simplest form.

(a) ..... : .....**[2]**

Exemplar 1

1 mark

5 **(a)** Write 12 : 54 as a ratio in its simplest form.

12 : 54
÷2 ÷2
6 : 27

B1

(a) 6 : 27 **[2]**

Examiner commentary

This scores B1 for a partial reduction of the given ratio.

Many candidates gave 6 : 27 as their final answer and did not realise that further cancelling was possible. Some obtained 2 : 9 before attempting further reduction, often arriving at 1 : 3.

Question 5 (b)

5 (b) The ratio 400 g : 1 kg can be written in the form 1 : *n*.

Find the value of *n*.

(b) *n* = ... **[2]**

Exemplar 1

2 marks

(b) The ratio 400 g : 1 kg can be written in the form 1 : *n*.

Find the value of *n*.

÷400 (400 : 1000 / 1 : 2·5) ÷400

(b) *n* = 2·5 **[2]**

Examiner commentary

A correct answer here scores 2 marks in common with many who realised the need to equate the units and obtain 400 : 1000 before reducing the ratio and giving the correct answer of *n* = 2.5.

Some did not progress beyond the conversion of 1 kg, and identification of the uncancelled ratio, for B1. Others went on to use a correct method but gave their answer as 1 : 2.5 failing to identify 2.5 as the value of *n*. An answer of 0.4 from 400 ÷ 1000 was a common misconception.

Question 5 (c)

5 (c) Amanda and Wim share some money in the ratio 2 : 5.
Wim receives £115.

Calculate how much money was shared.

(c) £ ..... **[3]**

Exemplar 1 — 3 marks

Calculate how much money was shared.

2 + 5 = 7 parts
A W
2 : 5 115 = 5 parts
1 part = 115 / 5 = 23

Amanda has 2 parts so
23 + 23 = 46
115 + 46 = 161

(c) £ 161 **[3]**

Examiner commentary

This candidate scores all 3 marks for a correct answer from working that is logical and clearly set out.

Although the first line shows the addition of 5 and 2 they have not used 7 as a divisor in common with many other incorrect methods. Many of those who understood the correct process and scored M1 for finding £46 as Amanda's share did not add this sum to Wim's share in order to obtain the total amount.

Exemplar 2 — 0 marks

Calculate how much money was shared.

82.15 + 32.86 = £115.01

A = 5 + 2 = 7
D = 115 ÷ 7 = 16.43 M0
M = 16.43 × 2 = £32.86
C =

16.43 × 5 = 82.15

(c) £ 115.01 **[3]**

Examiner commentary

This scores 0 marks. The method is incorrect as the candidate has added 5 and 2 before dividing by 7 on the basis that £115 is the total. This was a common error with many giving a value for Amanda's share (around £32.86) or a re-evaluation for Wim (usually £82.14).

In this case, a glance at the answer should have provided a clue to their error.

Question 6

6 A leopard is running with a velocity of 3 m/s.
It then accelerates at 2 m/s^2 for 4 seconds.

Use the formula

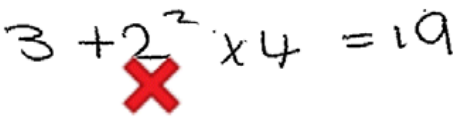
$$v = u + at$$

to work out the final velocity of the leopard.

..... m/s **[2]**

Exemplar 1

0 marks



19 m/s **[2]**

Examiner commentary

This candidate earns 0 marks. This is an example of a very common misconception where 2^2 is used in the substitution from failing to understand the unit for acceleration. An answer of 19 was frequently seen.

Question 7 (a)(iii)

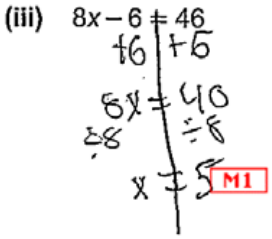
7 (a) Solve.

(iii) $8x - 6 = 46$

(iii) $x =$ ..... [2]

Exemplar 1

1 mark



(iii) $x =$ 5 ..... [2]

Examiner commentary

Although the answer here is incorrect it is pleasing to see a reasonable attempt at the algebraic process. The error in the first stage of the rearrangement resulted in loss of the mark for a correct answer but a method mark could be credited for the working shown with a correct follow through from $8x = 40$.

A majority of the candidates who gave an incorrect value for x did not gain a method mark due to the absence of any algebra in the working.

Question 7 (b)

7 **(b)** Solve by factorising.

$x^2 + 11x + 30 = 0$

(b) $x =$ ..... or $x =$ ..... **[3]**

Exemplar 1

2 marks

(b) Solve by factorising.

$x^2 + 11x + 30 = 0$

1 x 11 = 11
2

(x + 6) (x + 5)

1 x 30 = 30
2 x 15 = 30
3 x 10 = 30
6 x 5

x² + 11

(x + 6) (x + 5)
B2

(b) $x =$ 6 ..... or $x =$ 5 ..... **[3]**

Examiner commentary

This candidate has a clear understanding of the method for factorising a quadratic and has completed the process correctly for 2 marks. Unfortunately, they have not understood the significance of equating the factors to zero and have not arrived at the correct roots of -6 and -5.

Exemplar 2

1 mark

(b) Solve by factorising.

$x^2 + 11x + 30 = 0$

$(x + 10)(x + 3)$ M1

(b) $x =$ ..... or $x =$ ..... **[3]**

Examiner commentary

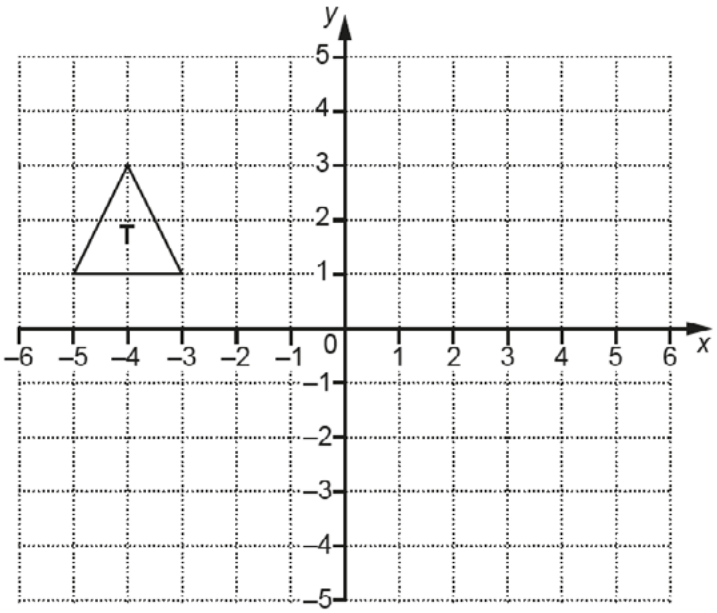
This scored M1 for a reasonable attempt at factorising using two brackets. If the brackets are multiplied two correct terms from the quadratic equation would be obtained.

Many attempts at factorising involved manipulation of the given equation e.g. $x^2 + 11x = -30$ or

$x(x + 11) = 30$ without any success.

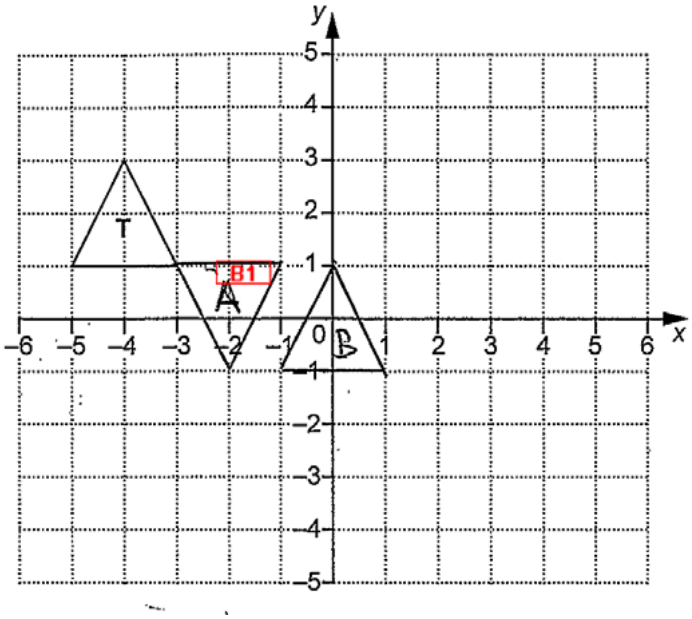
Question 8 (a)

8 Triangle **T** is drawn on a coordinate grid.



(a) Rotate triangle **T** through 180° about (0, 0).
Label your image **A**. **[2]**

Exemplar 1 1 mark



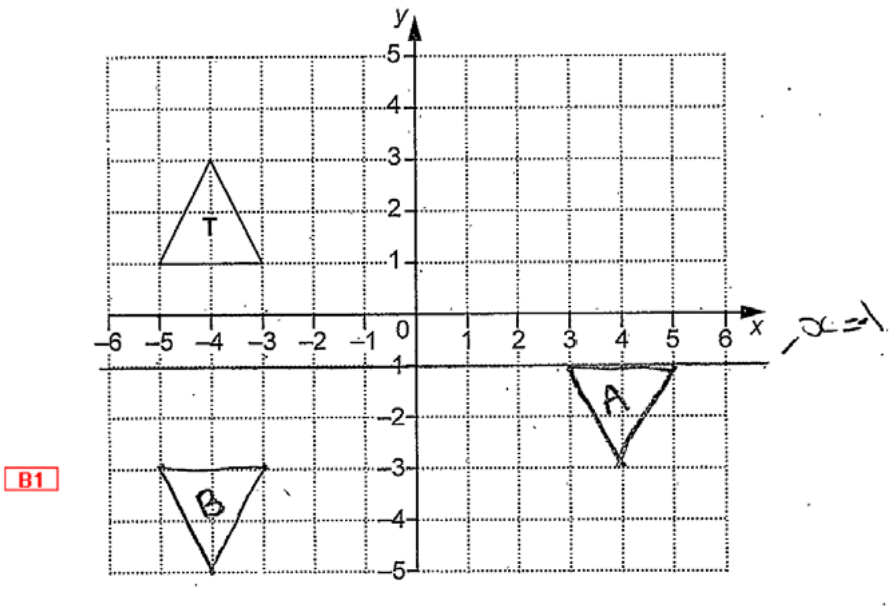
Examiner commentary

The majority of candidates showed an understanding of rotation and this example was credited a mark for correctly turning through 180°. More able candidates used the correct centre of rotation at the origin but a large number used a variety of positions, many attached to the original triangle as in this case (⁻3, 1).

Question 8 (b)

(b) Reflect triangle **T** in the line $x = -1$.
Label your image **B**. **[2]**

Exemplar 1 — 1 mark



B1

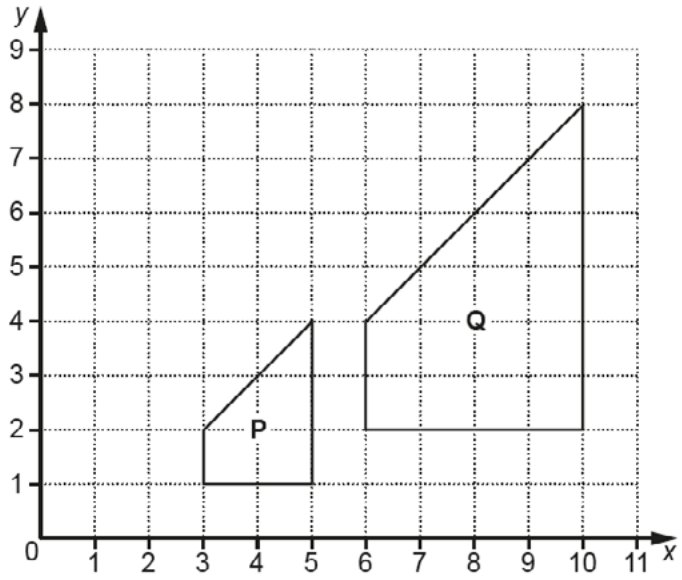
Examiner commentary

In common with part (a) the idea of reflection is apparent in this response. This candidate used an incorrect "mirror" line ($y = -1$ clearly mistaken and labelled as $x = -1$) but this was one of the acceptable alternatives for 1 mark. A reflection in other vertical lines ($x = k$) earned similar credit.

Other reflections did not score with the most common misconception being a reflection of T in the x axis.

Question 9

9 Two shapes are drawn on the grid below.



Describe fully the **single** transformation which maps shape **P** onto shape **Q**.

.....

..... [3]

Exemplar 1 — 2 marks

Describe fully the **single** transformation which maps shape **P** onto shape **Q**.

Shape P has been enlarged by a scale factor of 2. [3]

Examiner commentary

This scores 2 of the 3 marks for naming the correct transformation (enlargement) and scale factor.

A large number of candidates failed to consider the centre of an enlargement as part of their description.

Exemplar 2 — 0 marks

Describe fully the **single** transformation which maps shape **P** onto shape **Q**.

it has been enlarged by a scale of 2 and translated (3, 1) [3]

Examiner commentary

The definite use of a second transformation (translation) has resulted in 0 marks here. Although the candidate has given two of the required elements at the start of their description the question clearly asks for a **single** transformation.

Question 10

10 Reuben hires a car.
It costs £150, **plus** 85p for each mile he travels.

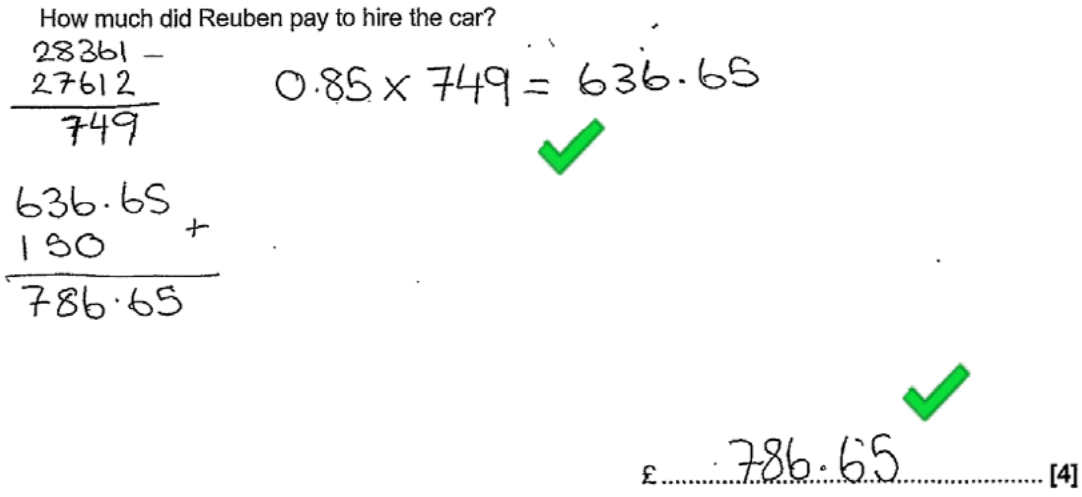
When Reuben hires the car, its mileage is 27612 miles.
When Reuben returns the car, its mileage is 28361 miles.

How much did Reuben pay to hire the car?

£ ..... **[4]**

Exemplar 1

4 marks

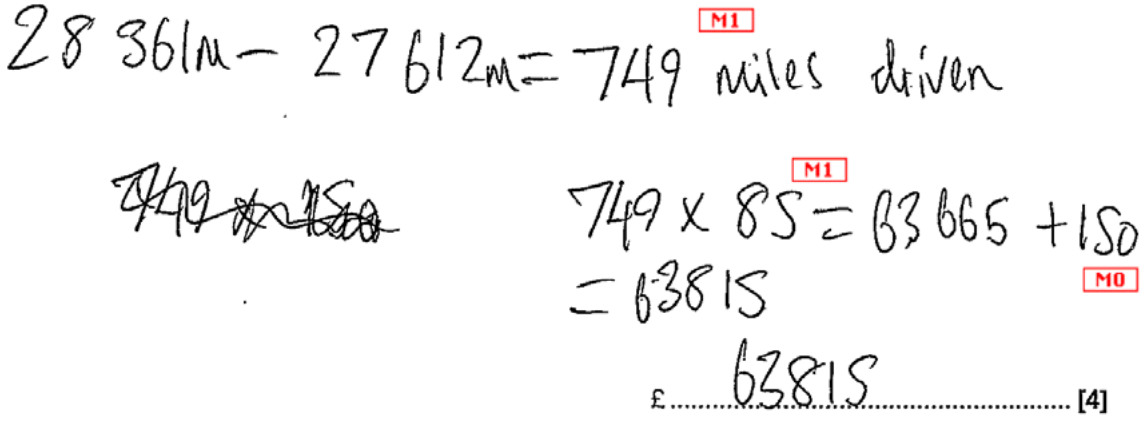


Examiner commentary

This candidate has shown a good understanding of the problem and has set the work out clearly and in a logical order. They have justly been rewarded with 4 marks.

Exemplar 2

2 marks



Examiner commentary

This example also shows a good understanding of the problem and the layout is quite acceptable. Unfortunately, the candidate has not converted the mileage charge (63665) from pence to pounds before adding £150. This scores M1 for obtaining the correct mileage (749) and a further M1 for multiplying by the correct rate (in this case 85p).

Although a majority of candidates realised that the distance travelled was 749 miles it was quite common to see this figure multiplied by £150 giving an answer of £112 350. Others attempted to use the odometer readings without any attempt to subtract often resulting in equally unrealistic answers.

This was one of the questions where it would have been particularly useful to check that the answer obtained is reasonable. In this case it should have been apparent that £63 815 was a lot to pay for the hire of a car for 749 miles.

Question 11 (a)

11 Pippa owns a snack bar.

(a) She uses $\frac{3}{5}$ of a kilogram of spread each day.

Spread costs £3.20 for a 1 kilogram tub and £6.15 for a 2 kilogram tub.

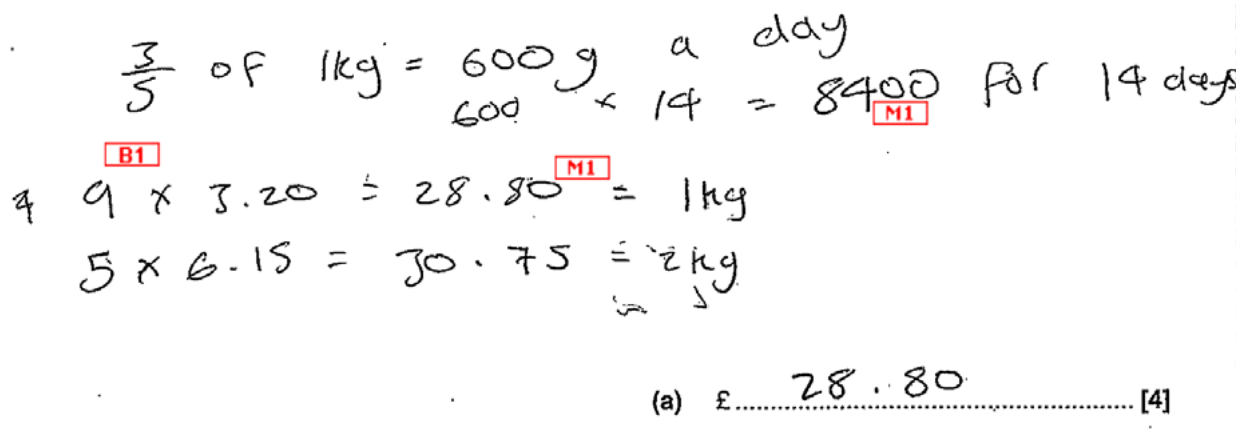
Pippa buys enough spread to last for 14 days.

What is the lowest price Pippa can buy this spread for?
Show your working.

(a) £ ..... [4]

Exemplar 1

3 marks



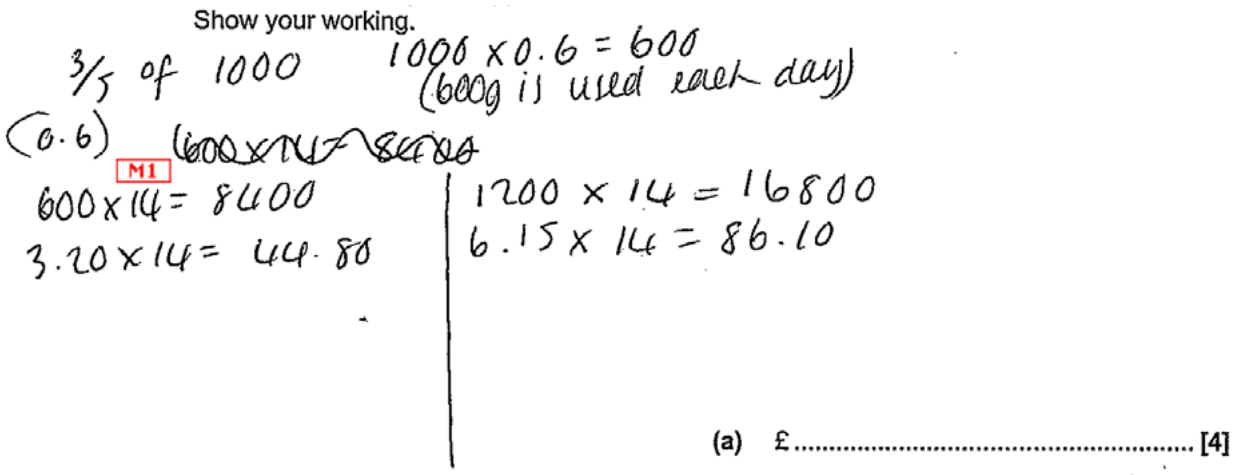
Examiner commentary

The key points in this question are the amount of spread required (kg) and the cheapest way of buying it using two different tub sizes. This candidate has realised that 8400 grams are required and that a whole number of kg needs to be purchased (rounding 8.4 up to 9). However, they have chosen to purchase 9 × 1 kg tubs at a cost of £28.80 when it would have been cheaper to buy 4 × 2 kg tubs and 1 × 1 kg tub for £27.80. The method for obtaining their answer is sound and they have been credited 3 of the 4 marks available.

Many other candidates did not deal with the "real life" situation and used 0.6 × 3.20 × 14 arriving at a cost of £26.88 for exactly 8.4 kg.

Exemplar 2

1 mark



Examiner commentary

This response shows that 8400 g of spread is required and earns M1 but the candidate does not know how to progress further. There is an attempt at a comparison of costs but they have simply resorted to the use of figures given in the question.

Question 11 (b)

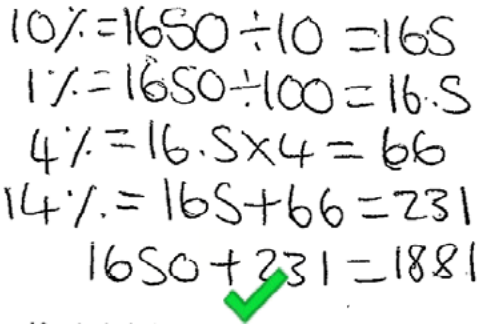
(b) In 2016, Pippa paid £1650 rent.
In 2017, the rent increased by 14%.

Calculate the amount of rent she paid in 2017.

(b) £ ..... **[3]**

Exemplar 1

3 marks



Examiner commentary

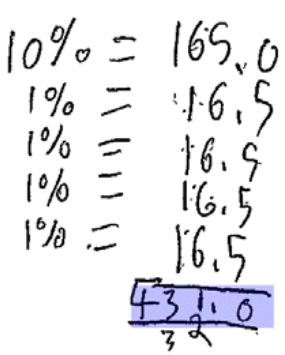
A fully correct answer obtained using a perfectly acceptable method.

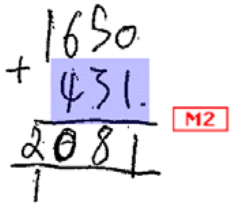
This is a further example of a candidate choosing to break down the percentage into a number of easily calculated parts. In this case, they have been successful but there were a large number of examples where errors were made in either the calculation of the individual percentages or in the addition of parts.

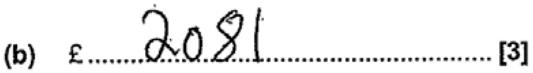
Those who understood that 114% was required tended to use a calculator.

Exemplar 2

2 marks





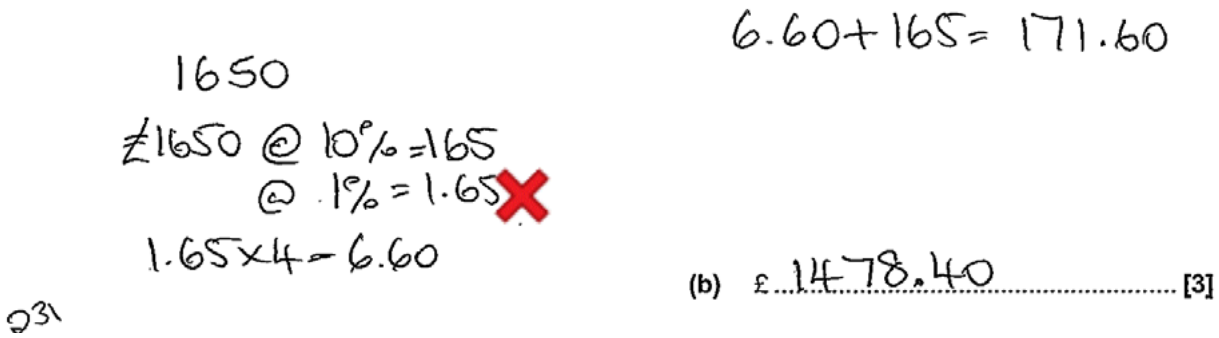


Examiner commentary

In this example the candidate has shown a good understanding of the problem, correctly given the individual percentages that could sum to the correct amount and attempted to add these totals for M2. However, an error in the final addition has lost the accuracy mark.

Exemplar 3

0 marks



Examiner commentary

This candidate has given a correct value for 10% of 1650 but has made a conceptual error in obtaining 1%. The individual parts of this calculation are clearly inconsistent and consequently method marks could not be credited.

Where calculators are allowed candidates should be encouraged to work out percentages in a single step (e.g. 1.14 × 1650) rather than using non-calculator style methods as seen here.

Question 12

12 A circle has radius 6 cm.

Calculate its circumference.
Give your answer in centimetres, correct to 1 decimal place.

..... cm [3]

Exemplar 1 2 marks

12 A circle has radius 6 cm.

$C = \pi \times d$

Calculate its circumference.
Give your answer in centimetres, correct to 1 decimal place.

M1 A1

$C = \pi \times 12 = 37.699111$

38

38

..... cm [3]

Examiner commentary

Both method and calculation are correct for M1 A1 but the candidate has not given the answer to the appropriate degree of accuracy so did not earn the final mark.

Exemplar 2 1 mark

circumference $= \pi r^2$

$= \pi \times 6^2$

$= \pi \times 36$

$= 113.09$

B1

113.1 ..... cm [3]

Examiner commentary

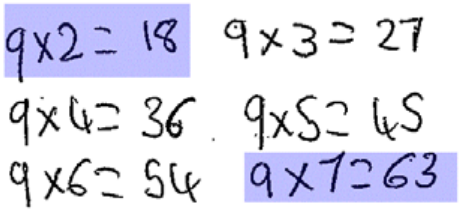
It was quite common for an incorrect formula for circumference to be applied or for 6 cm to be used as the diameter. In this case, the formula for area is evident and will not score method or accuracy marks but B1 can be credited as the candidate has correctly rounded their answer (113.09) to one decimal place (113.1).

Question 13 (a)

13 (a) Show that the highest common factor (HCF) of 18 and 63 is 9. **[2]**

Exemplar 1

1 mark



Examiner commentary

In this example, 9 has been identified as a factor of both 18 and 63 for 1 mark but without any indication that no higher common factor exists it cannot score the second mark.

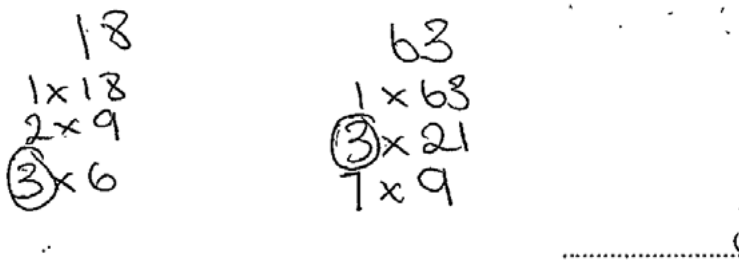
Question 13 (b)

(b) Find the lowest common multiple (LCM) of 18 and 63.

..... **[2]**

Exemplar 1 — 1 mark

(b) Find the lowest common multiple (LCM) of 18 and 63.



3 **[2]**

Examiner commentary

The use of factors instead of multiples was quite common in this part of the question even when factors were correctly used in part (a). In this case it would appear that the candidate is seeking the lowest common factor (other than 1).

Question 14

14 Aditi, Becky and Calli collect coins.
Aditi has 6 **more** coins than Becky.
Calli has 1 **less** coin than Aditi.
Altogether they have 71 coins.

How many coins do they each have?
Show all your working.

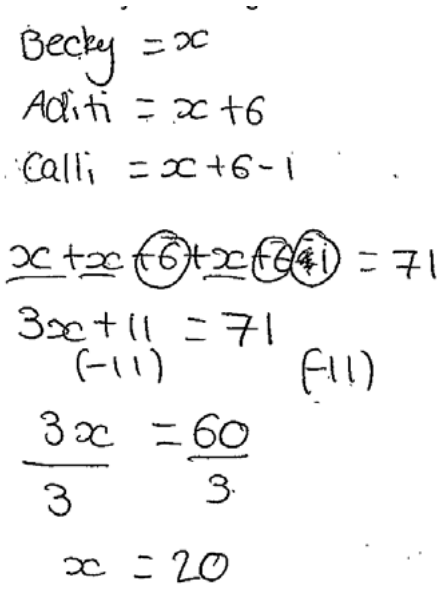
Aditi has ..... coins

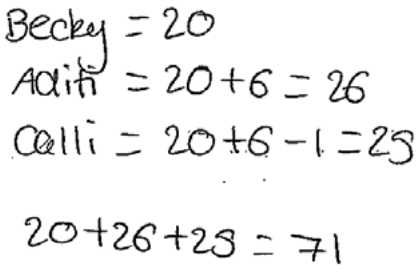
Becky has ..... coins

Calli has ..... coins
[5]

Exemplar 1

5 marks





Aditi has 26 coins

Becky has 20 coins

Calli has 25 coins
[5]

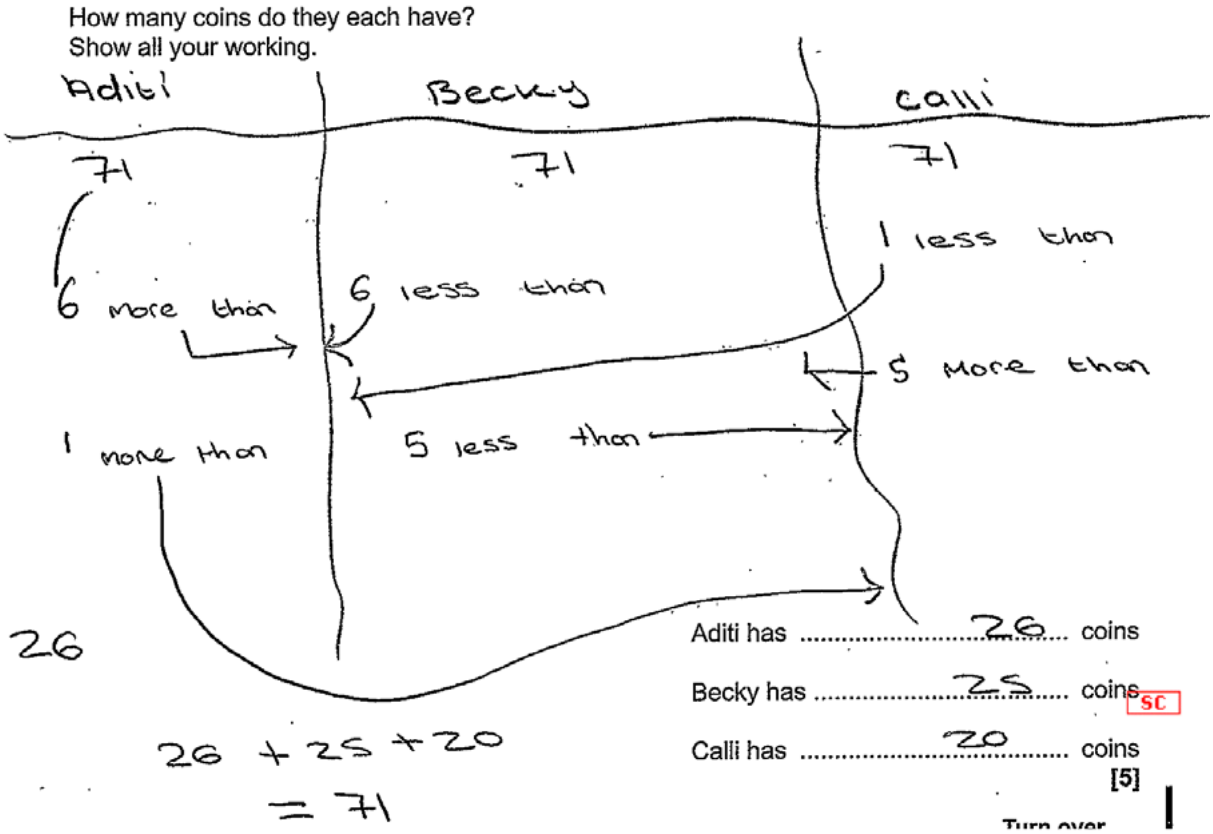
Examiner commentary

A perfect example of how to solve this problem with the correct use of algebra. This candidate has shown a good understanding of the process and has justifiably scored 5 marks.

A variety of different valid approaches were used to answer this question including trial and improvement although only more able candidates used algebra.

Exemplar 2

3 marks



Examiner commentary

It is not entirely clear how the diagram has helped this candidate arrive at the three correct values but it has been partially effective. Although they have divided the number of coins appropriately the amounts have not been allocated to the correct person in every case so this scores SC3.

Exemplar 3

1 mark

How many coins do they each have?
Show all your working.

Becky = x M1
Aditi = x + 6
Calli = x − 1

3x + 5 = 71
−5 −5
3x = 66
66/3 = 22
x = 22

Aditi has 28 coins
Becky has 22 coins
Calli has 21 coins
[5]

Examiner commentary

This candidate has made a valiant attempt to use algebra but has not assessed Calli's amount correctly as $x + 6 - 1$. Unfortunately this means that the starting point of a complete, correct equation has not been obtained and M1 only has been credited for two correct expressions (x and $x + 6$).

Exemplar 4

0 marks

14 Aditi, Becky and Calli collect coins.
Aditi has 6 **more** coins than Becky.
Calli has 1 **less** coin than Aditi.
Altogether they have 71 coins.

How many coins do they each have?
Show all your working.

71 ÷ 3 = 23.6
23.6 + 6 = 29.6 aditi
Calli = 28.6
29.6 + 28.6 = 58.2
71 − 58.2 = 12.8

Aditi has 29.6 coins
Becky has 12.8 coins
Calli has 28.6 coins
[5]

Examiner commentary

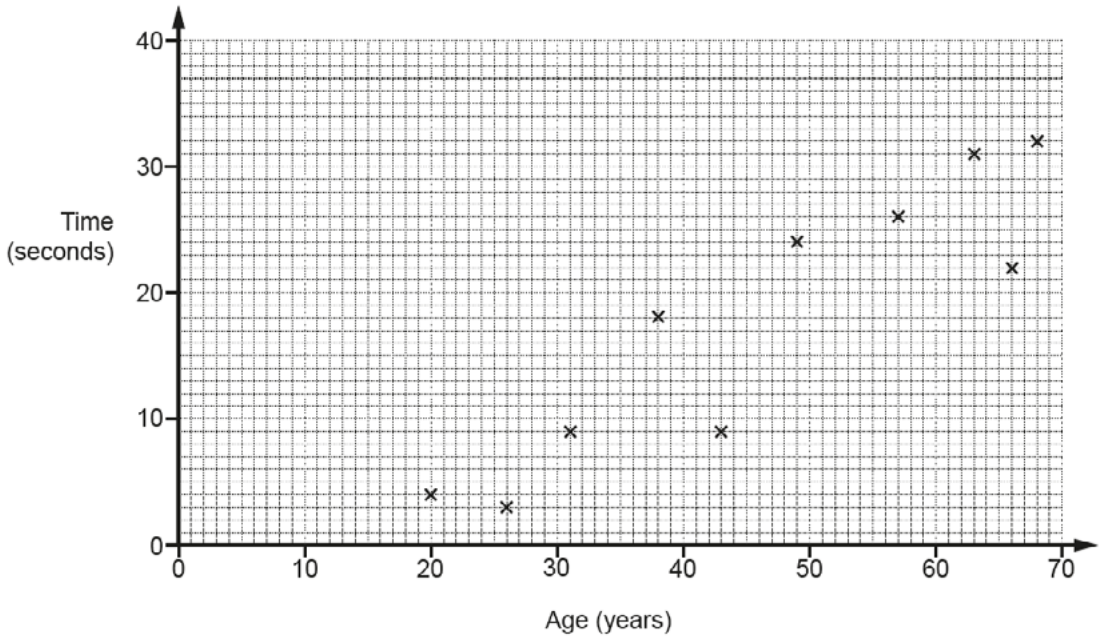
A common approach was to divide the number of coins (71) by 3 and use this value as a starting point. In this example 23.6 was attributed to Becky before applying the "rules" given in the question. Most responses using this method rounded to 24 coins realising that the original value obtained was unrealistic.

This approach, in all forms, scored 0 marks.

Question 15 (b)

15 Lee wishes to find out if there is a relationship between a person's age and the time it takes them to complete a puzzle.

Lee decides to conduct an experiment.
She asks 12 people to complete the puzzle.
She records each person's age and the time taken to complete the puzzle.
This scatter diagram shows the results for ten of the people in Lee's experiment.



(b) Here are the other two results.

Age (years)	47	60
Time (seconds)	21	34

Plot these results on the scatter diagram. **[2]**

Exemplar 1 — 1 mark

Examiner commentary

This scores 1 mark only as one of the points (47, 21) is out of the required tolerance.

Due to the fact that both coordinates give points that are on intersections of grid lines is was quite rare for errors of this type to occur.

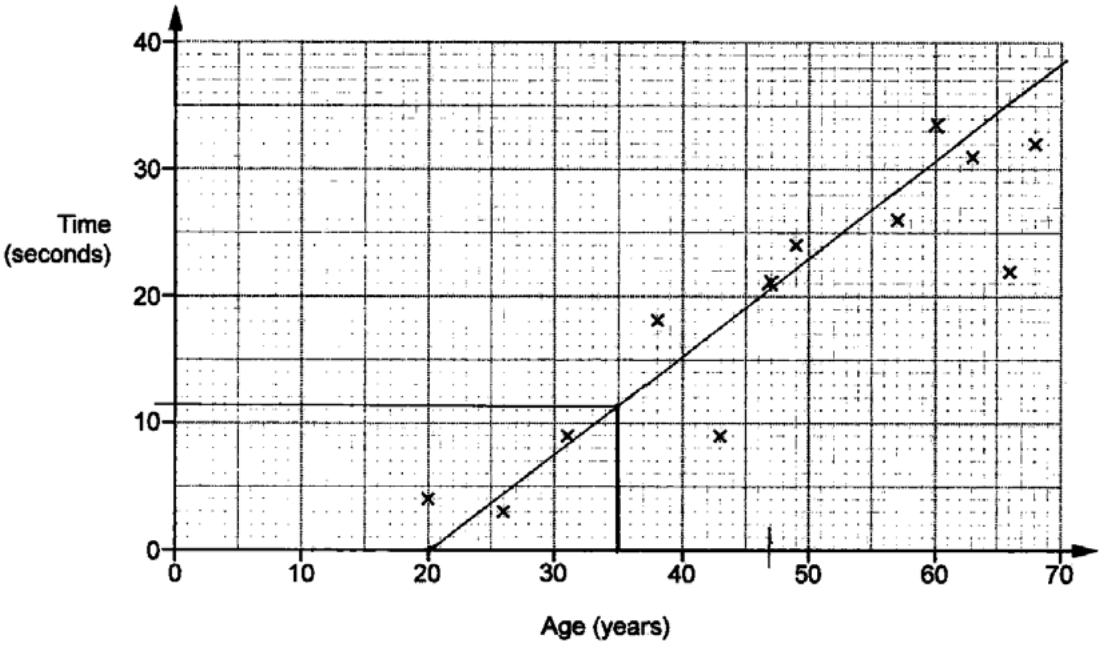
Question 15 (d)

(d) Estimate the time it would take a person aged 35 to complete the puzzle.
Show your working to justify your answer.

(d) ..... **[2]**

Exemplar 1

2 marks



(d) Estimate the time it would take a person aged 35 to complete the puzzle.
Show your working to justify your answer.

(d) 11 seconds. **[2]**

Examiner commentary

A fully correct method and answer within range so 2 marks earned.

Although not necessarily required candidates who used a line of best fit usually scored well. Other attempts to roughly obtain a point on the required line (where age is 35) were often less accurate. Some indication that this line had been used was required for 2 marks.

Question 15 (e)

(e) Lee says that at least 80% of the 12 people completed the puzzle in under 30 seconds.

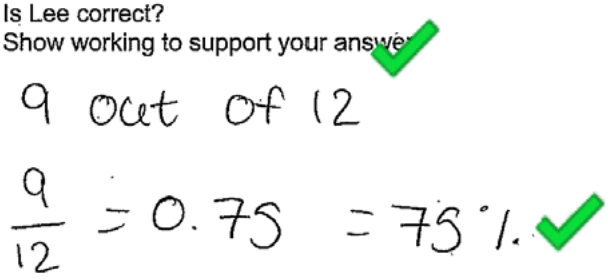
Is Lee correct?
Show working to support your answer.

..... **[3]**

Exemplar 1 — 3 marks

(e) Lee says that at least 80% of the 12 people completed the puzzle in under 30 seconds.

Is Lee correct?
Show working to support your answer



No, he's not correct ..... **[3]**

Examiner commentary

A fully correct conclusion justified by clear accurate working for 3 marks.

Questions where candidates are asked to show that a given statement is either true or false require a response that gives both a conclusion and working that justifies the answer. Marks are frequently lost for an incorrect conclusion or for correct conclusions that are not fully justified.

Exemplar 2

1 mark

Is Lee correct?
Show working to support your answer.

100% = 12
80% = 9.6 M1
1% = 0.12

^

Lee is wrong, less than 80% completed the puzzle under 30 seconds. [3]

Examiner commentary

In this case the conclusion is correct but the justification is incomplete. M1 has been credited for correctly obtaining 80% of 12 as 9.6. In order to score further a comparison with 9 is required either by stating that 9 is less than the 9.6 (10) required for 80% or by working out 9 as 75% of 12.

Question 16

16 Finn has two bags of counters.
He takes a counter at random from each bag.

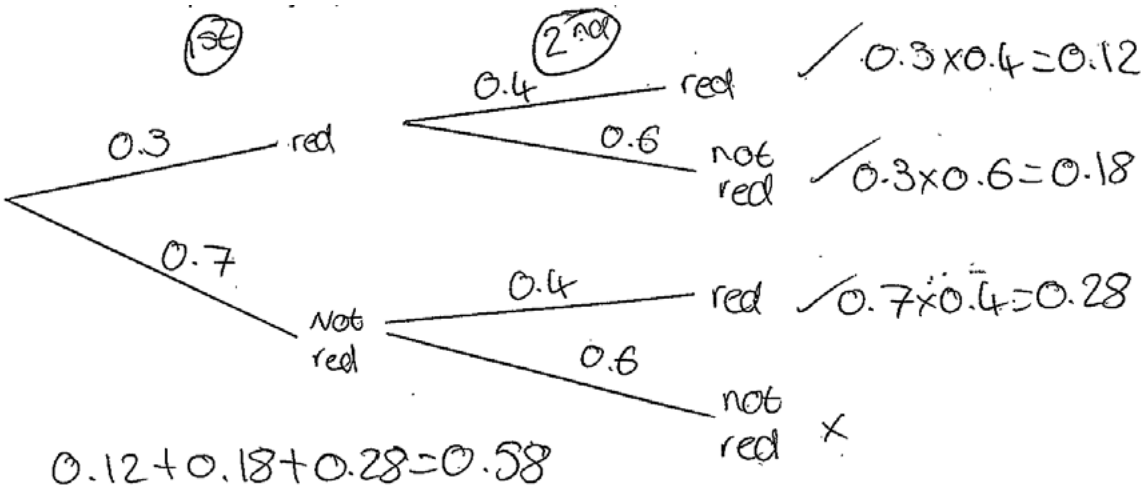
The probability that he takes a red counter from the first bag is 0.3.
The probability that he takes a red counter from the second bag is 0.4.

What is the probability that he takes **at least** one red counter?

..... **[4]**

Exemplar 1

4 marks



0.58 ..... **[4]**

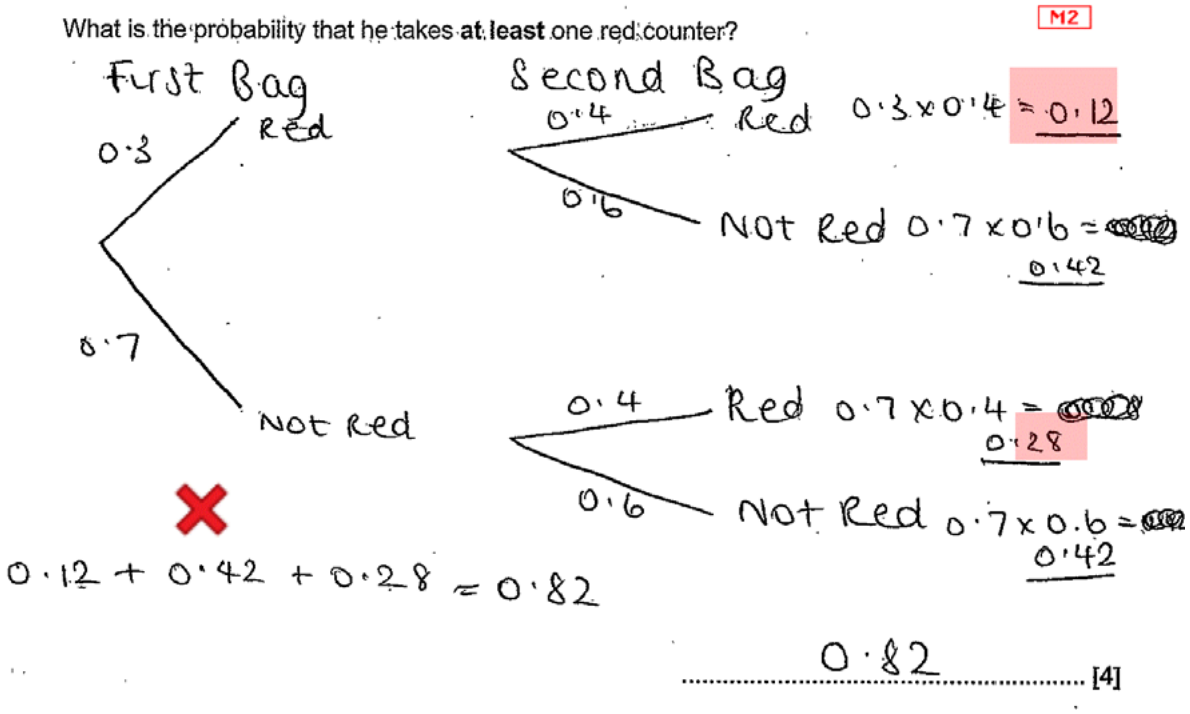
Examiner commentary

The tree diagram here is fully correct and the candidate has selected and processed the correct probabilities for 4 marks.

Fully correct responses were quite rare but the majority came from the use of tree diagrams. A large number did not score at all often because they simply added the two probabilities given in the question to obtain 0.7. Part marks usually came from either finding the probabilities for red NOT selected (0.7 and 0.6) or for calculating one correct product (usually 0.12).

Exemplar 2

2 marks

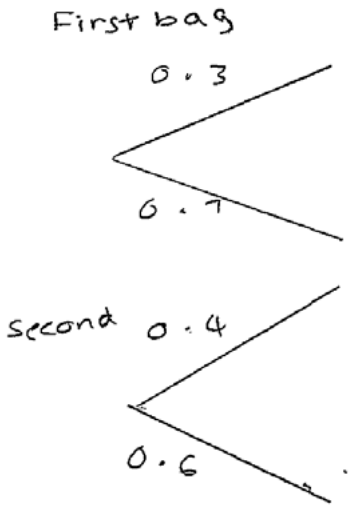


Examiner commentary

This candidate has completed the tree diagram correctly but has made an error with the calculation for red from the first bag followed by not red from the second bag. They have calculated the probabilities for the other outcomes correctly so M2 has been credited.

Exemplar 3

1 mark



Examiner commentary

An incomplete tree diagram but 0.7 and 0.6 have been correctly calculated for B1.

Question 17

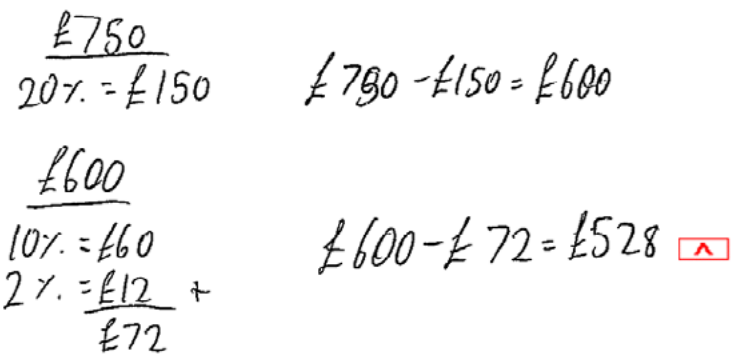
17 The price of a computer was £750.

In a sale the price is reduced by 20%.
On the final day the **sale price** is reduced by a further 12%.

How much is saved in total by buying the computer on the final day of the sale?

£ ..... **[5]**

Exemplar 1 — 4 marks

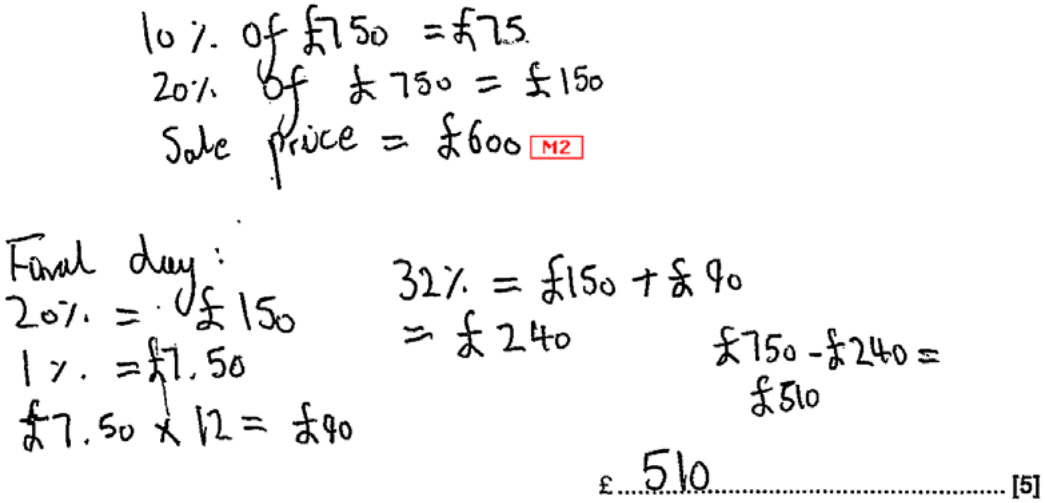


£ 528 **[5]**

Examiner commentary

This candidate has correctly worked out the cost of the computer on the final day of the sale (£528) but did not subtract the amount from £750 to obtain the amount saved of £222. They were credited 4 marks but the final subtraction, completed correctly, would have scored full marks.

Exemplar 2 — 2 marks



£ 510 **[5]**

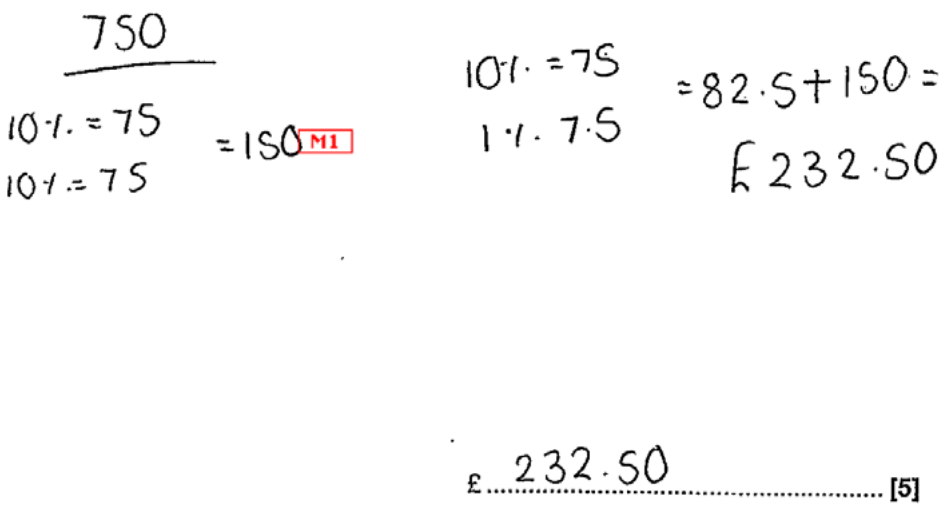
Examiner commentary

The initial sale price of £600 has been correctly obtained for M2 but the second reduction is incorrect. The candidate has found 12% of the original amount of £750 instead of applying the reduction to £600.

The reference to 32% is also incorrect and many others did not score at all by assuming that this was the overall reduction and applying this to the original amount usually giving a final answer of £510.

Exemplar 3

1 mark



£ 232.50 [5]

Examiner commentary

This response scores M1 only for finding 20% of £750. This amount has not been subtracted from £750 which could have earned a further mark. All other work is incorrect as they then attempt 11% of £750.

Question 18

18 The table below shows the weight, $w$kg, of the bags that people took on a plane.

Weight of bag (kg)	Frequency		
$0 < w \leqslant 10$	16		
$10 < w \leqslant 15$	10		
$15 < w \leqslant 20$	20		
$20 < w \leqslant 25$	8		
$25 < w \leqslant 30$	6		

Calculate an estimate of the mean weight of the 60 bags.

..... kg **[4]**

Exemplar 1

4 marks

Weight of bag (kg)	Frequency		midpoint		x F
$0 < w \leqslant 10$	16	*	5		80
$10 < w \leqslant 15$	10	*	12.5		125
$15 < w \leqslant 20$	20	*	17.5		350
$20 < w \leqslant 25$	8	*	22.5		180
$25 < w \leqslant 30$	6	*	27.5		165
	60				900

Calculate an estimate of the mean weight of the 60 bags

900 ÷ 60 = 15

15 kg **[4]**

Examiner commentary

This candidate made good use of the table provided in the question and gained full marks for a response showing good understanding of the process with no errors.

Although most candidates understood the need to find the midpoints, and were rewarded with a mark independent of the method, there were many candidates who simply added the frequencies to get 60 before dividing by 5. Others divided by 5 despite obtaining a correct total of 900 thus obtaining an answer of 180.

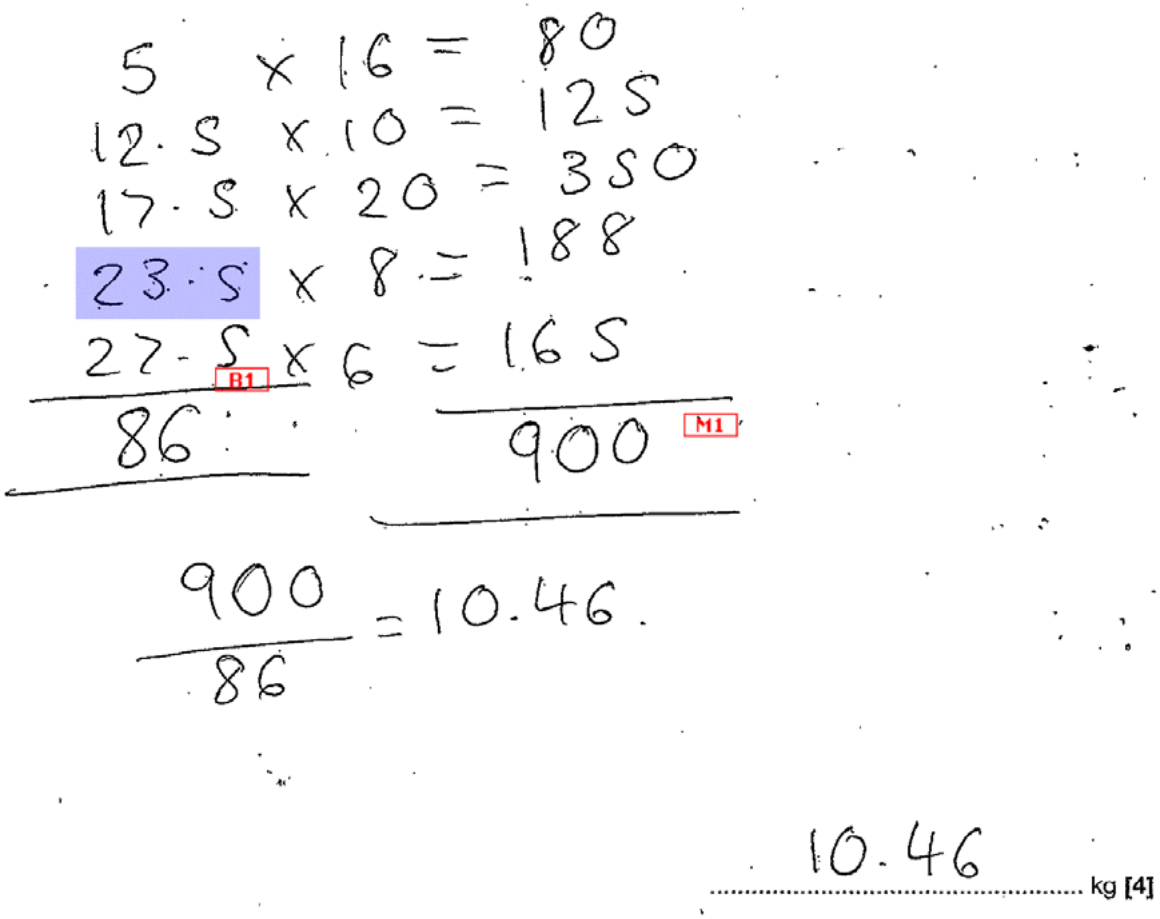
Centres should emphasise that the "estimate" required comes from using midpoints of the intervals and not from rounding values (e.g. midpoints) to whole numbers.

Exemplar 2

2 marks

Weight of bag (kg)	Frequency		
$0 < w \leqslant 10$	16		
$10 < w \leqslant 15$	10		
$15 < w \leqslant 20$	20		
$20 < w \leqslant 25$	8		
$25 < w \leqslant 30$	6		

Calculate an estimate of the mean weight of the 60 bags.



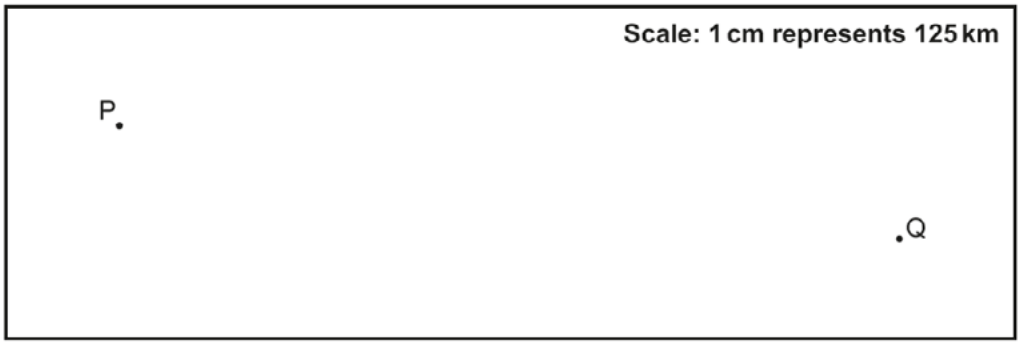
Examiner commentary

Despite an incorrect midpoint and one error in the addition of totals this scores B1 for an appropriate number of correct midpoints and M1 for $\sum mf$ despite the summation which actually gives a correct total.

No further marks have been credited due to an incorrect method for finding the divisor using the sum of the midpoints rather than total frequencies.

Question 19 (a)

19 The scale diagram below shows two cities, P and Q.



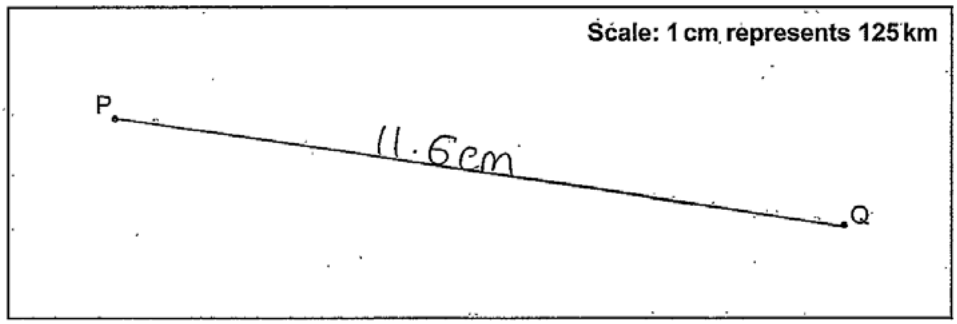
A plane departs from P at 0947 and arrives at Q at 1207.

(a) Work out the average speed, in kilometres per hour, of the plane.

(a) .....km/h **[5]**

Exemplar 1

4 marks



A plane departs from P at 0947 and arrives at Q at 1207.

(a) Work out the average speed, in kilometres per hour, of the plane.

B2

11.6 x 125 = 1450 km

B1

Difference in time = 2 hr 20 min

~~2.25~~ 140 mins

~~1450~~ 2.25 $\frac{1450}{140}$ = 10.4

M1

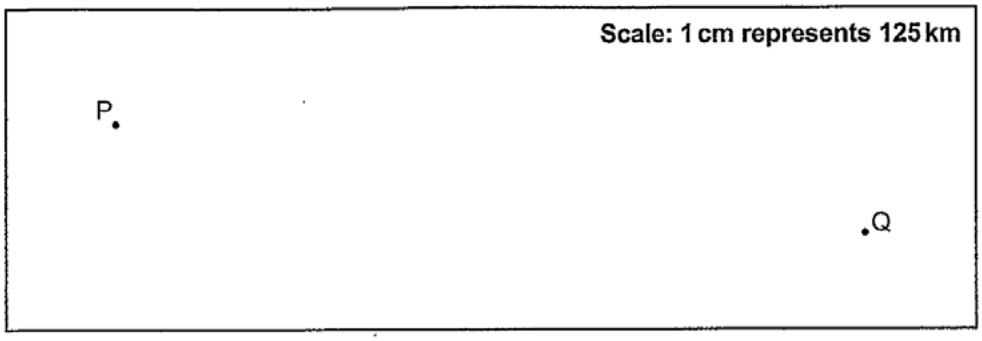
(a) 10.4 km/h **[5]**

Examiner commentary

A complete, correct method for finding the speed of the plane in kilometres per minute scoring 4 out of 5 marks. A correct final conversion to km/hr would have secured full marks.

Exemplar 2

3 marks



A plane departs from P at 0947 and arrives at Q at 1207.

(a) Work out the average speed, in kilometres per hour, of the plane.

2 hours and 20 minutes for how long

11.2cm x 125 = 1400km
M1

140 minutes
B1

1400 ÷ 140 = 10
M1

10 x 10 = 100

100km/h

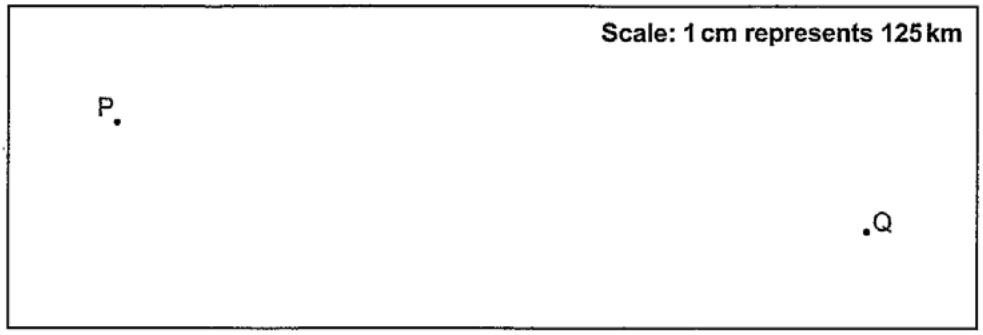
(a) ..... 100 .....km/h **[5]**

Examiner commentary

Again, a correct method has been employed resulting in a speed in km/min with no attempt at a conversion. This response, however, loses an additional mark for using a distance measurement that falls outside the required range (11.4 to 11.8).

Exemplar 3

2 marks



A plane departs from P at 0947 and arrives at Q at 1207.

(a) Work out the average speed, in kilometres per hour, of the plane.

9:47 —— 12:07
+3mins
9:50 —— 12:07
1 2hours
11:50 —— 12:07
17mins
12:07

12hours 20mins B1

12cm = 1500 km.
M1

(a) 1500 .....km/h **[5]**

Examiner commentary

In this example a correct time has been calculated for B1. The length between P and Q has been inaccurately measured but the scale has been used correctly when converting to km so M1 can be credited for this calculation. No further method is evident.

A common error was a failure to obtain the correct time in hours for the duration of the journey. Those who found the time in minutes were usually more successful and correctly obtained 140 but many used 2.2 hours for 2 hours 20 minutes and did not gain the final accuracy mark due to this error.

Question 20 (a)

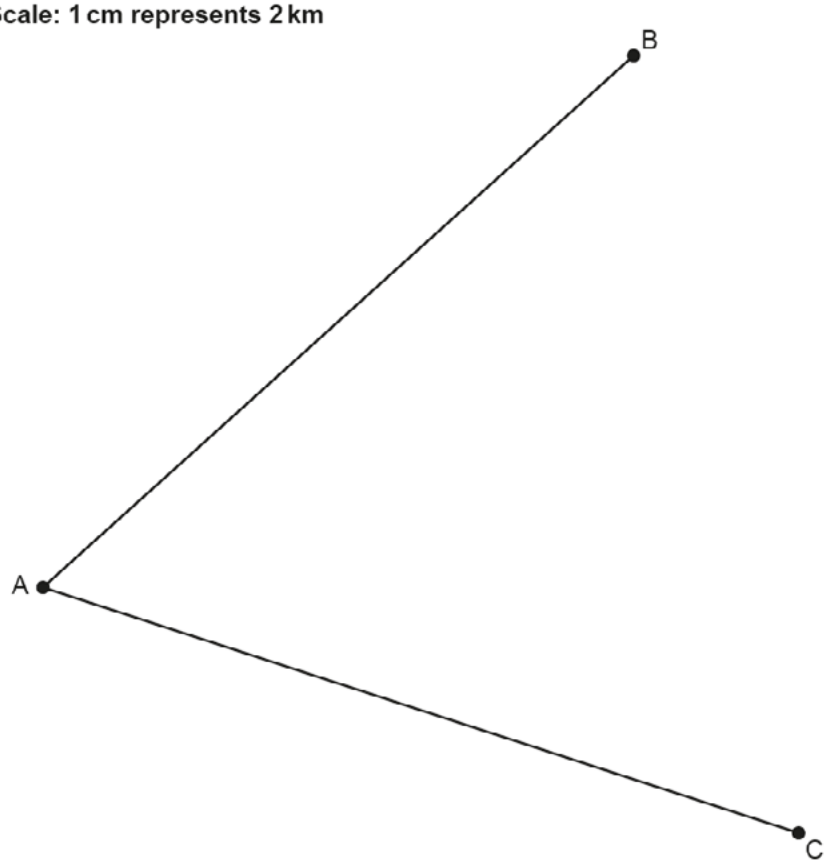
20 The scale diagram below shows towns, A, B and C.
Line AB represents the road from A to B and line AC represents the road from A to C.

A shopping centre is to be built so that it is

- nearer to the road from A to B than the road from A to C,
- less than 14 km from town C.

(a) Using construction, shade the region where the shopping centre could be built.
Show all your construction lines.

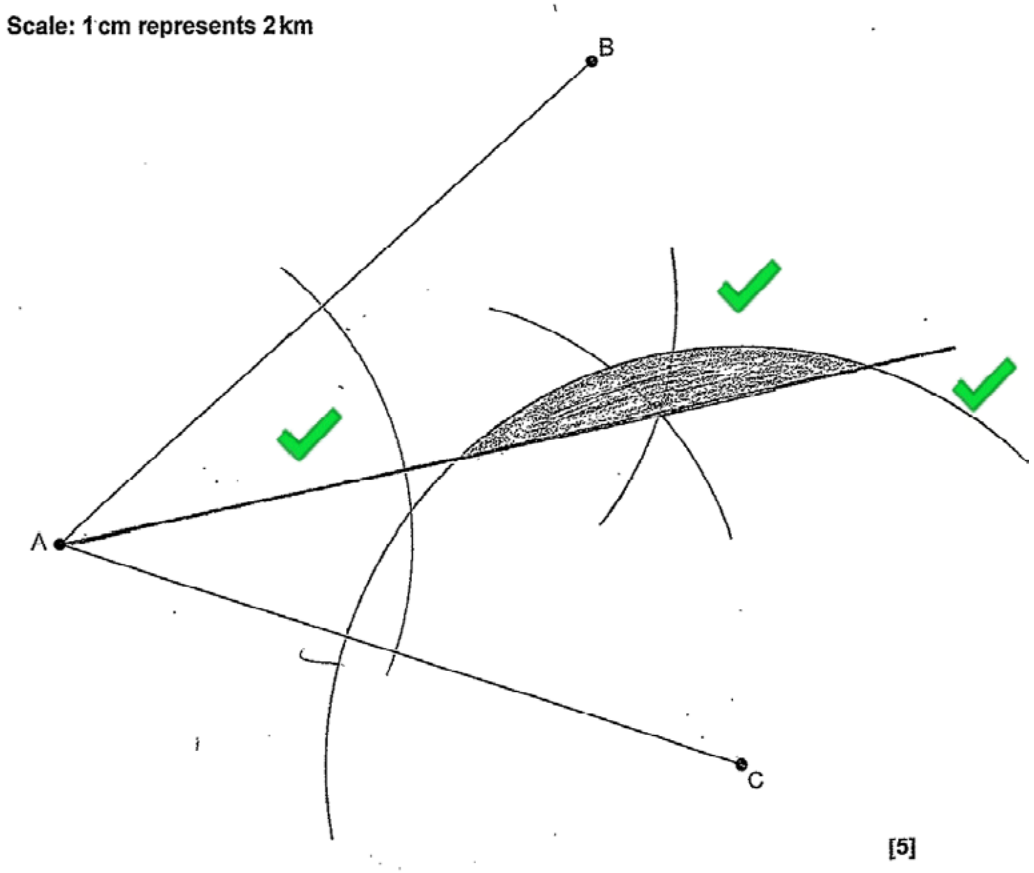
Scale: 1 cm represents 2 km



[5]

Exemplar 1

5 marks



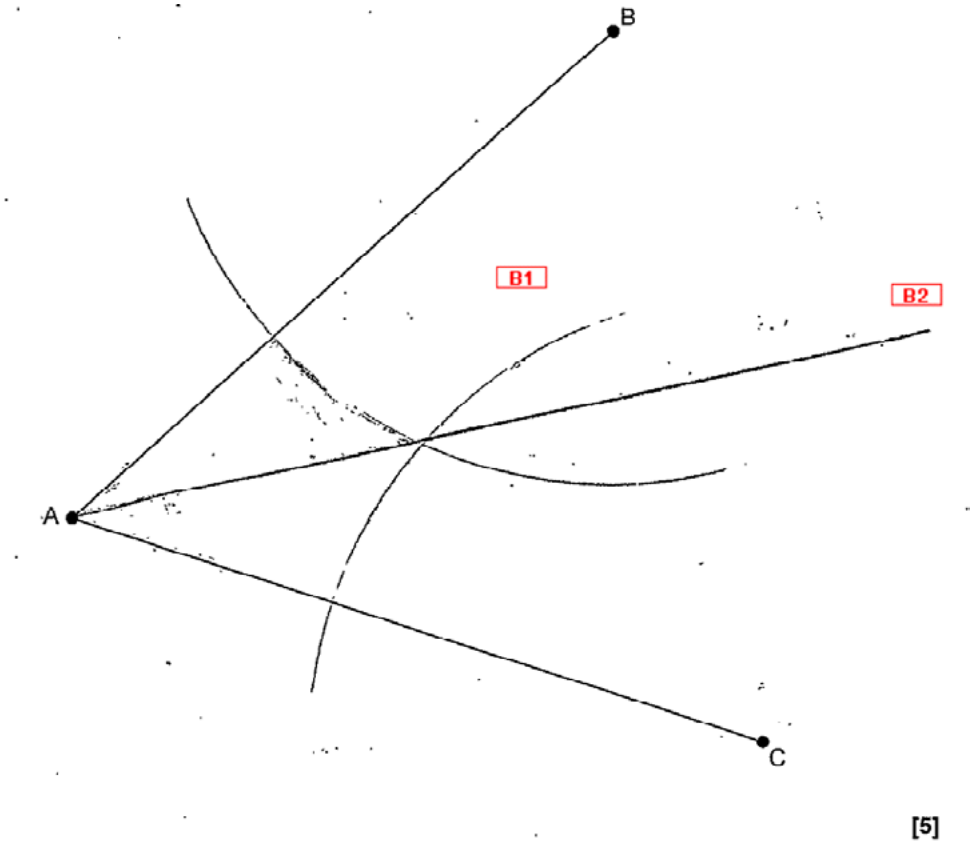
Examiner commentary

A fully correct response for 5 marks.

This candidate has been credited 2 marks for an accurate angle bisector with all correct arcs, 2 marks for an arc of 7 cm radius centred at C and 1 mark for identifying the correct region.

Exemplar 2

3 marks



[5]

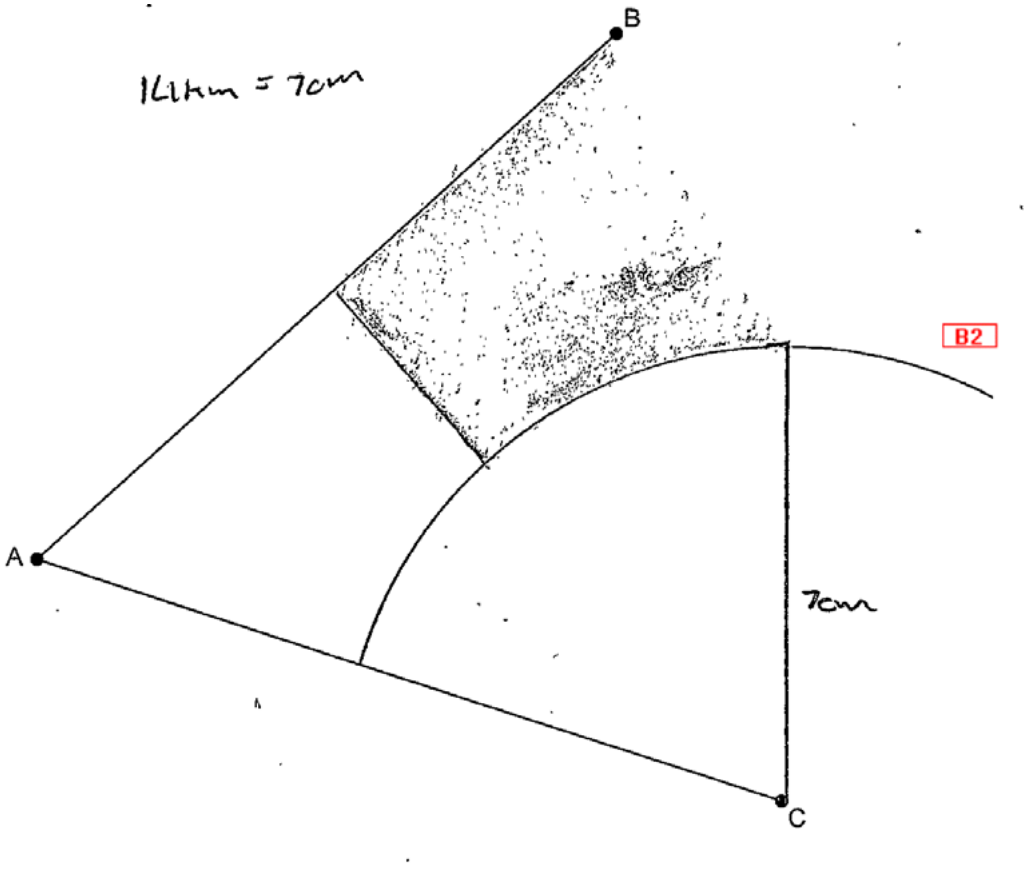
Examiner commentary

This response was credited 3 marks.

As AB and AC are the same length, two arcs of equal radius from B and C are acceptable for the construction and completion of an accurate angle bisector for 2 marks. If the arc from C had been 7 cm (± 2 mm) then a further 2 marks would have been gained. In this case the radius was outside the required tolerance and scored 1 mark only.

Exemplar 3

2 marks



[5]

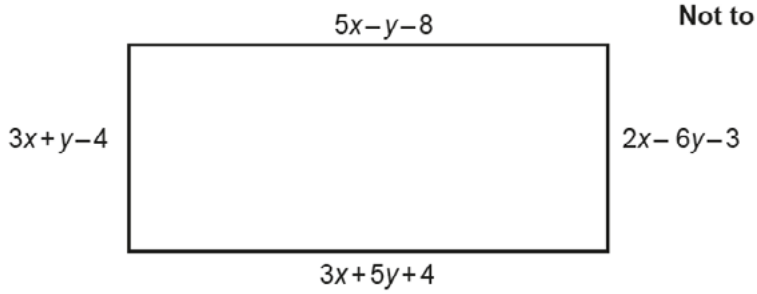
Examiner commentary

A majority of candidates realised that an arc centred at C was required as part of the construction and any radius would have scored 1 mark. In this case the candidate has drawn an arc with a radius within the required tolerance and 2 marks were credited.

Accuracy of constructions was an issue in many responses although most attempts were within tolerance. It would be helpful if candidates were advised regarding the use of appropriate instruments and the importance of accurate measurements.

Question 21

21 The dimensions, in centimetres, of this rectangle are shown as algebraic expressions.



Work out the length and width of the rectangle.

length = ... cm

width = ... cm

[6]

Exemplar 1

5 marks

$5x - y - 8 + 3x + 5y + 4 = 2x - 6y - 7 + 3x + y - 4$

$8x + 4y - 4 = 5x - 5y + 7$

$8x - 5x + 4y + 5y = -7 + 4$

$3x + 9y = -3$

(1) $5x - y - 8 = 3x + 5y + 4$

$5x - 3x = 5y + y + 4 + 8$

$2x = 6y + 12$

(2) $3x + y - 4 = 2x - 6y - 3$

$3x - 2x = -6y - y$

$-3 + 4$

$x = -7y + 1$

(3) $(2x = 6y + 12) \times 1$

$(x = -7y + 1) \times 2$

$2x = 6y + 12$

$2x = -14y + 2$

$6y + 12 = -14y + 2$

$6y + 14y = 2 - 12$

$20y = -10$

$y = \frac{10}{20} = -\frac{1}{2}$

$= -0.5$

(4) $2x = 6y + 12$

$2x = 6x - \frac{1}{2} + 12$

$2x = 9$

$x = \frac{9}{2} = 4.5$

length = -0.5 cm

width = 4.5 cm

[6]

Examiner commentary

This candidate shows a good understanding of the method involved in finding the dimensions of the given rectangle.

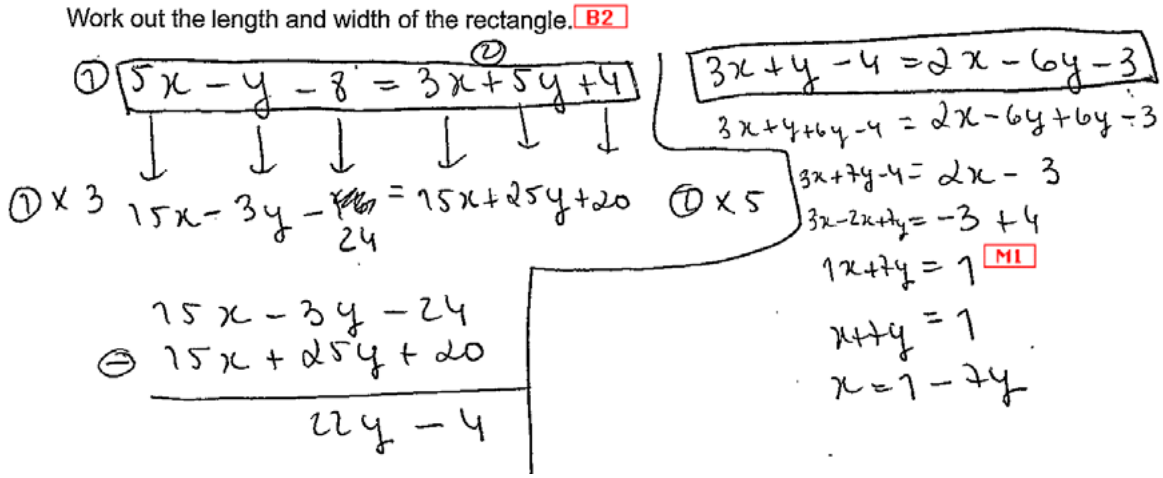
They have correctly equated the lengths and widths of the rectangle forming two separate simultaneous equations in x and y. The equations have been simplified, coefficients of x have been equated and this variable has been eliminated in order to form one equation in y. The correct value for y has been found before substituting to find x. They have scored B5 for obtaining two correct values ($x = 4.5$ and $y = -0.5$).

Full marks cannot be credited as they have not completed the task by obtaining the length and width of the rectangle.

Exemplar 2

3 marks

Work out the length and width of the rectangle. B2



length = ... cm

width = ... cm

[6]

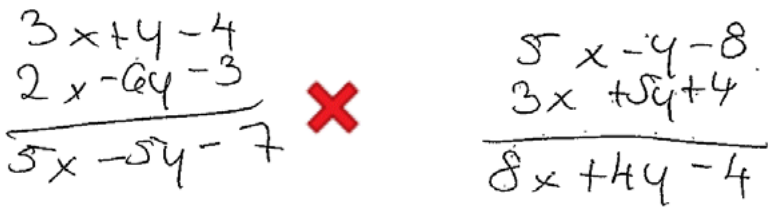
Examiner commentary

This candidate has also understood the need to equate lengths and widths in algebraic form and any one of these equations will earn 2 marks. They have been credited an additional M1 for correctly simplifying one of the required equations ($x + 7y = 1$). No further progress has been made.

Exemplar 3

0 marks

Work out the length and width of the rectangle.



length = 8x + 4y − 4 cm

width = 5x − 5 − 7 cm

[6]

Examiner commentary

This response did not score at all as the lengths and widths have simply been added.

Only a minority of candidates at this level were able to cope with the concepts involved in this question. It is one of the topics that has been included in recent changes to the specification and should be given some attention especially with regard to forming simultaneous equations. Many candidates chose methods similar to the example above often adding all sides to form one long expression.

A large number of candidates attempted to find solutions using trial and improvement but this type of question does not easily lend itself to this approach and any level of success was quite rare.

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