



TRIGONOMETRY

Checklist

Make sure you:

- revise all the basic trigonometry you learnt in Grade 10 & Grade 11
- can use the compound angle formulae and the double angle formulae

Compound Angle Formulae

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

Double Angle Formulae

$$\cos 2A = \cos^2 A - \sin^2 A = 1 - 2\sin^2 A = 2\cos^2 A - 1$$

$$\sin 2A = 2\sin A \cos A$$

- are able to prove trig identities
- can find the general solution of trig equations
- recall how to sketch and interpret graphs of trig functions

Exam Questions

Question 1

(a) Simplify, as far as possible:

$$\sqrt{\frac{\cos^2 \theta + \cos^2 (90^\circ - \theta) + \cos 2\theta}{2}} \quad (4)$$

(b) Simplify without using a calculator:

$$\cos^2(180^\circ + x)[- \tan(360^\circ - x) \cdot \cos(90^\circ - x) - \sin(90^\circ - x) \cdot \cos 180^\circ] \quad (6)$$

Question 2

(a) Prove, without the use of a calculator:

$$\left(\frac{\sin 15^\circ + \cos 15^\circ}{\sin 15^\circ - \cos 15^\circ} \right)^2 = 3 \quad (5)$$

(b) Prove the identity:

$$\frac{\cos 2\theta + \cos \theta}{\sin^2 \theta} = \frac{2 \cos \theta - 1}{1 - \cos \theta} \quad (5)$$





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Question 3

If $\sin 61^\circ = \sqrt{a}$ determine the value of the following in terms of a :

$$\cos 73^\circ \cdot \cos 15^\circ + \sin 73^\circ \cdot \sin 15^\circ \quad (6)$$

Question 4

Determine the general solution of the following equation:

$$\sin 2x + 2\sin x + \cos 2x + \cos x = 0 \quad (5)$$

Question 5

Answer the following questions WITHOUT the use of a calculator:

a) Simplify:

i)
$$\frac{\tan 210^\circ \cdot \sin 240^\circ \cdot \sin 170^\circ}{\cos 135^\circ \cdot \sin(-45^\circ) \cdot \cos 100^\circ} \quad (8)$$

ii)
$$\cos 110^\circ \sin 50^\circ + \sin 110^\circ \cos 140^\circ \quad (4)$$

b) Show that $\sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}}$ (5)

c) Find the value of $\sin 22,5^\circ$. (leave your answer in simplest surd form) (4)

Question 6

Three functions are given:

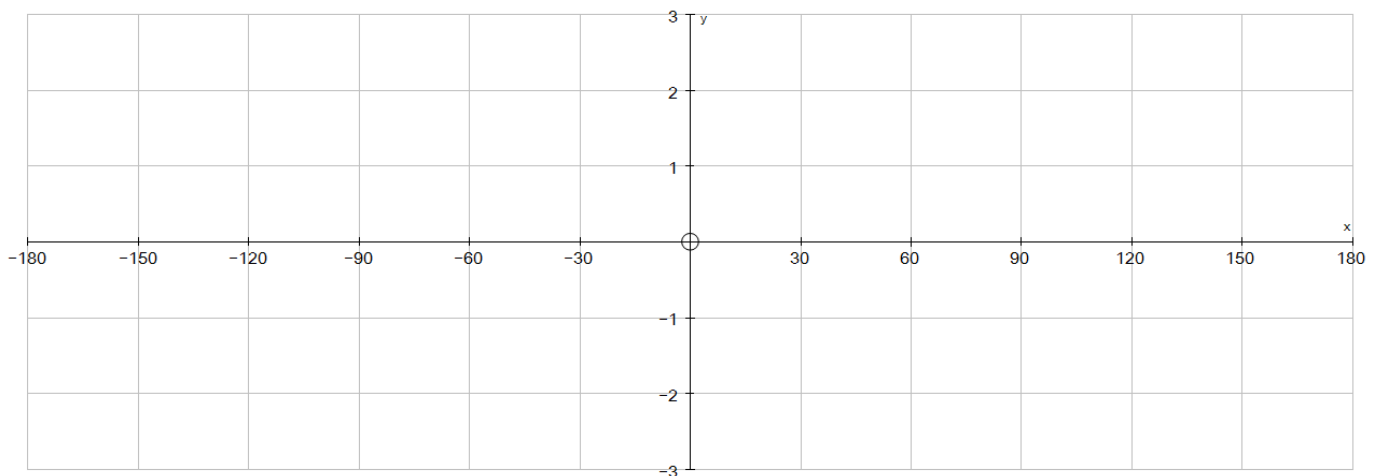
$$f(x) = -\sin \frac{1}{2}x \quad g(x) = \cos x - 1 \quad h(x) = \sin x$$

(a) Describe in words the transformations which transform $g(x)$ to $h(x)$. (2)

(b) Write down the period of $f(x)$. (1)

(c) Write down the amplitude of $g(x)$. (1)

(d) Make neat sketch graphs of $f(x)$ and $g(x)$ on the interval: $-180^\circ \leq x \leq 180^\circ$, labelling intercepts and turning points. (Re-draw the grid below) (6)





Test Yourself

Question 1

Simplify, without using a calculator, the following expressions: (Show ALL the Calculations.)

(a) $\frac{\cos 150^\circ \cdot \tan 225^\circ}{\sin(-160^\circ) \cdot \cos 480^\circ}$

- A. 2 B. 1 C. -1 D. -2 E. 0

(b) $\cos^2 x \left[\frac{1}{\sin x - 1} + \frac{1}{\sin x + 1} \right]$

- A. $-2 \sin x$ B. $2 \sin x$ C. 1 D. -2 E. $\cos x$

Question 2

Determine, without using a calculator, the value of the following in terms of t , if $\sin 34^\circ = t$:

(a) $\cos 56^\circ$

- A. $-t$ B. t C. $\sqrt{1-t}$ D. 1 E. -1

(b) $\tan(-34^\circ)$

- A. $\sqrt{1-t}$ B. $\frac{t}{\sqrt{1-t^2}}$ C. t D. 1 E. $-\frac{t}{\sqrt{1-t^2}}$

(c) Solve for x :

$5^{\tan x} = 125$ if $x \in [0; 360^\circ]$

- A. 45 B. $-71,6^\circ$ or $251,6^\circ$ C. $71,6^\circ$ or $251,6^\circ$ D. $31,6^\circ$ or $201,6^\circ$ E. $71,6^\circ$ or $200,2^\circ$

