Centre Number

Candidate Number

Rewarding Learning

General Certificate of Secondary Education
January 2014

Mathematics

Unit T6 Paper 1

(Non-calculator)
Higher Tier

[GMT61]

GMT61

WEDNESDAY 15 JANUARY 9.15am–10.30am

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

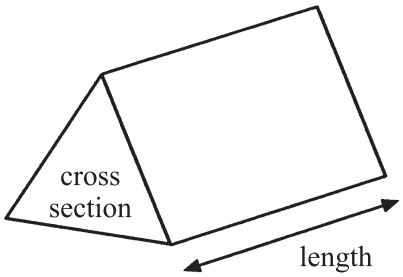
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all sixteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

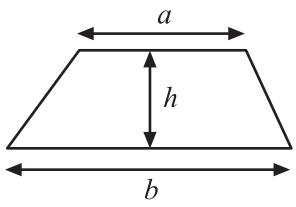
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 14 and 16**.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

Volume of prism = area of cross section × length

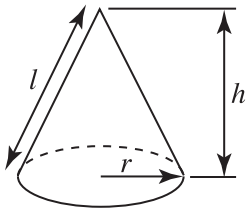


Area of trapezium $= \frac{1}{2}(a+b)h$



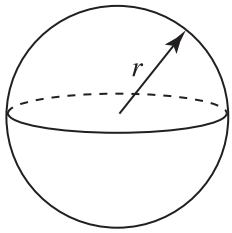
Volume of cone $= \frac{1}{3}\pi r^2 h$

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

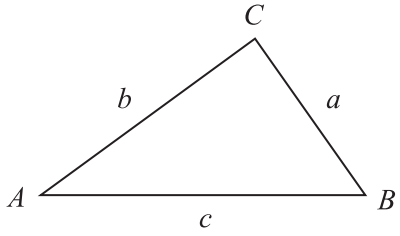


Volume of sphere $= \frac{4}{3}\pi r^3$

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: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

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(Questions start overleaf)

1 In planning a school trip Mr Davison uses the following information.

For every 20 pupils you will need

16 bottles of milk
24 rounds of sandwiches
10 bars of chocolate

Complete the following for 50 pupils on a school trip

_____ bottles of milk

_____ rounds of sandwiches

_____ bars of chocolate [3]

Examiner Only	
Marks	Remark
Total Question 1	

2 Estimate the value of

$$\frac{28.6 + 302.9}{116.1 - 115.6}$$

Show all your working.

Answer _____ [2]

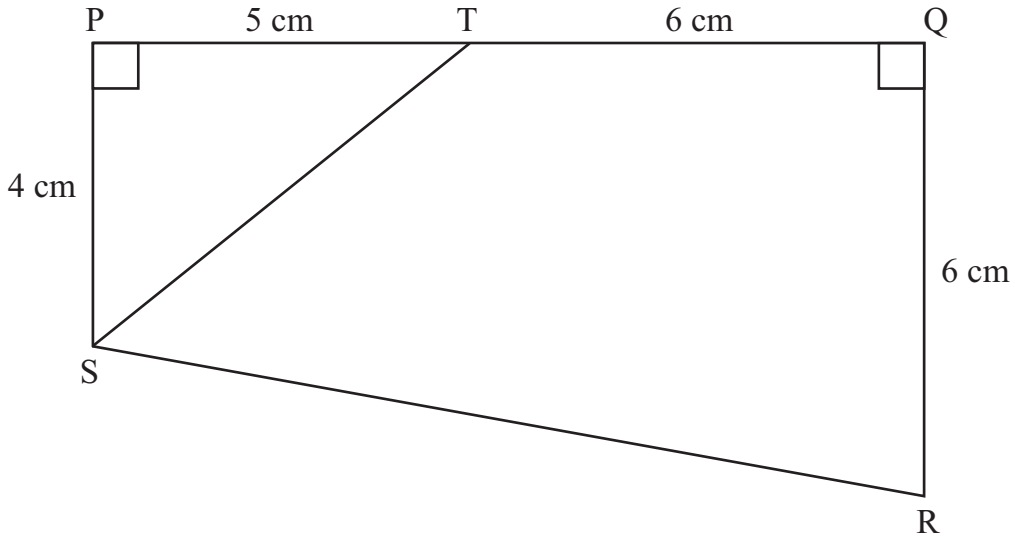
Examiner Only	
Marks	Remark
Total Question 2	

[Turn over

3 PQRS is a trapezium. PS and QR are perpendicular to the line PQ.

PT = 5 cm, TQ = 6 cm, PS = 4 cm and QR = 6 cm.

Diagram not drawn accurately



Find the area of the

(a) trapezium PQRS,

Answer _____ cm^2 [2]

(b) quadrilateral TQRS.

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark
Total Question 3	

4 Work out the value of $\frac{R(3S+T)}{5}$ when $R = -3$, $S = 4$, $T = -2$

Answer _____ [3]

Examiner Only	
Marks	Remark

Total Question 4

5 Which of the statements below describes the number $n^2 + 1$, where n represents any whole number?
Explain your answer.

"always even" **"always odd"** **"could be even or odd"**

Answer _____

because _____

_____ [2]

Total Question 5

[Turn over

6 A box contains pens.
There are 8 black, 6 blue, 4 green and the rest are red.
The probability of taking a red pen from the box is $\frac{1}{10}$
How many red pens are in the box?

Answer _____ [2]

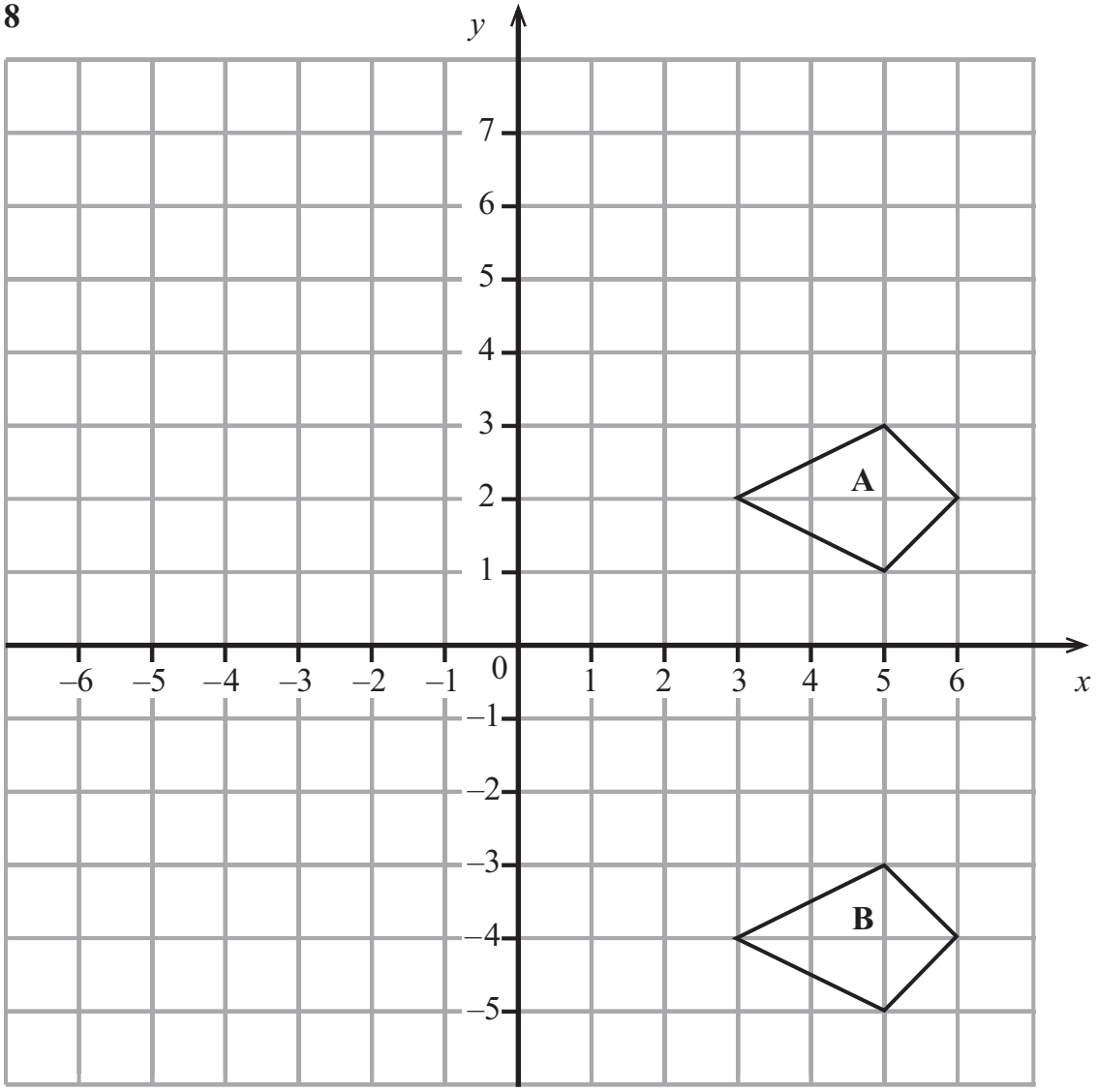
Examiner Only	
Marks	Remark
Total Question 6	

7 Find the reciprocal of 1.2

Answer _____ [2]

Total Question 7	

8



(a) Describe fully a single transformation which maps shape A onto shape B.

Answer _____ [2]

(b) Describe fully a different single transformation which maps shape A onto shape B.

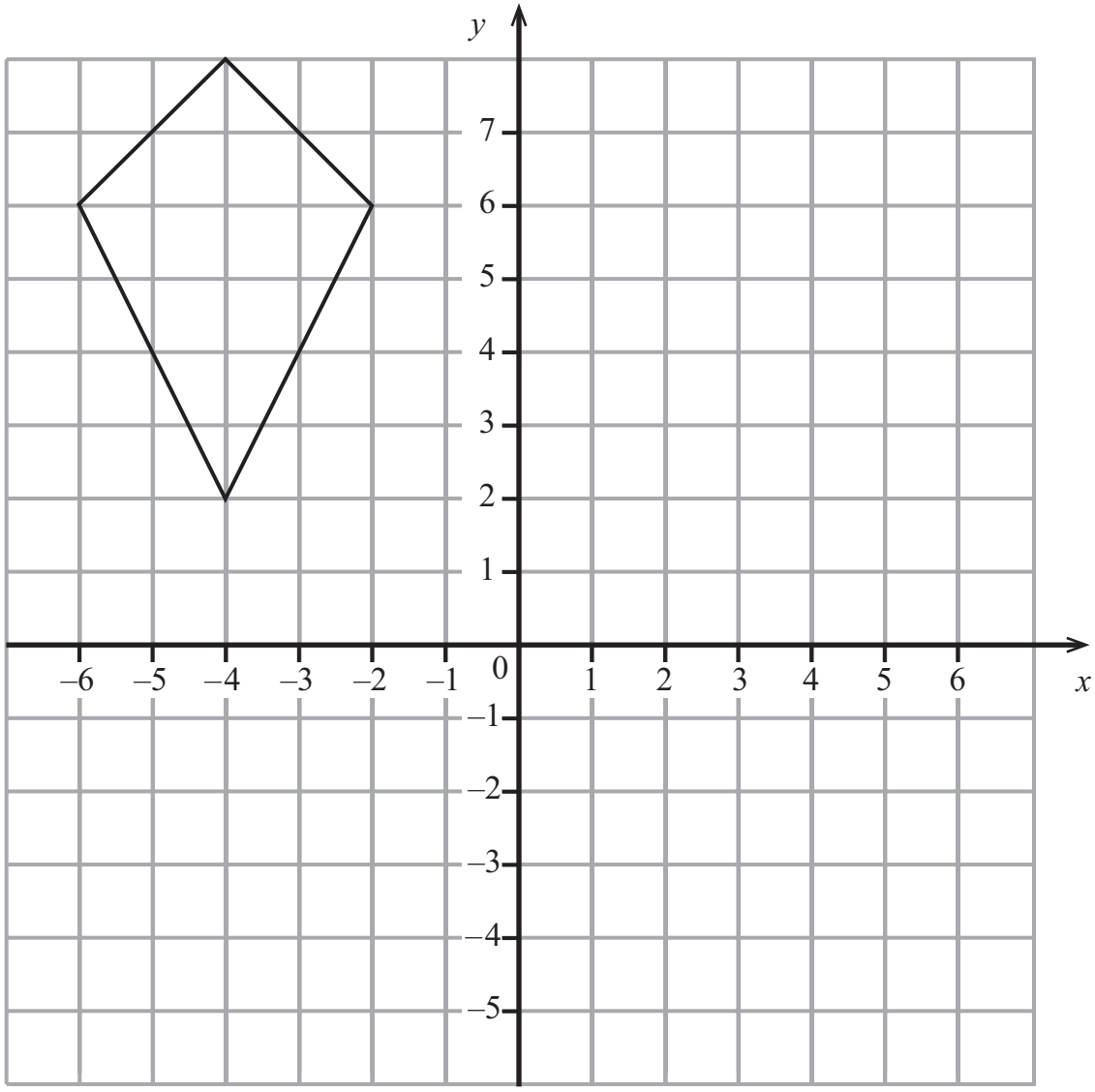
Answer _____ [2]

(c) Draw the image of shape A after a rotation of 90° anti-clockwise about the point (–1, 0). [2]

Examiner Only	
Marks	Remark
Total Question 8	

[Turn over

9 Enlarge the shape by scale factor $\frac{1}{2}$ using the centre (0, 0).



[2]

Examiner Only	
Marks	Remark
Total Question 9	

10 Find the value of $(3.46 \times 10^{-3}) \times (2.5 \times 10^{-6})$, giving your answer in standard form.

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 10	

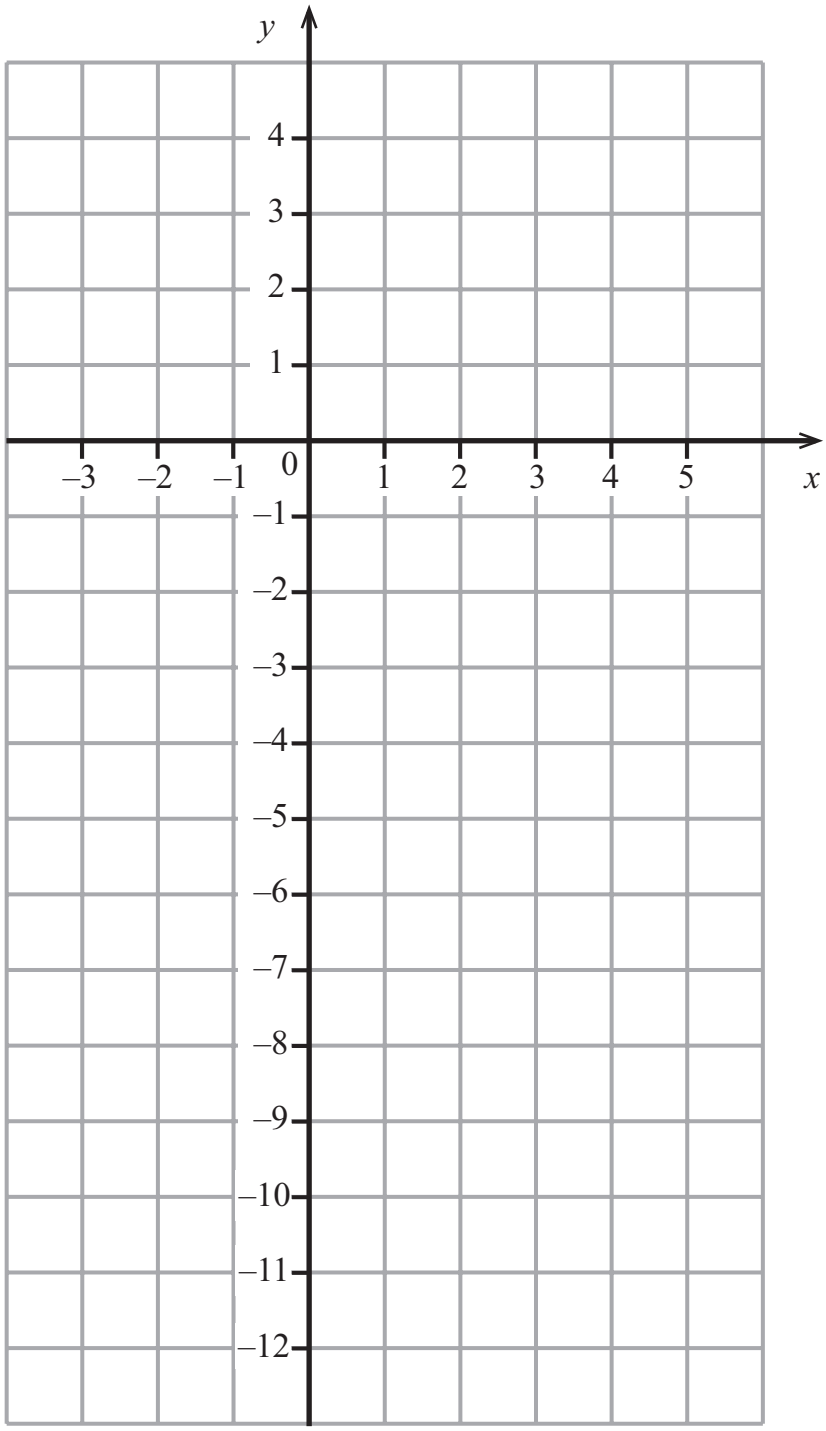
[Turn over

11 **(a)** Complete the table of values for $y = 3x - x^2 - 1$

x	–2	–1	0	1	2	3	4
y		–5	–1	1	1		–5

[2]

(b) On the grid below, draw the graph of $y = 3x - x^2 - 1$ between $x = -2$ and $x = 4$



[2]

Examiner Only	
Marks	Remark

(c) Use your graph to work out the values of x for which $y = -3$

Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark
Total Question 11	

12 Simplify $(5y^3)^2$

Answer _____ [2]

Total Question 12

13 A wooden spear of length 130 cm is made from a cylinder and a cone. The cylinder has radius 3 cm and length 120 cm.
Calculate the volume of the spear, giving your answer in terms of π.

Answer _____ cm^3 [5]

Total Question 13

Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

14 Martha has a bag of fruit sweets. There are 5 red, 4 green and 3 yellow sweets.

(a) Martha says, "I hate green sweets. If I take a green sweet, I am going to put it back in the bag and try again."

What is the probability that Martha takes two green sweets in succession?

Answer _____ [2]

(b) If Martha had said, "I hate green sweets. If I take a green sweet, I am going to throw it out and try again," would the probability of taking two green sweets in succession increase or decrease?
Justify your answer.

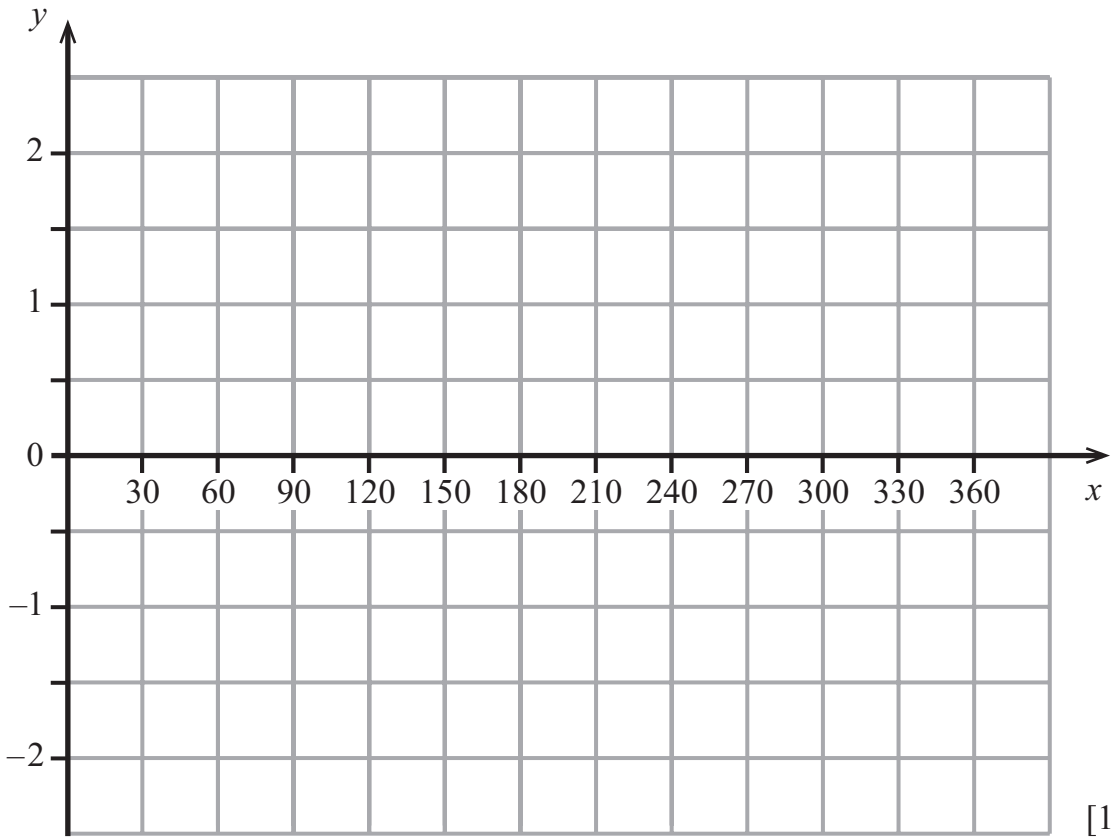
Answer _____ because _____

_____

_____ [2]

Total Question 14

15 **(a)** Sketch the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$ on the axes below.



[1]

(b) Use your graph from part **(a)** to solve the equation $\cos x = -0.75$

Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark
Total Question 15	

[Turn over

Quality of written communication will be assessed in this question.

16 Emer says she has worked out that $3 - \sqrt{5}$ is a square root of $14 - 6\sqrt{5}$

Showing all your work clearly prove that Emer is correct.

[2]

Examiner Only	
Marks	Remark
Total Question 16	

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For Examiner's use only	
Question Number	**Marks**
1	
2	
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13	
14	
15	
16	
Total Marks	

Examiner Number

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