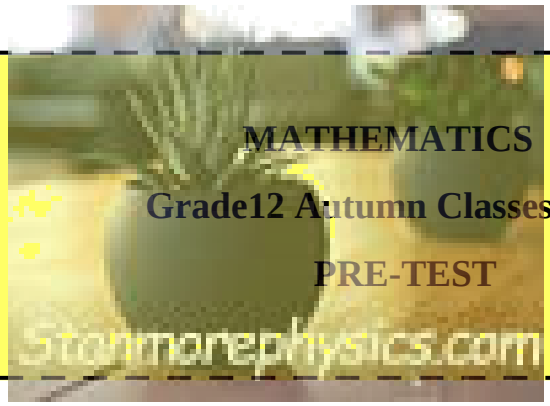
KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA



MATHEMATICS

Grade12 Autumn Classes 2024

PRE-TEST

MARKS: 25 **TIME: 30 minutes**

This paper consists of 3 pages including the cover page

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. Answers only will NOT necessarily be awarded full marks.
3. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
4. Number your answers correctly according to the numbering system used in this question paper.

QUESTION 1

1.1 Given: $\cos 35° = m$

Without using a calculator, determine the value of EACH of the following in terms of m:

1.1.1 $\cos 215°$ (2)

1.1.2 $\sin 20°$ (3)

1.2 Simplify the expression to a **single trigonometric term:**

$\tan(-x).\cos x.\sin(x-180°)-1$ (5)

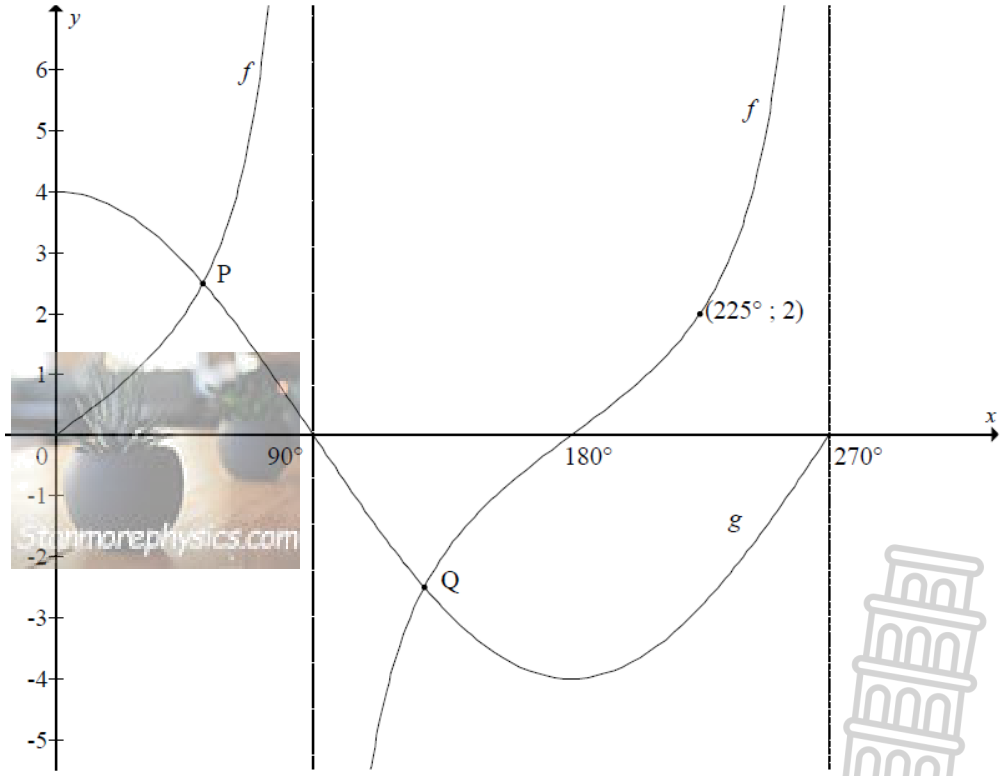
1.3 Determine the general solution of: $\cos 4x.\cos x + \sin x.\sin 4x = -0,7$ (4)

1.4 Prove the identity: $\dfrac{\sin 4x.\cos 2x - 2\cos 4x.\sin x.\cos x}{\tan 2x} = \cos^2 x - \sin^2 x$ (4)

[18]

QUESTION 2

The graphs of the functions $f(x) = a\tan x$ and $g(x) = b\cos x$ for $0° \le x \le 270°$ are shown in the diagram below. The point $(225°;2)$ lies on f. The graphs intersect at points P and Q.



2.1 Determine the numerical values of a and b (4)

2.2 Determine the minimum value of $g(x)+2$ (2)

2.3 Determine the period of $f\left(\frac{1}{2}x\right)$ (2)

[8]

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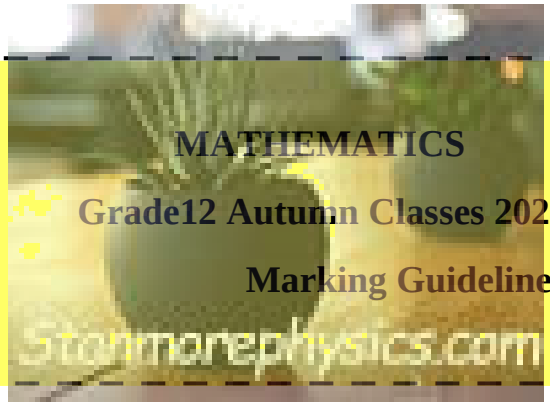

MATHEMATICS

Grade12 Autumn Classes 2024

Marking Guideline

QUESTION 1

1.1	$\cos 215°$ $= -\cos 35°$ $= -m$	✓ reduction ✓ answer (2)
1.1.2	$\sin 20°$ $= \cos 70°$ $= \cos 2(35°)$ $= 2\cos^2 35° - 1$ $= 2m^2 - 1$ OR $= \sin(55° - 35°)$ $= \sin 55°\cos 35° - \cos 55°\sin 35°$ $= m.m - \sqrt{1-m^2}.\sqrt{1-m^2}$ $= m^2 - (1-m^2)$ $= 2m^2 - 1$	✓ co-function ✓ double angle ✓ answer in terms of m (3) ✓ expansion ✓ $\cos 55° = \sqrt{1-m^2}$ ✓ answer in terms of m (3)
1.2	$\tan(-x).\cos x.\sin(x-180°)-1$ $= -\tan x.\cos x.\sin(-(180° - x))-1$ $= \frac{-\sin x}{\cos x}.\cos x.(-\sin x) - 1$ $= \sin^2 x - 1$ $= -\cos^2 x$	✓ $-\tan x$ ✓ $-\sin x$ ✓ $\frac{-\sin x}{\cos x}$ ✓ $\sin^2 x - 1$ ✓ answer (5)
1.3	$\cos 4x.\cos x + \sin 4x.\sin x = -0,7$ $\cos(4x - x) = -0,7$ ref $\angle$ = 45,57…° $3x = 180° - 45,57...° + k.360°$ or $3x = 180° + 45,57...° + k.360°$ $3x = 134,43° + k.360°$ or $3x = 225,57° + k.360°$ $x = 44,81° + k.120°$; $k \in Z$ $x = 75,19° + k.120°$; $k \in Z$	✓ compound angle ✓ $3x$ = 134,43° or 225,57° ✓ x = 44,81° or 75,19° ✓ + k.120°; $k \in Z$ (4)

QUESTION 2

2.1	$f(225°) = 2$ $a\tan 225° = 2$ $a = 2$ $g(0) = 4$ $b\cos 0° = 4$ $b = 4$	✓substitution ✓ $a = 2$ ✓substitution ✓ $a = 2$ $b = 4$

2.2	Minimum value of $g(x)+2=-4+2$ $=-2$	✓ -4 ✓ -2
2.3	Period $\frac{180°}{\frac{1}{2}}=360°$	✓ $\frac{180°}{\frac{1}{2}}$ ✓ $360°$