Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3948443310

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Evaluate $\frac{2}{7}+\frac{1}{5}$.

Answer ..... [1]

(b) Evaluate $\frac{2}{5}\times 1\frac{1}{5}$.

Answer ..... [1]

2 **(a)** Write $17\frac{1}{2}\%$ as a fraction in its simplest form.

Answer ..... [1]

(b) Evaluate $6+4(1-0.4)$.

Answer ..... [1]

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3 y is directly proportional to the square of x.

Given that $y = 8$ when $x = 4$, find y when $x = 3$.

Answer $y =$ ..... [2]

4 During one year, the mass of a child increased from 25 kg to 30 kg.

Calculate the percentage increase in the mass.

Answer ..... % [2]

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5 **(a)** Factorise completely $15a + 3ab$.

Answer ..... [1]

(b) Factorise $6k - xy + 2kx - 3y$.

Answer ..... [2]

6 $\mathrm{f}(x) = \dfrac{3}{x+4}$

(a) Find $\mathrm{f}(-6)$.

Answer ..... [1]

(b) Find $\mathrm{f}^{-1}(x)$.

Answer $\mathrm{f}^{-1}(x) =$ ..... [2]

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7 The value of each term of a sequence is 4 more than the value of the term before it.
The third term is 17 and the fourth term is 21.

(a) Find the first term.

Answer ..... [1]

(b) Find an expression for the nth term of this sequence.
Give your answer in its simplest form.

Answer ..... [2]

8 **(a)** Write down an irrational number which has a value between 4 and 5.

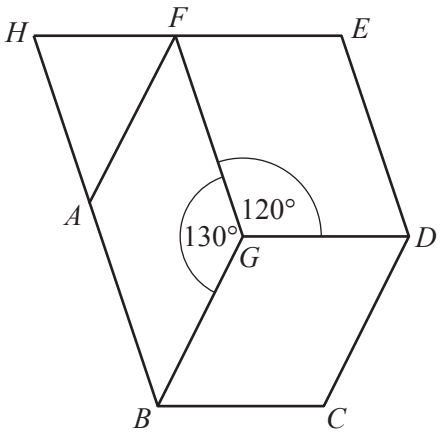
Answer ..... [1]

(b) Kofi is using number cards to form a 5-digit number.
His number is a multiple of 8.
Complete the final digit of his number.

1	2	3	4	

[1]

9



In the diagram, $AFGB$, $BGDC$ and $FEDG$ are parallelograms.
EF and BA produced meet at H.
$B\hat{G}F = 130°$ and $D\hat{G}F = 120°$.

(a) Find $B\hat{G}D$.

Answer $B\hat{G}D =$ ..... [1]

(b) Find $A\hat{B}G$.

Answer $A\hat{B}G =$ ..... [1]

(c) Find $H\hat{F}G$.

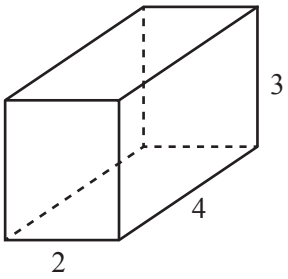
Answer $H\hat{F}G =$ ..... [1]

(d) Find $F\hat{H}A$.

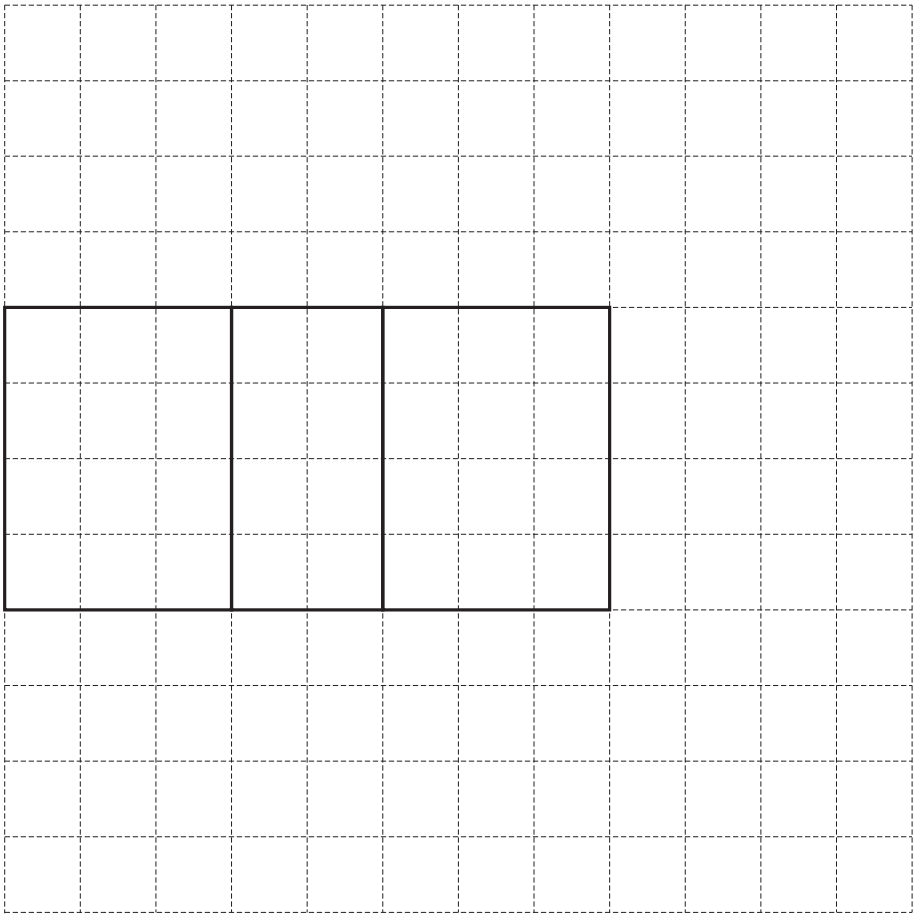
Answer $F\hat{H}A =$ ..... [1]

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10 The diagram shows a **closed** box.
The box is a cuboid.
The measurements are in centimetres.



On the grid below, complete an accurate drawing of the net of the box.
Do **not** draw outside the grid.



[2]

11 $N = 4 \times 10^5$

Giving your answers in standard form, find

(a) N^2,

Answer ..... [2]

(b) $\frac{1}{N}$.

Answer ..... [2]

12 By writing each number correct to 1 significant figure, calculate an estimate for the value of

$$\frac{614.2 \times 0.0304}{19.88}.$$

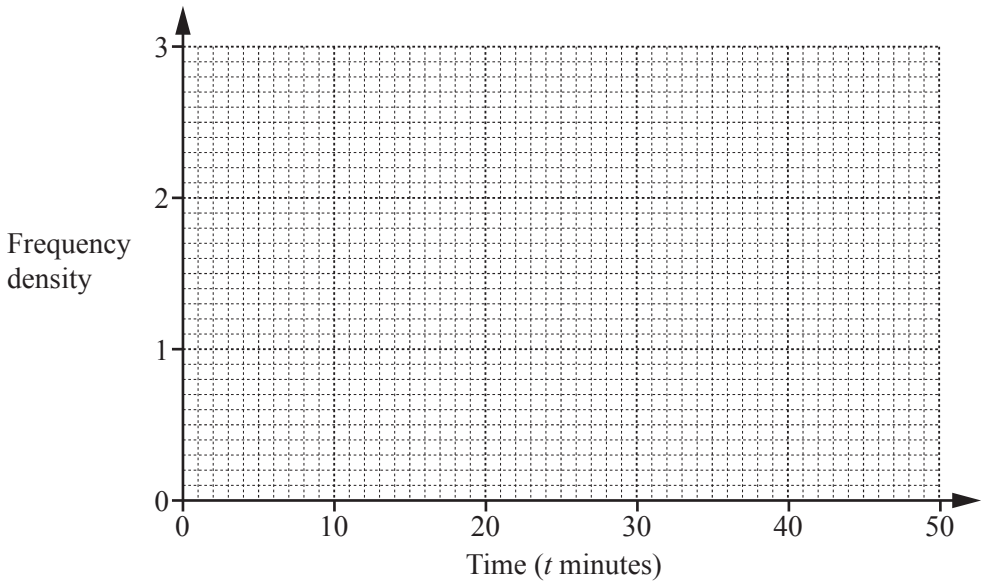
Answer ..... [2]

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13 The lengths of the times of telephone calls made by Ellie during one week are summarised in the table.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 25$	$25 < t \leqslant 30$	$30 < t \leqslant 50$
Frequency	10	15	10	12	16

On the grid, draw a histogram to illustrate the distribution of these times.



[3]

14 **(a)** Evaluate $\left(\frac{1}{3}\right)^0 - \left(\frac{1}{3}\right)^2$.

Answer ..... [1]

(b) Simplify $\left(\frac{27}{x^6}\right)^{-\frac{1}{3}}$.

Answer ..... [2]

15 A five-sided spinner is numbered 1, 2, 3, 4 and 5.
Ashraf spun the spinner 200 times.
The results are shown in the table.

Number spinner lands on	1	2	3	4	5
Frequency	30	25	50	55	40

(a) Calculate the relative frequency that the spinner lands on 3.

Answer ..... [1]

(b) Meriam spins the spinner 20 times.

How many times would you expect the spinner to land on 3?

Answer ..... [1]

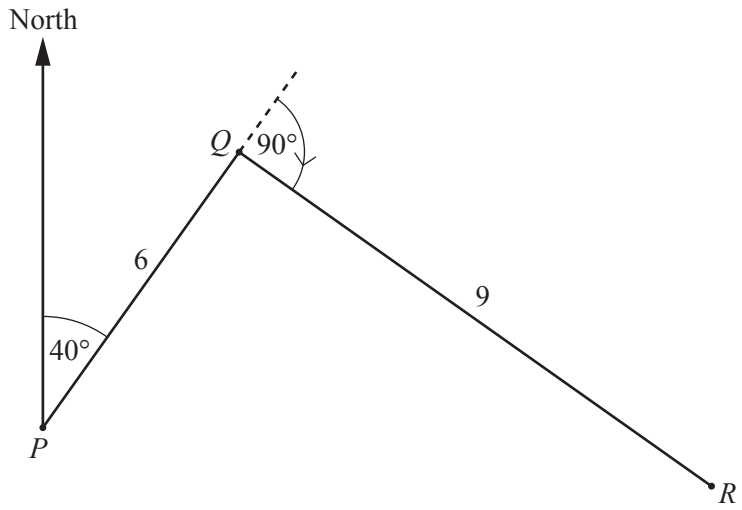
(c) Ashraf claims: "My results show that the spinner is fair".
Is his claim correct?
Give a reason for your answer.

..... because .....

..... [1]

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16



A boat travels from P to Q.
At Q, it turns through 90° and travels to R as shown in the diagram.

It then returns from R to Q, and then to P, following the same route in reverse.
$PQ = 6$ km and $QR = 9$ km.

The first part of the journey, from P to Q to R, takes 3 hours.
The return part of the journey, from R to Q to P, takes 2 hours.

(a) Calculate the average speed for the whole journey from P to Q to R and back from R to Q to P.

Answer ..... km/h [2]

(b) The bearing of Q from P is 040°.

(i) Calculate the bearing of R from Q.

Answer ..... [1]

(ii) Calculate the bearing of P from Q.

Answer ..... [1]

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17 $120 = 2^3 \times 3 \times 5$

(a) Express 1200 as the product of its prime factors.

Answer ..... [1]

(b) Find the smallest value of n, such that $120n$ is a square number.

Answer ..... [1]

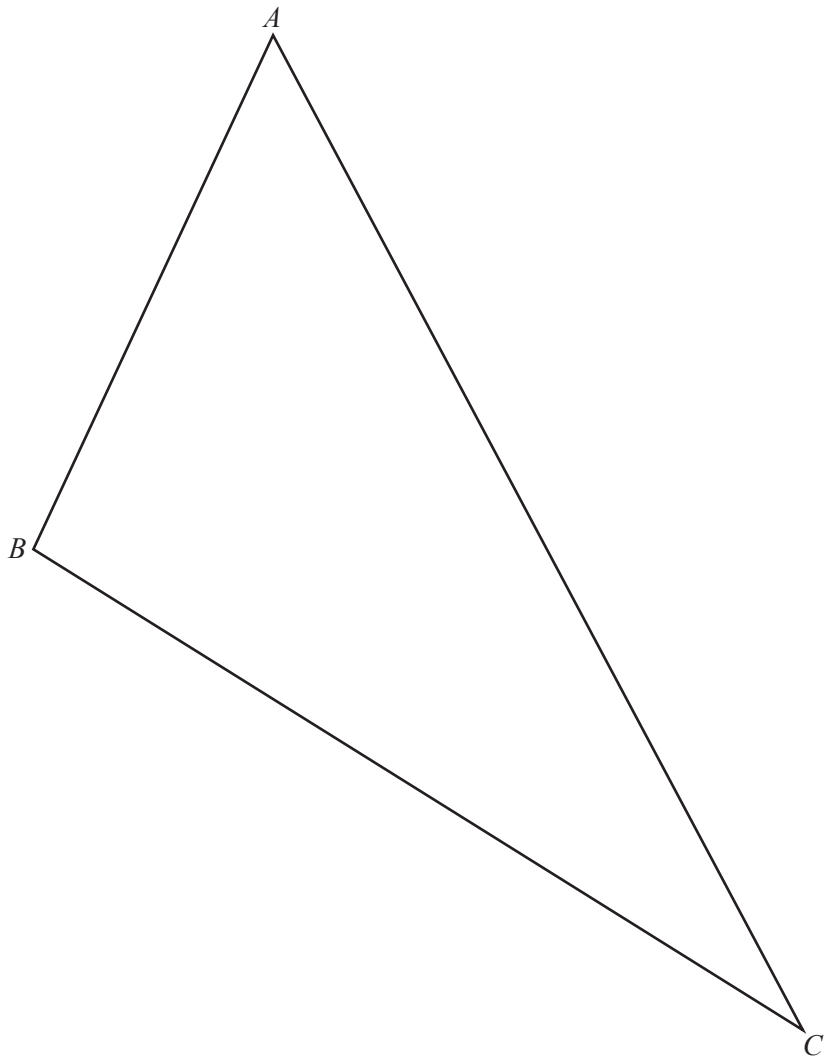
18 Four interior angles of a hexagon are 100°, 110°, 120° and 140°.
The remaining two interior angles are equal to each other.

Calculate the size of one of these interior angles.

Answer ..... [3]

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19



(a) Measure angle *ABC*.

Answer ..... [1]

(b) In this part, use a pair of compasses and a straight edge only.

(i) Construct the bisector of angle *BAC*. [2]

(ii) Construct the perpendicular bisector of *AB*. [2]

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[Turn over

20 $\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 0 & 1 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 4 & 3 \\ 6 & -2 \end{pmatrix}$

(a) Express $2\mathbf{A} - \mathbf{B}$ as a single matrix.

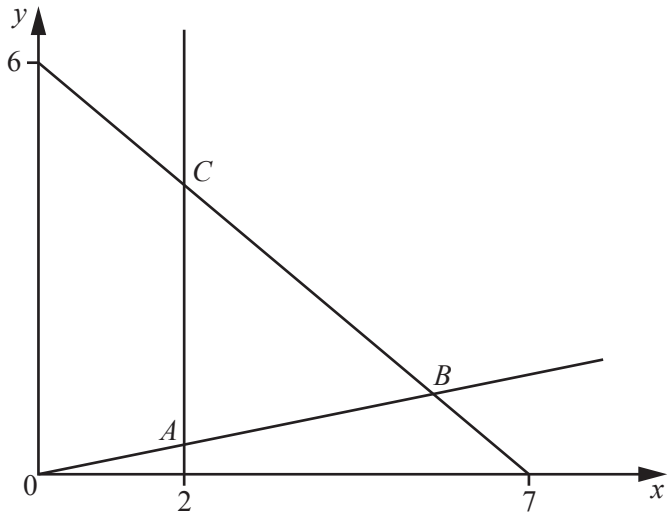
Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Find $\mathbf{A}^{-1}$.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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21



In the diagram, the equation of the line

- through B and C is $6x + 7y = 42$
- through A and B is $y = \frac{x}{5}$.

(a) The region **inside** triangle ABC is defined by three inequalities.
One of these is $y > \frac{x}{5}$.

Write down the other two inequalities.

Answer .....

..... [2]

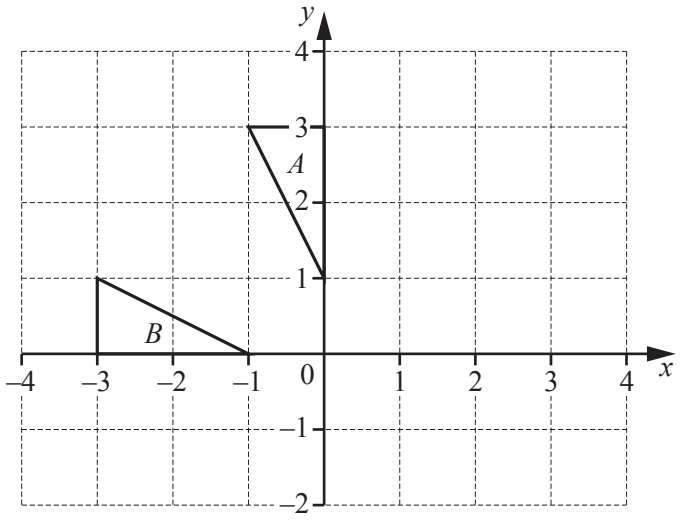
(b) The line $y = kx$ passes through triangle ABC.

Find all the possible **integer** values of k.

Answer ..... [2]

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22



The diagram shows triangles *A* and *B*.

(a) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

.....

..... [2]

(b) Triangle *A* is mapped onto triangle *C* by a rotation, through 90° clockwise, centre (0, 0).

Draw, and label, triangle *C* on the diagram. [2]

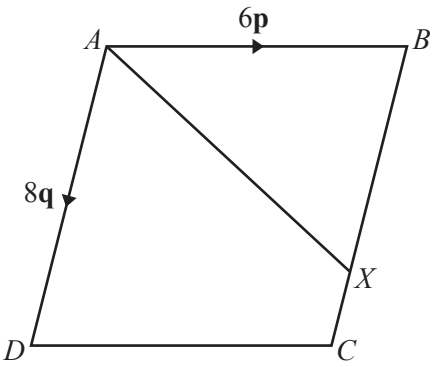
(c) Triangle *B* is mapped onto triangle *C* by the transformation T.

Find the matrix that represents the transformation T.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

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23



In the diagram, $ABCD$ is a parallelogram.
X is the point on BC such that $BX : XC = 3 : 1$.
$\overrightarrow{AB} = 6\mathbf{p}$ and $\overrightarrow{AD} = 8\mathbf{q}$.

(a) Express $\overrightarrow{BX}$ in terms of **p** and/or **q**.

Answer ..... [1]

(b) Express $\overrightarrow{AX}$ in terms of **p** and/or **q**.

Answer ..... [1]

(c) Y is the point such that $\overrightarrow{CY} = 3\mathbf{p} + \mathbf{q}$.

(i) Express $\overrightarrow{AY}$ in terms of **p** and/or **q**.

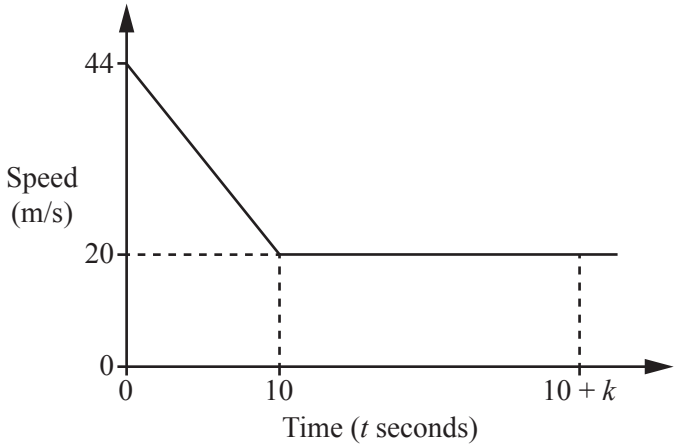
Answer ..... [1]

(ii) Find the ratio $AX : AY$.

Answer ..... : ..... [1]

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24 The diagram is the speed–time graph of part of a train's journey.



The train slows down uniformly from a speed of 44 m/s to a speed of 20 m/s in a time of 10 seconds. It then continues at a constant speed of 20 m/s.

(a) Find the deceleration when $t = 5$.

Answer ..... m/s^2 [1]

(b) Find the speed when $t = 5$.

Answer ..... m/s [1]

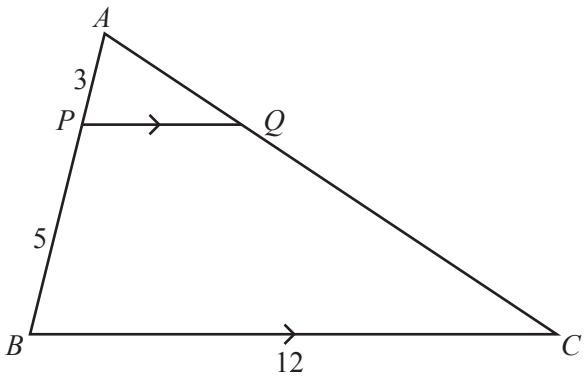
(c) The distance travelled from $t = 0$ to $t = 10$ is equal to the distance travelled from $t = 10$ to $t = 10 + k$.

Find k.

Answer $k =$ ..... [3]

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25



In the triangle ABC, P and Q are points on AB and AC such that PQ is parallel to BC.

$AP = 3$ cm, $PB = 5$ cm and $BC = 12$ cm.

(a) Find PQ.

Answer ..... cm [2]

(b) The area of triangle ABC is x cm^2.

Find an expression, in terms of x, for the area of trapezium $BCQP$.

Answer ..... cm^2 [2]

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