

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

May/June 2022 Exemplar
1MA1-2H Paper 2 (Calculator)
Higher Tier

Senior Examiner's feedback on student responses

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About this booklet

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

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

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

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

How to use this booklet

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27 28 29

Question 7

Question Mark Scheme Examiner Comments

Performance Response A Response B Response C

Question 7 - Question

7 Simon buys some candles.
Each candle costs £2

Simon pays with a £20 note.
He gets £6 change.

Work out the number of candles Simon buys.

(Total for Question 7 is 3 marks)

Question 7 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
7	7	P1	for $20 - 6 (= 14)$ or $20 \div 2 (=10)$ and $6 \div 2 (=3)$	M re lis
		P1	for " 14 " $\div 2 (= 7)$ or " 10 " - " 3 " ($= 7$)	
		A1	cao	

Question 7 - Examiner Comments

Generally well answered, some with minimal working shown. Careless arithmetic was a major reason for some students not gaining full marks in this question. $20 - 6 = 24$ or $20 - 6 = 12$ were the most common errors made but by dividing correctly by 2 to get 12 or 6, 2 out of the 3 marks available were possible. A common approach was to list costs of candles in multiples of 2. However, it was not uncommon for some multiples to be omitted, thus affecting the final number of candles bought. Some weaker students got no further than working out the number of candles that could be bought for £20. To gain any credit £6 \div 2 also needed to be seen. Giving an answer of 14 on the answer line was also common following correct calculations, with 7 candles often being an embedded answer.

Question 7 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:						
			ALL	5	4	3	2	1	U
2.70	3	90	2.70	2.97	2.93	2.84	2.64	2.18	1.47

Navigate to the Contents page

Navigate to a question

Navigate to a specific part of this question

Q7

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Performance

Response A

Response B

Response C




General Examiner Feedback


It was very pleasing to see that, despite the last two years disruption, students were well prepared for this exam and most were able to attempt the majority of questions, indicating centres are continuing to get their entry strategy correct.

Students seemed to be well equipped, especially with calculators and so none seemed to be impeded on those questions where one was required. Although, some students do need to improve on their use of a calculator.

- Question: **4** **5** **7** **9** **10** **11** **12** **15** **16** **17** **18**
20 **22**

Question 4

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

 **Question 4 - Question**

4 Festival A will be in a rectangular field with an area of $80\,000\text{ m}^2$
The greatest number of people allowed to attend Festival A is 425
Festival B will be in a rectangular field 700 m by 2000 m.
The greatest number of people allowed to attend Festival B is 6750
The area per person allowed for Festival B is greater than the area per person allowed for Festival A.
(a) How much greater?
Give your answer correct to the nearest whole number.

..... m^2
(4)

Callum says,

“ 300 cm^2 is the same as 3 m^2 because there are 100 cm in 1 m so you divide by 100”

Callum’s method is wrong.

(b) Explain why.

.....
.....
.....

(1)






(Total for Question 24 is 5 marks)

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

 **Question 4 - Mark Scheme**

Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	19	P1	for process to find area available at festival B, eg $700 \times 2000 (=1\ 400\ 000)$	
		P1	For process to find the area available per person at one festival, eg $80\ 000 \div 425 (= 188.23..)$ or $[\text{area}] \div 6750 (= 207.40..)$	Accept either number rounded eg 207 or 188
		P1	for process to find the area available per person at both festivals, eg $80\ 000 \div 425 (= 188.23..)$ and $[\text{area}] \div 6750 (= 207.40..)$	Accept both numbers rounded eg 207 and 188
		A1	answer in the range 18.7 to 19.5	
(b)	explanation	C1	for a valid statement relating to scale factor for area, Acceptable examples There are 10000 (cm ²) in 1 (m ²) Because 1 m ² is the same as $100 \times 100 = 10000$ cm ² There are 2 side lengths that change from 1 m to 100 cm $300 \div 3$ is 100 should use 100^2 $300 \div 100 \div 100 = 0.03$ $3 \times 100 \times 100 = 30000$ Because it's area not length. Because it's in m ² not just metres He hasn't taken the squared sign into account Not acceptable examples There are 1000 cm in 1 m Callum is correct because $300 \div 3$ is 100 $3^2 = 9$ $300 \times 300 = 90000$ You have to square the number	

Q4






A
B
C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

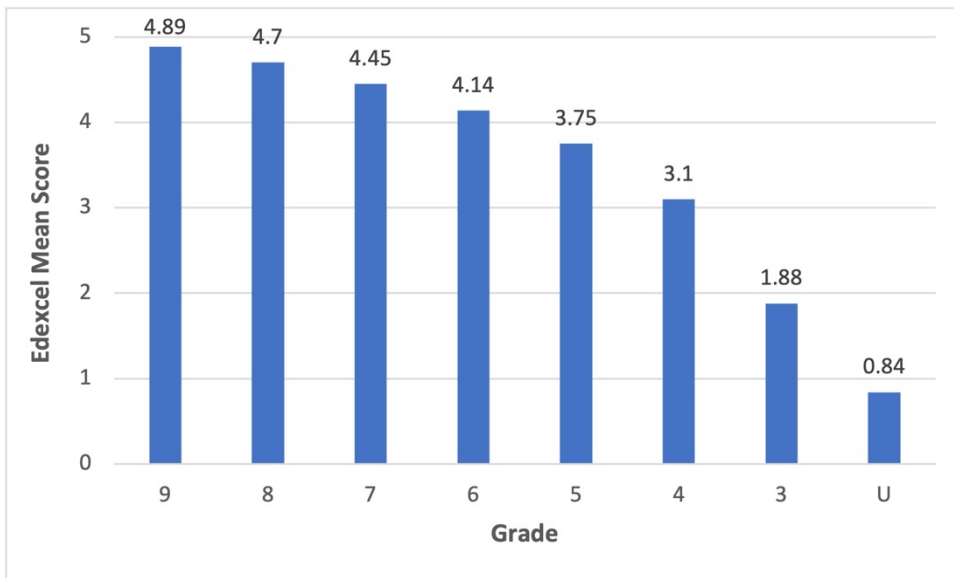
 **Question 4 - Examiner Comments**

Part (a) was the first problem question on the paper and was looking for students to compare the people per unit area at two festivals. To be able to do so students had to first find the area at one of the festivals. However, students could gain the second and third marks even if they were unsuccessful in finding this area. These two marks were for finding the area per person at one or both festivals.


Part (b) required students to understand the mistake made in the unit conversion. To gain the mark students needed to explain that, for the conversion from cm^2 to m^2 , the conversion factor is 10000 or 100^2 . This was done with varying degrees of success with a good number able to work with the correct conversion factor, often showing the correct conversion for 3m^2 to cm^2 or 300cm^2 to m^2 . The most common incorrect answer was to show that $300 \times 300 = 90,000$.

 **Question 4 - Performance**


Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
4.16	5	83	4.16	4.89	4.70	4.45	4.14	3.75	3.10	1.88	0.84




Q4











A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 4 - Response A**

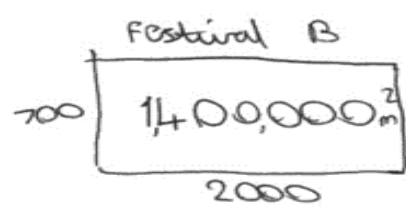
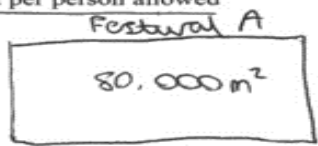
4 Festival A will be in a rectangular field with an area of 80000m²
The greatest number of people allowed to attend Festival A is 425
Festival B will be in a rectangular field 700m by 2000m.
The greatest number of people allowed to attend Festival B is 6750
The area per person allowed for Festival B is greater than the area per person allowed for Festival A.

(a) How much greater?
 Give your answer correct to the nearest whole number.

$$\frac{80,000}{425} = 188$$

$$\frac{1,400,000}{6750} = 207$$

$$207 - 188 = 19$$








$$\frac{19}{(4)} \text{ m}^2$$

Callum says, 90000 9
 "300 cm² is the same as 3 m² because there are 100 cm in 1 m so you divide by 100"
 Callum's method is wrong. 1m = 100

(b) Explain why.
 Because it is cm², so you would need to divide by 10,000
 (1)

5 / 5

Q4





A
B
C

Part (a)
 P1 for a process to find the available area at festival B (we can award for the process 700 x 2000 OR the evaluation without the process if the 1,400,000 is seen)
 P1 for process to find the area per person at A or B (here both are seen).
 P1 for process to find the area per person at A and B
 A1 correct answer

Part (b)
 C1 valid statement relating the scale factor for area

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 4 - Response B**

4 Festival A will be in a rectangular field with an area of 80 000 m²
 The greatest number of people allowed to attend Festival A is 425
 Festival B will be in a rectangular field 700 m by 2000 m.
 The greatest number of people allowed to attend Festival B is 6750
 The area per person allowed for Festival B is greater than the area per person allowed for Festival A.
 (a) How much greater?
 Give your answer correct to the nearest whole number.

$$700 \times 2000 = 1,400,000$$

$$80,000 = 425$$

$$\frac{1,400,000}{80,000} = 17.5$$

$$\frac{6750}{425} =$$

$$\frac{80,000}{425} = 188,235$$

$$\frac{1,400,000}{6750} = 207.407$$

$$\frac{1,400,000}{6750} \div \frac{80,000}{425} = 1.101351409$$

_____ | _____ m²
(4)

Callum says,
 "300 cm² is the same as 3 m² because there are 100 cm in 1 m so you divide by 100"
 Callum's method is wrong.

(b) Explain why.

$$300 \text{ cm} \times 300 \text{ cm} = 90,000 \text{ cm} = 900 \text{ m}$$

$$3 \text{ m} \times 3 \text{ m} = 9 \text{ m} \quad 900 \text{ m} > 9 \text{ m}$$

(1)

3 / 5

- Part (a)**
P1 for a process to find the available area at festival B.
P1 for process to find the area per person at A **or** B (here both are seen)
P1 for process to find the area per person at A **and** B.


Part (b)
C0 invalid statement
Note: if a candidate states **10000**, even with missing or incorrect units this would get C1


Q4

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A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 4 - Response C**

4 Festival A will be in a rectangular field with an area of 80 000 m²
 The greatest number of people allowed to attend Festival A is 425
 Festival B will be in a rectangular field 700 m by 2000 m.
 The greatest number of people allowed to attend Festival B is 6750
 The area per person allowed for Festival B is greater than the area per person allowed for Festival A.

(a) How much greater?
 Give your answer correct to the nearest whole number.

Handwritten student work:

Festival A
 80,000 m² = 425 people
 425 = 80,000
 ÷ 425 ÷ 425
 L = 188 m²

Festival B
 2000
 140,000 700 = 6750
 60,000 = 6325
 ÷ 6325 ÷ 6325






Festival B
 140,000 = 6750
 ÷ 6750 ÷ 6750
 201 = 1

..... m²
 (4)

Callum says,
 "300 cm² is the same as 3 m² because there are 100 cm in 1 m so you divide by 100"
 Callum's method is wrong.

(b) Explain why.
 Because it is squared it means you have to divide by 100 twice

3 / 5

Q4





A
B
C

Part (a)

P0 there is no process to find the available area at Festival B and the evaluation is incorrect.

P1 for process to find the area per person at A **or** B.

P1 for process to find the area per person at A **and** B.

A0 no answer given.

Note: [area] can be anything the candidate thinks is the **area** of B, even if the calculation leading to that value is wrong, eg 2000 + 700. However, it cannot be 2000 or 700 alone.




Part (b)

C1 valid statement relating the scale factor for area.

Note: we would not accept a statement such as: it is twice the amount of cm in a m for m²

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 5

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

Question 5 - Question

- 5 The points L , M and N are such that LMN is a straight line.
 The coordinates of L are $(-3, 1)$
 The coordinates of M are $(4, 9)$
 Given that $LM : MN = 2 : 3$,
 find the coordinates of N .

(..... ,)

(Total for Question 5 is 4 marks)

Question 5 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
5	14.5, 21	P1	for process to work with coordinates, eg $4 - (-3) (= 7)$ or $9 - 1 (= 8)$	Accept in reverse order eg $-3 - 4 (= -7)$ and negative distances throughout
		P1	for process to use ratio, eg $"7" \div 2 (= 3.5)$ or $"8" \div 2 (= 4)$ or $"7" \times 3 (= 21)$ or $"8" \times 3 (= 24)$	This mark is implied by 10.5 or 12 or 17.5 or 20
		P1	for complete process to find either the x or the y coordinate of N , eg $"3.5" \times 3 + 4$ or $"4" \times 3 + 9$ or $"3.5" \times 5 - 3$ or $"4" \times 5 + 1$ OR to find both the required distances eg $"3.5" \times 3 (= 10.5)$ and $"4" \times 3 (= 12)$ or $"21" \div 2 (= 10.5)$ and $"24" \div 2 (= 12)$ or $"3.5" \times 5 (= 17.5)$ and $"4" \times 5 (= 20)$	
		A1	oe	

Question:

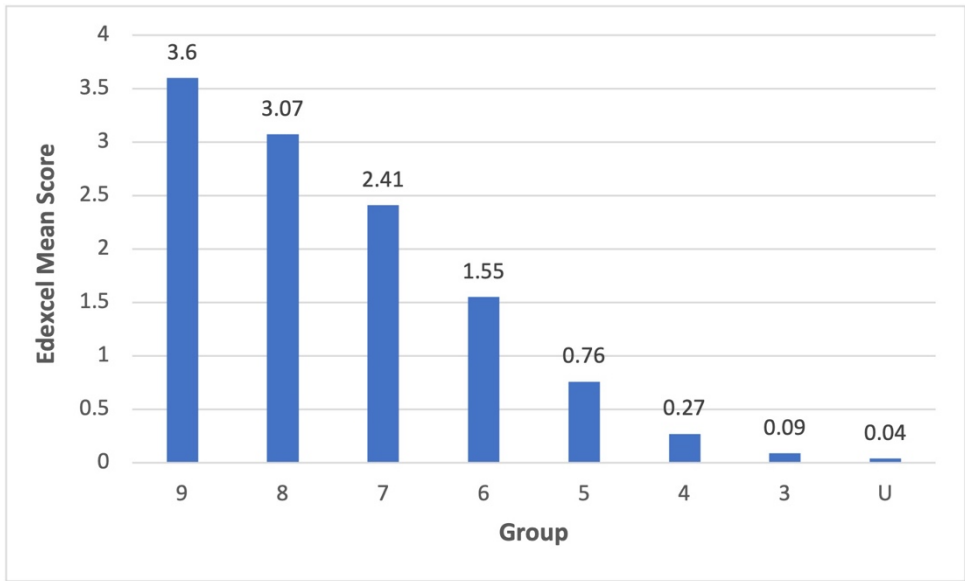
- [4](#)
- [5](#)
- [7](#)
- [9](#)
- [10](#)
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- [16](#)
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Question 5 - Examiner Comments

This problem required students to work with coordinates and a ratio to determine the coordinates of another point. A good number of students were able to gain credit on this question, with many gaining all 4 marks. Those who didn't score fully often only went as far as finding the vertical and horizontal distances, but then didn't add these onto the coordinates of L or M . Another common error was to use the ratio incorrectly, typically dividing by 3 and multiplying by 2, as was finding the equation of the line LMN , which could still gain P1 for the values of 8 and 7 within the gradient.

Question 5 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
1.87	4	47	1.87	3.60	3.07	2.41	1.55	0.76	0.27	0.09	0.04





Q5

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A

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C

Question:

4

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Question 5 - Response A

5 The points L , M and N are such that LMN is a straight line.

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$, $2+3=5$

find the coordinates of N .

L
 x
 $(-3, 1)$

M
 x
 $(4, 9)$

N
 x
 $?$

$\frac{\Delta y}{\Delta x} = \frac{8}{7}$

$\frac{8}{2} \times 3 = 12$

$\frac{7}{2} \times 3 = 10.5$

$(4, 9) + (10.5, 12) = (14.5, 21)$

$(14.5, 21)$

Q5



A

B

C

4 / 4


P1 for process to work with coordinates (7 and 8 both found)

P1 P1 for both distances found (10.5 and 12)

A1 correct answer given

Note: it is quite common to see candidates working with gradients and fractions (as they are here), this is perfectly acceptable.

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 5 - Response B**

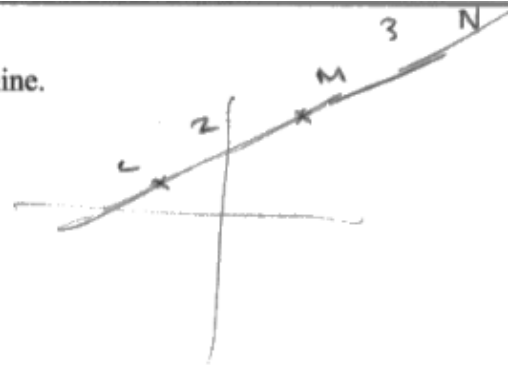
5 The points L , M and N are such that LMN is a straight line.

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$,

find the coordinates of N .



$$\frac{4 - (-3)}{9 - 1} = \frac{7}{8} = \text{gradient}$$

$$2 : 3 = 5$$

$$2 : 3 =$$

$$\left(\frac{7}{8} \div 2 \right) \times 3 = \frac{10.5}{24}$$

7.5, 25.

(7.5, 25)

(Total for Question 5 is 4 marks)

3 / 4

P1 for process to work with coordinates (7 and 8 found)

P1 for process to use ratio (7/2 or 8/2)

P1 for process to find both the required distances (7/2 x 3 and 8/2 x 3). Here 8/2 x 3 has been incorrectly evaluated.

A0 incorrect answer

Q5











A

B

C

Question:

4

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Question 5 - Response C

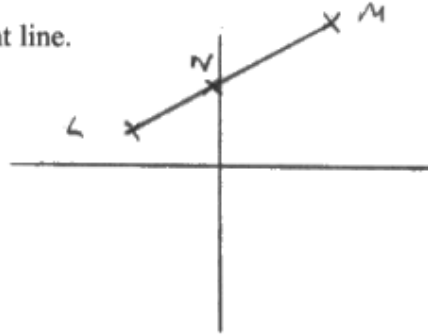
5 The points L , M and N are such that LMN is a straight line.

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$,

find the coordinates of N .



Change in $x = +7$

Change in $y = +8$

$7 \times \frac{2}{5} = 2.8$ (x)

$8 \times \frac{2}{5} = 3.2$ (y)

$-3 + 2.8 = -0.2$ (x)

$1 + 3.2 = 4.2$ (y)

$(-0.2, 4.2)$

(Total for Question 5 is 4 marks)

1 / 4

P1 for correct process with coordinates (either of 7 or 8 found)

P0 P0 no correct process with ratio

A0 incorrect answer

Note: using $5/2$ instead of $3/2$ is a correct process with ratio and would lead to 17.5 and 20.

Q5










A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 7

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

Question 7 - Question

7 In Spain, Sam pays 27 euros for 18 litres of petrol.
 In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
 4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

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

(Total for Question 7 is 4 marks)

Question 7 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
27	No (supported)	P1 P1 P1 C1	for a conversion with litres and gallons, eg $18 \div 4.5 (= 4)$ or $8 \times 4.5 (= 36)$ for a conversion with £ and euros, eg $27 \times 0.85 (= 22.95)$ or $40.8 \div 0.85 (= 48)$ for finding the unit price, eg $27 \div 18 (= 1.5)$ OR finding proportionality for fuel eg (" 36 " \div 18) $(= 2)$	See page at end of mark scheme May compare cost per gallon or cost in euros May be seen in a calculation or given in a description Accept comparative figures rounded or truncated No is implied by eg Wales is cheaper

Question:

4

5

7

9

10

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12

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16

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18

20

22

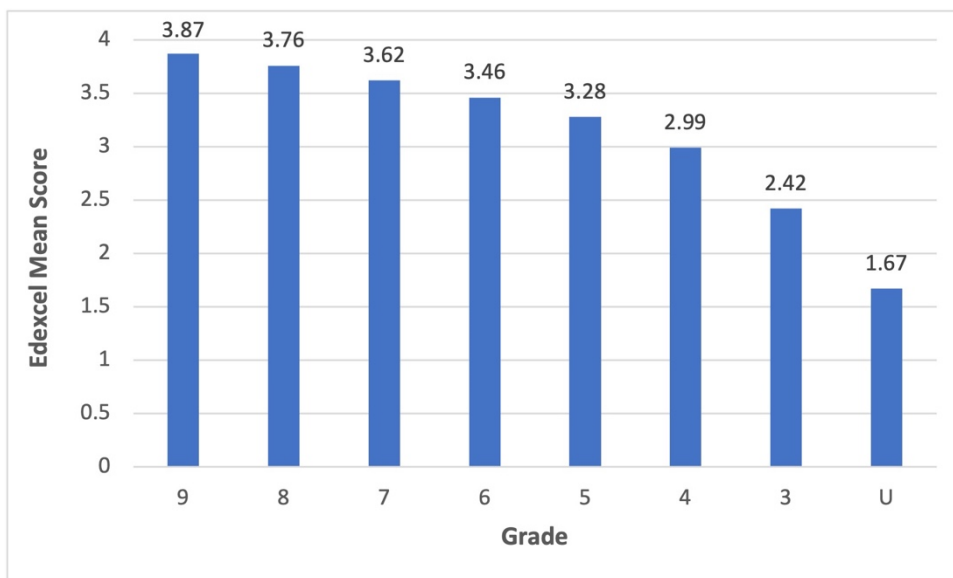
Question 7 - Examiner Comments

This problem question required students to compare different volumes of petrol in different currencies. There are many approaches that could be used to answer this question.

Most students were able to score some marks. The most commonly awarded marks were those for converting volumes and for converting currency. It was often the third mark to get to the comparable figures that students struggled to gain. One common error was confusion with the currency conversion e.g. $27 \div 0.85$ instead of 27×0.85 .

Question 7 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
3.49	4	87	3.49	3.87	3.76	3.62	3.46	3.28	2.99	2.42	1.67



Q7

Navigation icons: Question mark, Checkmark, Menu, Bar chart, Document with pencil, and letters A, B, C.

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 7 - Response A**

7 In Spain, Sam pays 27 euros for 18 litres of petrol.
 In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
 4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

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

Sam: £22.95
 18L ~~27 x 0.85 = 22.95~~

$$27 \times 0.85 = 22.95$$

Leo: £40.80
 36L






$$8 \times 4.5 = 36$$

$$\text{Spain} - 36L = (22.95 \times 2) = £45.90$$

$$\text{Wales} - 36L = £40.80$$

No, ~~£40~~ £45.90 > £40.80

4 / 4

Q7





A
B
C

P1 process for conversion 8 gallons to 36 litres (capacity conversion)

P1 process for conversion €27 to £22.95 (currency conversion)

P1 making £22.95 a comparable figure 22.95×2 (2 seen as the scale factor)

C1 No with a conclusion with correct comparable figures (using the given £40.80 and £45.90). Here we would accept Wales is cheaper, without the 'NO'.

Note: the scale factor of 2 is often not seen but can be implied if a suitable multiplication or division by 2 is completed.

Question:

4

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Question 7 - Response B

- 7 In Spain, Sam pays 27 euros for 18 litres of petrol.
In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

Is Sam correct?

You must show how you get your answer.

$$W = \frac{£40.80}{8} \text{ for 8 gallons} \\ = \underline{\underline{£5.10 \text{ per gallon}}}$$

$$S = 27 \times 0.85 = £22.95 \text{ for 18 litres} \\ = £22.95 \text{ for 4 gallons} \\ = \underline{\underline{£5.74 \text{ per gallon}}}$$

$$5.10 < 5.74$$

So petrol is cheaper in Wales than in Spain. Sam is correct.

Q7

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Bar chart icon

✍️

A

B

C

3 / 4

P1 converting 18 litres to 4 gallons (capacity conversion)

P1 process for conversion €27 to £22.95 (currency conversion)

P1 process for cost of gallon in Wales (5.10, can be seen without the £ sign) (unit cost)

C0 Although the correct comparable figure for cost per gallon in £ for Spain has been found (£5.74), the candidate has reached the wrong conclusion ('Sam is correct')

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

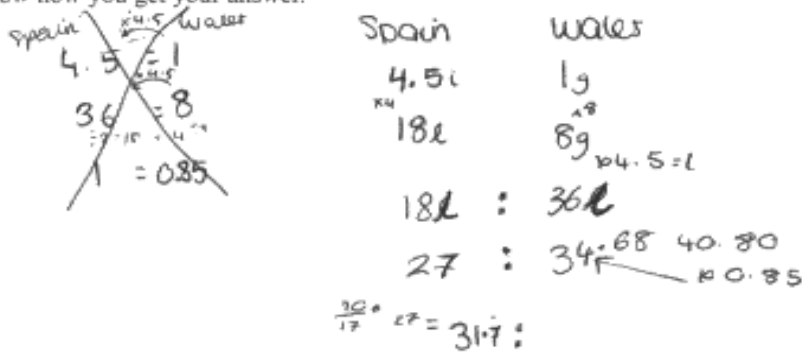
 **Question 7 - Response C**

7 In Spain, Sam pays 27 euros for 18 litres of petrol.
 In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
 4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

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



Spain	Wales
4.5 l	1 g
18 l	8 g
27 €	40.80 £
36 l	36 l
27 €	34.68 £
	40.80 £
	0.85
	$\frac{36}{17} \text{ €} = 31.7$

Q7











A

B




C




1 / 4

- P1 process for conversion 8 gallons to 36 litres (capacity conversion)
- P0 incorrect process for conversion €27 to pounds (currency conversion)
- P0 C0 no further work (no scale factor or unit price)

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 9

 Question
 Mark Scheme
 Examiner Comments

 Performance
 Response A
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Question 9 - Question

9 A box in the shape of a cuboid is placed on a horizontal floor.
 The box exerts a force of 180 newtons on the floor.
 The box exerts a pressure of 187.5 newtons/m² on the floor.
 The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.
 Work out the value of x .

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$x = \dots\dots\dots$
 (Total for Question 9 is 3 marks)

Question 9 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
9	0.8	P1 P1 A1	for process to find the area, eg $187.5 = \frac{180}{A}$ or $180 \div 187.5 (= 0.96)$ or $\frac{180}{1.2x} = 187.5$ or $1.2x = \frac{180}{187.5}$ for complete process to find width, eg “0.96” \div 1.2 or $180 \div 225$ cao	Ignore units for P marks only

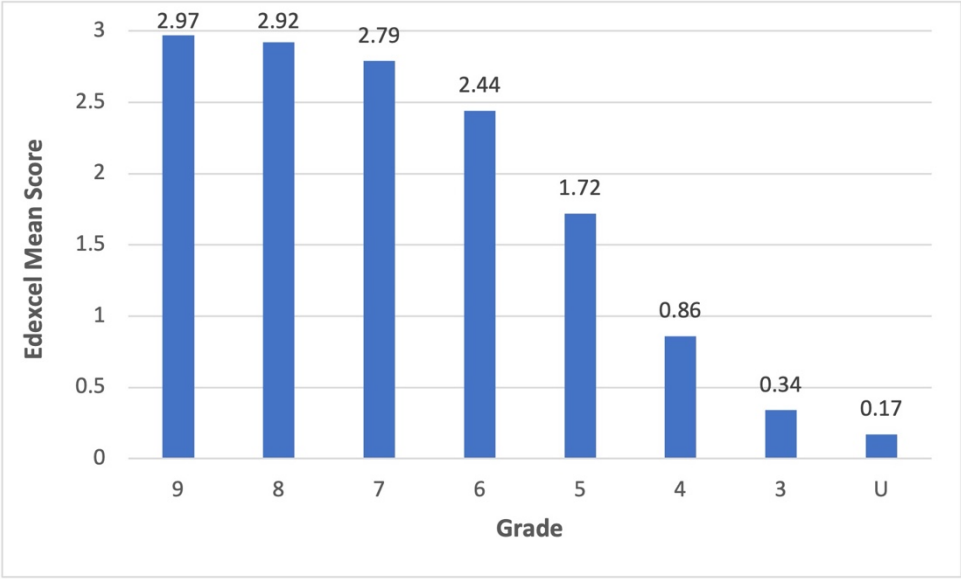
- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 9 - Examiner Comments**


This problem required students to use the given pressure formula to first find the area and then subsequently the length of the base of a cuboid. Most students were able to gain the first mark for substituting the force and pressure correctly into the formula. Unfortunately, many were then unable to rearrange the formula correctly to find the area. This meant that although they then divided by the width, they couldn't gain the second mark as the process to find the area was incorrect. That said, there was still a high proportion of students who were able to complete the process correctly and gain an answer of 0.8 for 3 marks.


 **Question 9 - Performance**


Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
2.33	3	78	2.33	2.97	2.92	2.79	2.44	1.72	0.86	0.34	0.17





Q9











A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 9 - Response A**

9 A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.
 The box exerts a pressure of 187.5 newtons/m² on the floor.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.

Work out the value of x .

Handwritten student work:

$$187.5 = \frac{180}{\text{area}}$$
~~$$x \cdot 1.2 = \frac{180}{187.5}$$

$$1.2x = \frac{180}{187.5}$$

$$225 = \frac{180}{x}$$~~

$$1.2x \cdot 187.5 = 180$$

$$225x = 180$$

$$x = 0.8$$

(Total for Question 9 is 3 marks)


3 / 3


P1 for $187.5 = 180 / \text{area}$


P1 for $180 / 225$


A1 for 0.8


Q9











A

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C

Question:

4

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Question 9 - Response B

9 A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.

The box exerts a pressure of 187.5 newtons/m² on the floor.

The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.

Work out the value of x .

$$p = \frac{F}{a}$$

$$p \times a = \frac{F}{p}$$

$$a = \frac{F}{p}$$

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$\frac{180}{187.5} = 0.95 \text{ m}^2$$

$$1.2 \times x = 0.95 \text{ m}^2$$

$$\frac{0.95}{1.2} = x$$

$$0.7916 = x$$

$$x = 0.79167$$

(Total for Question 9 is 3 marks)

2 / 3

P1 for 180/187.8

P1 for "0.96"/1.2

A0 incorrect answer

Q9



A

B

C

Question:

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Question 9 - Response C

9 A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.

The box exerts a pressure of 187.5 newtons/m² on the floor.

The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.

Work out the value of x .

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$187.5 = \frac{180}{1.2 \times n}$$

$$187.5(1.2n) = 180$$

$$225n = 180$$

$$n = 1.25$$

$$1.2 \times 1.25 = 1.5$$

$$\frac{180}{187.5} = 0.96$$

$$- 1.2$$

$$\frac{180}{1.5} = 120?$$

$$x = 1.25$$

(Total for Question 9 is 3 marks)

1 / 3

Q9



A

B

C

P1 for $187.5 = 180/1.2n$ (allow use of n instead of x)

P0 no complete correct process – they have done $225/180$

A0 incorrect answer

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

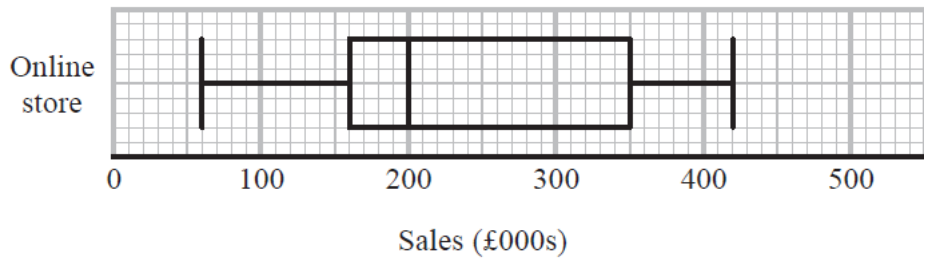
Question 10

Question
Mark Scheme
Examiner Comments

Performance
Response A
Response B
Response C

Question 10 - Question

10 The box plot shows information about the sales, in thousands of pounds (£000s), of an online store each month.



Andrew says,

“Three quarters of the given data lies between 160 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

Andrew is wrong.

(a) Explain why.

.....

.....

.....

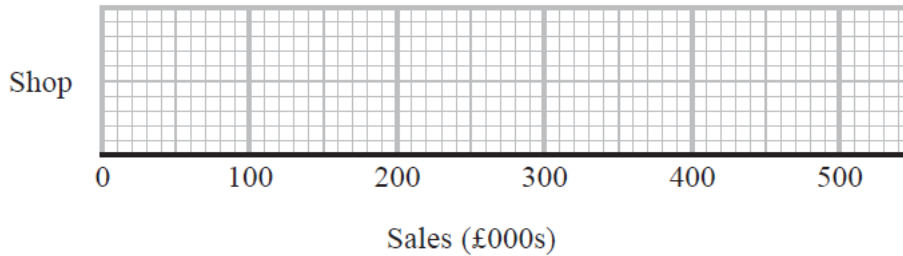
(1)

The table shows information about the sales, in £000s, in a shop each month.

	Sales (£000s)
least value	30
lower quartile	80
median	170
upper quartile	260
greatest value	350

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

(b) On the grid below, draw a box plot for this information.



(2)

(c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

(2)

(Total for Question 10 is 5 marks)


Q10



A

B

C

 **Question 10 - Mark Scheme**

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	Explanation	C1	for explanation, eg Acceptable examples The IQR is half the data This is half the data $\frac{3}{4}$ of the data is less than 350(000) $\frac{3}{4}$ of the data is more than 160(000) $\frac{3}{4}$ of the data is lies between 60(000) and 350(000) $\frac{1}{2}$ of the data lies between 160(000) and 350(000) Not acceptable examples The data lies between 160 and 350 The IQR is 190 (000) IQR = UQ – LQ The upper and lower quartiles represent half the data	Zeros can be present or missing, but must be consistent.

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question	Answer	Mark	Mark scheme	Additional guidance												
(b)	box plot drawn	B2	for fully correct box plot	Box can be of any height. Accept ends that are marked (eg line, cross, dot) or defined by the end of the whiskers if clear												
		(B1)	for showing a box and at least 3 correctly plotted values)													
(c)	decision and comparisons	C1	(ft) for correct comparison of medians eg the median for online is greater than the median for the shop, the shop takes less money from sales in general as the median is lower	Simply quoting values for median, range and IQR is insufficient, they must be compared <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>Median</td> <td>Range</td> <td>IQR</td> </tr> <tr> <td>Online</td> <td>200</td> <td>360</td> <td>190</td> </tr> <tr> <td>Shop</td> <td>170</td> <td>320</td> <td>180</td> </tr> </table> Also accept figures as 000s as long as consistent. Figures need not be seen but if given they must be correct.		Median	Range	IQR	Online	200	360	190	Shop	170	320	180
	Median	Range	IQR													
Online	200	360	190													
Shop	170	320	180													
		C1	(ft) for a correct comparison of a measure of spread, eg the interquartile (range) of sales for the online store is greater than the IQR for the sales of the shop Comparisons for this mark can relate to the range or the IQR. For the award of both marks at least one comparison must be in the context of the question.													

Q10



A

B

C

Question 10 - Examiner Comments

This three-part question challenged students understanding of box plots. Part (a) dealt with the proportionality of box plots and like with many response questions, students often struggled to articulate themselves. To gain the mark in this question students had to explain that the difference between the quartiles represents 50% not just $LQ = \frac{1}{4}$ and $UQ = \frac{3}{4}$

Part (b) required students to draw a box plot. Students performed very well, the vast majority gaining 2 marks.

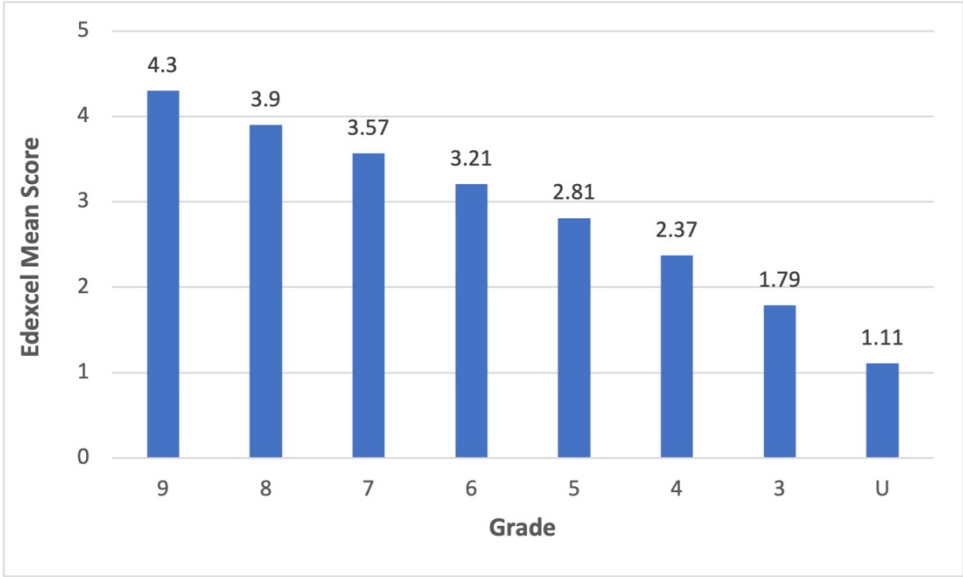
In part (c) a comparison of distributions was required. This is again a familiar question and most students were able to get at least one mark for a correct comparison of either the median or the spread. Most students continue to struggle to gain both marks as they are unable to contextualise these comparisons, misunderstanding what the median and range/IQR actually tell us. Other errors included the word ‘average’ used instead of ‘median’ and values being stated without comparison. Other incorrect answers saw students comparing the quartiles or the highest and lowest values.

Question:

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 **Question 10 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
3.32	5	66	3.32	4.30	3.90	3.57	3.21	2.81	2.37	1.79	1.11



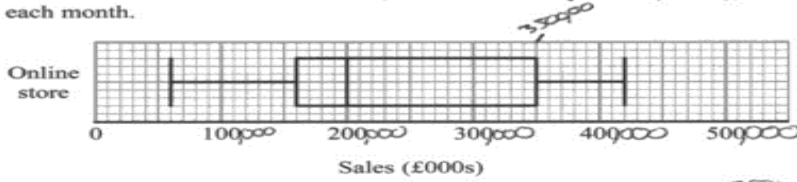
Q10

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- A
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- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 10 - Response A

10 The box plot shows information about the sales, in thousands of pounds (£000s), of an online store each month.



$350 - 160 = 190$

Andrew says,

“Three quarters of the given data lies between 160 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

Andrew is wrong.

(a) Explain why.

Three quarters of the given data is only the upper quartile, which is 350,000 alone.

(1)

The table shows information about the sales, in £000s, in a shop each month.

	Sales (£000s)
least value	30
lower quartile	80
median	170
upper quartile	260
greatest value	350

$260 - 80 = 180$

(b) On the grid below, draw a box plot for this information.



(c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

the median of the sales in ^{the} online store is higher, so on average had more sales overall
 - also, the inter quartile range is greater in the sales in the online store, so the shops are more consistent at sales.

(2)

(Total for Question 10 is 5 marks)

Q10

Navigation icons: Question mark, Checkmark, Home, Bar chart, Pencil, and letters A, B, C.

4 / 5

Part (a)

C0 incorrect explanation – doesn't refer to the difference between minimum and upper quartile.

Part (b)

B2 Fully correct box plot

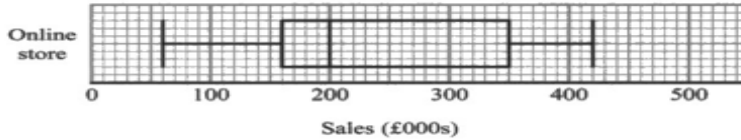
Part (c)

C2 both comparisons are correct as are both contextualisations

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 10 - Response B

10 The box plot shows information about the sales, in thousands of pounds (£000s), of an online store each month.



Andrew says,

“Three quarters of the given data lies between 160 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

Andrew is wrong.

(a) Explain why.

The lower quartile is 25% and upper quartile is 75%. $75\% - 25\% = 50\%$.
 Only half of the data given lies between (1)

The table shows information about the sales, in £000s, in a shop each month.

Sales (£000s)	
least value	30
lower quartile	80
median	170
upper quartile	260
greatest value	350

180

(b) On the grid below, draw a box plot for this information.



(c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

The online store sells ~~has~~ more sales in average than in shops by £30,000 difference. But the online store has a larger Interquartile Range than in shops by £10,000.

(2)

4 / 5

Part (a)
 C1 correct explanation

Part (b)
 B2 Fully correct box plot

Part (c)
 C1 There is no comparison for the median ('average' is not enough alone but can be used in context with median). There is a comparison of measure of spread. Here the IQR is correctly compared.
 Note: The word 'medium' is not acceptable in place of 'median'

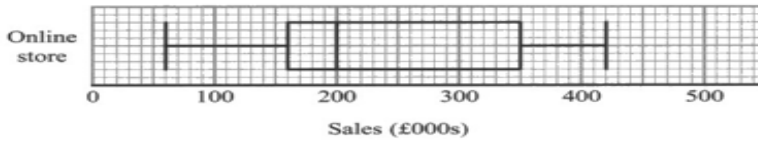
Q10

Navigation icons: Question mark, Checkmark, Home, Bar chart, Pencil, A, B, C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 10 - Response C

10 The box plot shows information about the sales, in thousands of pounds (£000s), of an online store each month.



Andrew says,

“Three quarters of the given data lies between 160 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

Andrew is wrong.

(a) Explain why.

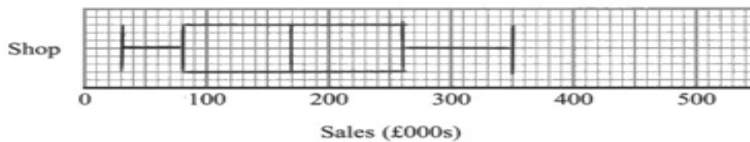
It does not give us the maximum and minimum, 160000 is lower quartile and 350000 is upper quartile not in' between.

(1)

The table shows information about the sales, in £000s, in a shop each month.

Sales (£000s)	
least value	30
lower quartile	80
median	170
upper quartile	260
greatest value	350

(b) On the grid below, draw a box plot for this information.



(2)

(c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

Sales^{Online} have a larger range of ~~190~~ 360 while sales in shop have a range of 320. The online store has a greater median by 30000.

3 / 5

Part (a)

C0 incorrect explanation

Part (b)

B2 Fully correct box plot. **Note:** we are awarding B1 for correctly plotting values, not for correctly drawing a box plot eg, 3 lines at correct values scores the B1 irrespective of their position within a box plot.

Part (c)




C1 There are two correct comparisons one for median and the other for range (could be for IQR) However, there is no explanation within the context of the Q for either.





Q10

Navigation icons: Question mark, Checkmark, Home, Bar chart, Pencil, A, B, C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 11

 Question
 Mark Scheme
 Examiner Comments

 Performance
 Response A
 Response B
 Response C

Question 11 - Question

11 Kieron has 13 workers he can use for a job.
 He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.
 Show that Kieron has enough workers to finish this job in less than 7 days.

(Total for Question 11 is 3 marks)

Question 11 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
11	Shown	M1	for $6 \times 14.5 (= 87)$ or $13 \times 7 (= 91)$ or $13 \div 6 (= 2.16(666\dots))$	May work in hours or other units of time
		M1	for “87” $\div 7 (= 12.428\dots)$ or “87” $\div 13 (= 6.692\dots)$ or $6 \times 14.5 (= 87)$ and $13 \times 7 (= 91)$ or $14.5 \div “2.16” (= 6.692\dots)$	Accept figure rounded or truncated to 1dp
		C1	(dep M2) for 12.(428...) (workers) or 6.69(2...) (days) or 87 and 91	Figures must be correct and supported by working. Accept value in range 6.69 to 6.72 for number of days

Question:

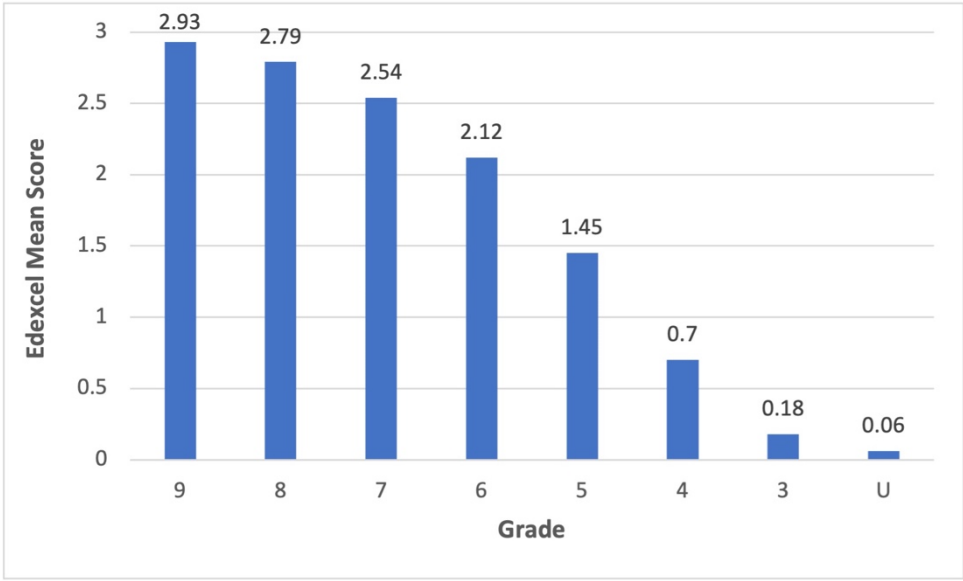
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 **Question 11 - Examiner Comments**

Inverse proportion is a topic that many students find difficult. The students who understood that this was inverse proportion rather than direct proportion, typically did well and gained all three marks. The remaining students struggled to gain any marks, normally dividing 14.5 by 13 or 6 as a first step, and were then unable to get any further. Another common error was to try a ‘build up’ method, e.g. recognise that if 6 workers take $14\frac{1}{2}$ days then 12 workers will take $7\frac{1}{4}$ days but they were unable to get to the time taken for 13 workers.

 **Question 11 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
2.10	3	70	2.10	2.93	2.79	2.54	2.12	1.45	0.70	0.18	0.06





Q11

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Question:

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Question 11 - Response A

11 Kieron has 13 workers he can use for a job.

He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.

Show that Kieron has enough workers to finish this job in less than 7 days.

$$6 \times 14\frac{1}{2} = 87$$

87 days for 1 worker

$$\frac{87}{13} = \boxed{6.7 \text{ days}}$$

he has enough workers to complete it under 7 days (6.7 days)

(Total for Question 11 is 3 marks)

3 / 3

M1 for 6×14.5

M1 for $87/13$

C1 correct value for number of days

Note - We can accept figures rounded or truncated to 1 dp

Q11



A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 11 - Response B**

11 Kieron has 13 workers he can use for a job.
 He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.
 Show that Kieron has enough workers to finish this job in less than 7 days.

$\div 6$ $\left(\begin{array}{l} 6 \text{ take } 14\frac{1}{2} \\ 1 \text{ takes } \cancel{14} \frac{1}{2} \end{array} \right) \times 6$
 $\times 13$ $\left(\begin{array}{l} 13 \text{ takes } 3.23 \end{array} \right) \div 13$

$3.23 < 7$
 Yes the job can be completed

(Total for Question 11 is 3 marks)


2 / 3


M1 for 14.5×6 – There is an arithmetic error in this step, but as we see the method we still award


M1 for "87" / 13


C0 figures are not correct


Q11











A

B

C

Question:

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Question 11 - Response C

11 Kieron has 13 workers he can use for a job.

He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.

Show that Kieron has enough workers to finish this job in less than 7 days.

$$\begin{aligned}
 3W &= 29 \\
 6W &= 14\frac{1}{2} & 14.5 \div 2 &= 7.25 \\
 (2W &= 7.25 \\
 1W &= 3.625 \rightarrow (0.87) & 7.25 \times 0.87 &= 6.3 \\
 12W + 1W &= \underline{6.3 \text{ days}}
 \end{aligned}$$

(Total for Question 11 is 3 marks)

1 / 3

M1 for 1 worker = 87

M0 A0 No further correct working and an incorrect answer

Q11






A





B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 12

 Question
 Mark Scheme
 Examiner Comments

 Performance
 Response A
 Response B
 Response C

Question 12 - Question

12 The equation of the line L_1 is $y = 2x + 3$
 The equation of the line L_2 is $5y - 10x + 4 = 0$
 Show that these two lines are parallel.

(Total for Question 12 is 2 marks)

Question 12 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
12	comparison shown	M1 A1	for starting to manipulate equation, eg $5y = 10x + 15$ or $5y = 10x - 4$ or $y - 2x + \frac{4}{5} = 0$ or $y - 2x = 3$ for statement and equation(s) which can be used to show that the gradients of the two lines are the same, eg $5y = 10x + 15$ and $5y = 10x - 4$ and both have the same x coefficient OR $y = 2x - \frac{4}{5}$ and both have a gradient of 2	Ignore constant terms for both marks

Question:

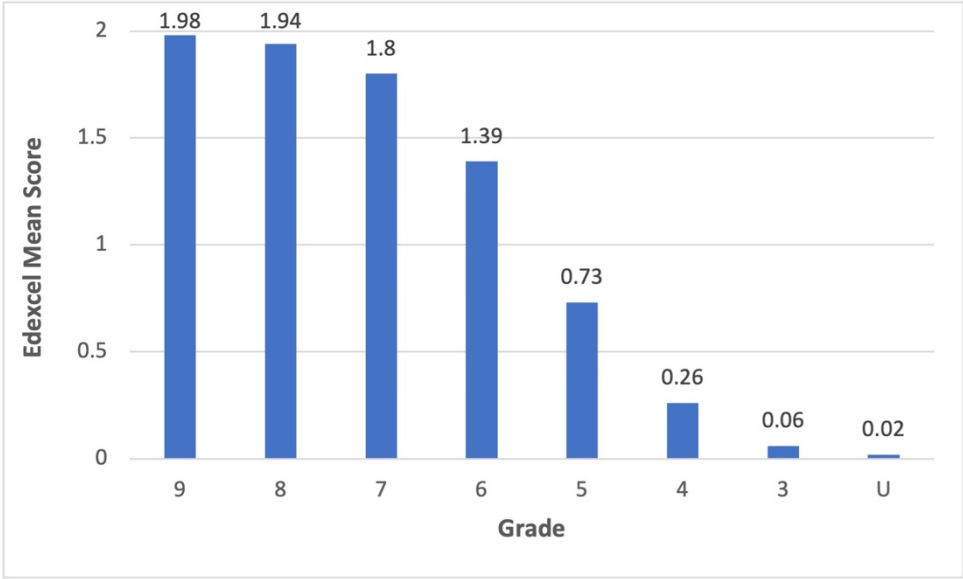
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 **Question 12 - Examiner Comments**

This question was answered better than it has been on previous papers, with many students understanding the need to rearrange one of the equations, and in most cases being successful to some extent. The first mark could be gained by correctly moving one of the variables in either equation, or by correctly scaling one of the equations by multiplying or dividing by 5. To gain both marks the equations had to be manipulated enough for a comparison of coefficients to be possible, and for a comparison to be drawn – this was generally done well with the most common incorrect comparison being to state that the gradient was 10 when both equations were in the form $5y = 10x \dots$

 **Question 12 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
1.37	2	69	1.37	1.98	1.94	1.80	1.39	0.73	0.26	0.06	0.02




Q12

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✓

☰






A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 12 - Response A**

12 The equation of the line L_1 is $y = 2x + 3$
 The equation of the line L_2 is $5y - 10x + 4 = 0$
 Show that these two lines are parallel.

$$L_2 \Rightarrow 5y - 10x + 4 = 0$$

$$5y = 10x - 4$$

$$y = 2x - \frac{4}{5}$$

$L_1 \quad m = 2$
 $L_2 \quad m = 2$

(Total for Question 12 is 2 marks)


2 / 2


M1 for $5y = 10x - 4$

A1 for rearranging L_2 to $y = 2x - 4/5$ and for stating that L_1 has gradient of 2 and L_2 has a gradient of 2

Q12











A

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C

Question:

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Question 12 - Response B

- 12 The equation of the line L_1 is $y = 2x + 3$
 The equation of the line L_2 is $5y - 10x + 4 = 0$

Show that these two lines are parallel.

$$y = 2x + 3$$

$$\times 5$$

$$L_1 \quad 5y = 10x + 15$$

$$L_2 \quad 5y = 10x + 4$$
~~$$5y = 10x + 15$$~~

$$y = mx + c$$

$$\left\{ \begin{array}{l} m \text{ in both lines is the} \\ \text{same meaning both} \\ \text{lines } \textit{are} \text{ have} \\ \text{the same gradient and} \\ \text{are therefore parallel} \end{array} \right.$$

(Total for Question 12 is 2 marks)

2 / 2

M1 for rearranging L_1

A1 for L_1 rearranged to $5y = 10x + 15$ and a correct statement

Q12






A
B
C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 12 - Response C**

12 The equation of the line L_1 is $y = 2x + 3$
 The equation of the line L_2 is $5y - 10x + 4 = 0$

Show that these two lines are parallel.

$$\begin{aligned}
 & y = 2x + 3 \\
 & y = x + 2 \\
 & \text{M1} \\
 -4 \quad (\quad & 5y - 10x + 4 = 0 \\
 \div 5 \quad (\quad & 5y - 10x = -4 \\
 \div -2 \quad (\quad & y - 2x = -4 \\
 & y + x = 2
 \end{aligned}$$

(Total for Question 12 is 2 marks)

1 / 2

M1 for starting to manipulate the equation for L_2 eg $y - 2x = -4$ (we can ignore the constant terms for both marks)

A0 they don't have two comparable equations nor a statement

Note: The M1 is awarded here for the division by 5, not for the moving of the constant term. That alone is insufficient to award M1

Q12



A

B

C

Question:

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Question 15

[? Question](#)[✓ Mark Scheme](#)[☰ Examiner Comments](#)[📊 Performance](#)[📝 Response A](#)[📝 Response B](#)[📝 Response C](#)[?](#)

Question 15 - Question

- 15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5
Both Marta and Khalid get an increase of £1.50 in their hourly pay.
The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11
Work out the hourly pay before the increase for Marta and for Khalid.

Marta £.....

Khalid £.....

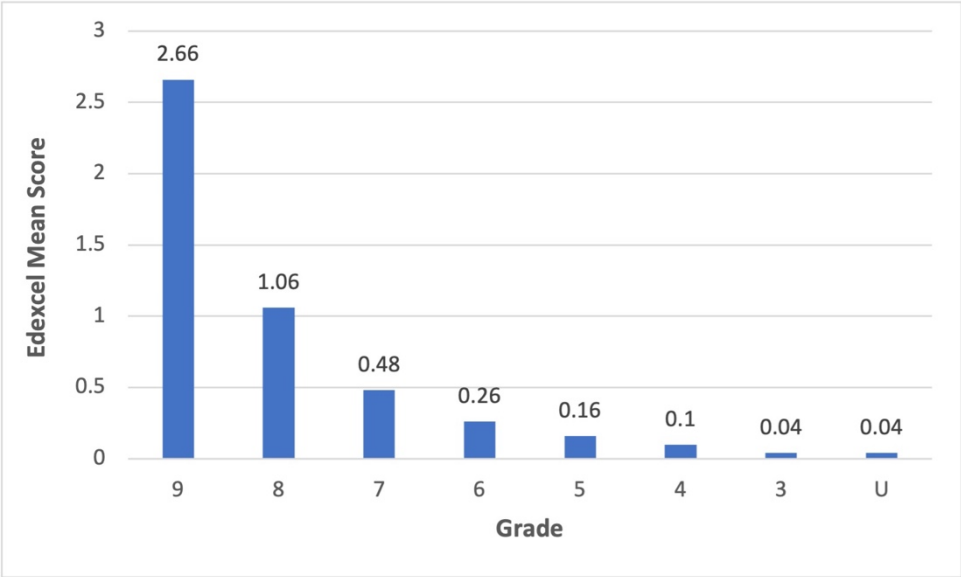
(Total for Question 15 is 4 marks)

Question:

- 4
- 5
- 7
- 9
- 10
- 11
- 12
- 15
- 16
- 17
- 18
- 20
- 22

 **Question 15 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
0.63	4	16	0.63	2.66	1.06	0.48	0.26	0.16	0.10	0.04	0.04



Q15

?

✓

≡





A

B

C

Question:

- 4
- 5
- 7
- 9
- 10
- 11
- 12
- 15
- 16
- 17
- 18
- 20
- 22

 **Question 15 - Response A**

15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.

The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

M : K
6 : 5
 $6x : 5x$
↓+1.50 ↓+1.50
 $6x+1.5 : 5x+1.5 = 13 : 11$

$\frac{6x+1.5}{13} = \frac{5x+1.5}{11}$

$11(6x+1.5) = 13(5x+1.5)$
 $66x + 16.5 = 65x + 19.5$
 $-65x$
 $x + 16.5 = 19.5$
 $x = 3$

M : K
 $6x : 5x$
 $6 \times 3 : 5 \times 3$
 $£18 : £15$

Marta £ 18
Khalid £ 15

(Total for Question 15 is 4 marks)

4 / 4

Q15

- ?
- ✓
- ≡
- ▒
- A
- B
- C

P1 for $6x + 1.5$ and $5x + 1.5$

P1 for setting up an equation

P1 for $x = 3$

A1 correct answer

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 15 - Response B**

15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.

The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

$$M : K = 6 : 5$$

$$\frac{6x + 1.50}{5x + 1.50} \overset{\text{cross multiply}}{=} \frac{13}{11}$$

$$\frac{11(6x + 1.50)}{13(5x + 1.50)} = \frac{66x + 16.5}{65x + 19.5}$$

Marta £.....

Khalid £.....

(Total for Question 15 is 4 marks)

2 / 4


P1 for $6x + 1.5$ and $5x + 1.5$ (both are required)


P1 for setting up an equation


P0 terms in x not isolated


A0 incorrect answer


Q15











A

B

C

Question:

- 4
- 5
- 7
- 9
- 10
- 11
- 12
- 15
- 16
- 17
- 18
- 20
- 22

 **Question 15 - Response C**

15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.

The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

$M : K$ $M = \frac{6}{11}$ $K = \frac{5}{11}$
 $6x : 5x$

$6x + 1.50 = 13$
 $5x + 1.50 = 11$

~~130 : 110~~

$30 : 25$
 $7x$

~~18.50~~

Marta £ 18.50
 Khalid £ 14.50



(Total for Question 15 is 4 marks)

1 / 4

P1 for $6x + 1.5$ and $5x + 1.5$

P0 P0 A0 no further correct working

Q15

- ?
- ✓
- ≡
- 
- 
- A
- B
- C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 16

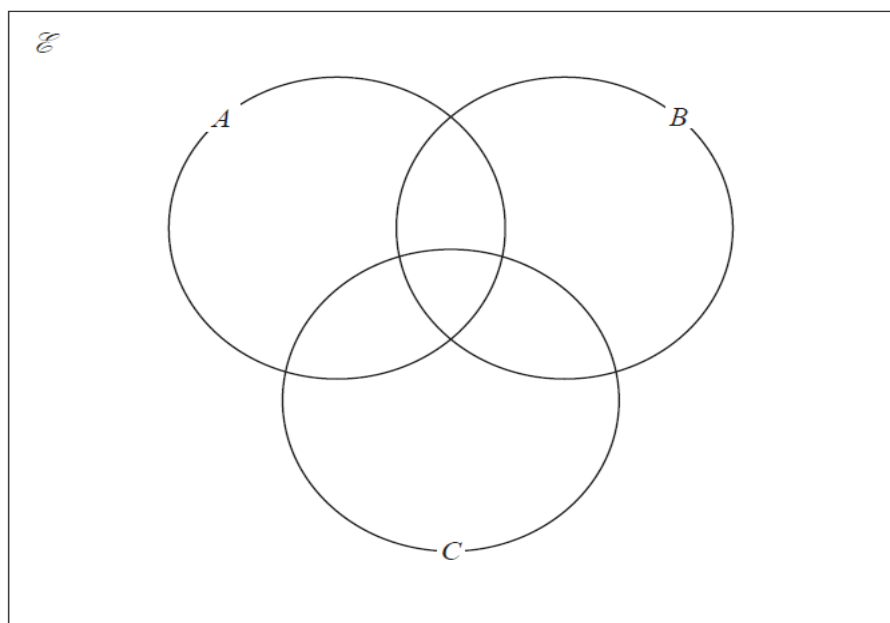
? Question
✓ Mark Scheme
☰ Examiner Comments
📊 Performance
📝 Response A
📝 Response B
📝 Response C

? Question 16 - Question

16 A shop manager wants to advertise special offers on social media platforms. The manager asks 100 customers which of type *A*, type *B* or type *C* they use. Of these customers,

- 4 use all three types
- 16 do not use any of type *A*, type *B* or type *C*
- 8 use both type *A* and type *B*, but not type *C*
- 14 use both type *B* and type *C*
- 62 in total use type *A*
- all 20 who use type *C* also use at least one of type *A* and type *B*.

(a) Complete the Venn diagram for this information.



(4)

One of the customers is chosen at random.

Given that this customer uses type *A*,

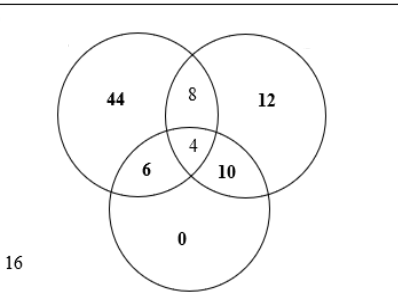
(b) find the probability that this customer also uses type *B*

.....
(2)

(Total for Question 16 is 6 marks)

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 16 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	Venn diagram	C4 (C3 (C2 (C1	fully correct Venn diagram 6 or 7 of the 8 regions correct) 4 or 5 of the 8 regions correct) 2 or 3 of the 8 regions correct)	 <p>If all other regions correct, accept blank region for 0 Additional digits in the diagram should be counted as 2 elements</p>
(b)	$\frac{12}{62}$	M1 A1	(ft their Venn diagram) for $\frac{"8 + 4"}{b}$ where $b > "8 + 4"$ or $\frac{a}{"44 + 8 + 4 + 6"}$ where $a < "44 + 8 + 4 + 6"$ oe ft oe	Need not be written in correct form at this stage eg could be a ratio 12 : 62 Accept any equivalent fraction, decimal form 0.19(35...) or percentage form 19(.35...)%

Q16

Navigation icons: ? (question), ✓ (check), ☰ (list), 📊 (bar chart), 📝 (writing), A, B, C (options)

Question 16 - Examiner Comments

This Venn diagram question allowed most students to gain at least some credit. However, this example was challenging so that only a minority of students were able to score all 4 marks. The region most often incorrect was B only due to the fact it was the region that required the most working out. 0 was often omitted which cost students a mark unless they had the other 7 sections correct.

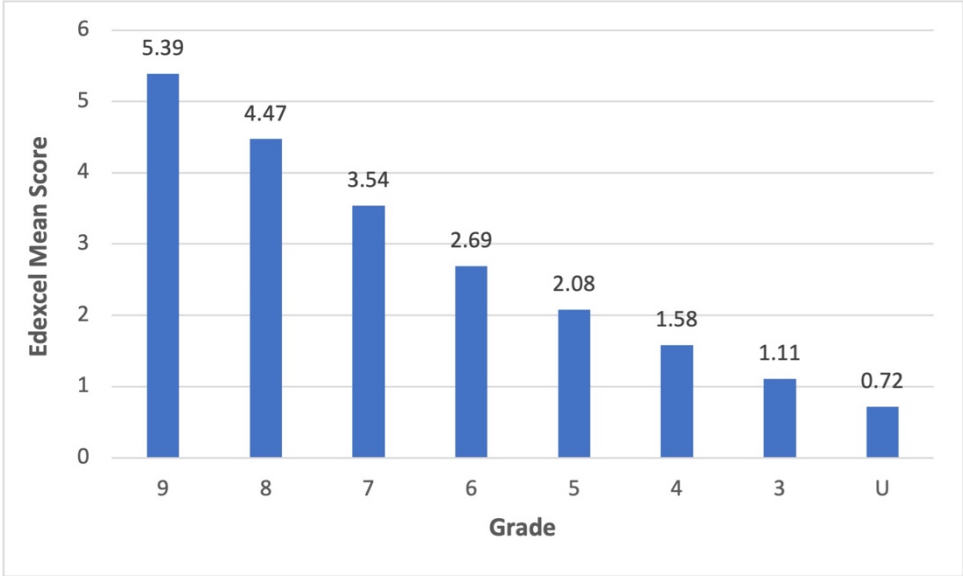
Part (b) required students to pull values from the diagram. Many students scored 1 mark for a correct numerator or denominator (more commonly numerator). There was a follow through on this question, which meant that students could gain credit for pulling the correct values from their incorrect Venn diagram. Many students did not understand the ‘given uses A’ and had 100 as the denominator.

Question:

- 4
- 5
- 7
- 9
- 10
- 11
- 12
- 15
- 16
- 17
- 18
- 20
- 22

 **Question 16 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
3.15	6	53	3.15	5.39	4.47	3.54	2.69	2.08	1.58	1.11	0.72



Q16

- 
- 
- 
- 
- 
- A
- B
- C

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 16 - Response A

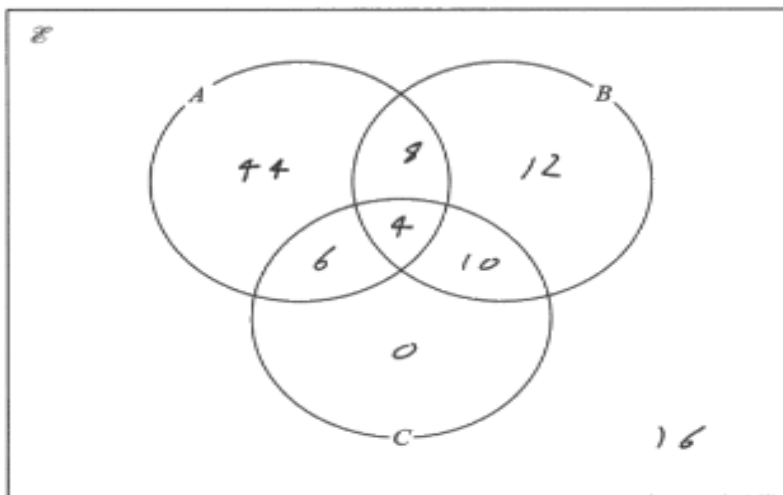
16 A shop manager wants to advertise special offers on social media platforms.

The manager asks 100 customers which of type A, type B or type C they use.

Of these customers,

- 4 use all three types ✓
- 16 do not use any of type A, type B or type C ✓
- 8 use both type A and type B, but not type C ✓
- 14 use both type B and type C ✓
- 62 in total use type A ✓
- all 20 who use type C also use at least one of type A and type B. ✓

(a) Complete the Venn diagram for this information.



(4)

One of the customers is chosen at random.

Given that this customer uses type A,

(b) find the probability that this customer also uses type B.

$$A = 12$$

$$\frac{12}{62} = \frac{6}{31}$$

$$\frac{6}{31}$$

(2)

(Total for Question 16 is 6 marks)

6 / 6

Part (a)

C4 fully correct Venn diagram

Note: here, as **all** other regions are correct, we would have accepted a blank region for the '0'

Part (b)

M1 A1 correct answer

Note: we will accept any equivalent fraction, decimal form or % form

Q16

?

✓

≡

A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 16 - Response B

16 A shop manager wants to advertise special offers on social media platforms.

The manager asks 100 customers which of type A, type B or type C they use.

Of these customers,

- 4 use all three types
- 16 do not use any of type A, type B or type C
- 8 use both type A and type B, but not type C
- 14 use both type B and type C
- 62 in total use type A
- all 20 who use type C also use at least one of type A and type B.

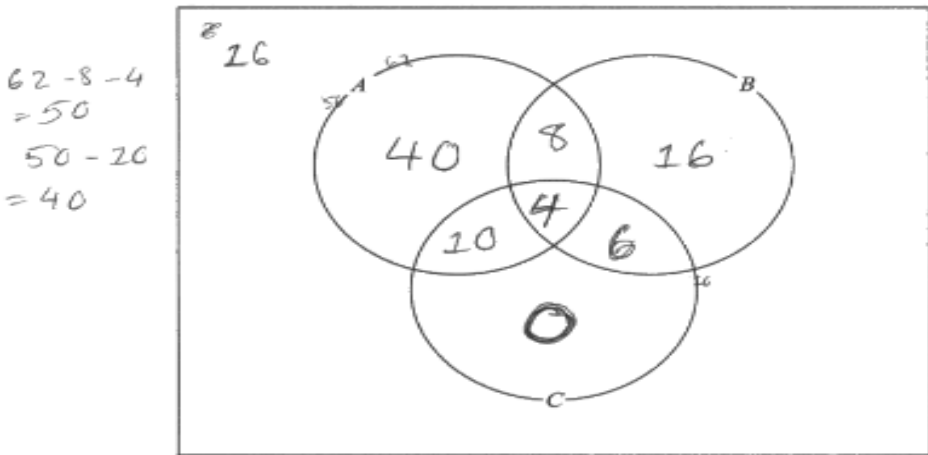
$$100 - 16 - 8 - 4 = 72$$

$$100 - 26 = 74$$

$$72 - 62 = 10$$

$$20 - 10 = 10$$

(a) Complete the Venn diagram for this information.



$$62 - 8 - 4 = 50$$

$$50 - 20 = 40$$

(4)

One of the customers is chosen at random.

Given that this customer uses type A,

(b) find the probability that this customer also uses type B.

$$\frac{12}{200}$$

(2)

(Total for Question 16 is 6 marks)

3 / 6

Part (a)
C2 4 correct values

Part (b)
M1 Their probability has a correct numerator (and their denominator is greater than their numerator)

A0 The probability given is not the correct answer of 12/62 and is not correct ft for their Venn diagram

Q16

?

✓

≡

Bar chart icon

✍️

A

B

C

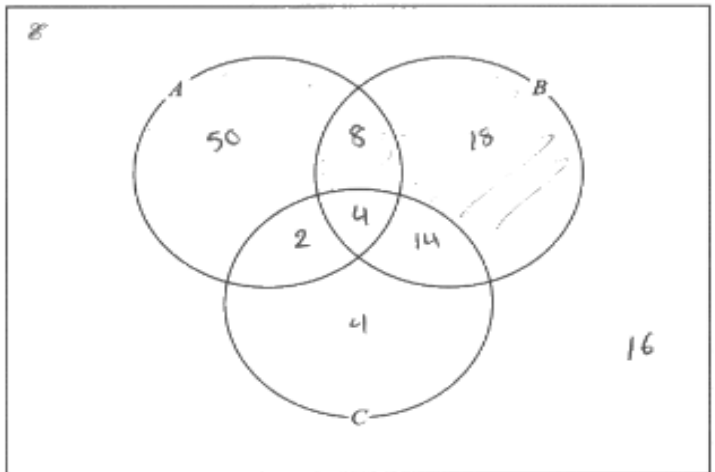
- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 16 - Response C

16 A shop manager wants to advertise special offers on social media platforms.
The manager asks 100 customers which of type A, type B or type C they use.

- Of these customers,
- 4 use all three types ✓
 - 16 do not use any of type A, type B or type C ✓
 - 8 use both type A and type B, but not type C ✓
 - 14 use both type B and type C ✓
 - 62 in total use type A $\rightarrow 62 - 8 - 4 = 50$
 - all 20 who use type C also use at least one of type A and type B. $\rightarrow 20 - 14 - 4 = 2$

(a) Complete the Venn diagram for this information.



(4)

One of the customers is chosen at random.
Given that this customer uses type A,
(b) find the probability that this customer also uses type B.

$\frac{8}{62}$ $\frac{2}{19}$
 ~~$\frac{8}{62}$~~ ~~$\frac{2}{19}$~~
 $\frac{4}{29}$ (2)

(Total for Question 16 is 6 marks)

1 / 6

Part (a)
C1 – 3 correct values

Part (b)
M0 The probability given does not have an acceptable numerator or denominator and neither are correct ft from their Venn diagram

A0 The probability given is not the correct answer of 12/62 and is not correct ft for their Venn diagram

Q16

?

✓

≡

A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 17

? Question

✓ Mark Scheme

≡ Examiner Comments

▮ Performance

📝 Response A

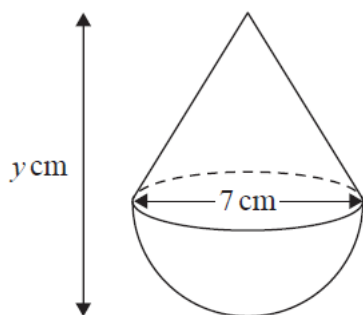
📝 Response B

📝 Response C

?

Question 17 - Question

17 A solid cone is joined to a solid hemisphere to make the solid **T** shown below.



Volume of sphere = $\frac{4}{3} \pi r^3$

Volume of cone = $\frac{1}{3} \pi r^2 h$

The diameter of the base of the cone is 7 cm.
 The diameter of the hemisphere is 7 cm.
 The total volume of **T** is $120\pi \text{ cm}^3$
 The total height of **T** is $y \text{ cm}$.

- (a) Calculate the value of y .
 Give your answer correct to 3 significant figures.

$y = \dots\dots\dots$ (4)

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount.
 Assuming the total volume of **T** does not change,

- (b) explain the effect this would have on your answer to part (a).

(1)
 (Total for Question 17 is 5 marks)

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 17 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	25.9	P1	for process to find volume of hemisphere, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3$ (=89.797...) $\left(\frac{343\pi}{12}\right)$ or for a correct expression for the volume of the cone, eg $\frac{1}{3} \times \pi \times 3.5^2 (y - 3.5)$ or $\frac{1}{3} \times \pi \times 3.5^2 \times h$	'y - 3.5' may be seen as a new variable, but cannot be just y Condone missing brackets Accept decimals rounded or truncated to 1dp
		P1	for setting up an equation linking all three aspects, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 + \frac{1}{3} \times \pi \times 3.5^2 (y - 3.5) = 120\pi$ or "89.797..." + "12.828..."(y - 3.5) = "376.99 ..." or "28.5833..." π + "4.0833..." π(y - 3.5) = 120π	120π - "89.797..." = 287.193... or $\frac{1097\pi}{12}$ π may be missing throughout Award of this mark implies award of the previous May be seen in multiple steps
		P1	for process to isolate y or (y - 3.5) or h in their equation, eg $\frac{120\pi - \frac{1}{2} \times \frac{4}{3} \pi 3.5^3 + \frac{1}{3} \pi 3.5^3}{\frac{1}{3} \pi 3.5^2}$ or $\frac{"376.99..." - "89.797..." + "44.898..."}{"12.828..."}$ or $\frac{120\pi - "28.583..." \pi + "14.291..." \pi}{"4.083..." \pi}$ oe	
		A1	for answer in range 25.8 to 26.3 SCB3 for an answer in the range 22.3 to 22.8 or $\frac{1097}{49}$	If an answer is given in the range in working and then rounded incorrectly award full marks.
	(b) explanation	C1	for explanation, eg Acceptable examples the height would decrease the height would be 0 at 14.227 y would be smaller it would decrease Not acceptable examples the height would increase	

Q17

A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 17 - Examiner Comments

This volume problem required students to work with a hemisphere and a cone. The first process mark was for a correct method to find the volume of the hemisphere or for a correct expression for the volume of the cone. Many students were unable to get past this point for 2 reasons. Firstly, they didn't halve the volume of the sphere to find the volume of the hemisphere, or they used 'y' as the height of the cone, which was unacceptable as 'y' was the height of the overall solid.

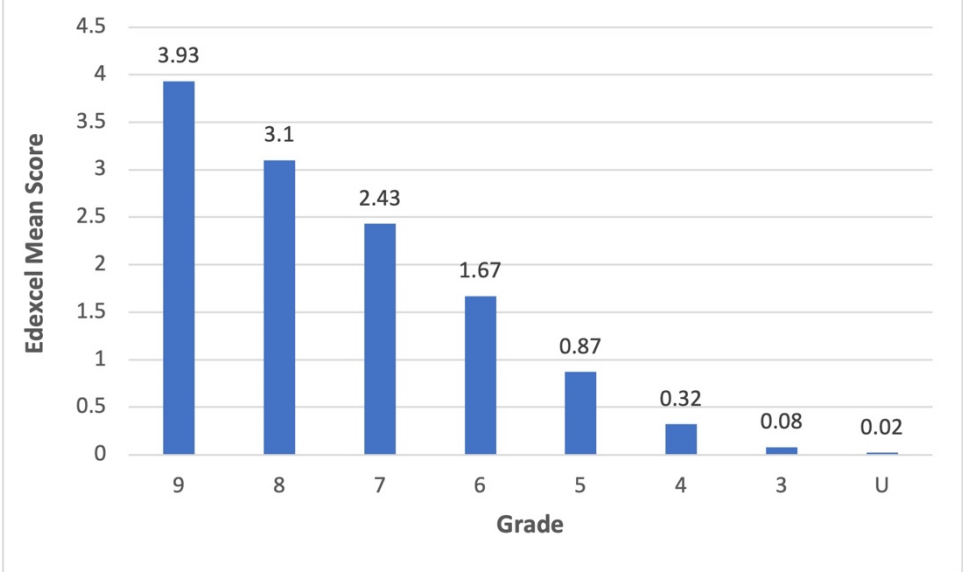
The second mark was for linking the 3 elements of the problem correctly. This was sometimes seen as an equation, but most commonly seen in multiple steps, normally subtracting the volume of the hemisphere from the total volume, and then equating to the volume. The third mark was for correct manipulation to find the height of the cone and was typically seen again in multiple steps of working. Those who correctly found the height of the cone scored 3 marks.

It was quite common to see students use 120 instead of 120π , but this was dealt with as a misread as per the general marking guidance. Common incorrect methods worth no marks were to use 7 or 4.5 (without showing where 4.5 had come from) as the radius.


Part (b) required students to understand the inverse proportional relationship between radius and height when the volume is constant. Many were able to do so, and thus gained this mark.


Question 17 - Performance


Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
1.96	5	39	1.96	3.93	3.10	2.43	1.67	0.87	0.32	0.08	0.02





Q17











A

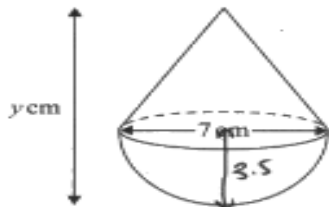
B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 17 - Response A

17 A solid cone is joined to a solid hemisphere to make the solid T shown below.



Volume of sphere = $\frac{4}{3}\pi r^3$

Volume of cone = $\frac{1}{3}\pi r^2 h$

The diameter of the base of the cone is 7 cm.
The diameter of the hemisphere is 7 cm.

The total volume of T is $120\pi \text{ cm}^3$
The total height of T is $y \text{ cm}$.

- (a) Calculate the value of y .
Give your answer correct to 3 significant figures.

$$\frac{4}{3}\pi \times 3.5^3 \times \frac{1}{2} = 89.7972$$

$$\frac{1}{3}\pi \times 3.5^2 \times x = 120\pi - \frac{343}{12}\pi = \frac{1097}{12}\pi$$

$$x = \frac{1097}{49}$$

$$x + 3.5 = y = 25.888 = 25.9$$

$$\frac{1}{3}\pi 4^2 \times h = \frac{232}{3}\pi \quad h = \frac{29}{2}$$

$$\left(\frac{4}{3}\pi \times 4^3\right) \div 2 = \frac{128}{3}\pi \quad y = 25.9 \quad (4)$$

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount. ($w \times h \times r$)
Assuming the total volume of T does not change,

- (b) explain the effect this would have on your answer to part (a).

It would decrease the answer to part (a)

(1)

(Total for Question 17 is 5 marks)

5 / 5

Part (a)
P3 A1 fully correct processes and answer

Part (b)
C1 correct explanation

Q17

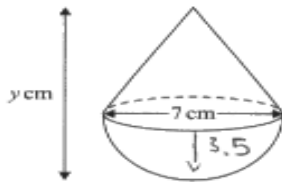
?
✓
≡

A
B
C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 17 - Response B

17 A solid cone is joined to a solid hemisphere to make the solid **T** shown below.



Volume of sphere = $\frac{4}{3}\pi r^3$

Volume of cone = $\frac{1}{3}\pi r^2 h$

The diameter of the base of the cone is 7 cm.
 The diameter of the hemisphere is 7 cm.

The total volume of **T** is $120\pi \text{ cm}^3$
 The total height of **T** is $y \text{ cm}$.

(a) Calculate the value of y .
 Give your answer correct to 3 significant figures.

Volume of sphere = 89.797 cm^3

Volume of cone = 30.202 cm^3

$$30.202 = \frac{1}{3} \times \pi \times r^2 \times h$$

$$90.606 = \pi \times r^2 \times h$$

$$28.841 = r^2 \times h$$

$$2.354 = h$$

$y = \frac{5.854}{(4)}$

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount.
 Assuming the total volume of **T** does not change,

(b) explain the effect this would have on your answer to part (a).

it would increase the height as the radius of the circle could increase which would make it taller

3 / 5

Q17

?

✓

≡

Bar chart icon

✍️

A

B

C

Part (a)

P1 for correct volume of hemisphere

P1 for setting up an equation linking all three aspects. (120 - volume of hemisphere, equated to the volume of the cone) In this question, we can accept a misread of 120 instead of 120π - this case does not need to be sent to review.

P1 for correct process to isolate height

A0 incorrect answer

Note: $120 - 89.797... = 30.203$ is commonly seen when 120 is used.

Part (b)

C0 - incorrect answer

- Question: [4](#) [5](#) [7](#) [9](#) [10](#) [11](#) [12](#) [15](#) [16](#) [17](#) [18](#)
[20](#) [22](#)

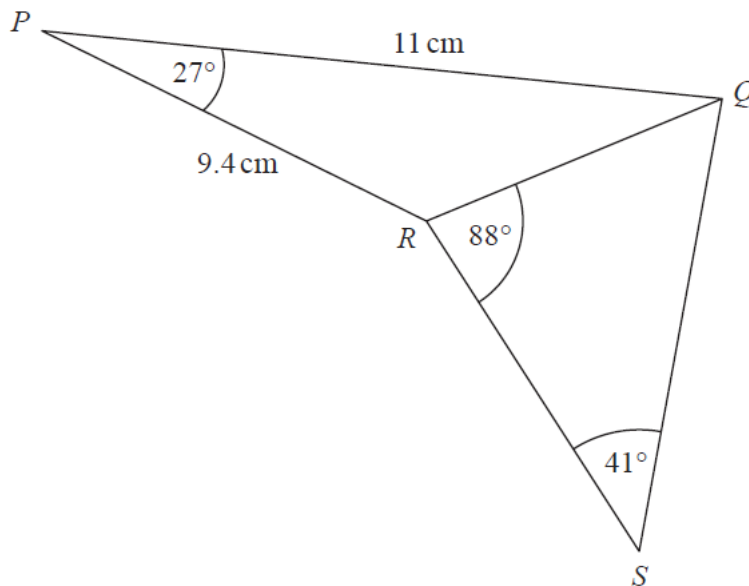
Question 18

[? Question](#)
[✓ Mark Scheme](#)
[Examiner Comments](#)

[Performance](#)
[Response A](#)
[Response B](#)
[Response C](#)

Question 18 - Question


18 PQR and QRS are triangles.



Calculate the length of QS .
 Give your answer correct to 3 significant figures.
 You must show all your working.

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

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 18 - Mark Scheme**

Question	Answer	Mark	Mark scheme	Additional guidance
18	7.63	M1	for process to use the cosine rule to find QR , eg $(QR^2 =) 11^2 + 9.4^2 - 2 \times 11 \times 9.4 \cos(27)$	18
		M1	for correct order of operations, eg $QR = \sqrt{209.36 - 206.8 \times \cos 27}$ (= 5(.009...)) or $QR = \sqrt{25(.09...)}$ or $\sqrt{25.1}$	
		M1	(dep on M1) for process to use the sine rule, eg $\frac{QS}{\sin 88} = \frac{[QR]}{\sin 41}$ oe or $QS = \frac{[QR] \times \sin 88}{\sin 41}$ (= 7.631...) oe	[QR] could be written as "5.009..." or could be a different figure, as long as this is clearly associated with the side QR
		A1	for answer in range 7.61 to 7.632	If an answer is given in the range in working and then rounded incorrectly award full marks. Award 0 marks for a correct answer with no (or incorrect) supportive working

Q18






A
B
C

 **Question 18 - Examiner Comments**

This trigonometry question was again a familiar style and provided access to marks for a good number of students. It required students to first use the Cosine rule to find a missing length, and then the Sine rule to find another missing length. If a student didn't score the first mark for the use of the Cosine Rule, they were then unable to gain any further credit. Many who scored this first mark, didn't fully complete this process, often forgetting to square root. However, these students could then pick up the third mark (and therefore a total of 2 marks) for correctly using the Sine Rule for their incorrect value for QR .

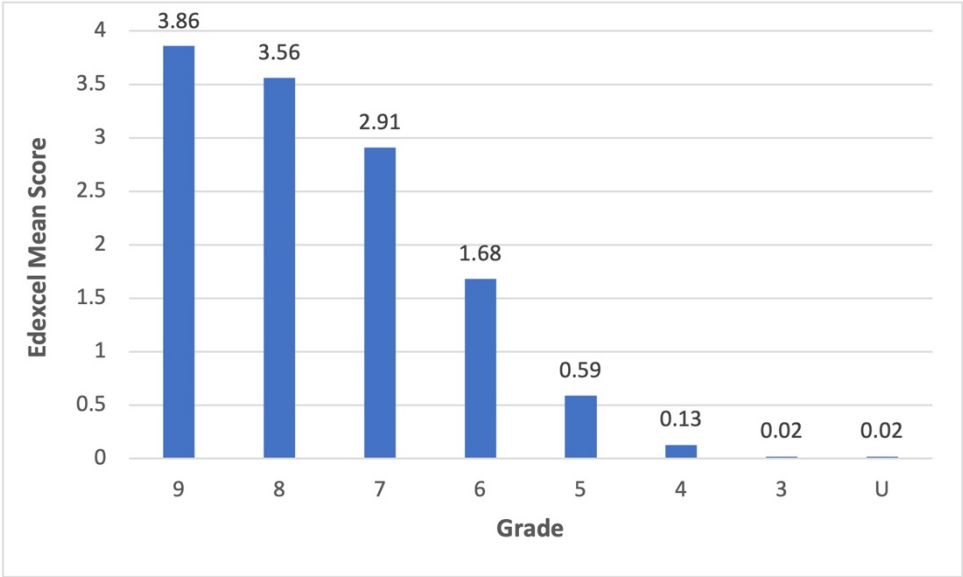
Common incorrect methods seen were attempts to use Pythagoras and SOHCAHTOA.

Question:

- 4
 - 5
 - 7
 - 9
 - 10
 - 11
 - 12
 - 15
 - 16
 - 17
 - 18
- 20
 - 22

 **Question 18 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
2.05	4	51	2.05	3.86	3.56	2.91	1.68	0.59	0.13	0.02	0.02



Q18

?

✓

≡





A

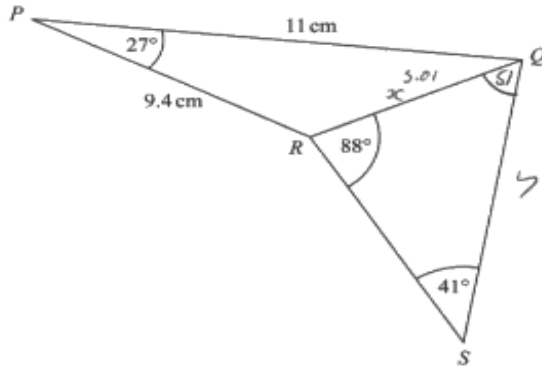
B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 18 - Response A**

18 *PQR* and *QRS* are triangles.



Calculate the length of *QS*.
 Give your answer correct to 3 significant figures.
 You must show all your working.

$$x^2 = 9.4^2 + 11^2 - 2(9.4)(11) \cos(27) = 25.01$$

$$x = 5.01$$


$$\frac{5.01}{\sin(41)} = \frac{y}{\sin(88)}$$


$$7.6365 =$$


$$7.6318$$


$$\underline{7.64} \text{ cm}$$


Q18











A

B

C

4 / 4

M1 for correct substitution into the cosine rule to find QR

M1 for correct order of operations eg $(\text{root}(25.09985)) = 5.(009\dots)$

M1 for process to use the sine rule for QS

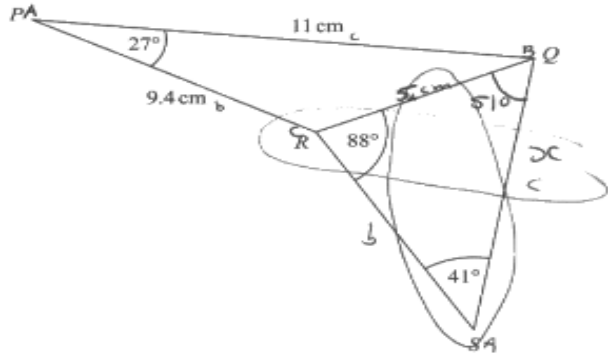
A1 answer in range seen (7.6318) - this has been rounded incorrectly but we can award full marks as correct answer seen.

Note: 7.6365 is the correct value for $5.01/\sin 41$

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 18 - Response B

18 PQR and QRS are triangles.



Calculate the length of QS .
Give your answer correct to 3 significant figures.
You must show all your working.

$$A = 9.4^2 + 11^2 - (2 \times 9.4 \times 11 \cos 27)$$

$$A^2 = 25.0998$$

$$a = 5.0099$$

$$\frac{a}{\sin 41} = \frac{5}{\sin 88}$$

$$\frac{\sin 41}{5} = \frac{\sin 88}{a}$$

$$a = \frac{\sin 41}{5} \times \sin 88$$

$$= 13.1$$

..... 13.1 cm

(Total for Question 18 is 4 marks)

Q18

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A

B

C

3 / 4

M1 for correct substitution into the cosine rule to find QR


M1 for correct order of operations eg 5.0099

M1 for process to use the sine rule for QS NB sine rule used in this way will gain this mark

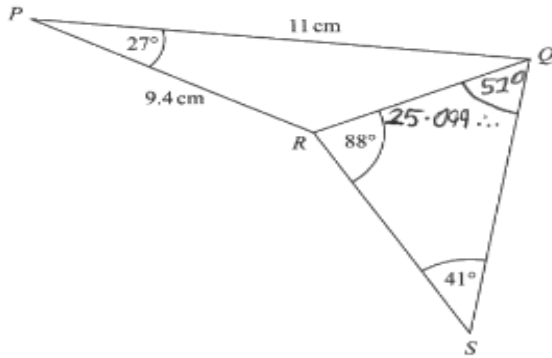
A0 incorrect answer

Note: if a candidate gets as far as $QR^2 = 25$ and then uses the 25 as QR in the sine rule you can award **M1 M0 M1 A0**

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 18 - Response C**

18 *PQR* and *QRS* are triangles.



Calculate the length of *QS*.
 Give your answer correct to 3 significant figures.
 You must show all your working.

$180 - 41 - 88 = 51^\circ$
 $QR = \sqrt{11^2 + 9.4^2 - 2 \times 11 \times 9.4 \times \cos(27)} = 25.0948508$
 $\frac{25.0948508}{\sin(41)} = \frac{QS}{\sin(88)} = 38.25852505$
 $38.25852505 \times \sin(88) = 38.23521899 = 38.2$
38.2 cm

Q18

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 ✓
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 A
 B
 C

2 / 4

M1 for correct substitution into the cosine rule to find QR

M0 value for QR is incorrect, they have not squared rooted 25.09...

M1 for process to use the sine rule for QS.

Note: [QR] could be written as "5.009..." or could be a different figure as long as clearly associated with the side QR such as labelled on the diagram or labelled in the workspace as QR =

A0 incorrect answer

- Question: [4](#) [5](#) [7](#) [9](#) [10](#) [11](#) [12](#) [15](#) [16](#) [17](#) [18](#)
[20](#) [22](#)

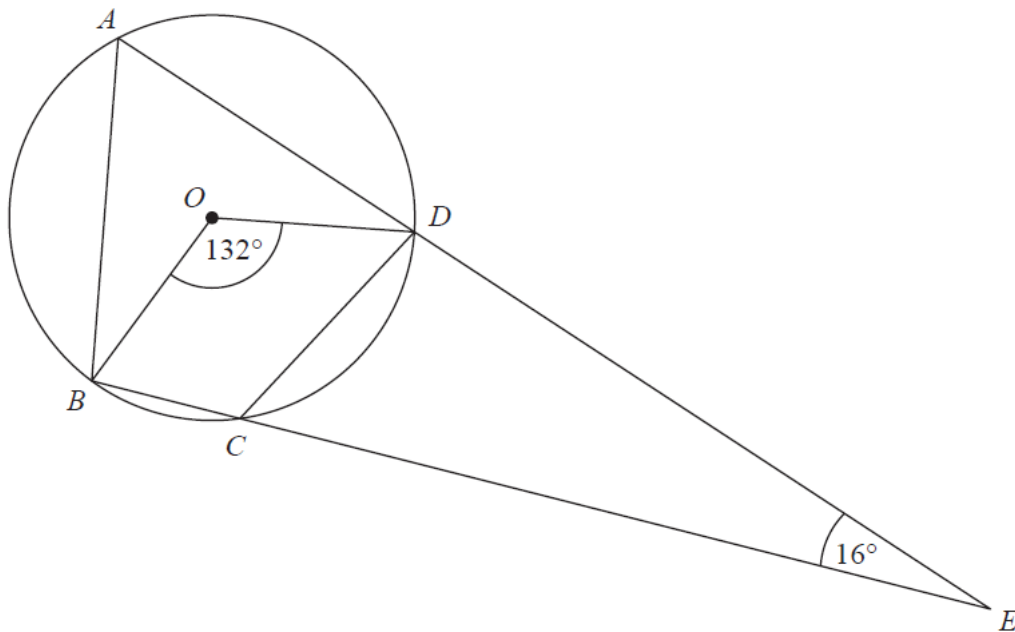
Question 20

[? Question](#)
[✓ Mark Scheme](#)
[☰ Examiner Comments](#)

[📊 Performance](#)
[📝 Response A](#)
[📝 Response B](#)
[📝 Response C](#)

[?](#) **Question 20 - Question**


20 *A, B, C* and *D* are points on the circumference of a circle, centre *O*.
ADE and *BCE* are straight lines.



Work out the size of angle *CDE*.
 Give a reason for each stage of your working.


.....^o
(Total for Question 20 is 4 marks)

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 20 - Mark Scheme**

Question	Answer	Mark	Mark scheme	Additional guidance	
20	98	M1	for $BAD = 132 \div 2 (= 66)$	Angles may be seen on diagram	
		M1	eg $BCD = 180 - "66"$ (= 114) or $ABE = 180 - "66"$ - 16 (= 98)		M2 for reflex $BOD = 360 - 132$ (= 228) and $BCD = "228" \div 2$ (= 114)
		A1	for finding $CDE = 98$		
		C1	(dep on at least M2) for one circle theorem relevant to their method eg The <u>angle</u> at the <u>centre</u> of a circle is <u>twice</u> the <u>angle</u> at the <u>circumference</u> or <u>Opposite angles</u> of a <u>cyclic quadrilateral</u> add up to 180	Underlined words need to be shown; reasons need to be linked to their method.	

Q20



A
B
C

 **Question 20 - Examiner Comments**

This circle theorem question proved to be challenging to many. There were 3 routes through this problem. The most common start was to find BAD and then BCD before moving into triangle CDE . Alternatively, a number of students found BAD and then ABE using angles in a triangle before finding ADC . The third method was to find the reflex BOD before moving to BCD . All of these methods were seen regularly, and successfully. However, many students struggled with remembering their circle theorems and either thought opposite angles in a cyclic quadrilateral are equal, or incorrectly thought that $OBCD$ was a cyclic quadrilateral.

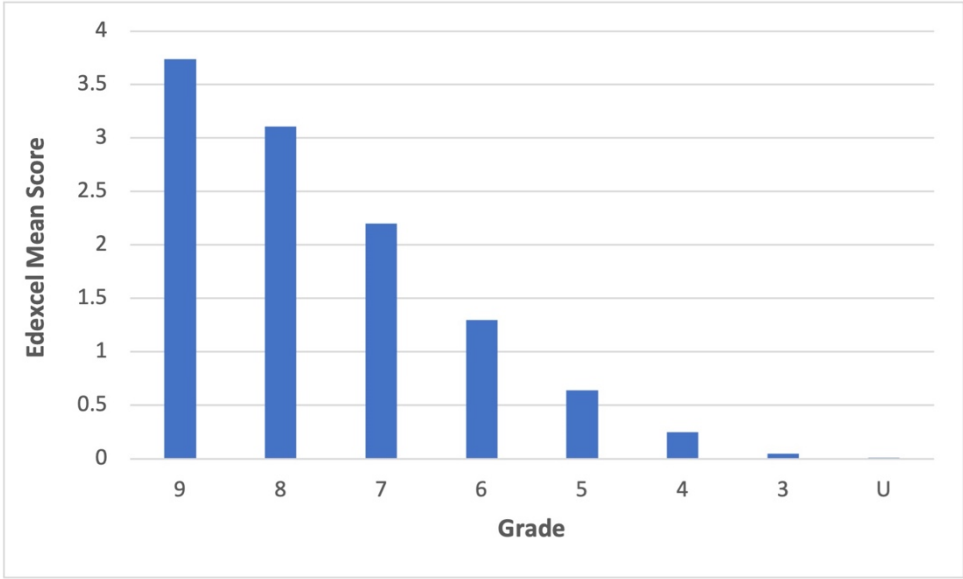
Reasons were frequently not accurately stated; correct geometric terms must be used.

Question:


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- 20
- 22

 **Question 20 - Performance**

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
1.76	4	44	1.76	3.74	3.11	2.20	1.30	0.64	0.25	0.05	0.01



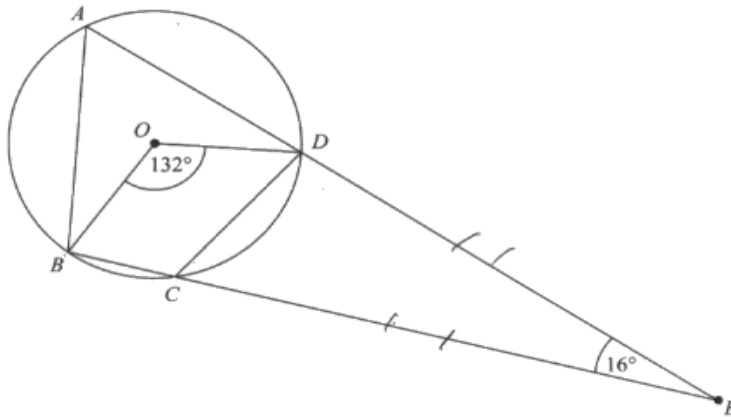
Q20

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- 
- A
- B
- C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 20 - Response B

20 *A, B, C and D are points on the circumference of a circle, centre *O*.
ADE and *BCE* are straight lines.*



Work out the size of angle *CDE*.
 Give a reason for each stage of your working.

$\angle BAD = 66$
 angles in the centre are twice the angle in the circumference
 $\angle BCD = 114$ because any opposite angles in a cyclic quadrilateral equal 180°
 $\angle DCE = 66$ angle on a straight line equal 180°
 $\angle CDE = 66$ two tangent from the same point are equal

66 °

3 / 4

Q20

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A
B
C

M1 for $\angle BAD = 66$

M1 for $\angle BCD = 114$

A0 value for $\angle CDE$ is incorrect

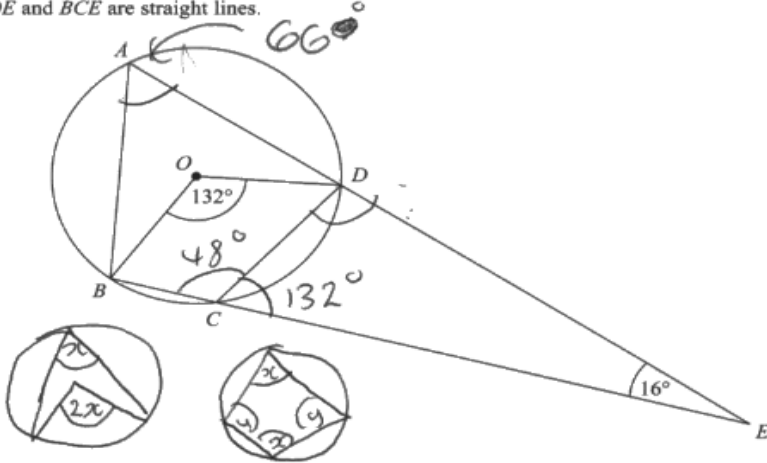
C1 For one correct circle theorem. (either circle theorem stated would earn this mark). This mark is dependent on M2 which this student has.

Note: $\angle BCD = 114$, or 114 correctly placed on the diagram implies M2. However, an incorrectly placed 114 will contradict this and lose the mark.

- Question: 4 5 7 9 10 11 12 15 16 17 18
- 20 22

Question 20 - Response C

20 *A, B, C and D are points on the circumference of a circle, centre O. ADE and BCE are straight lines.*



Work out the size of angle CDE.
Give a reason for each stage of your working.

angles at the circumference is half double the angle at the diameter.

$$\hookrightarrow 132 / 2 = 66^\circ$$

opposite angles in a cyclic quadrilateral add up to 180

$$180 - 132 = 48^\circ$$

angles at a tangent = 180

$$180 - 48 = 132$$

132. °

1 / 4

Q20

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A

B

C

M1 for $\angle BAD = 66$ seen. The candidate has not then used this in the rest of their method, but we will award M1 for correct use of a circle theorem.

M0 another appropriate missing angle not found

A0 value for CDE is incorrect

C0 To award C1, M2 must be earned.

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

Question 22

 Question
 Mark Scheme
 Examiner Comments

 Performance
 Response A
 Response B
 Response C

Question 22 - Question

22 Find algebraically the set of values of x for which

$$x^2 - 49 > 0 \quad \text{and} \quad 5x^2 - 31x - 72 > 0$$

.....

(Total for Question 22 is 5 marks)

Question 22 - Mark Scheme

Question	Answer	Mark	Mark scheme	Additional guidance
22	$x < -7, x > 8$	M1 A1 M1 A1 A1	for method to solve $x^2 - 49 > 0$ eg $(x + 7)(x - 7)$ or 7 and -7 for $x < -7$ and $x > 7$ for method to solve $5x^2 - 31x - 72 > 0$ eg $(5x \pm 9)(x \pm 8)$ or $\frac{- -31 \pm \sqrt{(-31)^2 - 4 \times 5 \times (-72)}}{2 \times 5}$ or 8 and -1.8 oe for $x < -1.8$ and $x > 8$ cao	accept use of = or incorrect inequality symbol for both the M marks This may be implied by a suitable diagram This may be implied by a suitable diagram

Question:

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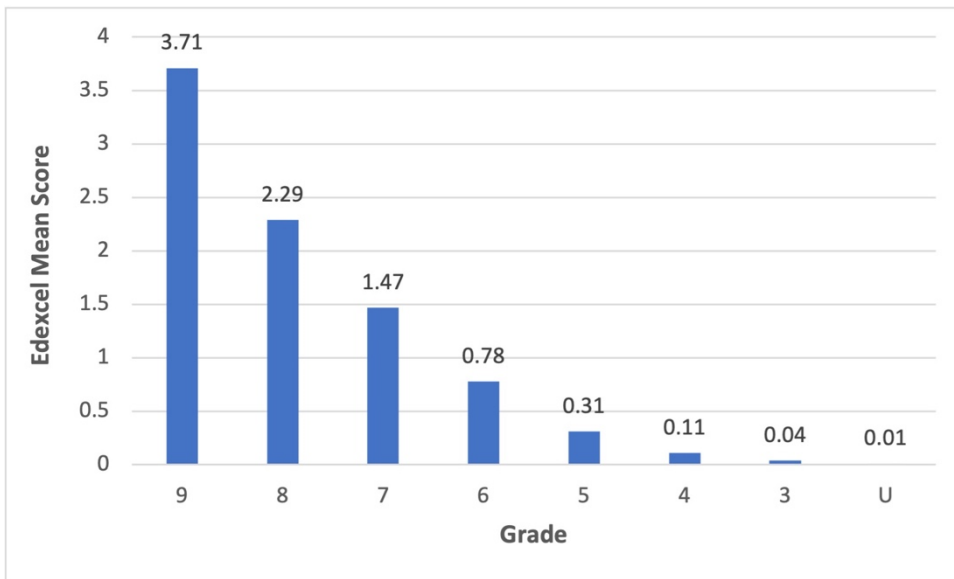
Question 22 - Examiner Comments

This demanding question required students to solve two quadratic inequalities and then select the correct critical values to satisfy both. The mark scheme has 2 sets of 2 marks, a method and an accuracy, for the solving of each quadratic inequality. Students could gain the accuracy mark for both by drawing a suitable diagram, either inequalities on a number line, or a sketch of the quadratic with the correct regions drawn. However, to score the final mark students needed to state both linear inequalities that satisfy both quadratics inequalities.

A large number of students were able to gain one mark for a method to solve the first quadratic, normally by factorising, but typically didn't correctly state the solutions. The second quadratic proved much more challenging. Many were unable to factorise, and thus chose to use the formula. The problem with this was their substitution was often inaccurate, either with incorrect values or with missing brackets.

Question 22 - Performance

Mean score	Max score	Mean %	Edexcel averages: mean scored by candidates achieving grade:								
			ALL	9	8	7	6	5	4	3	U
1.28	5	26	1.28	3.71	2.29	1.47	0.78	0.31	0.11	0.04	0.01



Q22

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A

B

C

- Question: 4 5 7 9 10 11 12 15 16 17 18
20 22

 **Question 22 - Response C**

22 Find algebraically the set of values of x for which

$x^2 - 49 > 0$ and $5x^2 - 31x - 72 > 0$

~~$x^2 > 49$~~ or

~~$x > 7$~~

$(x+7)(x-7)$

$x > 7$

$x > 7$ or $x > -7$

or

$x > -8$

$-8 < x < 7$

$-7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7$ are able

$\frac{-31 \pm \sqrt{31^2 - 4(5)(-72)}}{2(5)}$

$\frac{-31 + \sqrt{31^2 - 4(5)(-72)}}{10} = 1.8$

$\frac{-31 - \sqrt{31^2 - 4(5)(-72)}}{10} = -1.8$

(Total for Question 22 is 5 marks)

Q22

A

B

C

1 / 5

M1 for method to solve $x^2 - 49 > 0$ here it is $(x + 7)(x - 7)$

A0 only $x > 7$ found

M0 method to solve $5x^2 - 31x - 72 > 0$ has been attempted, however they have incorrectly used -31 at the start of the quadratic formula also the root sign for the quadratic formula is not long enough however this could be recovered if used correctly. There is not a correct value as evidence they have recovered so we cannot award.

A0 no correct solutions for $5x^2 - 31x - 72 > 0$

A0 as previous marks not gained

Note: We will accept $-7 > x > 7$ as evidence for the first A1 and $-1.8 > x > 8$ for the second A1, but **not** $-7 > x > 8$ for the final mark