EXAM-STYLE CLASS TEST

MARKS	DURATION	QUESTIONS
52	1 hour 20 minutes	4

Name: _____ Class: _____

Date: _____

MARK _____ / 52

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 The PERIOD of $y = \sin 2x$ is ... (1)

A) $180°$ **B)** $720°$
C) $360°$ **D)** $90°$

1.2 The PERIOD of $y = \tan 3x$ is ... (1)

A) $540°$ **B)** $180°$
C) $60°$ **D)** $120°$

1.3 The AMPLITUDE of $y = -4\cos x$ is ... (1)

A) 8 **B)** 4
C) -4 **D)** 1

1.4 The RANGE of $y = 3\sin x - 1$ is ... (1)

A) $-4 \leq y \leq 2$ **B)** $-2 \leq y \leq 4$
C) $-3 \leq y \leq 3$ **D)** $-1 \leq y \leq 3$

1.5 Compared with $y = \sin x$, the graph of $y = \sin(x - 30°)$ is ... (1)

A) reflected in the x-axis **B)** shifted $30°$ to the left
C) shifted 30 units down **D)** shifted $30°$ to the right

1.6 The graph of $y = \cos(x + 60°)$ has a maximum at $x =$ ... (1)

A) $180°$ **B)** $0°$
C) $-60°$ **D)** $60°$

1.7 $y = 2\sin x$ and $y = \sin 2x$ differ because ... (1)

A) the outside 2 changes the AMPLITUDE; the inside 2 changes the PERIOD

B) both change the period

C) they are in fact the same graph

D) both change the amplitude

1.8 On $[0° ; 360°]$, how many complete cycles does $y = \cos 3x$ complete? (1)

A) 6

B) 1

C) $\frac{1}{3}$

D) 3

1.9 The MAXIMUM value of $y = -2\cos x + 3$ is ... (1)

A) 3

B) 5

C) 1

D) -2

1.10 The graph of $y = \tan x$ has asymptotes wherever ... (1)

A) $\sin x = 0$

B) $\cos x = 0$

C) $x = 0$

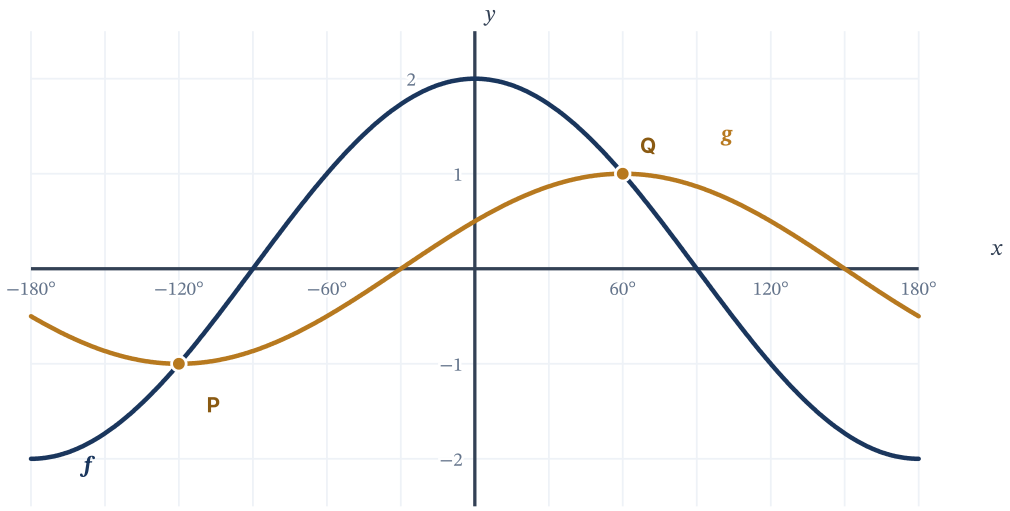
D) $\tan x = 0$

ANSWER GRID — CIRCLE YOUR ANSWERS FOR QUESTION 1

1.1	A	B	C	D
1.2	A	B	C	D
1.3	A	B	C	D
1.4	A	B	C	D
1.5	A	B	C	D
1.6	A	B	C	D
1.7	A	B	C	D
1.8	A	B	C	D
1.9	A	B	C	D
1.10	A	B	C	D

QUESTION 2 [17 MARKS]

The graphs of $f(x) = 2\cos x$ and $g(x) = \sin(x + 30°)$ are drawn below on the SAME set of axes for $x \in [-180° ; 180°]$. P and Q are the points of intersection of f and g.



2.1 Write down the range of f and the period of g, and state how many complete cycles f completes in the interval $[-180° ; 180°]$. **(3)**

2.2 Write down the x-coordinates of the points at which g cuts the x-axis in the given interval, and show how you obtained them. **(3)**

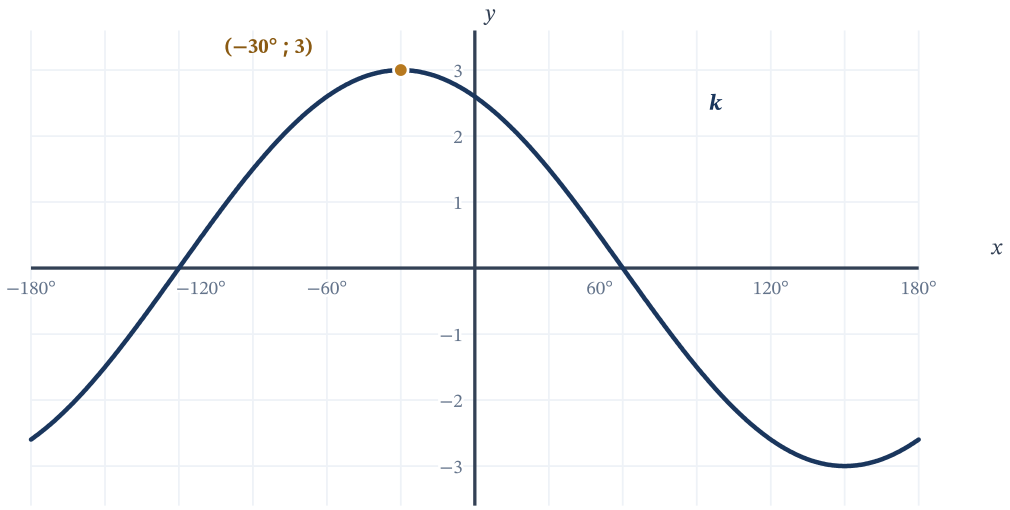
2.3 Write down the coordinates of P and Q, and hence use the graphs to determine the values of x for which $f(x) > g(x)$. **(4)**

2.4 Determine, from the graphs, the values of $x \in [-180° ; 180°]$ for which $f(x) \cdot g(x) \leq 0$. **(4)**

2.5 The graph of f is shifted 3 units DOWN to give a new graph m. Write down the range of m, and state, with a reason, whether m still cuts the x-axis. **(3)**

QUESTION 3 [15 MARKS]

The graph of $k(x) = a \sin(x + p)$ is sketched below for $x \in [-180° ; 180°]$. The maximum turning point of k in this interval is $(-30° ; 3)$, and $0° < p < 180°$.



3.1 Show that $a = 3$ and $p = 120°$. **(4)**

3.2 Write down the range of k, and determine the coordinates of the minimum turning point of k in the given interval. **(4)**

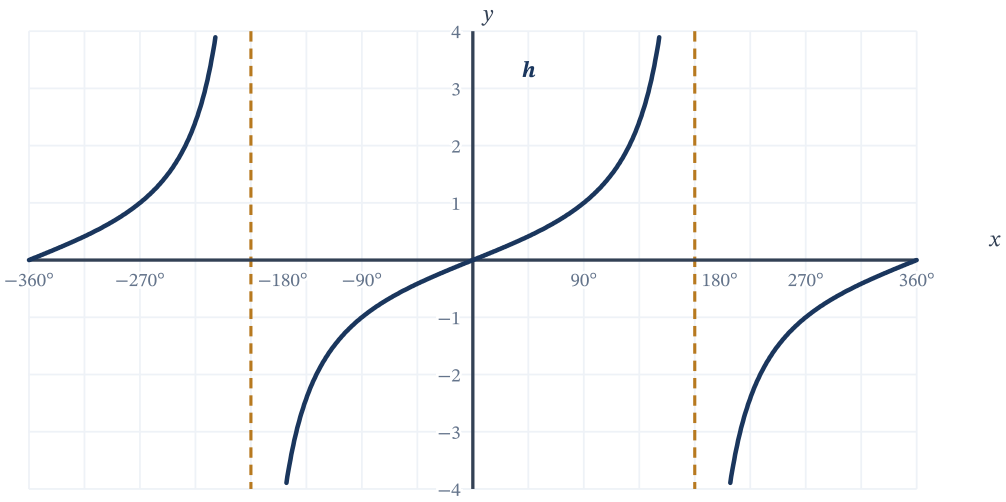
3.3 Determine the x-intercepts of k in the interval $[-180° ; 180°]$. **(4)**

3.4 Describe fully the transformation that maps $y = 3 \sin x$ onto k, and write down the period of $y = 3 \sin 2(x + 120°)$. **(3)**

QUESTION 4

[10 MARKS]

The graph of $h(x) = \tan \frac{1}{2}x$ is sketched below for $x \in [-360° ; 360°]$. The dashed lines are the asymptotes of h.



4.1 Write down the period of h, and the equations of the two asymptotes shown in the sketch. **(4)**

4.2 Determine the values of $x \in [-360° ; 360°]$ for which $h(x) = 1$. **(3)**

4.3 Use the sketch to write down the values of x, where $-180° < x < 180°$, for which $h(x) < 0$. **(3)**

TOTAL: 52 marks

This question paper consists of 4 questions.

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