Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

The graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$, together with simple translations and reflections, and using the symmetry of these graphs t

REVISE
.wales

3.17 — Trigonometric function graphs

Spec 3.7.8 — Unit 3 (calculator allowed)

The graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$, together with simple translations and reflections, and using the symmetry of these graphs to solve trigonometric equations. Sourced from legacy WJEC GCSE Mathematics Higher calculator-allowed papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~1 hours 9 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (46 marks across 12 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

A calculator is allowed on every question in this pack (Unit 3 is the calculator-allowed paper).

Trigonometric function graphs — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 3: calculator-allowed.

Graphs of sin, cos & tan 3.7.8

- Recognise and sketch $y = \sin x$ and $y = \cos x$: period $360°$, range $[-1, 1]$.
- Recognise and sketch $y = \tan x$: period $180°$, asymptotes at $90° + 180°n$.
- Identify simple translations and reflections; use symmetry to find all solutions in $0° \leq x \leq 360°$.

Crib sheet »

Trigonometric function graphs in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

$y = \sin x$

Period $360°$, range $-1 \leq y \leq 1$.

Key points on $0°$–$360°$:
$(0, 0), (90, 1), (180, 0), (270, -1), (360, 0)$.

Symmetric about $x = 90°$ within the first cycle; passes through the origin.

$y = \cos x$

Period $360°$, range $-1 \leq y \leq 1$.

Key points on $0°$–$360°$:
$(0, 1), (90, 0), (180, -1), (270, 0), (360, 1)$.

Same shape as sine but shifted $90°$ to the left.

$y = \tan x$

Period $180°$ (not 360!). Range: all real numbers.

Asymptotes at $x = 90°, 270°, \ldots$ where $\cos x = 0$.

Passes through $(0, 0), (45°, 1), (180°, 0)$.

Translations — up/down

$y = \sin x + k$ shifts the curve up by k (or down if $k < 0$).

$y = \cos x - 1$ has the same shape as $\cos x$ but range $-2 \leq y \leq 0$.

Reflections & stretches

$y = -\sin x$ is a reflection of $y = \sin x$ in the x-axis.

$y = 2\cos x$ is a vertical stretch — range $-2 \leq y \leq 2$.

Period and zeros are unchanged by a vertical stretch.

Symmetry — solving $\sin x = k$

If $\sin \alpha = k$ (acute), then in $0°$–$360°$ the solutions are $x = \alpha$ and $x = 180° - \alpha$.

For $\sin x = -k$, solutions are $x = 180° + \alpha$ and $x = 360° - \alpha$.

Symmetry — solving $\cos x = k$

If $\cos \alpha = k$ (acute), then in $0°$–$360°$ the solutions are $x = \alpha$ and $x = 360° - \alpha$.

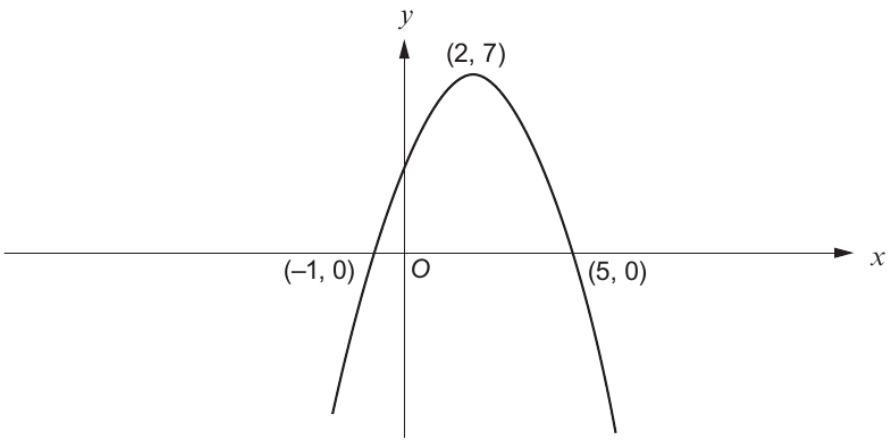
For $\cos x = -k$, solutions are $x = 180° - \alpha$ and $x = 180° + \alpha$.

Common traps

- Forgetting tan has period $180°$, not $360°$.
- Missing the second solution when symmetry gives two answers in $0°$–$360°$.
- Mixing up vertical translations ($+k$) and horizontal ones.
- Not labelling key axis points when asked to sketch.

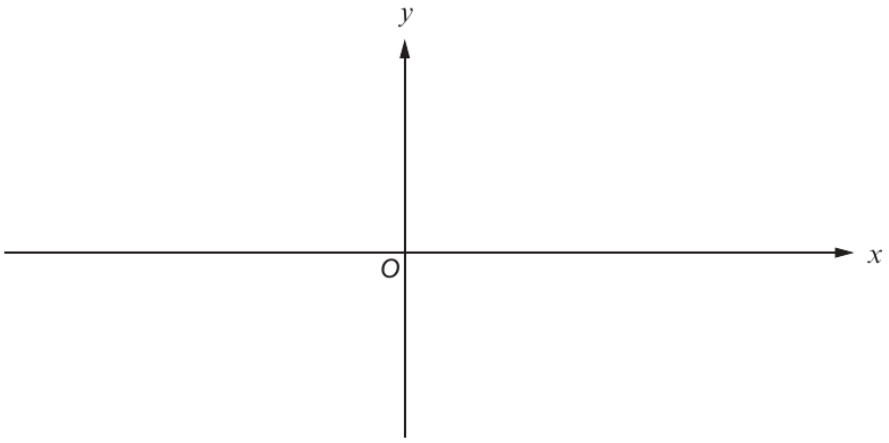
Examiner only

15. *(a)* The diagram shows a sketch of the graph $y = f(x)$.
The graph passes through the points (–1, 0) and (5, 0) and its highest point is at (2, 7).



Sketch the graph of $y = f(x - 3)$ on the axes below.
You must indicate

- the coordinates of the points of intersection of the graph with the x-axis
- the coordinates of the highest or lowest point. [3]



Examiner only

(b) Using the axes below, **sketch** the graph of $y = \cos x + 1$ for values of x from 0° to 360°. [2]

Examiner only

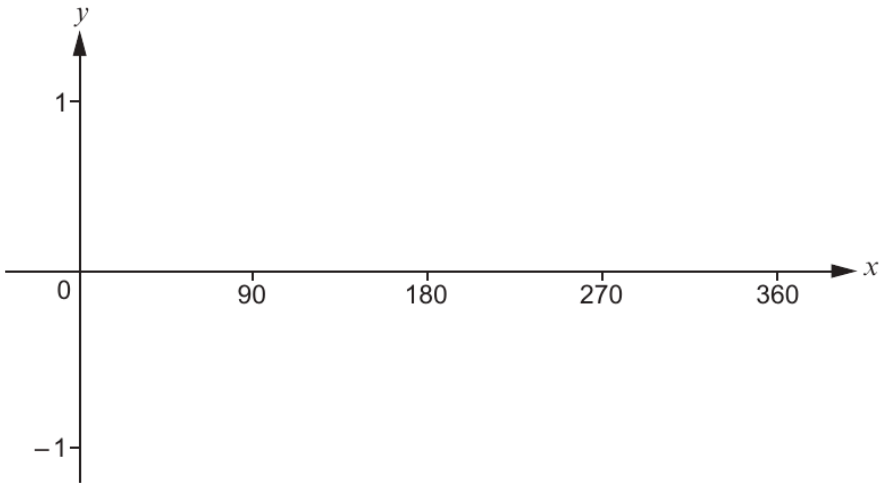
15. *(a)* Using the axes below, **sketch** the graph of $y = \sin x$ for values of x from 0° to 360°. You must label any important values on both axes. [2]

(b) Circle the value that is equal to sin 200°. [1]

sin 20° sin 100° sin 160° sin 220° sin 340°

Examiner only

14. *(a)* Sketch the curve $y = \sin x$, for values of x in the range $x = 0°$ to $x = 360°$. [1]



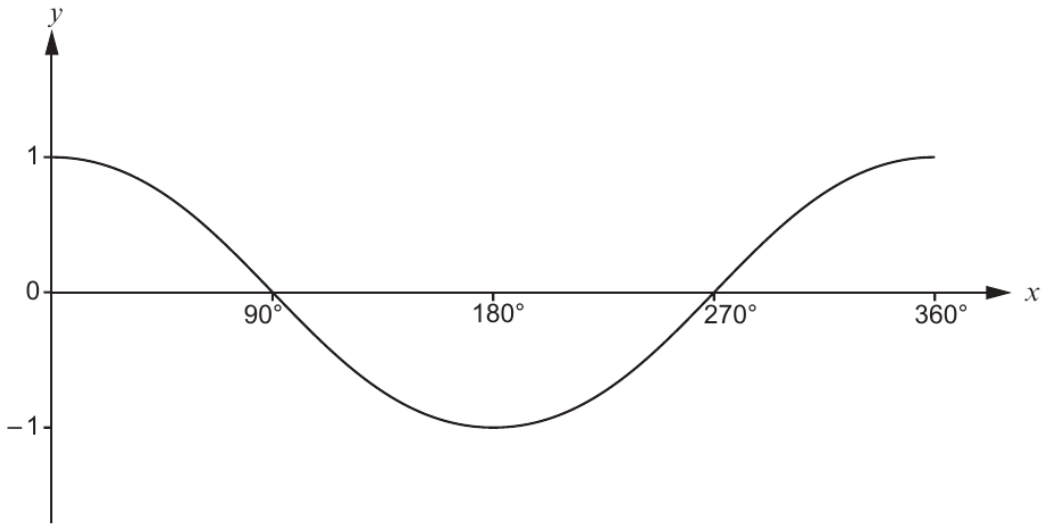
(b) Solve each of the following equations.
Give all answers in the range $x = 0°$ to $x = 360°$.

(i) $\sin x = 0{\cdot}3$ [2]

(ii) $\sin x + 1 = 0$ [1]

Examiner only

18. The following diagram shows a sketch of $y = \cos x$ for values of x from 0° to 360°.



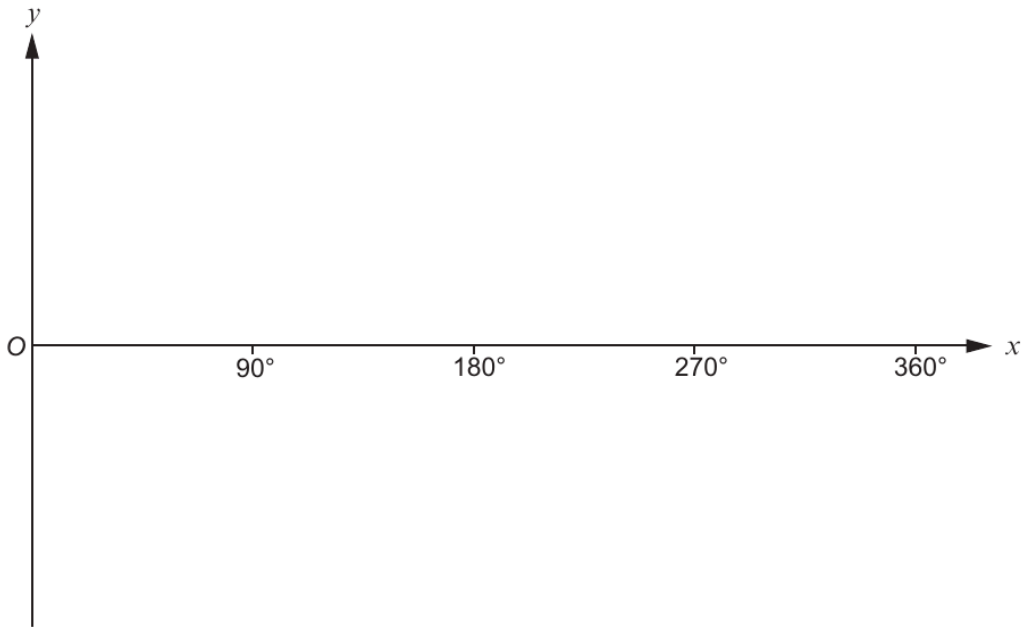
(a) Given that $\cos 21° = 0{\cdot}9336$, correct to 4 decimal places, write down all the solutions of the equation

$$\cos x = -0{\cdot}9336$$

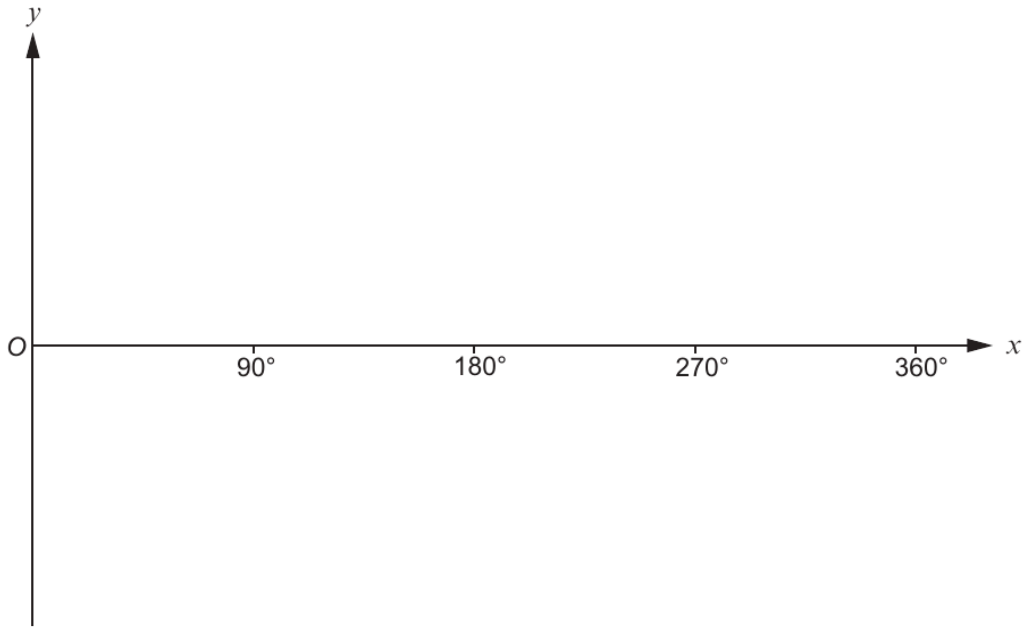
for values of x from 0° to 360°. [2]

Examiner only

(b) (i) Use the following axes to sketch the graph of $y = 2\cos x$ for values of x from 0° to 360°.
You must indicate any important points on both axes. [2]



(ii) Use the following axes to sketch the graph of $y = \cos x - 1$ for values of x from 0° to 360°.
You must indicate any important points on both axes. [2]



END OF PAPER

Examiner only

10. A googol is the number 1×10^{100}.
Circle the value that is 90% of a googol. [1]

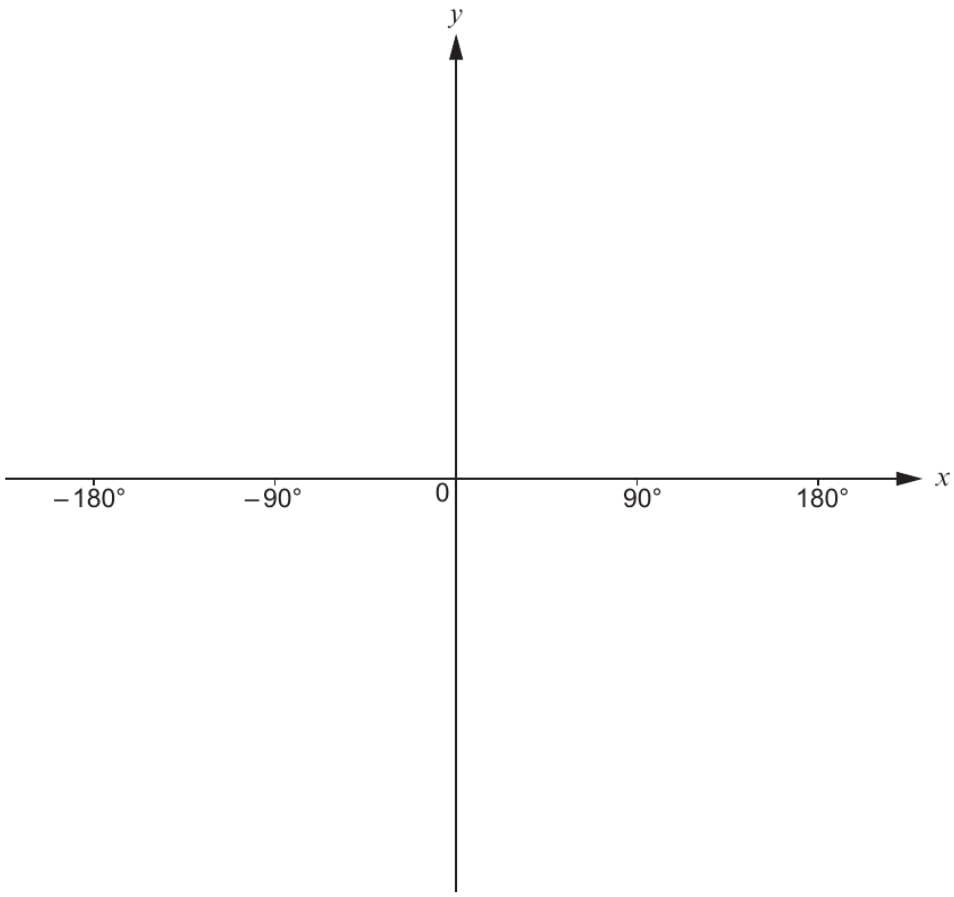
1×9^{100} 1×10^{90} 1×9^{90} 9×10^{90} 9×10^{99}

.....

.....

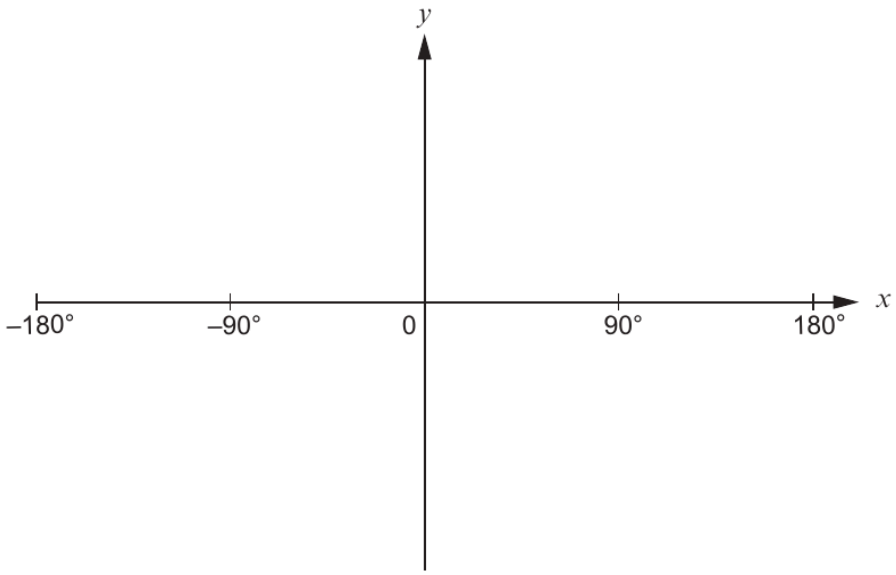
.....

11. Sketch the curve $y = \tan x$, for values of x in the range $x = -180°$ to $x = 180°$. [2]



Examiner only

16. *(a)* Sketch the curve $y = \sin x$ on the axes below.
You must indicate any important values on the y-axis. [2]



(b) Solve the equation $\sin x = -0{\cdot}5$.
Give all answers in the range $x = -180°$ to $x = 180°$. [2]

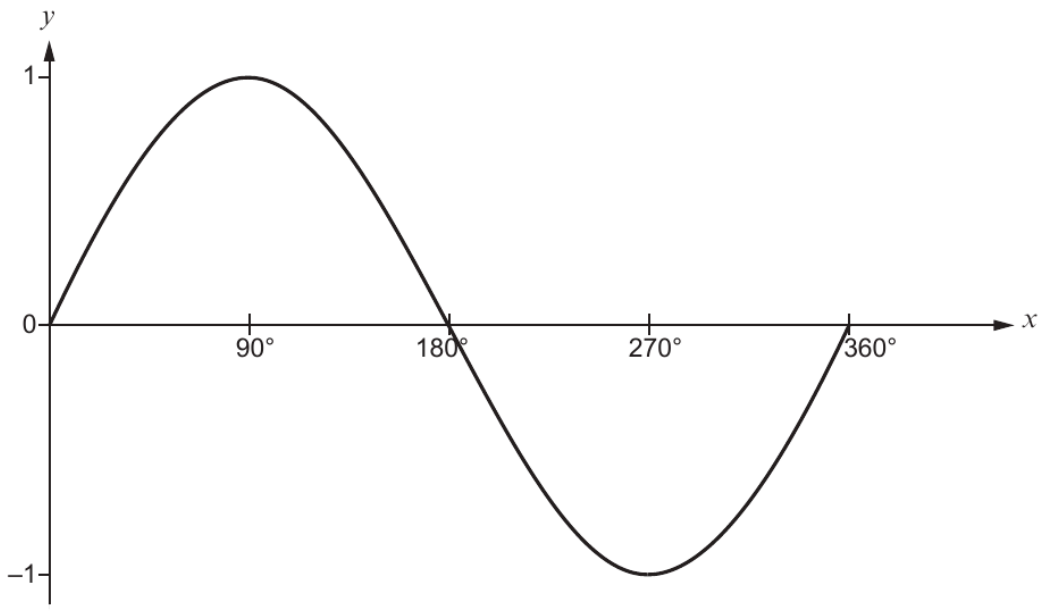
Examiner only

17. *(a)* Sketch the curve $y = \cos x$, for values of x in the range $x = 0°$ to $x = 360°$.
You must indicate any important values on the axes. [2]

(b) Solve the equation $\cos x = 0{\cdot}7$.
Give all solutions in the range $x = 0°$ to $x = 360°$. [2]

Examiner only

17. The following diagram shows a sketch of $y = \sin x$ for values of x from 0° to 360°.



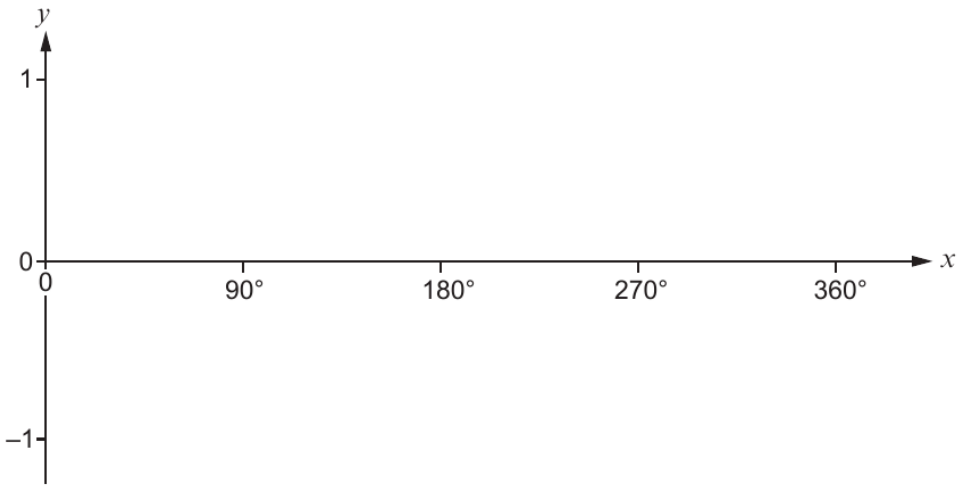
Given that $\sin 38° = 0{\cdot}6157$, correct to 4 decimal places, write down all the solutions of the equation

$$\sin x = -0{\cdot}6157$$

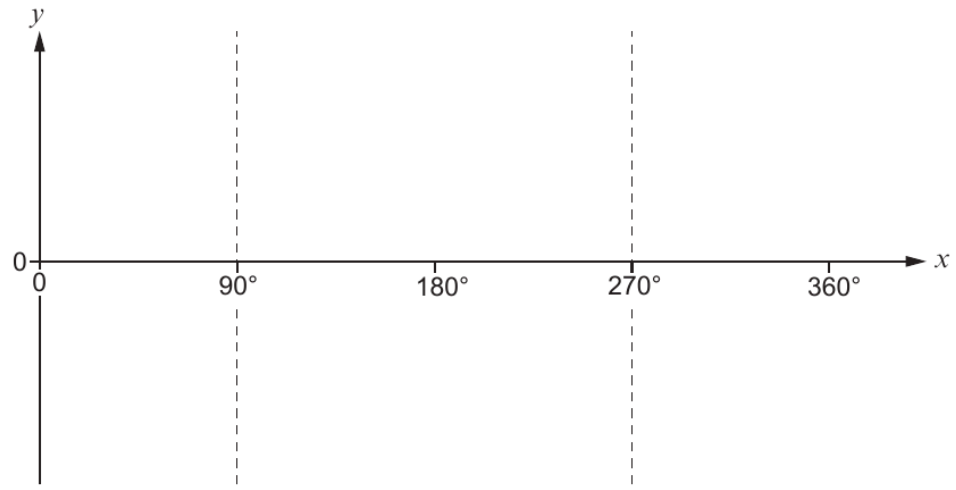
for values of x from 0° to 360°. [2]

Examiner only

9. (a) Sketch the curve $y = \sin x$, for values of x in the range $x \geqslant 0°$ to $x \leqslant 360°$. [1]

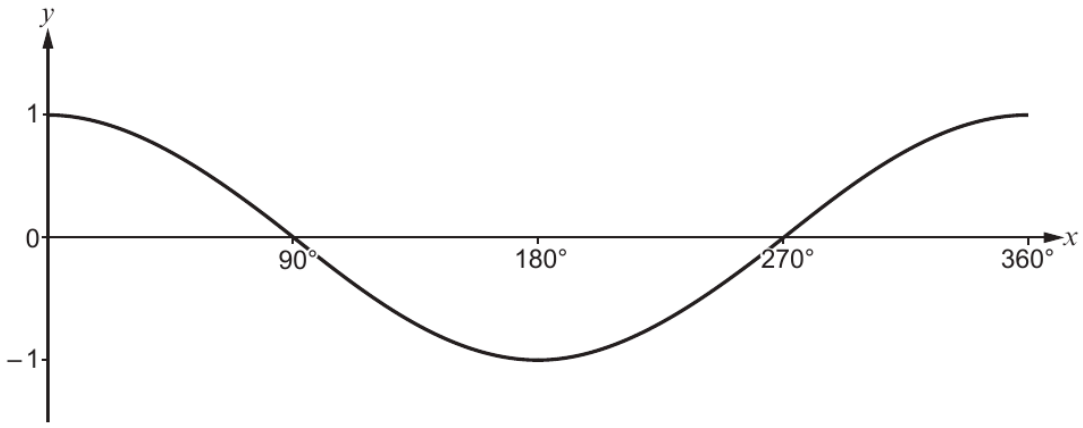


(b) Sketch the curve $y = \tan x$, for values of x in the range $x \geqslant 0°$ to $x \leqslant 360°$. [1]



Examiner only

20. The following diagram shows a sketch of $y = \cos x$ for values of x from 0° to 360°.



Given that $\cos 25^\circ = 0 \cdot 9063$, correct to 4 decimal places, write down all the solutions of the equation

$$\cos x = -0 \cdot 9063$$

for values of x from 0° to 360°. [2]

Examiner only

21. Solve the following equation.
Do not use a trial and improvement method. [5]

$$\frac{x}{x+1} = \frac{2}{4x-5}$$

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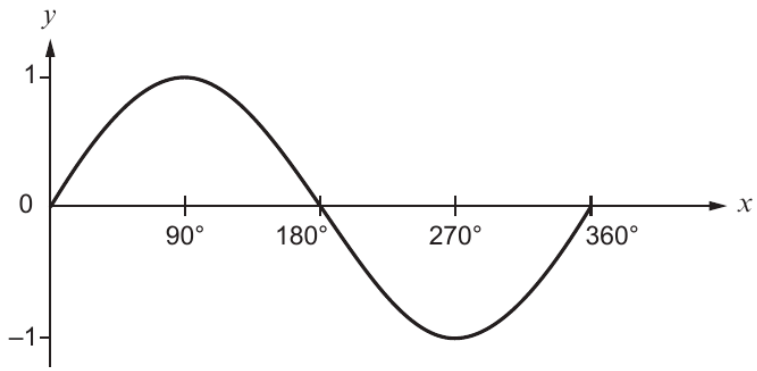
Examiner only

16. The following diagram shows a sketch of $y = \sin x$ for values of x from 0° to 360°.



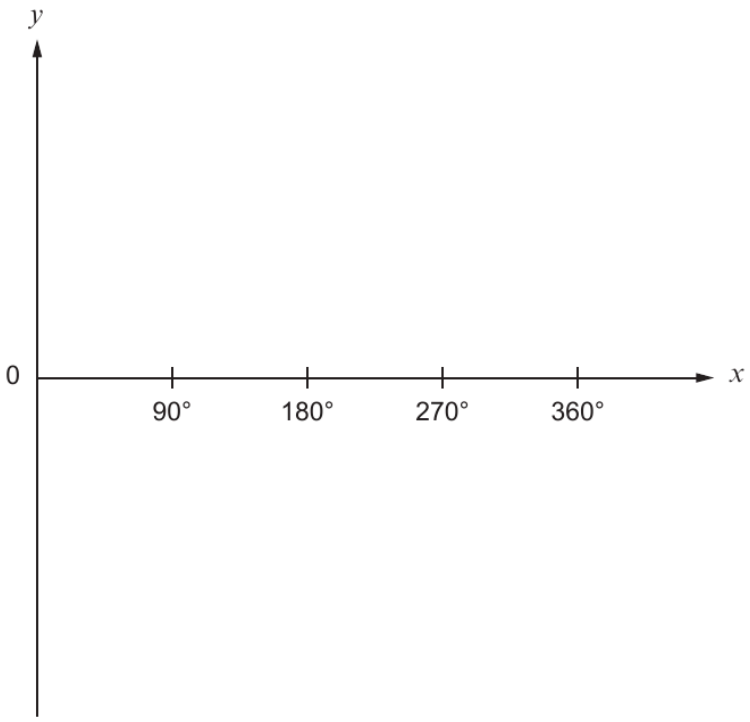
(a) Given that $\sin 62° = 0{\cdot}8829$, correct to 4 decimal places, write down all the solutions of the equation

$$\sin x = -0{\cdot}8829$$

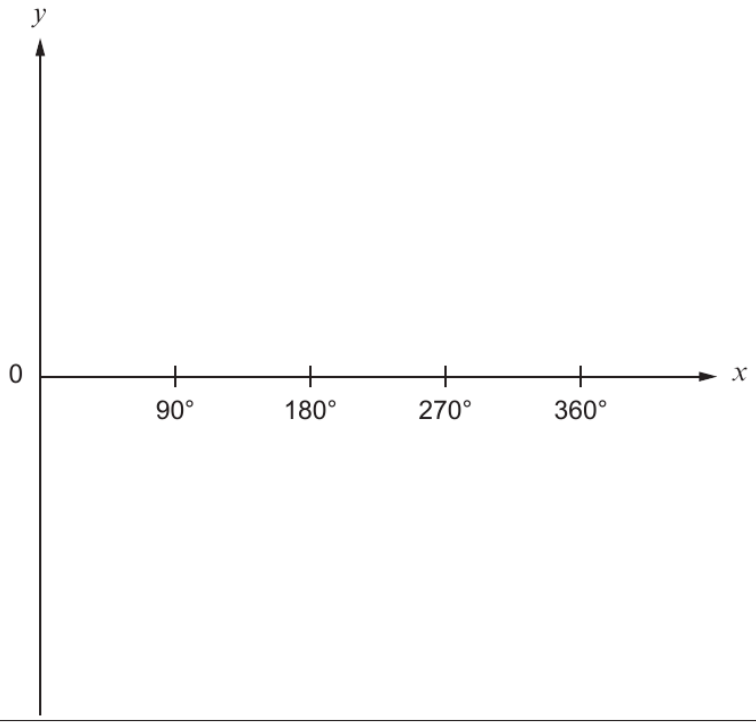
for values of x from 0° to 360°. [2]

Examiner only

(b) (i) Use the following axes to sketch the graph of $y = -\sin x$ for values of x from 0° to 360°. You must indicate any important values on the y-axis. [2]



(ii) Use the following axes to sketch the graph of $y = \sin x + 1$ for values of x from 0° to 360°. You must indicate any important values on the y-axis. [2]



Examiner only

16. (a) Sketch the curve $y = \cos x$ on the axes below, for values of x from 0° to 360°.
You must indicate any important values on both axes. [2]

(b) Solve the equation $2\cos x = 1$.
Give all answers in the range $x = 0°$ to $x = 360°$. [2]