AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____
I declare this is my own work.

GCSE
MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

Wednesday 8 November 2023 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments
- the Formulae Sheet (enclosed).

You must **not** use a calculator.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26	
TOTAL	

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Answer **all** questions in the spaces provided.

1 Work out the lowest common multiple (LCM) of 20 and 25

[1 mark]

Answer _____

2 Work out the size of an **exterior** angle of a regular hexagon.

[1 mark]

Answer _____ °

3 *A* is (2, 0) and *B* is (0, –4)

Work out the midpoint of *AB*.

[1 mark]

Answer (_____ , _____)

Do not write outside the box

4 Simplify $a + 3a \div a$

[1 mark]

Answer _____

5 Work out the value of $(8^2 \times 8) \div (8^9 \div 8^5)$

Give your answer as a decimal.

[3 marks]

Answer _____

Turn over for the next question

7

Do not write outside the box

6 A music company releases 10 albums.

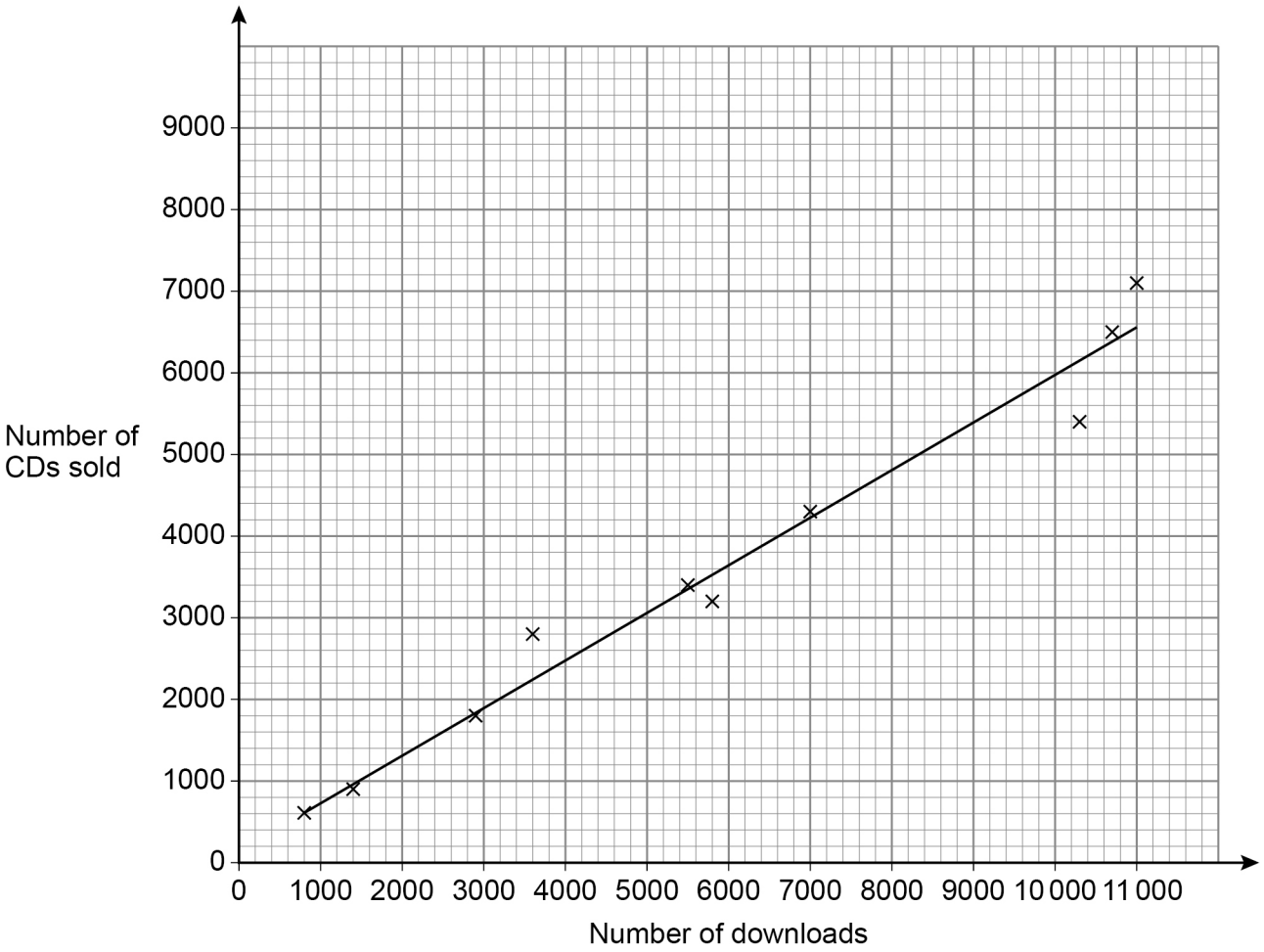
The scatter graph shows, for each album,

the number of downloads on the first day

and

the number of CDs sold on the first day.

A line of best fit has been drawn on the scatter graph.



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6 (a) The scatter graph shows positive correlation.

Describe the relationship between number of downloads and number of CDs sold.

[1 mark]

6 (b) The company earns

£2.50 for each download

and

£3 for each CD sold.

The company releases another album.

On the first day it has 9000 downloads.

Estimate the **total** amount the company earns from downloads and CDs of the album that day.

[3 marks]

Answer £ _____

4

Do not write outside the box

7 70% of a number is 350

Work out 120% of the number.

[3 marks]

Answer _____

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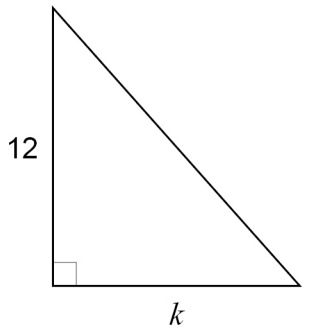
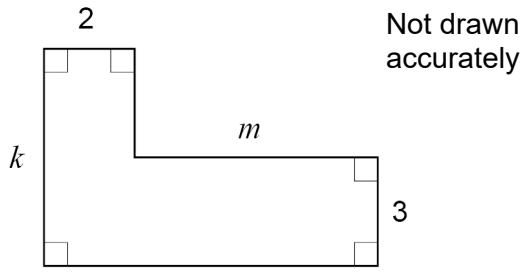
8 In the diagrams, all lengths are in centimetres.





The two shapes have equal areas.

Work out $k : m$

[3 marks]

Answer _____ : _____

Turn over for the next question

6

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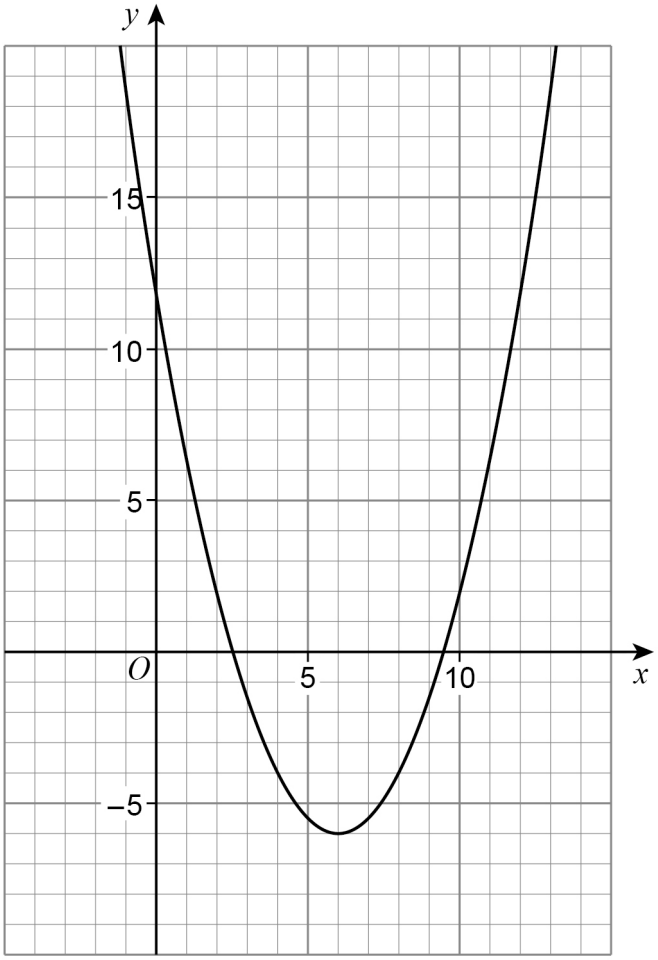
9 Here is the graph of $y = 0.5x^2 - 6x + 12$



Use the graph to estimate the solutions of $0.5x^2 - 6x + 12 = 0$

[2 marks]

Answer _____

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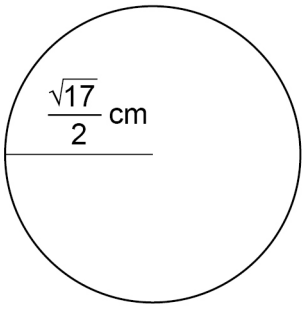
10 Shape A is a circle with radius $\frac{\sqrt{17}}{2}$ cm

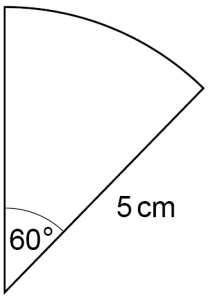
Shape B is a sector of a circle with radius 5 cm

Not drawn accurately

Shape A



Shape B



Which shape has the greater area, A or B?

You **must** show your working.

[5 marks]

Answer _____

7

Turn over ►

Do not write outside the box

11 Factorise $x^2 + 2x - 24$

[2 marks]

Answer _____

12 (a) Write 2×10^3 as an ordinary number.

[1 mark]

Answer _____

12 (b) Simplify $(2 \times 10^3) : (5 \times 10^{-1})$

Give your answer in the form $n : 1$

[2 marks]

Answer _____ : 1

Do not write outside the box

13 Here is an identity in x.

$$5(2x + d) \equiv cx + 30$$

Work out the values of c and d.

[3 marks]

$c =$ _____ $d =$ _____

14 Cora is revising for two subjects, History and French.
The time she spends revising is in the ratio

History : French = 7 : 2

The time she spends revising for History is 20 hours **more** than for French.

Work out the **total** time she spends revising.

[3 marks]

Answer _____ hours

11

Turn over ►

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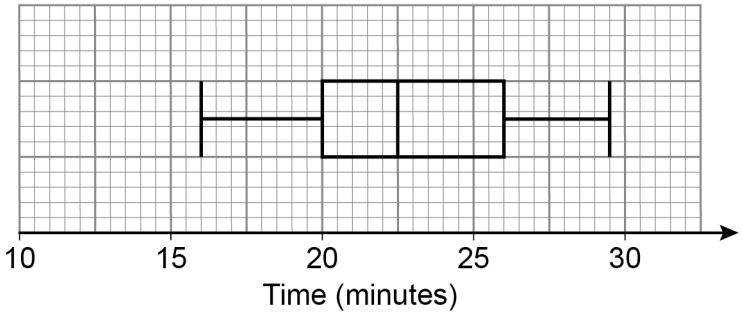
15 A race was run in 2019 and in 2020

The box plot shows information about the finishing times in 2019



15 (a) In 2019, what was the fastest time?

[1 mark]

Answer _____ minutes

Do not write outside the box

15 (b) The table shows information about the finishing times in 2020

Lower quartile	21 minutes
Median	24 minutes
Upper quartile	27 minutes

Use the data to comment on each of the following statements.

[4 marks]

On average, times were faster in 2019 than in 2020

Times were equally consistent in 2019 and 2020

5

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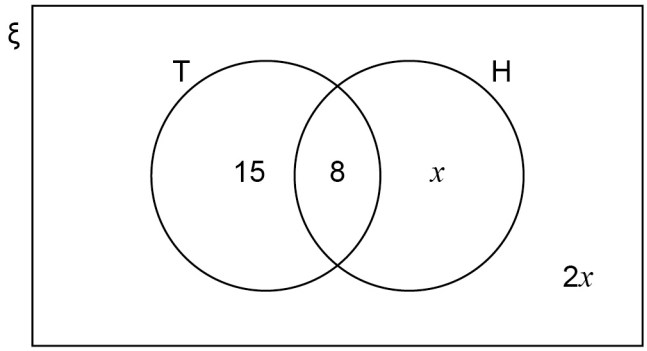
16 The Venn diagram shows information about 80 people who visited an online shop.

ξ = 80 people

T = people who bought trainers

H = people who bought a hoodie



16 (a) One person is chosen at random.

Work out the probability that they bought a hoodie.

[3 marks]

Answer _____

16 (b) One person who bought trainers is chosen at random.

Work out the probability that they bought a hoodie.

[1 mark]

Answer _____

Do not write outside the box

17 x and y are integers.

$$8 \leqslant 4x \leqslant 20 \qquad \text{and} \qquad y - 3x < 12$$

Work out the **largest** possible value of y.

[3 marks]

Answer _____

Turn over for the next question

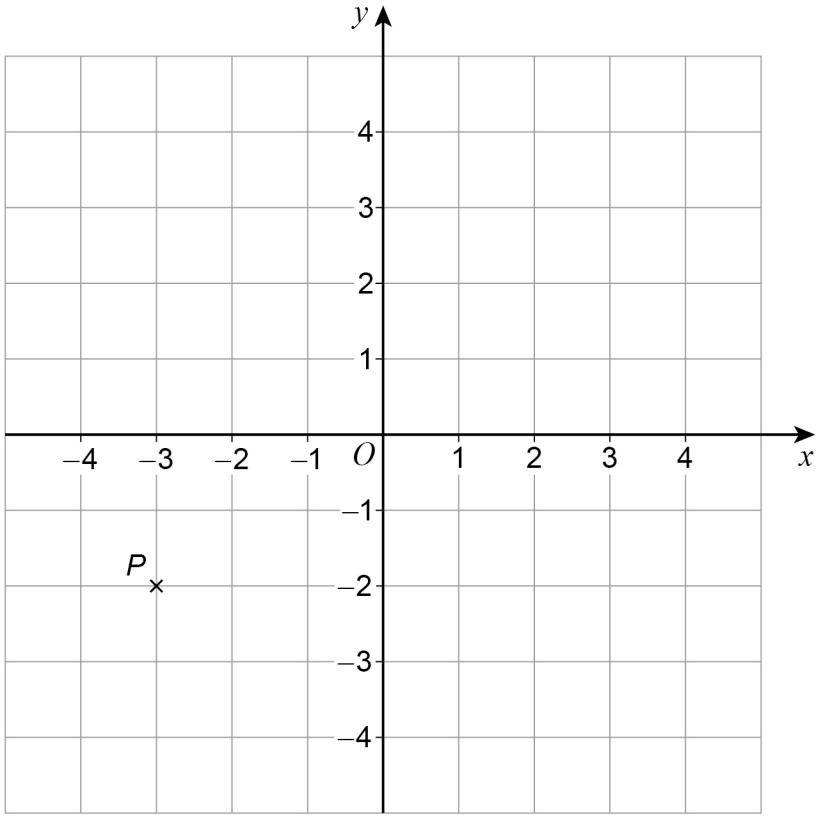
7

Do not write outside the box

18 (a) *P* and *Q* are points.

P (–3, –2) is mapped to *Q* by a rotation about (1, 0) through 90° clockwise.

Q is mapped back to *P* by a **single** transformation.



Complete these two **single** transformations that each map *Q* back to *P*.

[2 marks]

Rotation about (1, 0) _____

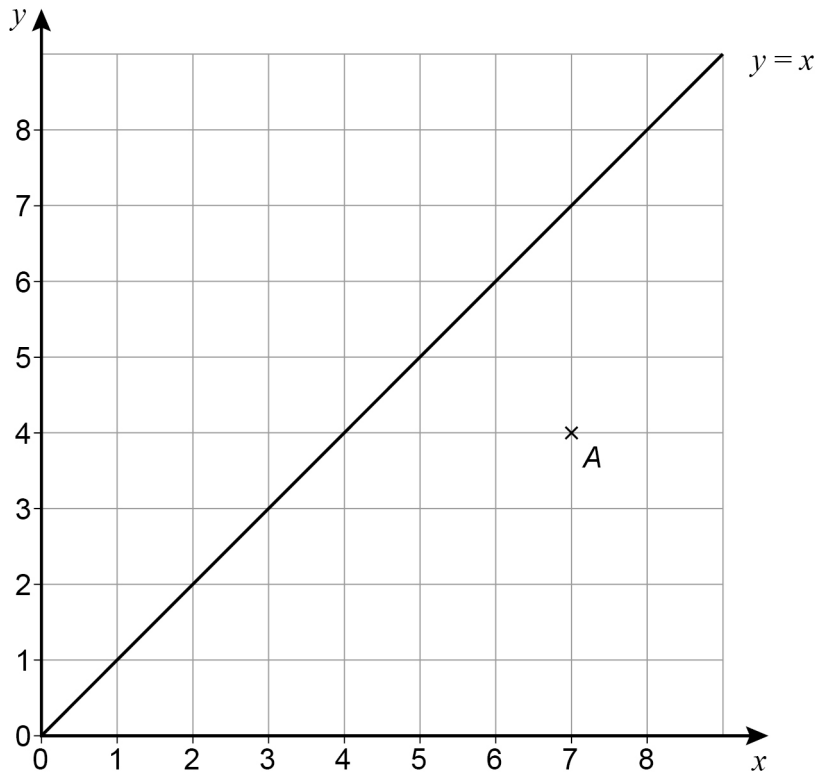
_____

Translation _____

_____

Do not write outside the box

18 (b) Point A (7, 4) and the line $y = x$ are shown on the grid.



B and C are points on the grid, each having positive **integer** coordinates.

BAC is a right-angled triangle.

When BAC is reflected in the line $y = x$ side BC is invariant.

Work out **one** possible set of coordinates for B and C.

[1 mark]

B (_____ , _____) C (_____ , _____)

3

Turn over ►

Do not write outside the box

19 When converted to a fraction $0.\dot{7} = \frac{7}{9}$

Work out $0.\dot{4} + 0.0\dot{7}$

Give your answer as a fraction.

[3 marks]

Answer _____

Do not write outside the box

20 x and y are acute angles.

$\sin x = \frac{\sqrt{3}}{2}$ $\tan y = 1$

$w = 3x - 2y$

Work out the value of $\cos w$

You **must** show your working.

[3 marks]

Answer _____

Turn over for the next question

6

Do not write outside the box

21 $f(x) = \dfrac{x-9}{8}$ $g(x) = 2x^2 + 9$ $h(x) = 4x$

Solve $f^{-1}(x) = gh(x)$

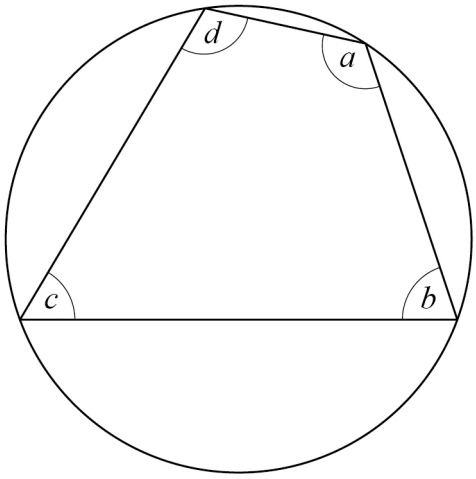
[5 marks]

Answer _____

Do not write outside the box

22 Here is a cyclic quadrilateral.

$a : b : c = 9 : 5 : 3$



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Work out the size of angle d.

[3 marks]

$d =$ _____ °

8

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23 Work out $\frac{7}{\sqrt{2}} \times \frac{\sqrt{3}}{\sqrt{10}}$

Give your answer in the form $\frac{x\sqrt{15}}{y}$ where x and y are integers.

[3 marks]

Answer _____

Do not write outside the box

24 Line A is perpendicular to line B.

The gradient of line A is -2

Work out the gradient of line B.

[1 mark]

Answer _____

25 The nth term of a geometric progression is r^n where $r > 0$

The second term is $\frac{8}{9}$

Work out the third term.

Give your answer in the form $\frac{c\sqrt{2}}{d}$ where c and d are integers.

[2 marks]

Answer _____

6

Turn over ►

Do not write outside the box

26 (a) Work out the value of $\left(5\frac{1}{16}\right)^{\frac{1}{4}}$

[2 marks]

Answer _____

26 (b) Write $\left(49^{m}\right)^{2.5}$ as a power of 7 in terms of m.

[2 marks]

Answer _____

27 Write down the solution of $x^2 < 16$

[1 mark]

Answer _____

Do not write outside the box

28 *PQRS* is a quadrilateral.

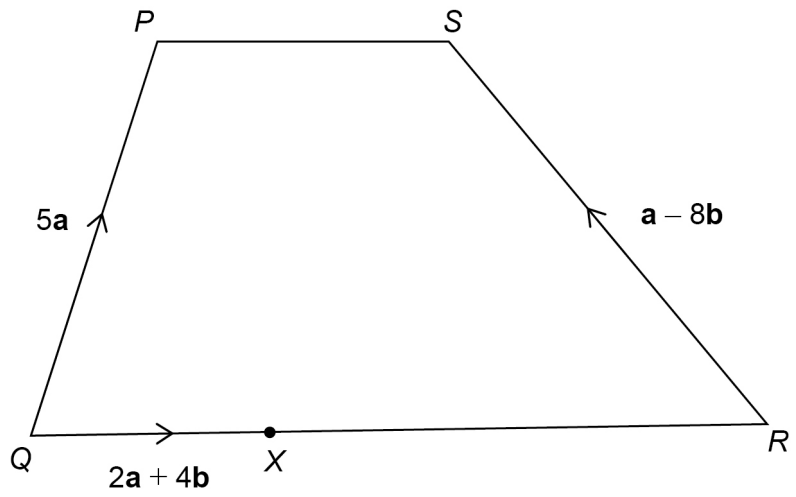
PQ is not parallel to *SR*.

X is a point on *QR*.

$QX : XR = 2 : 3$

$\overrightarrow{QX} = 2\mathbf{a} + 4\mathbf{b}$

Not drawn accurately



Prove that *PQRS* is a trapezium.

[3 marks]

8

Turn over ►

Do not write outside the box

29 Here are the equations of three graphs.

$y = \sin x$ $y = \cos x$ $y = \tan x$

29 (a) Which statement is true?

Tick **one** box.

[1 mark]

☐ $y = \sin x$ passes through (180°, –1)

☐ $y = \cos x$ passes through (180°, –1)

☐ $y = \tan x$ passes through (180°, –1)

☐ None of the graphs pass through (180°, –1)

29 (b) Which statement is true?

Tick **one** box.

[1 mark]

☐ $y = \sin x$ passes through (270°, 1)

☐ $y = \cos x$ passes through (270°, 1)

☐ $y = \tan x$ passes through (270°, 1)

☐ None of the graphs pass through (270°, 1)

END OF QUESTIONS

2

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