OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE MATHS

(9260)

Paper 2 Extension

Example responses with commentary

For teaching from September 2016 onwards
For GCSE exams in May/June 2018 onwards

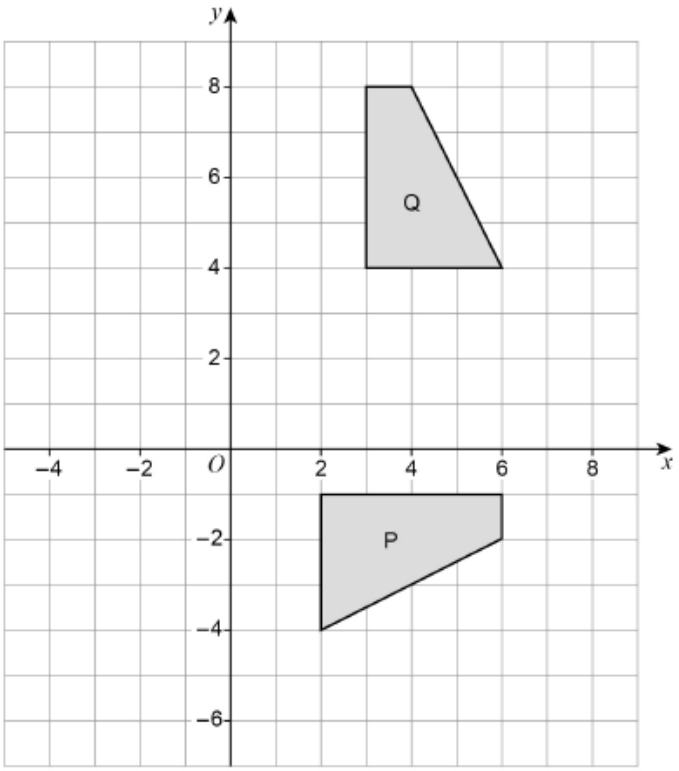
This guide includes some examples of student responses to a selection of questions from the summer 2018 Maths Paper 2E.

The question parts are reproduced, along with the final mark scheme, student responses and a commentary from the Lead Examiner on each of the students' answers.

QUESTION

10

10 The diagram shows shapes P and Q.



Describe fully the **single** transformation that maps shape P to shape Q.

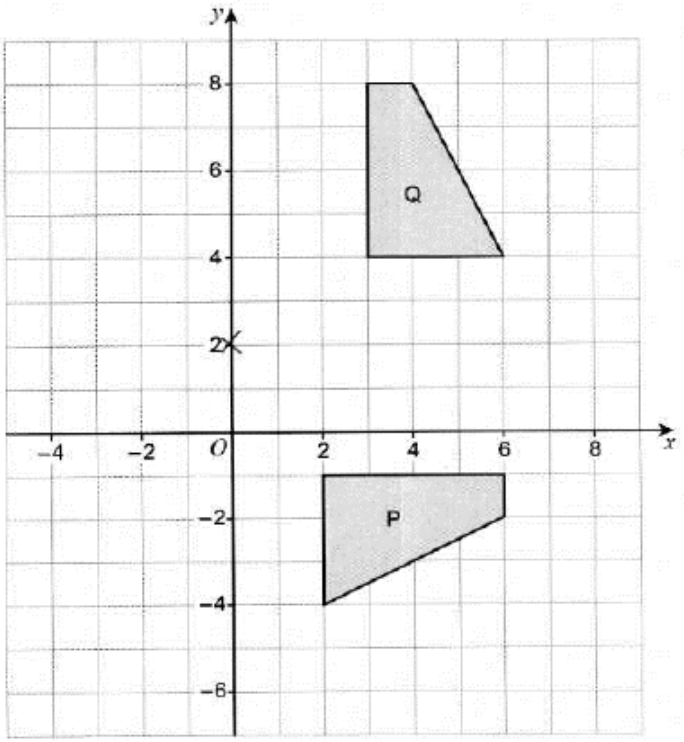
[3 marks]

MARK SCHEME

Q	Answer	Mark	Comments
10	Rotation	B1	
	90° anti-clockwise or 270° clockwise or ¼ turn anti-clockwise or ¾ turn clockwise	B1	
	(Around the point) (0, 2)	B1	

STUDENT A

10 The diagram shows shapes P and Q.



Describe fully the **single** transformation that maps shape P to shape Q.

[3 marks]

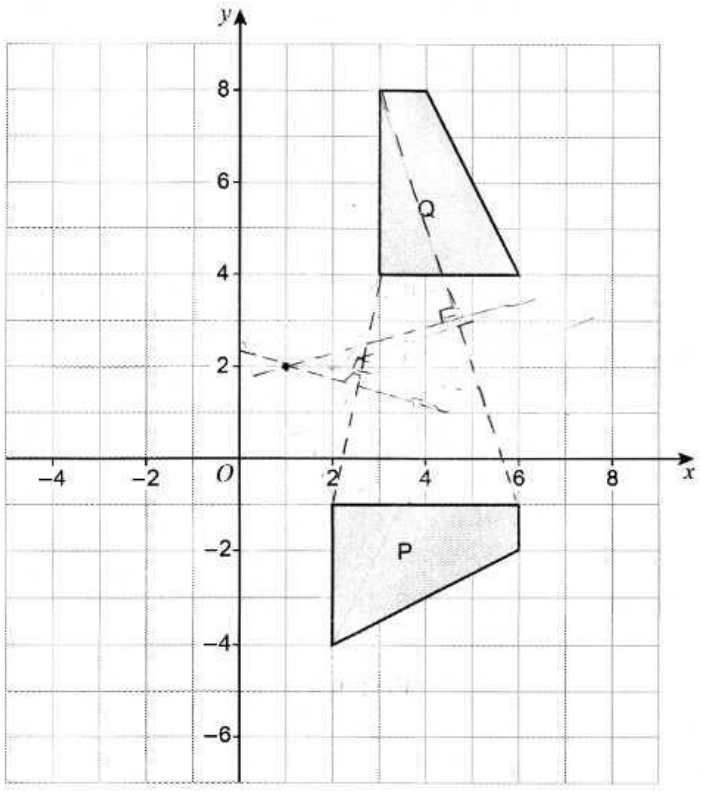
Rotation ~~from~~
anticlockwise
(0, 2)

EXAMINER COMMENTARY

The student has identified the rotation and the centre of rotation for 2 marks. The description requires both the direction and the angle of turn, but 90° has not been stated.
2 marks out of a possible 3 awarded
The student has worked back from the bars that were drawn to complete the table for the first mark. The remaining two bars have been completed using the idea that one large square represents 5 lessons. As no scale or key has been shown, no follow through marks could be awarded.
1 mark out of a possible 4 awarded

STUDENT B

10 The diagram shows shapes P and Q.



Describe fully the **single** transformation that maps shape P to shape Q.

[3 marks]

Rotation anticlock 90° with center (1, 2)

EXAMINER COMMENTARY

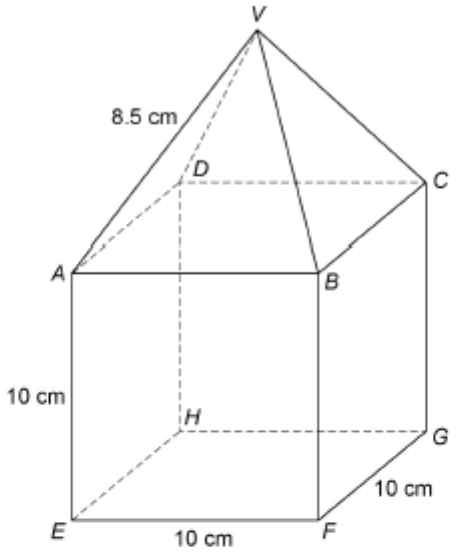
The student has identified it is a rotation for 1 mark. The correct angle and direction have been stated for another mark ('anticlock' was accepted as indicating anti-clockwise). Many students struggled to work out the correct centre of rotation. This student has joined the transformed vertices and attempted to find the intersection of the perpendicular bisectors but has not worked accurately. Some students successfully used a trial approach using tracing paper.
2 marks out of a possible 3 awarded

QUESTION

15

15 This trophy is a square-based pyramid on top of a 10 cm cube.

$AV = BV = CV = DV = 8.5$ cm



A box is a 10.2 cm by 10.2 cm by 15 cm cuboid.

Will the trophy fit in the box?

You **must** show your working.

[4 marks]

Answer _____

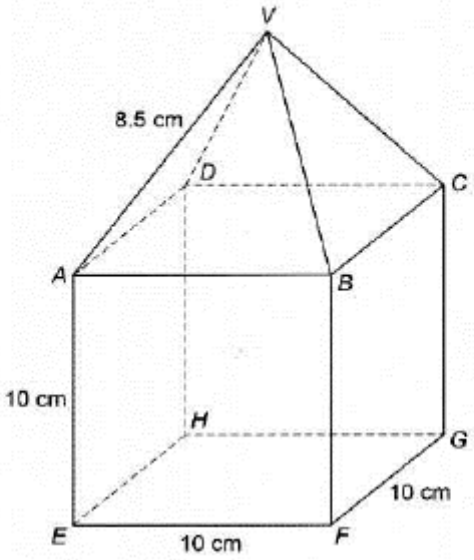
MARK SCHEME

Q	Answer	Mark	Comments
15	$\sqrt{10^2+10^2}$ or $\sqrt{200}$ or $10\sqrt{2}$ or 14.1(...) or $\sqrt{5^2+5^2}$ or $\sqrt{50}$ or $5\sqrt{2}$	M1	
	$8.5^2 - ((\text{their } 10\sqrt{2}) \div 2)^2$ or $8.5^2 - (\text{their } \sqrt{50})^2$ or 22.25 or $\sqrt{22.25}$ or 4.7....	M1 dep	
	$\sqrt{\text{their } 22.25} + 10$ or 4.7(169905) + 10 or 14(.7...) or $15 - (\sqrt{\text{their } 22.25} + 10)$ or 0.2(83...)	M1 dep	
	14(.7169905) and Yes or 0.2(83...) and Yes	A1	

STUDENT A

15 This trophy is a square-based pyramid on top of a 10 cm cube.

$AV = BV = CV = DV = 8.5$ cm



A box is a 10.2 cm by 10.2 cm by 15 cm cuboid.

Will the trophy fit in the box?

You **must** show your working.

[4 marks]

A to the ABCD distance

$\sqrt{10^2+10^2} = 14.14$

$14.14 \div 2 = 7.07$

$\sqrt{8.5^2 - 7.07^2} = 4.98$ No, it does not fit

$10 + 4.98 = 14.98$cm $14.98 < 15$

so, it does fit

Answer it does fit

EXAMINER COMMENTARY

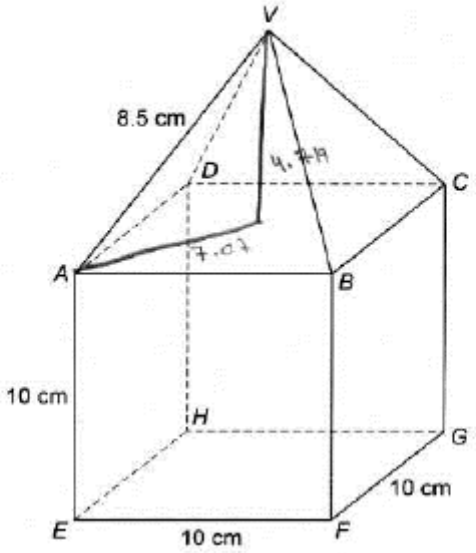
The student has correctly worked out the length of the cube's diagonal for the first mark. The method to work out the height of the pyramid is correct for the second mark. The third mark is also gained for the correct method for the overall height. It is important to show a full method because, had the student not done so, the incorrect value of 4.98 would have lost the second mark and all subsequent marks.

3 marks out of a possible 4 awarded

STUDENT B

15 This trophy is a square-based pyramid on top of a 10 cm cube.

$AV = BV = CV = DV = 8.5$ cm



A box is a 10.2 cm by 10.2 cm by 15 cm cuboid.

Will the trophy fit in the box?

You **must** show your working.

[4 marks]

box = 10.2 x 10.2 x 15 = 1560.6

trophy = △ → ½ (4.719 x 10 x 10)

→ 471.86

□ → 10 x 10 x 10 = 1000

= 1000 + 471.86 = 1471.86

1560.6 − 1471.86 = 88.74

Answer yes

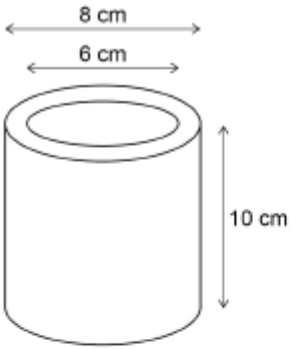
EXAMINER COMMENTARY

Although no method has been shown, the value of 4.719 for the height of the pyramid gains 2 marks as it implies that the correct method must have been used. Subsequently the student has attempted to work out the volume of the pyramid and compare it with the volume of the box which is an inappropriate method and gains no further marks.
2 marks out of a possible 4 awarded

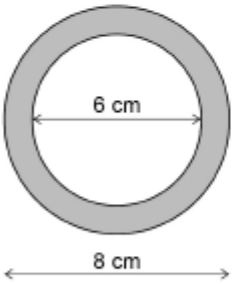
QUESTION

23

23 Claire has this cylindrical, metal, hollow tube.



A cross-section of the tube is shown.



Not drawn accurately

Claire melts the tube and uses the metal to make solid spheres with radius 0.75 cm

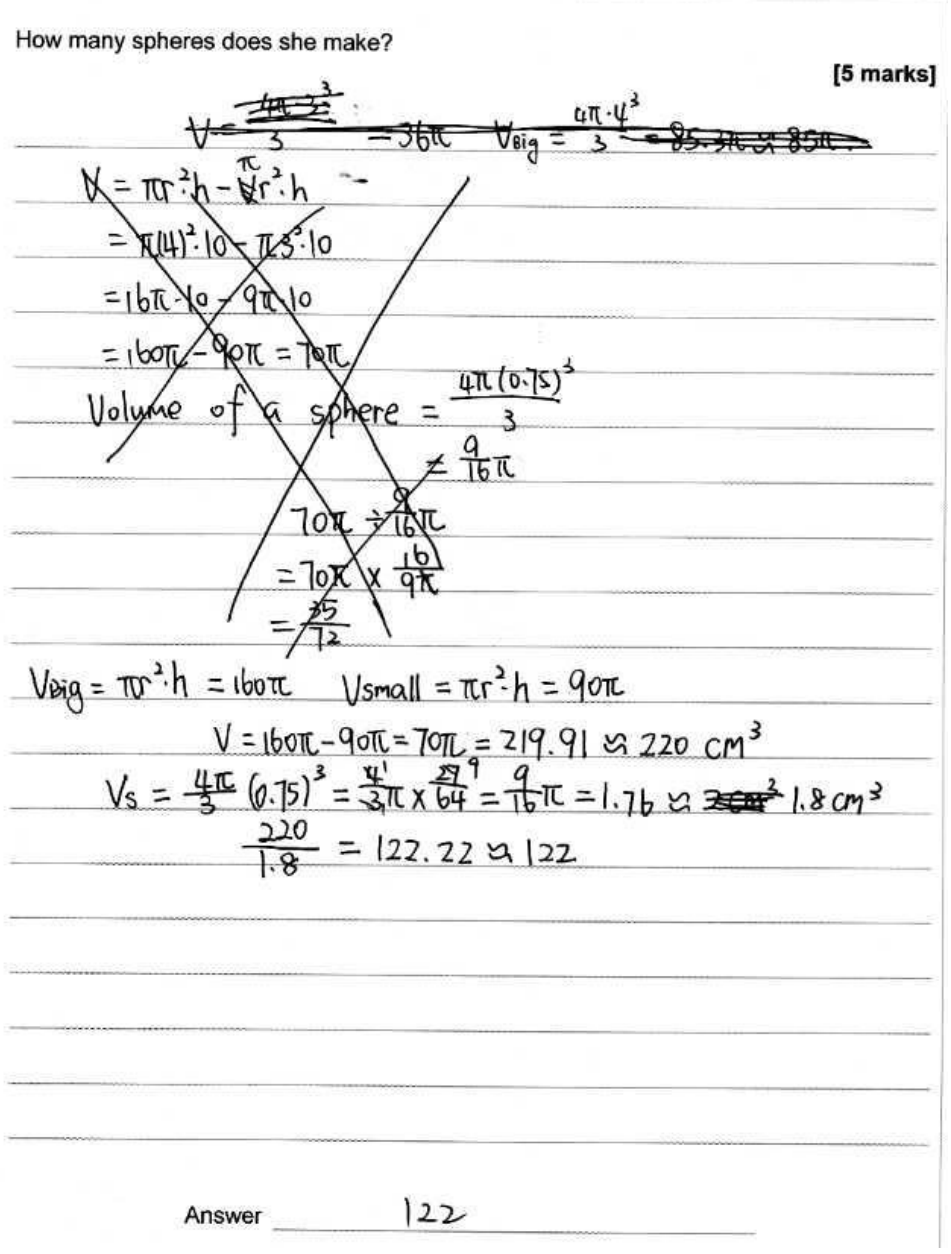
Volume of a sphere $= \frac{4\pi r^3}{3}$ where r is the radius

She makes as many of these spheres as possible.

MARK SCHEME

Q	Answer	Mark	Comments
23	$\pi \times 3^2 \times 10$ or [282.6, 282.78] or $\pi \times 4^2 \times 10$ or [502.4, 502.72] or $\pi \times 4^2 - \pi \times 3^2$ or 7π or [21.98, 21.994]	M1	M2 $10\pi(4^2 - 3^3)$
	$(\pi \times 4^2 - \pi \times 3^2) \times 10$ or their $7\pi \times 10$ or 70π or their [21.98, 21.994] × 10 or [219.8, 219.94] or $\pi \times 4^2 \times 10 - \pi \times 3^2 \times 10$ or their [502.4, 502.72] – their [282.6, 282.78]	M1 dep	
	$\frac{4 \times \pi \times 0.75^3}{3}$ or 0.5625π or [1.76, 1.77]	M1	
	their $70\pi \div$ their 0.5625π or their $70\pi \div$ their [1.76, 1.77] or 124.4(444…)	M1 dep	dep on M3 oe eg consistent omission of π
	124	A1	

STUDENT A



How many spheres does she make?

[5 marks]

$V = \frac{4\pi \cdot 4^3}{3} = 85.3\pi \approx 85\pi$ $V_{Big} = \frac{4\pi \cdot 4^3}{3}$

$V = \pi r^2 h - \pi r^2 h$

$= \pi(4)^2 \cdot 10 - \pi 3^2 \cdot 10$

$= 16\pi \cdot 10 - 9\pi \cdot 10$

$= 160\pi - 90\pi = 70\pi$

Volume of a sphere $= \frac{4\pi(0.75)^3}{3}$

$= \frac{9}{16}\pi$

$70\pi \div \frac{9}{16}\pi$

$= 70\pi \times \frac{16}{9\pi}$

$= \frac{35}{72}$

$V_{Big} = \pi r^2 h = 160\pi$ $V_{small} = \pi r^2 h = 90\pi$

$V = 160\pi - 90\pi = 70\pi = 219.91 \approx 220\ cm^3$

$V_s = \frac{4\pi}{3}(0.75)^3 = \frac{4}{3}\pi \times \frac{27}{64} = \frac{9}{16}\pi = 1.76 \approx 1.8\ cm^3$

$\frac{220}{1.8} = 122.22 \approx 122$

Answer 122

EXAMINER COMMENTARY

The student has used and shown the correct method throughout. However, 70π has been rounded to 220 and 1.76 has been rounded to 1.8 before the division, which means that the final answer is inaccurate and loses the last mark. Students should always keep full values in their calculators.
4 marks out of a possible 5 awarded

STUDENT B

How many spheres does she make? [5 marks]

$\frac{4\pi 8^3}{3} - \frac{4\pi 6^3}{3}$

$\frac{4\pi r^3}{3} = \frac{4\pi 0.75^3}{3} = 1.77$

$\frac{4\pi 4^3}{3} - \frac{4\pi 3^3}{3}$

$= 154.98$

$154.98 \div 1.77 = 87.56$

Answer 87.56

EXAMINER COMMENTARY

The student has worked out the correct volume of one of the spheres and gains the third mark. However, the student has used the volume of a sphere rather than a cylinder to work out the amount of metal and does not gain any further marks. This was a common error.
1 mark out of a possible 5 awarded

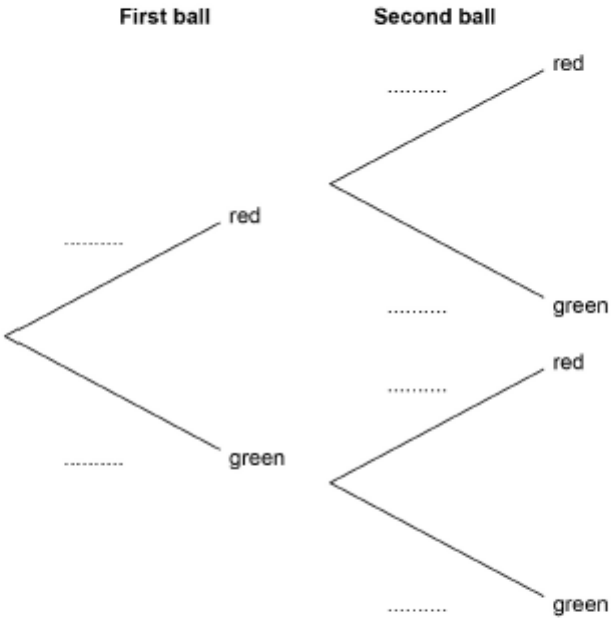
QUESTION

26

26 In a bag there are 80 balls.
50 are red and 30 are green.
Two balls are taken at random.

26 (a) Complete the tree diagram.

[3 marks]

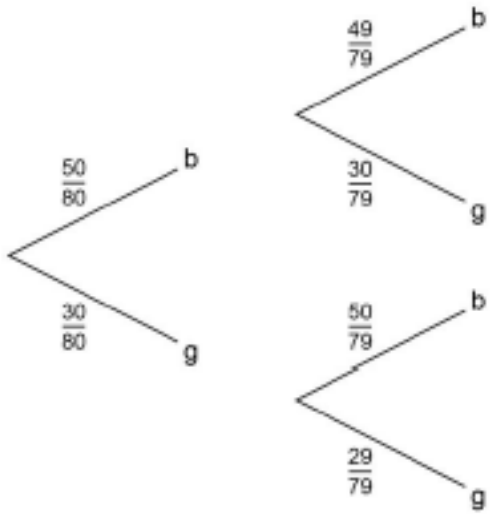


26 (b) Work out the probability that both balls are red.

[2 marks]

Answer _____

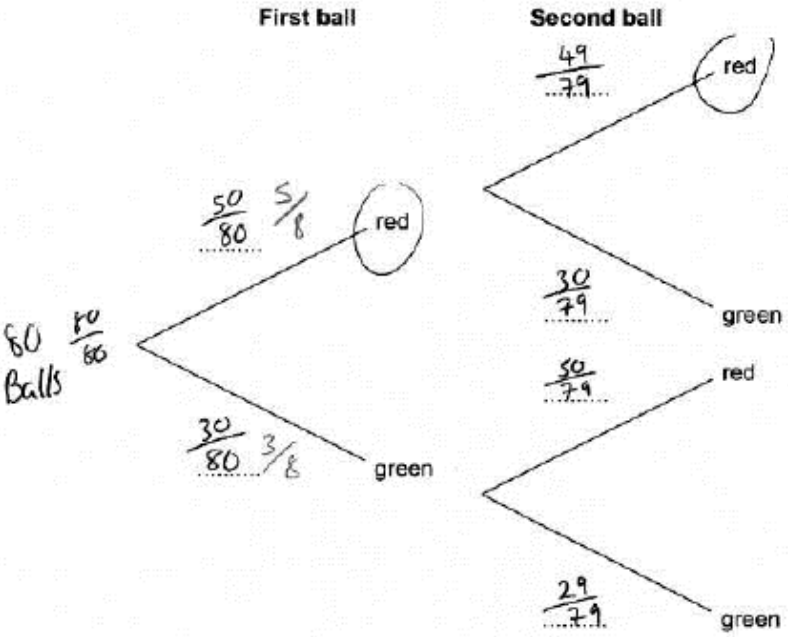
MARK SCHEME

Q	Answer	Mark	Comments
26(a)	Correct probabilities against each branch on first pair of arms	B1	
	Correct probabilities against each branch on a second pair of arms	B1	
	Correct probability on each branch	B1	
	Additional Guidance		
	Decimals to 2dp or better Accept equivalent fractions/percentages		

26(b)	$\frac{50}{80} \times \frac{49}{79}$	M1	oe ft their probabilities from (a) (each probability must be <1)
	0.388 or 0.39 or $\frac{245}{632}$ or $\frac{2450}{6320}$	A1ft	oe ft their probabilities from (a)
	Additional Guidance		
	Ignore incorrect simplification or conversion to a decimal or percentage after correct fraction seen		

STUDENT A

26 (a) Complete the tree diagram. **[3 marks]**



26 (b) Work out the probability that both balls are red. **[2 marks]**

$\frac{5}{8} \times \frac{49}{79} = \frac{395}{632} + \frac{392}{632} = \frac{787}{632}$

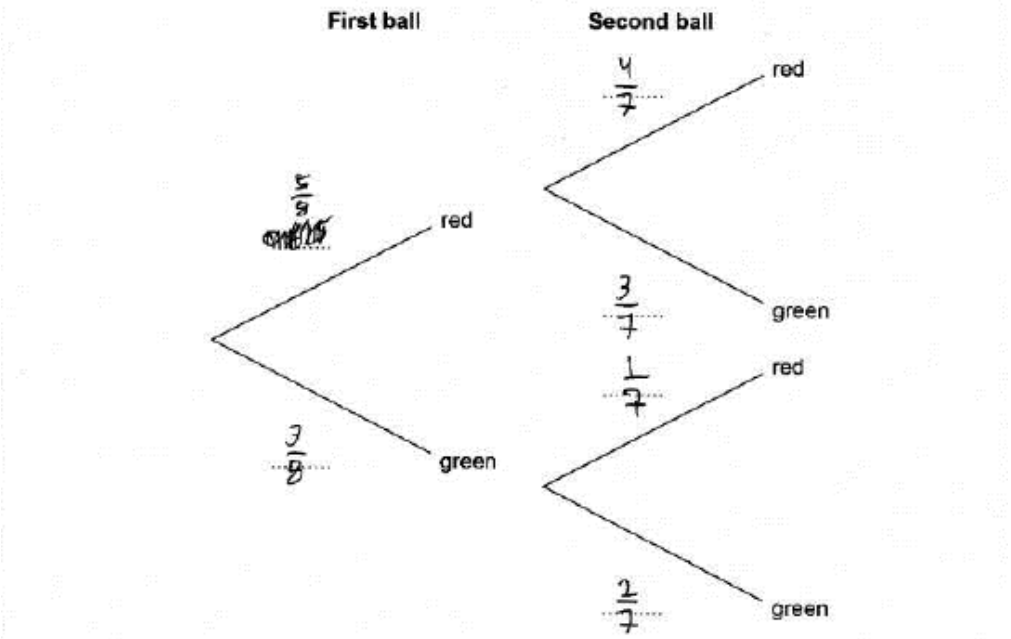
Answer $\frac{787}{632}$

EXAMINER COMMENTARY

The student has correctly completed the tree diagram in part (a) and scored all 3 marks. In part (b), the two relevant probabilities have been added rather than multiplied and this common misconception gains no marks.
3 marks out of a possible 5 awarded

STUDENT B

26 (a) Complete the tree diagram. **[3 marks]**



26 (b) Work out the probability that both balls are red. **[2 marks]**

$\frac{5}{8} \times \frac{4}{7} = \frac{20}{56} = 0.35714\,28571$

Answer 0.35714285 71

EXAMINER COMMENTARY

The student has completed the first pair of probabilities accurately for the first mark. However the student has then subtracted 1 from the numerator and denominator of the already simplified fraction which gives an incorrect probability. Many students made this error. However, in part (b) the student has used the correct method with their probabilities from the tree diagram and the answer follows through from their earlier error so this gains both marks.
3 out of a possible 5 awarded

QUESTION

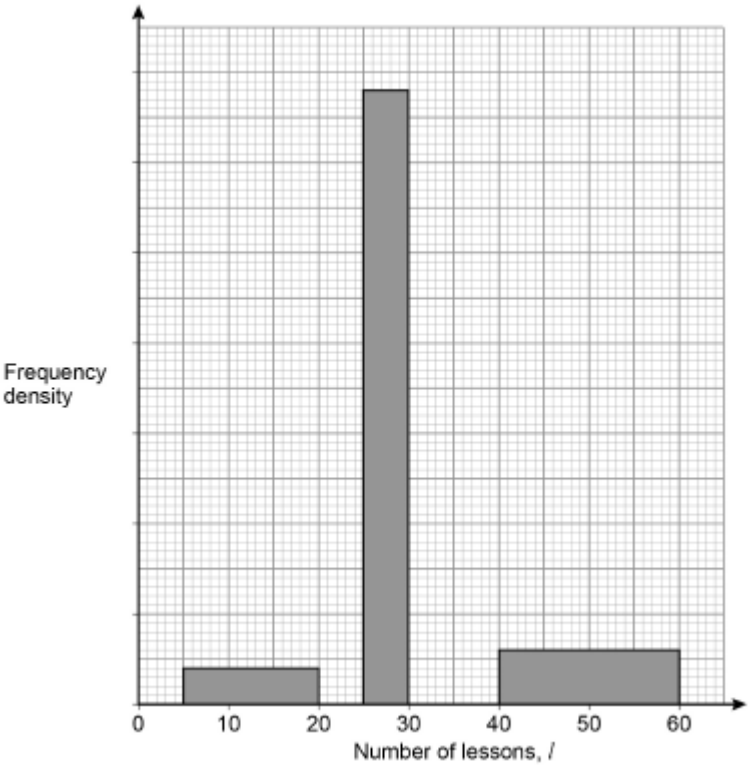
28

28 The table and the histogram show information about the number of driving lessons taken by 100 people.

Complete the table and the histogram.

[4 marks]

Number of lessons, l	Frequency
$5 \leqslant l < 20$	6
$20 \leqslant l < 25$	18
$25 \leqslant l < 30$	
$30 \leqslant l < 40$	30
$40 \leqslant l < 60$	



MARK SCHEME

Q	Answer	Mark	Comments
28	34 and 12 in table, in correct positions	B1	
	25 – 30 bar = 7.2 large squares high (plotted at 3.6 on their linear scale)	B1ft	ft their linear scale
	30 – 40 bar = 6 large squares high (plotted at 3 on their linear scale)	B1ft	ft their linear scale
	Correct vertical scale or key shown eg 10 small squares represents 1 lesson 0.5 fd per large square	B1	

STUDENT A

28 The table and the histogram show information about the number of driving lessons taken by 100 people.

Complete the table and the histogram.

[4 marks]

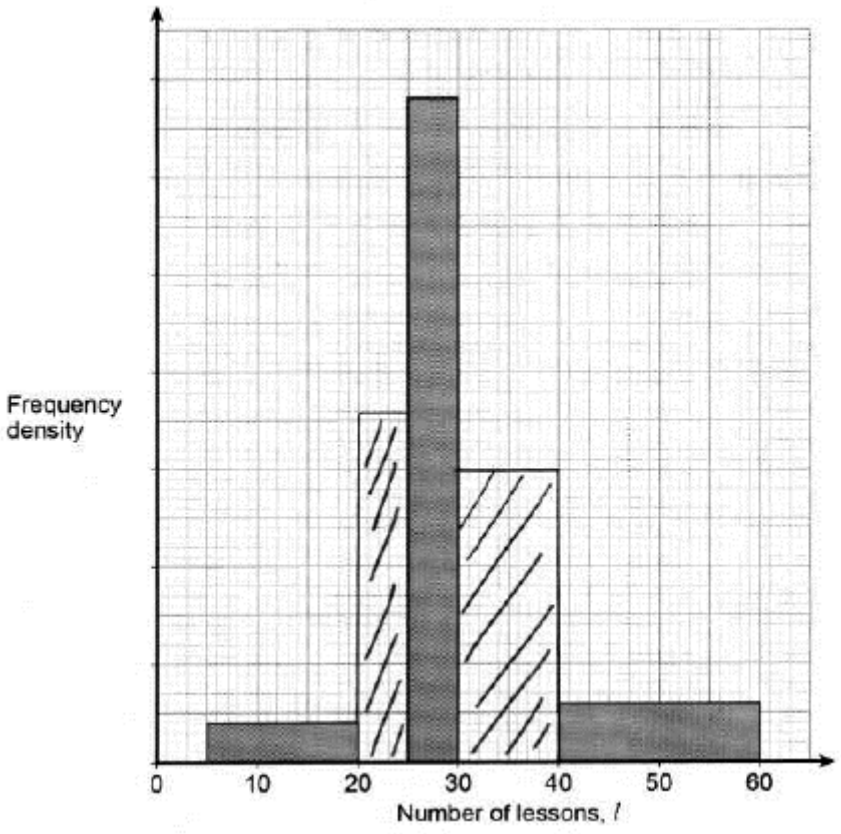
Number of lessons, l	Frequency
$5 \leqslant l < 20$	6
$20 \leqslant l < 25$	18
$25 \leqslant l < 30$	34
$30 \leqslant l < 40$	30
$40 \leqslant l < 60$	12.

$6.8 \times 5 = 34$

$0.6 \times 20 = 12$

$18 \div 5 = 3.6$

$30 \div 10 = 3$



EXAMINER COMMENTARY

The student has worked back from the bars that were drawn to complete the table for the first mark. This histogram has been accurately completed and gained two further marks but the vertical scale (or key) have not been completed for the final mark.
3 marks out of a possible 4 awarded

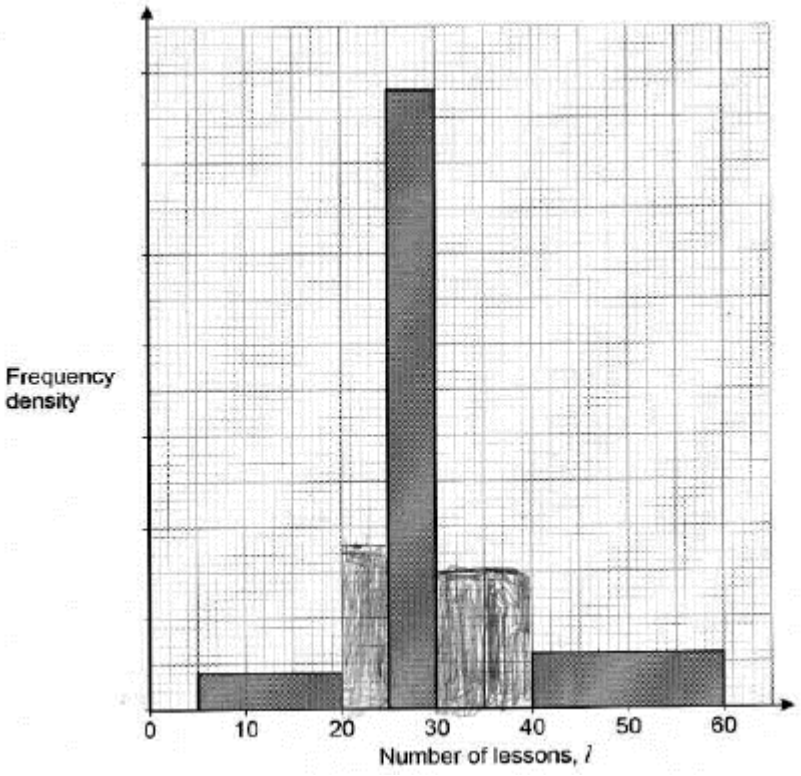
STUDENT B

28 The table and the histogram show information about the number of driving lessons taken by 100 people.

Complete the table and the histogram.

[4 marks]

Number of lessons, l	Frequency
$5 \leqslant l < 20$	6
$20 \leqslant l < 25$	18
$25 \leqslant l < 30$	34
$30 \leqslant l < 40$	30
$40 \leqslant l < 60$	12



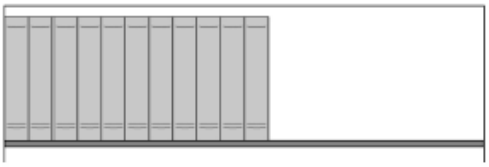
EXAMINER COMMENTARY

The student has worked back from the bars that were drawn to complete the table for the first mark. The remaining two bars have been completed using the idea that one large square represents 5 lessons. As no scale or key has been shown, no follow through marks could be awarded.
1 mark out of a possible 4 awarded

QUESTION

31

31 A bookshelf has width 68 cm, correct to the nearest cm



Books, each with width 11 mm correct to the nearest mm, are placed along the shelf as shown.

Work out the maximum number of these books that will definitely fit along the shelf.

You **must** show your working.

[3 marks]

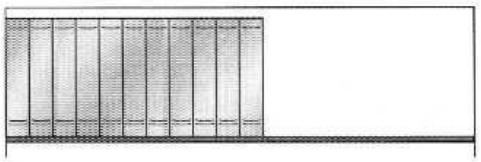
Answer _____

MARK SCHEME

Q	Answer	Mark	Comments
31	67.5 or 68.5 or 675 or 685 or 11.5 or 10.5 or 1.15 or 1.05	B1	
	their 675 ÷ their 11.5 or their 67.5 ÷ their 1.15	M1	must be their min shelf ÷ their max book in same units $670 \leq \text{min} < 680$ or $67 \leq \text{min} < 68$ $11 \leq \text{max} < 12$ or $1.1 \leq \text{max} < 1.2$
	675 ÷ 11.5 and 58 or 67.5 ÷ 1.15 and 58	A1	SC2 67.5 ÷ 11.5, ans = 5
	Additional Guidance		
	Answer only 58		B0M0A0
	58.695 and answer 58		B1M1A1

STUDENT A

31 A bookshelf has width 68 cm, correct to the nearest cm



Books, each with width 11 mm correct to the nearest mm, are placed along the shelf as shown.

Work out the maximum number of these books that will definitely fit along the shelf.

You **must** show your working.

[3 marks]

~~11mm=1.1cm~~ ~~68÷1.1≈61.82~~ ~~68cm=680mm~~

~~68÷(11+~~ ~~680÷(11+0.5)≈59 books~~ ~~(11+0.4)≈~~

~~68+0.4=68.4cm~~ 68−0.5=67.5cm = 675mm

675÷(11+0.4)≈59 books.

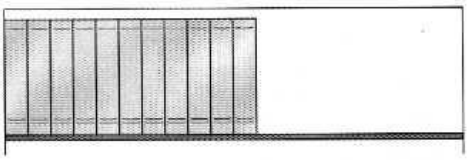
Answer 59 books

EXAMINER COMMENTARY

A correct lower bound has been given for the shelf width so this gained the first mark. The student then divided by their maximum book width which, although incorrect, was in the acceptable range for the second mark.
2 marks out of a possible 3 awarded

STUDENT B

31 A bookshelf has width 68 cm, correct to the nearest cm



Books, each with width 11 mm correct to the nearest mm, are placed along the shelf as shown.

Work out the maximum number of these books that will definitely fit along the shelf.

You **must** show your working.

[3 marks]

Bookshelf Upper bond: $68 + 1 \times \frac{1}{2} = 68.5\text{cm}$ ✓(select)
Lower bond: $68 - 1 \times \frac{1}{2} = 67.5\text{cm}$.
Books: Upper bond: $11 + 1 \times \frac{1}{2} = 11.5\text{mm}$
Lower bond: $11 - 1 \times \frac{1}{2} = 10.5\text{mm}$ ✓(select)

maximum number $= \frac{685\text{ mm}}{10.5\text{ mm}} \approx 65.23 \simeq 65$

Answer 65

EXAMINER COMMENTARY

The student has written all four correct bounds so has gained the first mark. However, the student then divides the maximum by the minimum so can score no more marks. This is the maximum number that might be able to fit along the shelf rather than the number that will definitely fit.
1 mark out of a possible 3 awarded

QUESTION

32

32 Calculate the gradient of the curve $y = (2x + 2)(3x - 1)$ at the point (3, 64)

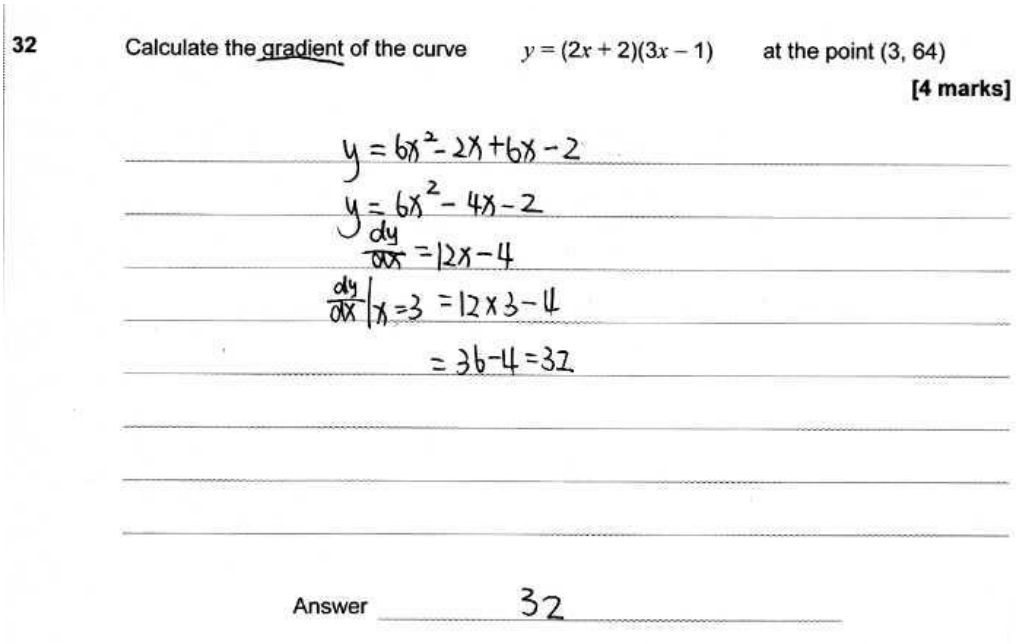
[4 marks]

Answer _____

MARK SCHEME

Q	Answer	Mark	Comments
32	$(y =) 6x^2 - 2x + 6x - 2$	M1	at least 3 terms correct implied by $6x^2 + ax - 2$
	$12x + 4$ or $12x - 2 + 6$	M1dep	at least one correct term for their $y=$
	$\frac{dy}{dx} = 12x + 4$ or $\frac{dy}{dx} = 12x - 2 + 6$	A1	fully correct
	40	A1 ft	ft their $\frac{dy}{dx}$ of the form $ax + b$ if M2 awarded
	Additional Guidance		
	Correct use of product rule acceptable		

STUDENT A



32 Calculate the gradient of the curve $y = (2x + 2)(3x - 1)$ at the point (3, 64)

[4 marks]

$y = 6x^2 - 2x + 6x - 2$

$y = 6x^2 - 4x - 2$

$\frac{dy}{dx} = 12x - 4$

$\frac{dy}{dx}\Big|_{x=3} = 12 \times 3 - 4$

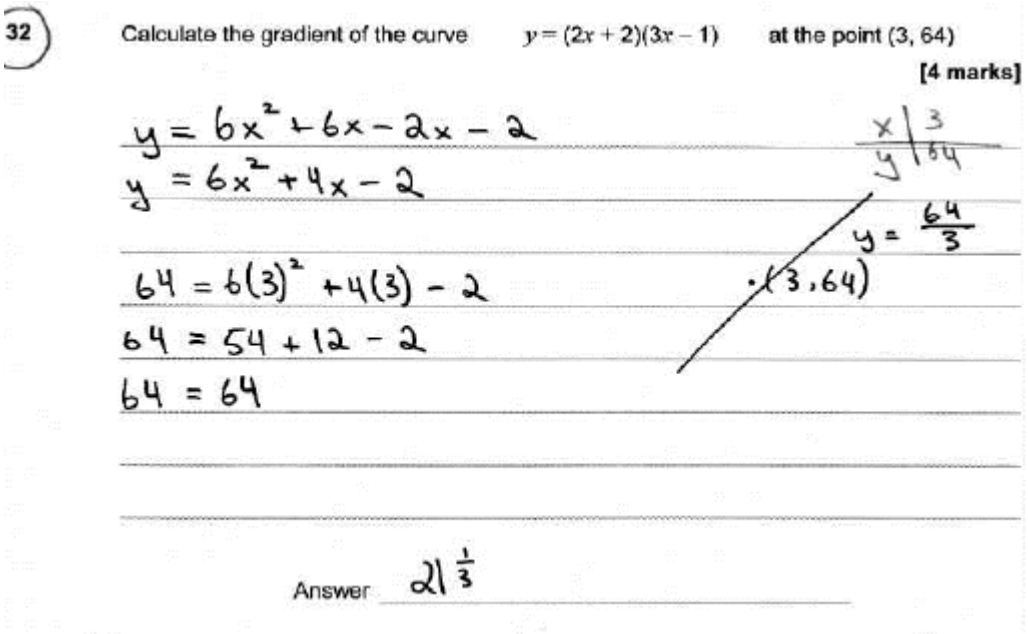
$= 36 - 4 = 32$

Answer 32

EXAMINER COMMENTARY

The student has expanded the brackets correctly for the first mark but then has collected the terms incorrectly. The second mark has been awarded for at least one term correctly differentiated. The third mark is lost because the gradient function is not completely correct. However, the final value of the gradient does follow through their gradient function at the point $x = 3$, so has been awarded the follow through mark.
3 marks out of a possible 4 awarded

STUDENT B


32 Calculate the gradient of the curve $y = (2x + 2)(3x - 1)$ at the point (3, 64)

[4 marks]

$y = 6x^2 + 6x - 2x - 2$

$y = 6x^2 + 4x - 2$

$64 = 6(3)^2 + 4(3) - 2$

$64 = 54 + 12 - 2$

$64 = 64$

x	3
y	64

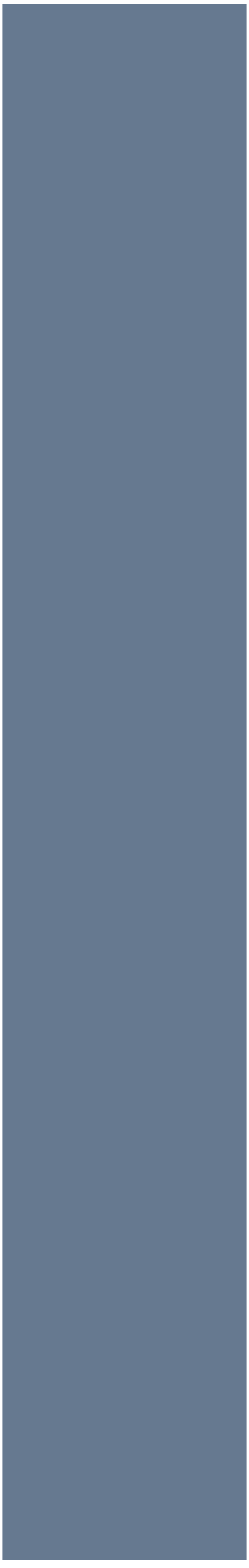
$y = \frac{64}{3}$

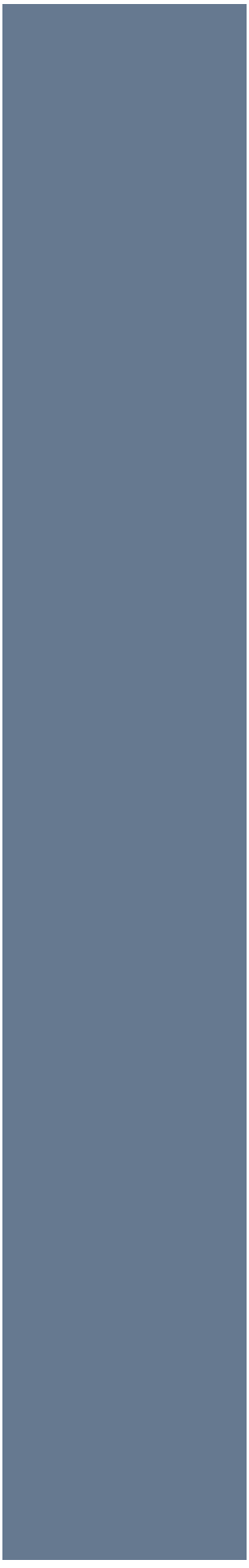
(3, 64)

Answer $21\frac{1}{3}$

EXAMINER COMMENTARY

The student has expanded the brackets correctly for the first mark. The student does not make any attempt to differentiate the function so does not gain any more marks. Many of the weaker students did not realise the need for calculus.
1 mark out of a possible 4 awarded





FURTHER GUIDANCE AND CONTACTS

You can contact the subject team directly at **english@oxfordaqaexams.org.uk**

Please note: We aim to respond to all email enquiries within two working days.

Our UK office hours are Monday to Friday, 8am – 5pm local time.

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