Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2025

Mathematics

StemUp Model Solution

Unit M8 Paper 2
(With calculator)
Higher Tier



[GMC82]

GMC82

WEDNESDAY 4 JUNE, 10.45am – 12 NOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only. **Do not write with a gel pen.**
Questions which require drawing or sketching should be completed using an HB pencil.
All working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.
Answer **all fourteen** questions.

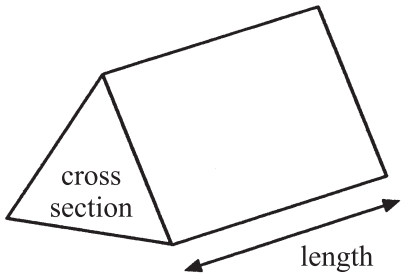
INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

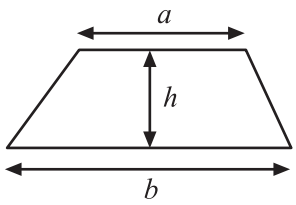
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Formula Sheet

Volume of prism = area of cross section × length

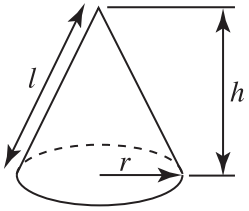


Area of trapezium = $\frac{1}{2}(a+b)h$



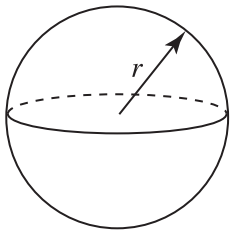
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

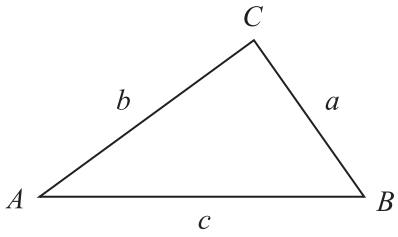


Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



In any triangle *ABC*



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$

1 A spinner is spun 400 times.

The table shows some of the numbers of times it landed on the number 4 and some of the relative frequency values.

Number of spins	Number of fours	Relative frequency
100	20	0.2
200	39	
300		0.24
400	102	0.255

(a) Calculate the missing relative frequency value.

Relative frequency = 39 ÷ 200 = 0.195

Answer *0.195* [1]

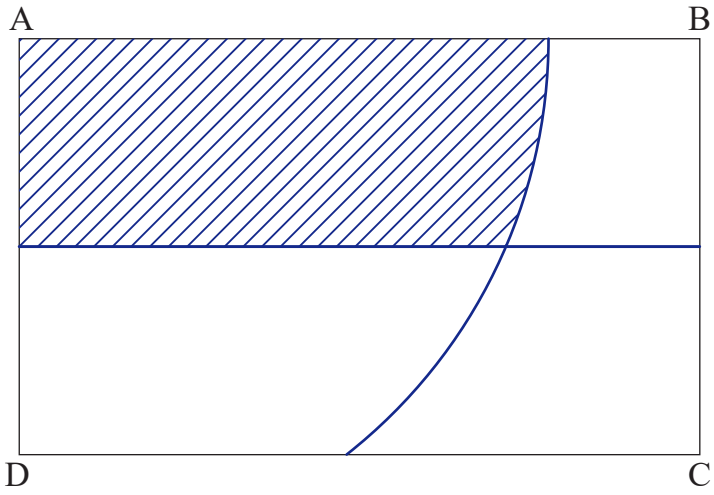
(b) Calculate the number of times it landed on 4 for the first 300 spins.

Number of fours = 300 × 0.24 = 72

Answer *72* [1]

[Turn over

2



ABCD is a rectangle.

Shade the region inside the rectangle which is closer to AB than to DC and less than 7 cm from A.

[3]

3 Fill in the blanks.

(a) $d^{12} \div d^3 = d^{\boxed{9}}$

(b) $d^2 \times d^{\boxed{6}} = d^8$

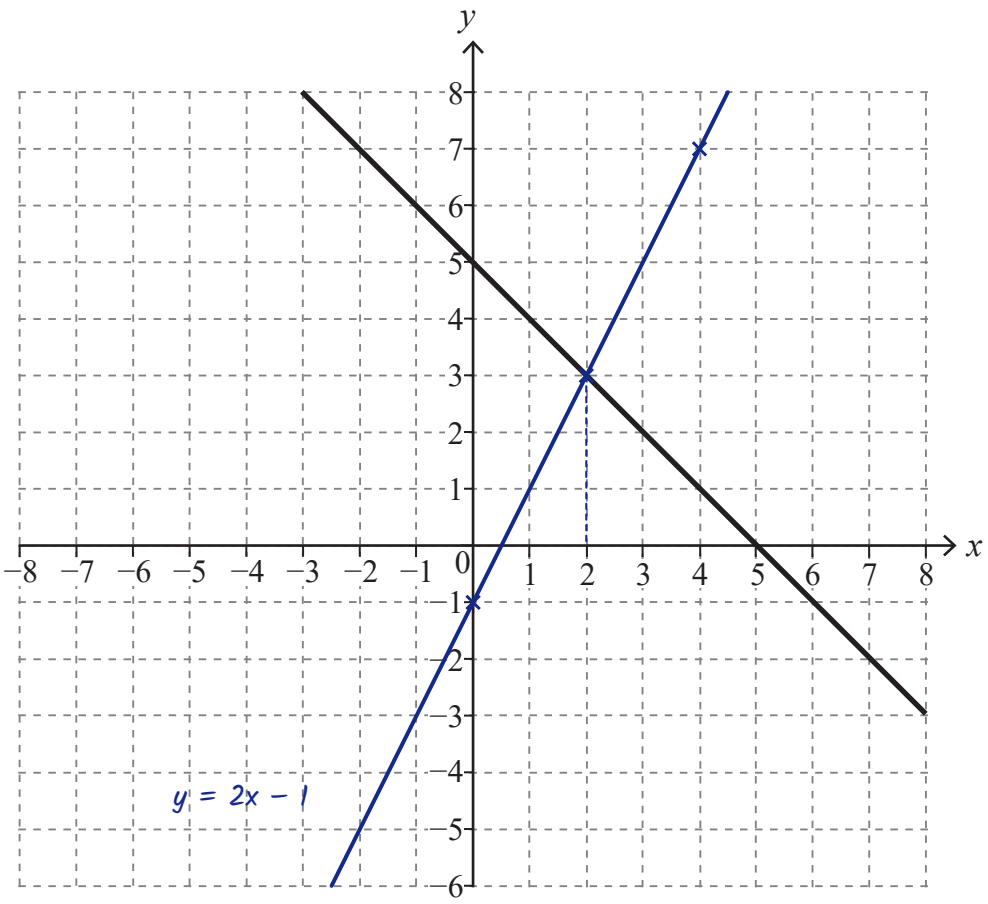
(c) $\dfrac{d^{30}}{(d^2)^5} = d^{\boxed{20}}$

[3]

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4 By drawing a suitable line on the grid, solve the simultaneous equations

$$y = 5 - x \quad \text{and} \quad y = 2x - 1$$



x: 0 2 4
y: −1 3 7
Lines cross at (2, 3)

Answer $x =$ 2 $y =$ 3 [4]

[Turn over

5 Solve the inequality $3(2x + 1) < 8$

$6x + 3 < 8$

$6x < 5$

$x < \frac{5}{6}$

Answer $x < \frac{5}{6}$ [3]

6 Make x the subject of the formula $5x = vx + 4y$

$5x - vx = 4y$

$x(5 - v) = 4y$

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

Answer $x =$ $\frac{4y}{5 - v}$ [3]

[Turn over

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7 **(a)** Rachel is buying a scoop of ice cream and a scoop of sorbet.

The eight flavours of ice cream are mint, peach, lemon, vanilla, butterscotch, honeycomb, chocolate and coffee.

The five flavours of sorbet are mint, peach, lemon, raspberry and strawberry.

In how many ways can she choose one scoop of ice cream and one scoop of sorbet?

$8 \times 5 = 40$

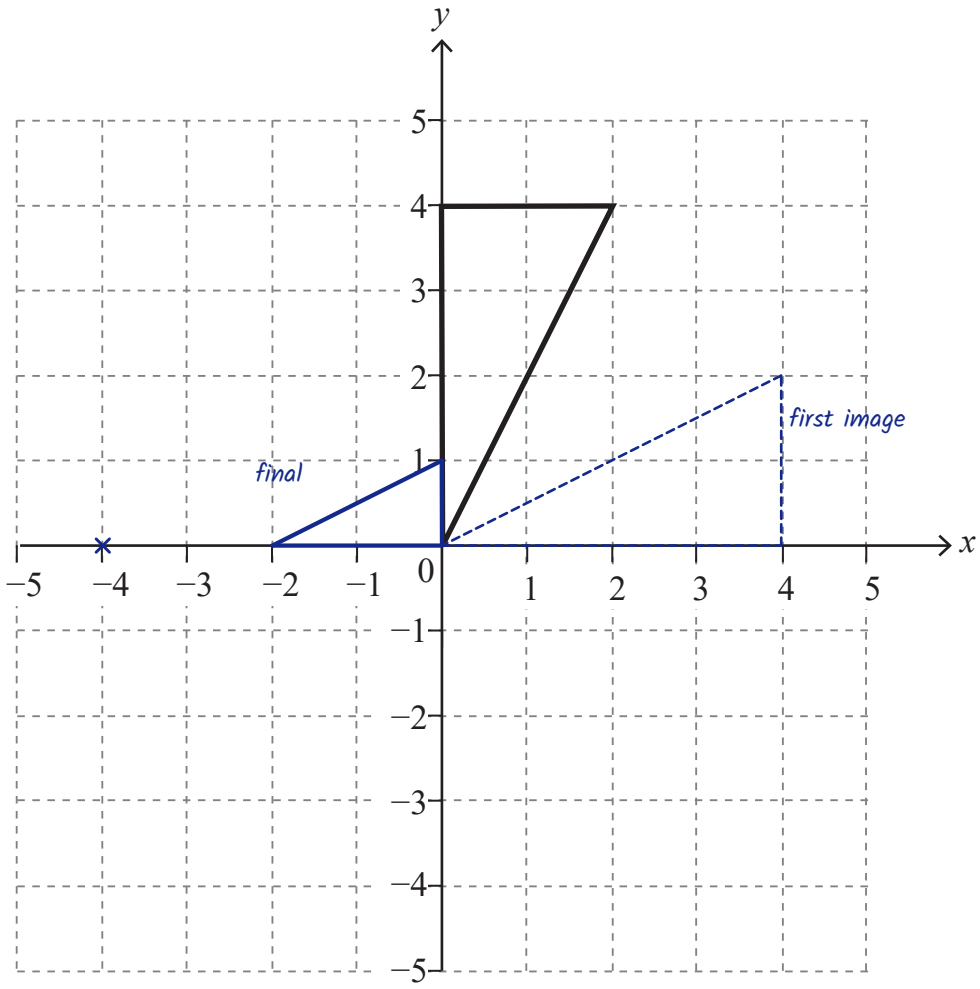
Answer 40 [2]

(b) In how many ways can she choose one scoop of ice cream and one scoop of sorbet which are different flavours?

mint, peach and lemon are in both,
so take away those 3 pairs:
$40 - 3 = 37$

Answer 37 [1]

8 Draw the image of the triangle after a reflection in the line $y = x$, followed by an enlargement of scale factor $\frac{1}{2}$ with centre $(-4, 0)$.

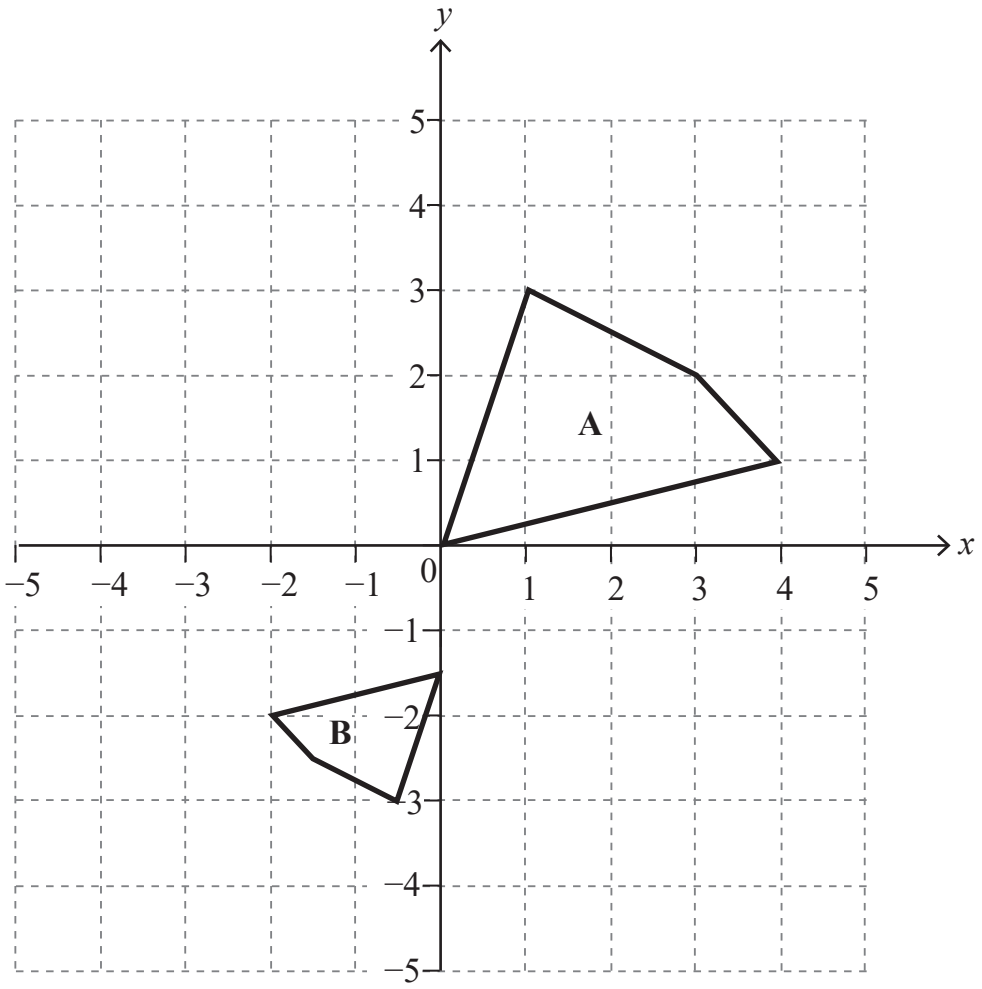


[4]

Reflection in y = x: (0, 0), (4, 0), (4, 2)
Enlargement scale factor ½ centre (−4, 0): (−2, 0), (0, 0), (0, 1)

[Turn over

9



Describe fully the single transformation that maps Shape A to Shape B.

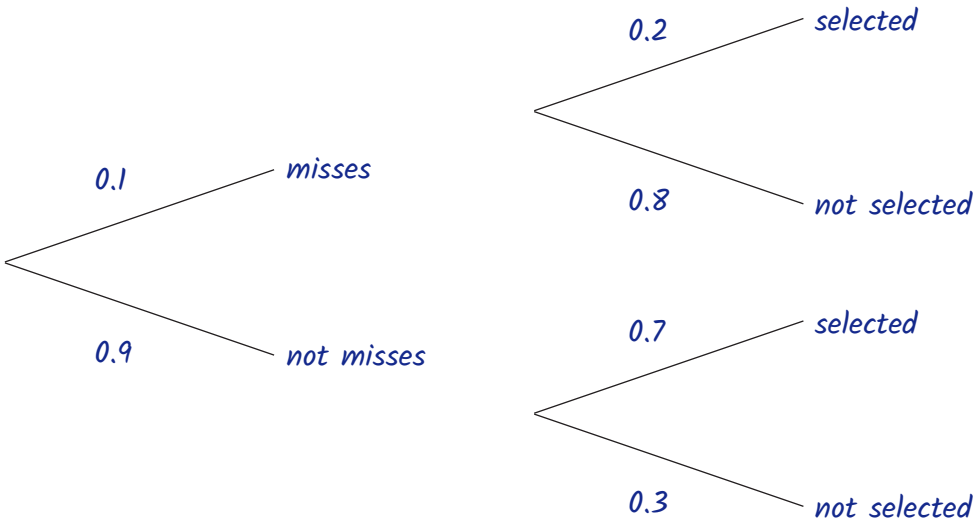
Answer Enlargement, scale factor $-\frac{1}{2}$, centre (0, −1) [3]

10 The probability that Jo misses the midweek practice is 0.1

If Jo misses the midweek practice, the probability she will be selected for the Saturday match is 0.2

If Jo does not miss the midweek practice, the probability she will be selected for the Saturday match is 0.7

Complete the tree diagram and use it to find the probability that Jo will not be selected for the Saturday match.

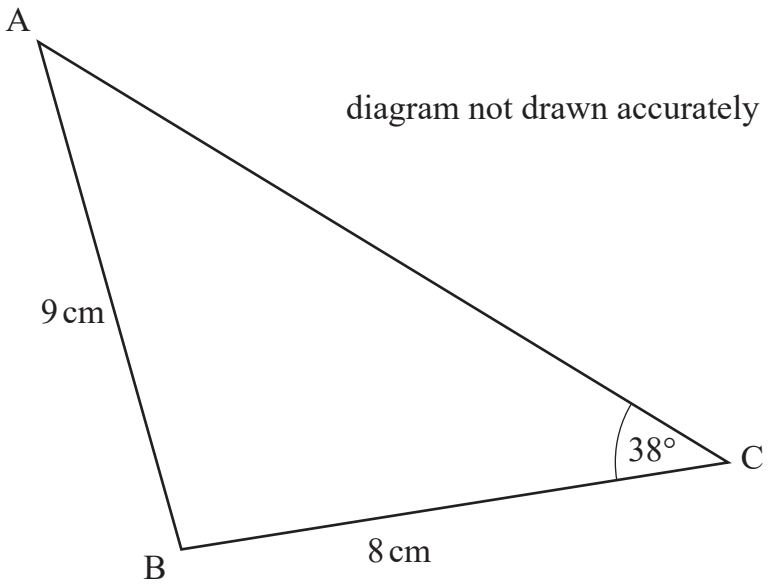


P(not selected) = P(M, NS) + P(NM, NS)
= 0.1 × 0.8 + 0.9 × 0.3
= 0.08 + 0.27
= 0.35

Answer 0.35 [4]

[Turn over

11



Calculate the value of angle ABC in the triangle above.

$\frac{\sin A}{8} = \frac{\sin 38°}{9}$

$\sin A = 8 \times \sin 38° \div 9 = 0.547254...$

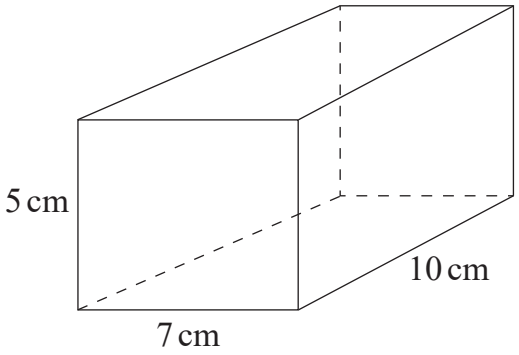
$A = \sin^{-1}(0.547254...) = 33.17887...°$

Angle ABC = $180° - 38° - 33.17887...°$

Angle ABC = $108.82112...° = 108.8°$

Answer 108.8 ° [3]

12



A cuboid measures 5 cm by 7 cm by 10 cm as shown.

(a) Calculate the length of a space diagonal of the cuboid.

$d^2 = 5^2 + 7^2 + 10^2 = 25 + 49 + 100 = 174$

$d = \sqrt{174} = 13.19090596...$

Answer 13.2 cm [2]

(b) Calculate the angle the space diagonal makes with one of the largest faces of the cuboid.

Largest face is 7 cm by 10 cm, so the angle is between the diagonal and its projection on that face

opposite side = 5 cm, hypotenuse = 13.19090596...

$\sin\theta = 5 \div 13.19090596... = 0.379049...$

$\theta = \sin^{-1}(0.379049...) = 22.27478...°$

Answer 22.3 ° [3]

[Turn over

13 A box contains six red candles and five green candles.

Tom takes two candles from the box at random.

What is the probability that the two candles are the same colour?

$P(2 \text{ red}) = \frac{6}{11} \times \frac{5}{10} = \frac{30}{110}$

$P(2 \text{ green}) = \frac{5}{11} \times \frac{4}{10} = \frac{20}{110}$

$P(\text{same colour}) = \frac{30}{110} + \frac{20}{110} = \frac{50}{110} = \frac{5}{11}$

Answer $\frac{5}{11}$ [4]

14

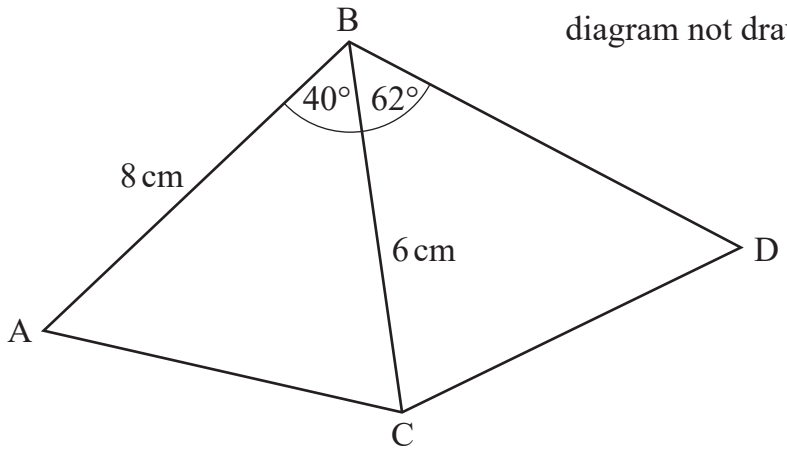


diagram not drawn accurately

The triangles ABC and BCD have the same area.

AB = 8 cm, BC = 6 cm, angle ABC = 40° and angle CBD = 62°

Find the length of CD.

Area ABC = Area BCD

$\frac{1}{2} \times 8 \times 6 \times \sin 40° = \frac{1}{2} \times 6 \times BD \times \sin 62°$

$15.42690... = 2.648842... \times BD$

$BD = \frac{8 \times \sin 40°}{\sin 62°} = 5.824015965...$

$CD^2 = 6^2 + BD^2 - 2 \times 6 \times BD \times \cos 62°$

$CD^2 = 36 + 5.824015...^2 - 12 \times 5.824015... \times \cos 62°$

$CD^2 = 37.10864...$

$CD = \sqrt{37.10864...} = 6.091686... = 6.09$

Answer 6.09 cm [6]

SOURCES:
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THIS IS THE END OF THE QUESTION PAPER

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Question Number	**Marks**
1	
2	
3	
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Total Marks	

Examiner Number

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