

IEB Trigonometry practice — Questions

10 newly generated questions across all 5 trigonometry topics the IEB examines in Paper II — 121 marks in all. Every answer is worked in the memorandum booklet. Nothing here is taken from a past paper.

Identities, reduction and compound angles

1

[10]

Given:

- $\cos A = -\frac{12}{13}$ where $90^\circ < A < 180^\circ$
- $\cos B = \frac{12}{13}$ where $270^\circ < B < 360^\circ$

(a) Determine, without the use of a calculator, the value of $\sin A$. (2)

Answer: _____

(b) Hence determine, without the use of a calculator, the value of $\sin(A + B)$. (5)

Answer: _____

(c) Determine the value of $\sin 2A$. (3)

Answer: _____

2

[14]

- (a) Simplify fully to a single trigonometric ratio: $(\sin(360^\circ - \theta) \cdot \sin(90^\circ - \theta)) / \sin(180^\circ - \theta)$ (6)

Answer: _____

- (b) Determine, without the use of a calculator, the value of $\cos 89^\circ \cos 61^\circ - \sin 89^\circ \sin 61^\circ$. (3)

Answer: _____

- (c) Determine, without the use of a calculator, the value of $2 \sin 15^\circ \cos 15^\circ$. (2)

Answer: _____

- (d) Determine the general solution of $\sqrt{3} \sin \theta + \cos \theta = 0$. (3)

Answer: _____

3

[14]

- (a) Determine the general solution of $2\sin^2 x + \cos x - 1 = 0$. (5)

Answer: _____

- (b) Prove that $\frac{\cos x}{1 - \sin x} - \frac{\cos x}{1 + \sin x} = 2 \tan x$. (5)

Answer: _____

- (c) Hence solve $\frac{\cos x}{1 - \sin x} - \frac{\cos x}{1 + \sin x} = 2\sqrt{3}$ for $x \in [0^\circ; 360^\circ]$. (4)

Answer: _____

4

[13]

- (a) Prove that $\frac{1 - \cos 2x}{\sin 2x} = \tan x$. (5)

Answer: _____

- (b) Determine the values of $x \in [0^\circ; 360^\circ]$ for which the identity in (a) is not valid. (4)

Answer: _____

- (c) Hence, or otherwise, solve $\frac{1 - \cos 2x}{\sin 2x} = 0$ for $x \in [-180^\circ; 180^\circ]$. (4)

Answer: _____

5

[10]

Given: $\sin 22^\circ \cos 22^\circ = p$. Determine, without the use of a calculator, each of the following in terms of p .

- (a) $\sin 44^\circ$ (2)

Answer: _____

- (b) $\cos 46^\circ$ (2)

Answer: _____

- (c) $\cos 88^\circ$ (3)

Answer: _____

- (d) $\cos 44^\circ$ (3)

Answer: _____

Given: $\sin 46^\circ = p$. Determine, without the use of a calculator, each of the following in terms of p .

(a) $\sin 134^\circ$ (2)

Answer: _____

(b) $\cos 46^\circ$ (2)

Answer: _____

(c) $\sin 92^\circ$ (3)

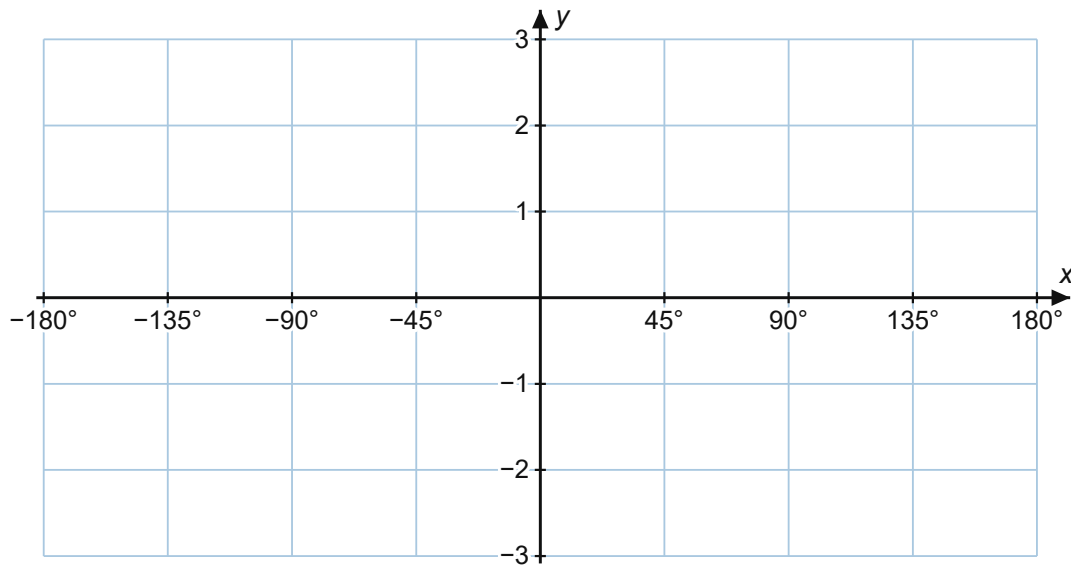
Answer: _____

Trigonometric graphs

7

[12]

Given: $f(x) = -\cos 2x$ and $g(x) = -\tan x$ for $x \in [-180^\circ; 180^\circ]$.



- (a) Write down the period of g . (1)

Answer: _____

- (b) Write down the equations of the asymptotes of g for $x \in [-180^\circ; 180^\circ]$. (2)

Answer: _____

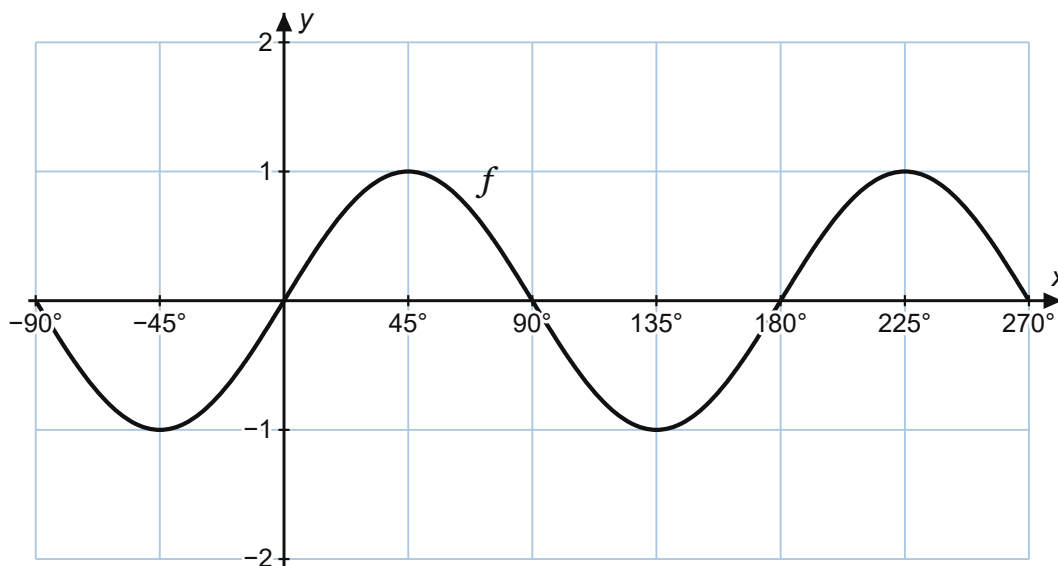
- (c) Sketch the graphs of f and g on the set of axes provided. Label all intercepts with the axes, asymptotes, turning points and end points. (6)

Answer: _____

- (d) Use your graph to determine the values of $x \in [-180^\circ; 180^\circ]$ for which $f(x) \cdot g(x) \leq 0$. (3)

Answer: _____

The graph of $f(x) = \sin bx$ is sketched below for $x \in [-90^\circ; 270^\circ]$.



- (a) Determine the value of b . (1)

Answer: _____

- (b) Write down the period of f . (1)

Answer: _____

- (c) Sketch the graph of $g(x) = -\cos x$ on the same set of axes as f . Label all intercepts with the axes, turning points and end points. (4)

Answer: _____

- (d) Write down the amplitude of g . (1)

Answer: _____

- (e) Determine the values of $x \in [-90^\circ; 270^\circ]$ for which $f(x) = g(x)$. Show all calculations. (5)

Answer: _____

- (f) Use your graph to determine the values of $x \in [-90^\circ; 270^\circ]$ for which $f(x) < g(x)$. (2)

Answer: _____

- (g) Use your graph to determine the values of $x \in [-90^\circ; 270^\circ]$ for which $\frac{f(x)}{g(x)} < 0$. (2)

Answer: _____

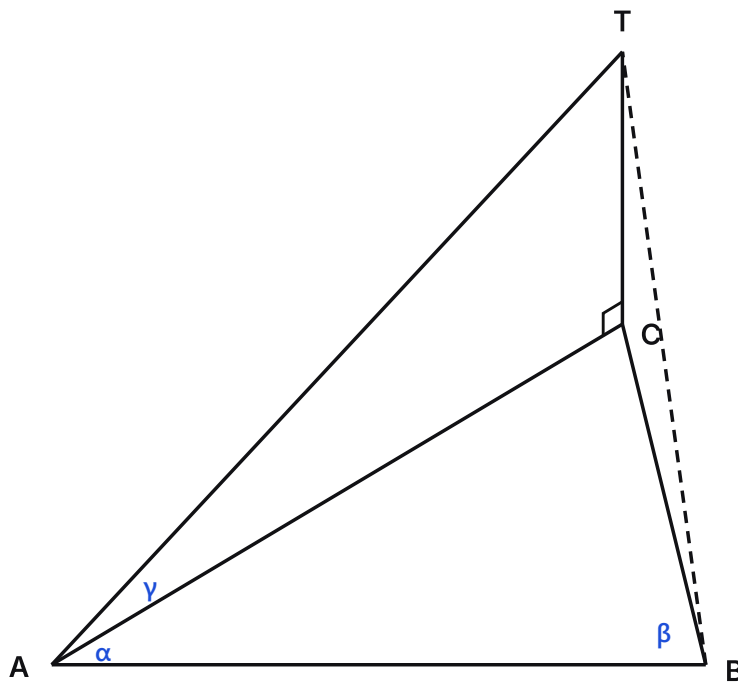
Sine, cosine and area rules (2D)

9

[12]

In the diagram (answers correct to two decimal places):

- A, B and C lie on horizontal ground, and TC is a vertical tower at C.
- $AB = d$, $\hat{BAC} = \alpha$ and $\hat{ABC} = \beta$.
- The angle of elevation of T from A is γ .



(a) Show that $AC = (d \sin \beta) / (\sin(\alpha + \beta))$. (3)

Answer: _____

(b) Hence show that $TC = (d \sin \beta \tan \gamma) / (\sin(\alpha + \beta))$. (2)

Answer: _____

(c) Calculate TC if $d = 100$ m, $\alpha = 50^\circ$, $\beta = 65^\circ$ and $\gamma = 44^\circ$. (2)

Answer: _____

(d) Calculate the length of BT. (3)

Answer: _____

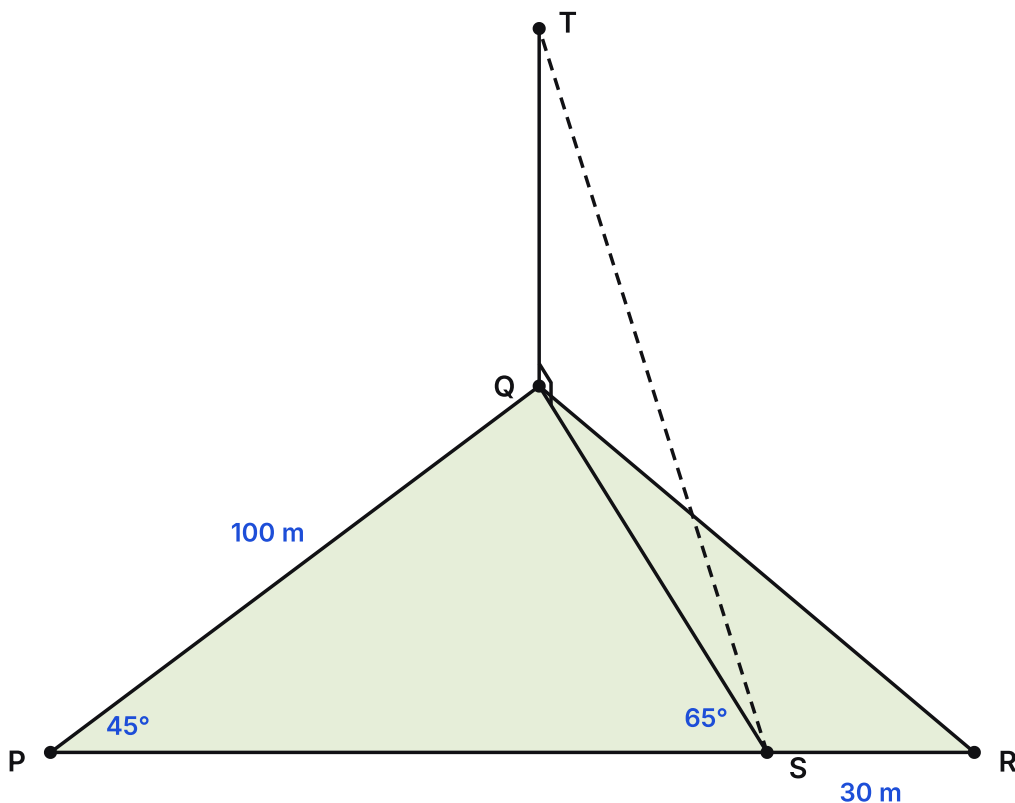
(e) Calculate the angle of elevation of T from B.

(2)

Answer: _____

In the diagram below (answers correct to two decimal places):

- PQR is a triangular field on horizontal ground, and S is a point on PR.
- TQ is a vertical mast at Q.
- $PQ = 100$ m and $SR = 30$ m.
- $\angle QPS = 45^\circ$ and $\angle QSP = 65^\circ$.



- (a) Calculate the length of QS. (3)

Answer: _____

- (b) Calculate the length of QR. (4)

Answer: _____

- (c) Calculate the area of $\triangle QSR$. (3)

Answer: _____

- (d) The angle of elevation of T from S is 25° . Calculate the height of the mast. (3)

Answer: _____