OCR | H | May | June '25 | P4

1 Calculate.

$$\frac{4.5^3}{1.8} + \frac{3.6}{2.4^2}$$

Give your answer correct to **3** significant figures.

$50.625 + 0.625 = 51.25$

✓OE

51.3 ✓

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

2 The ratio 40 grams to 1 kilogram can be written in the form 1 : *n*.

Find the value of *n*.

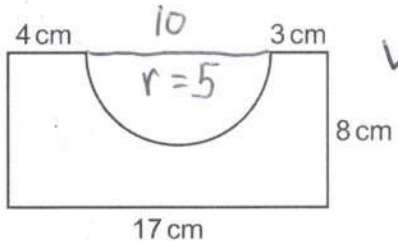
40 : 1000 ✓

4 : 100

1 : 25

n = 25 ✓ **[2]**

3 The diagram shows a shape formed from a rectangle measuring 8 cm by 17 cm with a semicircle removed from one side.



✓ **Not to scale**

Calculate the perimeter of the shape. ✓ ✓

$= 8 + 8 + 17 + 4 + 3 + \frac{1}{2} \times 2 \times \pi \times 5$

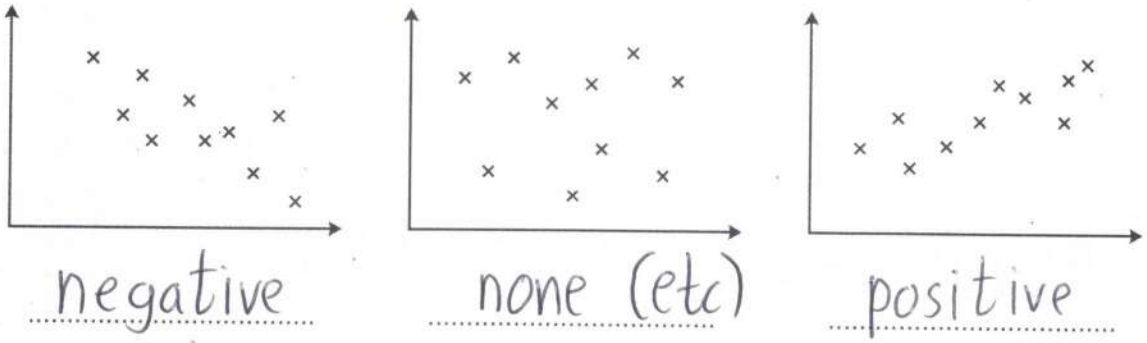
$= 40 + 5\pi$ ✓

or [55.7 → 55.71]

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

© OCR 2025

4 **(a)** Describe the correlation shown in each of these scatter diagrams.

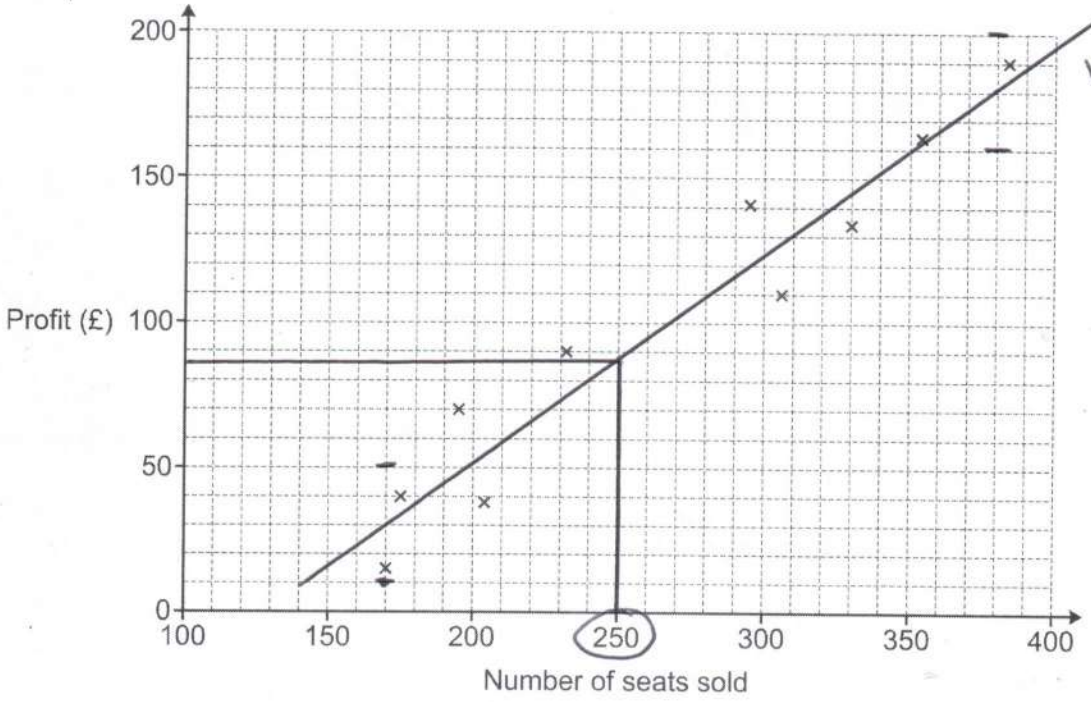


negative none (etc) positive

2 ✓ 3 ✓

[2]

(b) A theatre records the number of seats sold and the profit made for 10 performances. The scatter diagram shows these results.



By drawing a line of best fit, estimate the profit made when 250 seats are sold.

ft ✓

85

(b) £ ..... **[2]**

© OCR 2025

5 **(a)** For each of the algebraic statements below decide whether it is an equation or an identity.

$(x-1)(x-2)=12$ is an equation

$(x-1)(x-2)=x^2-3x+2$ is an identity

$x^2=3x+10$ is an equation

[1]

(b) A straight line is parallel to $y=3x$ and passes through the point (2, 11).

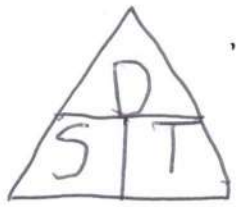
Find the equation of the line in the form $y=mx+c$.

$11 = 3 \times 2 + c$ ✓

$5 = c$ ✓

(b) $y = 3x + 5$ ✓ **[3]**

© OCR 2025



6 The distance of a car race is 420 km.
A car completes the first 210 km at an average speed of 150 km/h.
The same car completes the final 210 km at an average speed of 100 km/h.

Show that the average speed of the car for the whole race is less than 125 km/h. **[5]**

$D = 210$
$S = 150$

$T = \frac{210}{150} = 1.4\text{hr}$ ✓

$D = 210$
$S = 100$

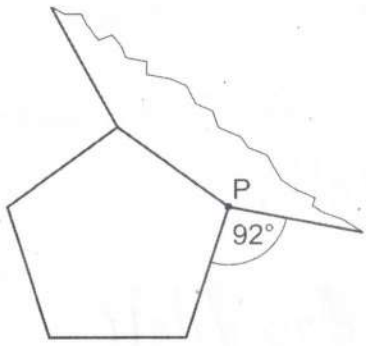
$T = \frac{210}{100} = 2.1$ ✓

Total $D = 420$
Total $T = 1.4 + 2.1 = 3.5$ ✓

Average $S = \frac{420}{3.5} = 120$ km/h ✓
✓ (<125)

© OCR 2025

7 The diagram shows a regular pentagon and part of another regular polygon meeting at point P.
One of the angles at point P is 92°.



Not to scale

(a) Show that the size of one interior angle of a regular pentagon is 108°. **[2]**

$$\frac{(5-2)\times 180}{5} = \frac{540}{5} = 108$$

✓ ✓ or similar

(b) Find the number of sides of the other regular polygon.

Internal = 360 − 108 − 92 = 160 ✓

External = 20 ✓

$$n = \frac{360}{20}$$ ✓

18 ✓

(b) ..... **[4]**

© OCR 2025

8 A town council are going to do a survey on how people travel to work or school and for how long they travel.

One day their interviewer stands outside the town railway station and chooses 20 people at random to form their sample.

Make **three different** criticisms or suggestions for improving the council's method for selecting their sample.

1 Sample size too small

2 Vary the time of day / date

3 Vary the location

[3]

etc

also → stratify by gender / age

© OCR 2025

9 **(a)** Write 0.0037 in standard form.

3.7×10^{-3}

(a) ..... **[1]**

(b) A country consists of a south island and a north island.
The table below shows the population and area of each island in June 2023.

	Population	Area (km^2)
South island	1.2×10^6	1.5×10^5
North island	4.0×10^6	1.1×10^5

Work out the overall population density of the country in June 2023.

$\frac{\text{Total P}}{\text{Total A}} = \frac{5.2 \times 10^6}{2.6 \times 10^5}$ ✓ ✓

✓

20 ✓OE

(b) ..... people per km^2 **[4]**

10 Find the value of k.

$$\frac{25 \times (5^3)^k}{5^4} = 5^{19}$$

$5^2 \times 5^{3K} = 5^{19} \times 5^4$ m✓

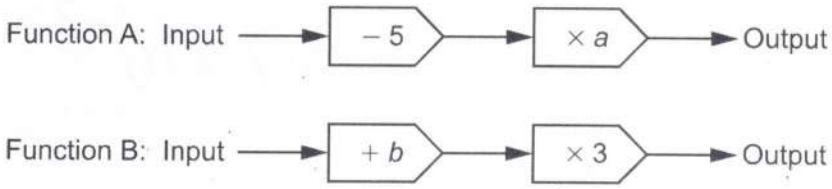
$3K + 2 = 23$

$3K = 21$ m✓

$k =$ 7 ✓ **[3]**

© OCR 2025

11 Function A and function B are shown below.



When the input for both machines is 11, the output of Function A is equal to the output of Function B.
When the input for both machines is 29, the output of Function A is twice the output of Function B.

Find the value of a and the value of b.

(A) $f(11) = 6a$

(B) $f(11) = 3b + 33$

so $3b + 33 = 6a$ ①

(A) $f(29) = 24a$

(B) $f(29) = 3b + 87$

so $3b + 87 = 12a$ ②

② − ① = $54 = 6a$

$a = \frac{54}{6} = 9$

① ⇒ $3b + 33 = 54$

$3b = 21$

$b = 21/3$

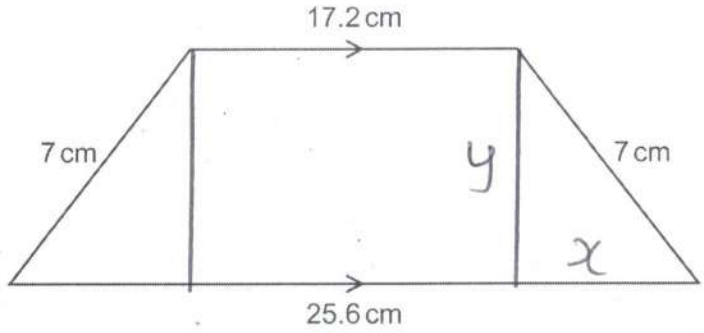
$a =$ 9

$b =$ 7

[5]

© OCR 2025

12 The diagram shows a trapezium.



Not to scale

Calculate the area of the trapezium.
You must show your working.

$x = \frac{25.6 - 17.2}{2} = 4.2$ ✓

$y = \sqrt{7^2 - 4.2^2} = 5.6$ ✓ ✓

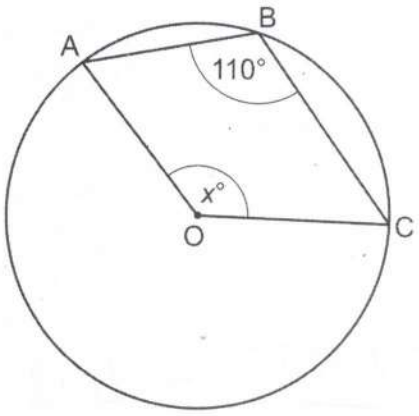
$A = \frac{1}{2}(25.6 + 17.2) \times 5.6$ ✓

119.8 (4) ✓

..... cm^2 **[5]**

© OCR 2025

13 A, B, and C are points on a circle, centre O.



Not to scale

(a) Explain why OABC is **not** a cyclic quadrilateral.

O is the centre and not on the circumference ✓

.....

.....

[1]

(b) Work out the value of x.

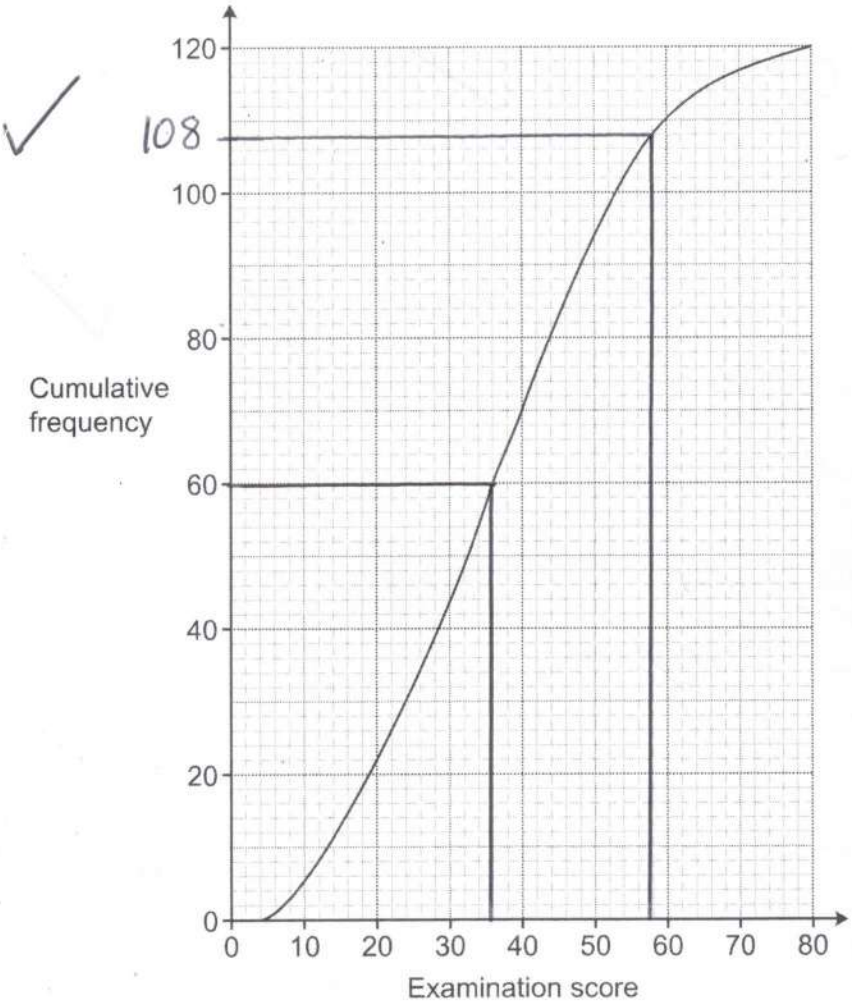
reflex AOC = 110 x 2 = 220 ✓

360 - 220

$x =$ 140 ✓ **[2]**

© OCR 2025

14 The cumulative frequency graph shows the distribution of the examination scores for 120 students.



(a) A student says that they had an examination score of 34 and so were in the top half of the 120 students.

Is the student correct?
Give a reason for your decision.

No because median = 36 (34<36) so they're in the bottom half [2]

© OCR 2025

(b) The top 10% of the 120 students are awarded a commendation.

Find the minimum mark required for a commendation.

10% of 120 = 12 ✓

58 ✓

(b) ..... **[3]**

15 y is inversely proportional to the square of x.
$y = 5$ when $x = 6$.

Find a formula linking x and y.

$y = \frac{K}{x^2}$ ✓

$5 = \frac{K}{36}$

$180 = K$ ✓

$y = \frac{180}{x^2}$ ✓

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

© OCR 2025

16 The population of fish, P, in a pond is predicted by the formula

$P = 640 \times 1.025^n$

where n is the number of years after 1st January 2020.

(a) Write down the population of fish on 1st January 2020.

640 ✓

(a) ..... **[1]**

(b) Write down the percentage increase per year used in the formula.

2·5 ✓

(b) ..... % **[1]**

(c) **(i)** Show that the formula predicts that the population of fish will reach 1000 between 1st January 2038 and 1st January 2039. **[3]**

(use 18 or 19) ✓

$P = 640 \times 1.025^{19}$
$= 1023...$

640×1.025^{18}
$= 998...$ ✓either

passes 1000 between $n = 18$ and $n = 19$ ✓All

(ii) Give **one** reason why this might not happen.

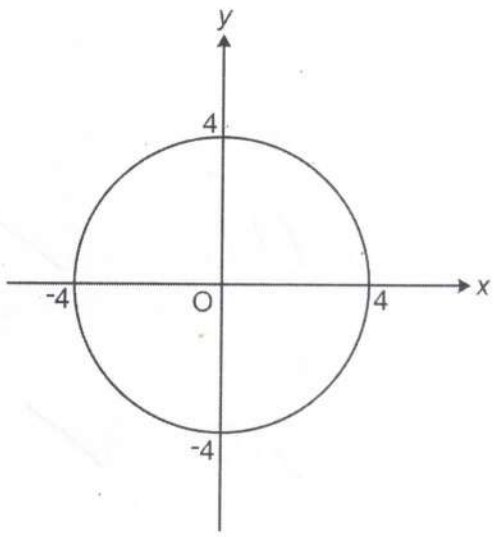
The rate may not continue **[1]**

or

There may be a max. number ✓etc

© OCR 2025

17 The diagram shows a circle, centre (0, 0).



(a) Write down the equation of the circle.

✓ ✓ or 16

(a) $x^2 + y^2 = 4^2$ ..... **[2]**

(b) Point A has coordinates (2.3, 3.3).

Show that point A does **not** lie on the circle and state, with a reason, whether it lies inside the circle or outside the circle.

$2{\cdot}3^2 + 3{\cdot}3^2 = 16{\cdot}18$ ✓✓

Point A lies outside the circle because $16{\cdot}18 > 16$ ✓

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

© OCR 2025

18 (a) A sequence is defined by

$u_{n+1} = ku_n - 2$, $u_2 = 7$ and $u_3 = 29.5$.

Find the value of k.

$29.5 = 7K - 2$ ✓

$31.5 = 7K$ ✓

(a) $k =$ 4·5 ✓OE [3]

(b) Another sequence is defined by $u_{n+1} = 6u_n - 7$.

(i) Find the value of u_1 in the case when $u_2 = 2 \times u_1$.

Let $u_1 = x$

$2x = 6x - 7$ ✓

$7 = 4x$

(b)(i) $u_1 =$ $\frac{7}{4}$ ✓oe [2]

(ii) Explain what happens to the sequence $u_{n+1} = 6u_n - 7$ when $u_1 = 1.4$.

$6 \times 1.4 - 7 = 1.4$ ✓

1·4 Keeps repeating

[1]

© OCR 2025

19 Multiply out and simplify.

$(\sqrt{5}+1)(\sqrt{15}-\sqrt{3})$

Give your answer in the form $a\sqrt{b}$, where a and b are integers.

You must show each step in your working.

$\sqrt{75} - \sqrt{15} + \sqrt{15} - \sqrt{3}$ ✓

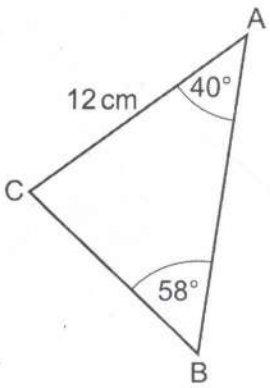
$\sqrt{25}\sqrt{3} - \sqrt{3}$ m

$5\sqrt{3} - 1\sqrt{3}$

$4\sqrt{3}$ ✓

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

20 The diagram shows triangle ABC.



Not to scale

Sine rule

AC = 12 cm, angle CAB = 40° and angle ABC = 58°.

Calculate length BC.

$\frac{BC}{\sin 40} = \frac{12}{\sin 58} \times \sin 40$ ✓✓

$BC = 9.0955...$

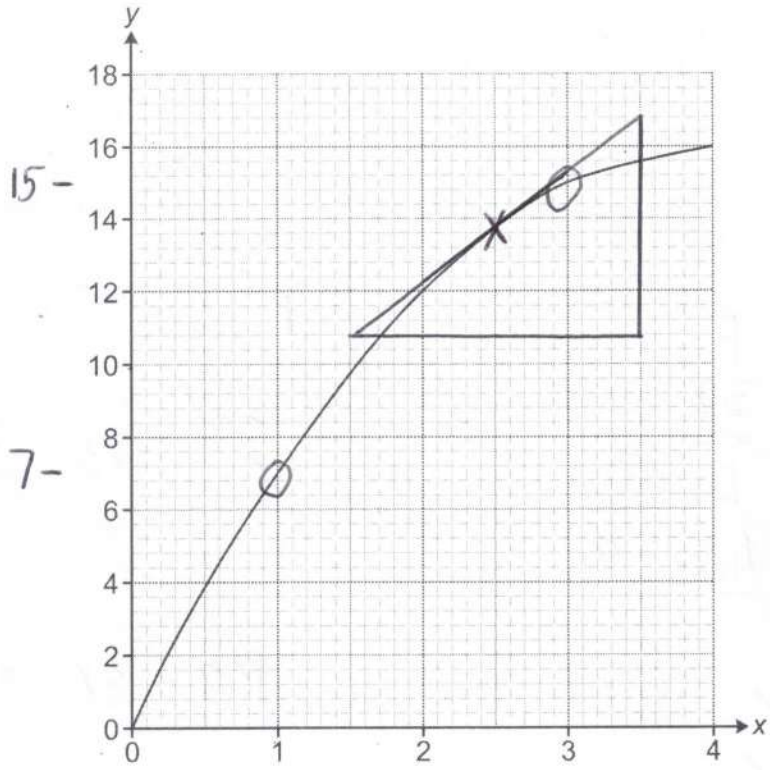
9.1 ✓

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

[9.09 → 9.1]

© OCR 2025

21 The graph of a function is drawn on the grid for $0 \leqslant x \leqslant 4$.



(a) Work out the average rate of change of the function between $x = 1$ and $x = 3$.

$\frac{15-7}{2} = 4$

(a) [3·8 → 4·2] ..... **[2]**

(b) Use the graph to estimate the gradient of the function at $x = 2.5$.
You must show working to support your estimate.



16·8 − 10·8

$\frac{6}{2}$

m ft

3

ft

(b) ..... **[4]**

© OCR 2025

22 A school has 90 students in Year 11.

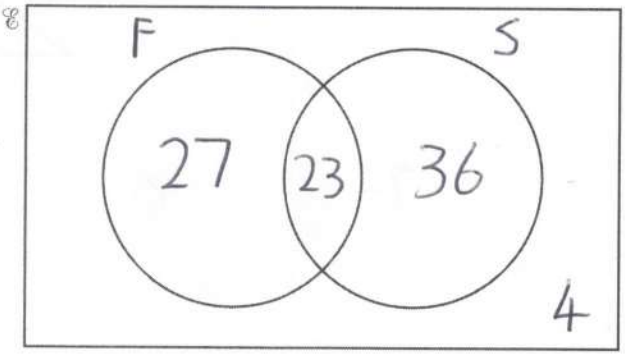
- 50 of the students study French.
- 59 of the students study Spanish.
- 4 of the students do not study either of these languages.

One the students is chosen at random.

Find the probability that the student studies French given that they study Spanish.
You may use the grid **or** the Venn diagram to help present your working if you wish.

	F	F'	
S	23	36	59
S'	27	4	31
	50	40	90

or



✓✓

109 − 86 = 23 ✓

1 ✓
2 ✓✓
5 ✓✓✓

$\frac{23}{59}$ ✓ ✓ ft

..... **[5]**

Turn over for question 23

© OCR 2025

23 **(a)** Write this expression in its simplest factorised form.

$(x+4)(x-4)^2 - x^2(x-5)$

You must show your working.

$(x-4)^2 = x^2 - 8x + 16$ ✓

	x^2	$-8x$	$+16$
x	x^3	$-8x^2$	$+16x$
$+4$	$4x^2$	$-32x$	$+64$

✓✓

$\Rightarrow x^3 - 4x^2 - 16x + 64 - x^3 + 5x^2$

$= x^2 - 16x + 64$ ✓

$= (x-8)(x-8)$ or $(x-8)^2$ ✓

$-x^2(x-5)$

$= -x^3 + 5x^2$ ✓

(a) ..... **[6]**

(b) Use your answer to part **(a)** to write down the value of x which gives the smallest value of this expression.

8 ✓

(b) $x =$ ..... **[1]**

END OF QUESTION PAPER

OCR
Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of Cambridge University Press & Assessment, which is itself a department of the University of Cambridge.

© OCR 2025