



Trigonometric Equations and Identities Exam Questions (From OCR 4722)

Q1, (Jun 2012, Q7a)

(i) Given that α is the acute angle such that $\tan \alpha = \frac{2}{5}$, find the exact value of $\cos \alpha$. [2]

(ii) Given that β is the obtuse angle such that $\sin \beta = \frac{3}{7}$, find the exact value of $\cos \beta$. [3]

Q2, (OCR 4752, Jun 2006, Q3)

θ is an acute angle and $\sin \theta = \frac{1}{4}$. Find the exact value of $\tan \theta$. [3]

Q3, (OCR 4752, Jan 2007, Q3)

Given that $\cos \theta = \frac{1}{3}$ and θ is acute, find the exact value of $\tan \theta$. [3]

Q4, (OCR 4752, Jan 2008, Q3)

You are given that $\tan \theta = \frac{1}{2}$ and the angle θ is acute. Show, without using a calculator, that $\cos^2 \theta = \frac{4}{5}$. [3]

Q5, (Jan 2010, Q1)

(i) Show that the equation

$$2 \sin^2 x = 5 \cos x - 1$$

can be expressed in the form

$$2 \cos^2 x + 5 \cos x - 3 = 0. \quad [2]$$

(ii) Hence solve the equation

$$2 \sin^2 x = 5 \cos x - 1,$$

giving all values of x between 0° and 360° . [4]

Q6, (Jun 2010, Q7)

(i) Show that $\frac{\sin^2 x - \cos^2 x}{1 - \sin^2 x} \equiv \tan^2 x - 1$. [2]

(ii) Hence solve the equation

$$\frac{\sin^2 x - \cos^2 x}{1 - \sin^2 x} = 5 - \tan x,$$

for $0^\circ \leq x \leq 360^\circ$. [6]

Q7, (Jun 2013, Q2)

Solve each of the following equations, for $0^\circ \leq x \leq 360^\circ$.

(i) $\sin \frac{1}{2}x = 0.8$ [3]

(ii) $\sin x = 3 \cos x$ [3]



Q8, (Jun 2009, Q5)

Solve each of the following equations for $0^\circ \leq x \leq 180^\circ$.

(i) $\sin 2x = 0.5$ [3]

(ii) $2 \sin^2 x = 2 - \sqrt{3} \cos x$ [5]

Q9, (Jun 2014, Q4)

(i) Show that the equation

$$\sin x - \cos x = \frac{6 \cos x}{\tan x}$$

can be expressed in the form

$$\tan^2 x - \tan x - 6 = 0. \quad [2]$$

(ii) Hence solve the equation $\sin x - \cos x = \frac{6 \cos x}{\tan x}$ for $0^\circ \leq x \leq 360^\circ$. [4]

Q10, (Jun 2017, Q9) [Modified]

The cubic polynomial $f(x)$ is defined by $f(x) = 4x^3 + 9x - 5$.

(i) Show that $(2x - 1)$ is a factor of $f(x)$ and hence express $f(x)$ as the product of a linear factor and a quadratic factor. [4]

(ii) (a) Show that the equation

$$4 \sin 2\theta \cos 2\theta + \frac{5}{\cos 2\theta} = 13 \tan 2\theta$$

can be expressed in the form

$$4 \sin^3 2\theta + 9 \sin 2\theta - 5 = 0. \quad [4]$$

(b) Hence solve the equation

$$4 \sin 2\theta \cos 2\theta + \frac{5}{\cos 2\theta} = 13 \tan 2\theta$$

for $0 \leq \theta \leq 360$. Give each answer in an exact form. [4]

Q11, (OCR 4752, Jun 2009, Q7)

Show that the equation $4 \cos^2 \theta = 4 - \sin \theta$ may be written in the form

$$4 \sin^2 \theta - \sin \theta = 0.$$

Hence solve the equation $4 \cos^2 \theta = 4 - \sin \theta$ for $0^\circ \leq \theta \leq 180^\circ$. [5]

Q12, (OCR 4752, Jun 2011, Q7)

Solve the equation $\tan \theta = 2 \sin \theta$ for $0^\circ \leq \theta \leq 360^\circ$. [4]



Q13, (Jan 2008, Q9)

(i)

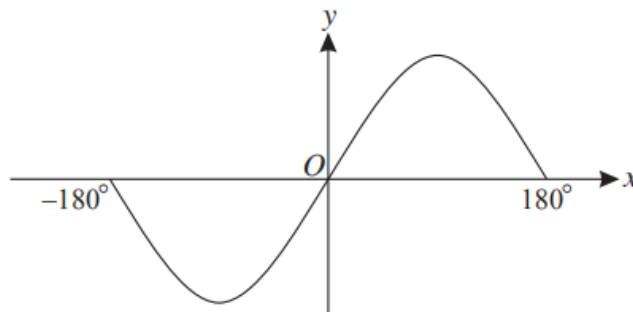


Fig. 1

Fig. 1 shows the curve $y = 2 \sin x$ for values of x such that $-180^\circ \leq x \leq 180^\circ$. State the coordinates of the maximum and minimum points on this part of the curve. [2]

(ii)

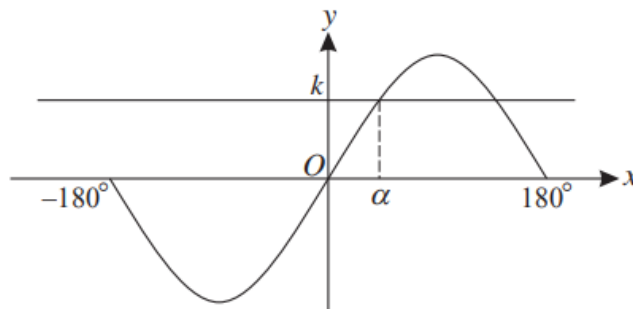


Fig. 2

Fig. 2 shows the curve $y = 2 \sin x$ and the line $y = k$. The smallest positive solution of the equation $2 \sin x = k$ is denoted by α . State, in terms of α , and in the range $-180^\circ \leq x \leq 180^\circ$,

- (a) another solution of the equation $2 \sin x = k$, [1]
(b) one solution of the equation $2 \sin x = -k$. [1]

Q14, (OCR 4752, Jun 2013, Q9)

- (i) Show that the equation $\frac{\tan \theta}{\cos \theta} = 1$ may be rewritten as $\sin \theta = 1 - \sin^2 \theta$. [2]
(ii) Hence solve the equation $\frac{\tan \theta}{\cos \theta} = 1$ for $0^\circ \leq \theta \leq 360^\circ$. [3]
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Q15, (Jun 2014, Q4)

(i) Show that the equation

$$\sin x - \cos x = \frac{6 \cos x}{\tan x}$$

can be expressed in the form

$$\tan^2 x - \tan x - 6 = 0. \quad [2]$$

(ii) Hence solve the equation $\sin x - \cos x = \frac{6 \cos x}{\tan x}$ for $0^\circ \leq x \leq 360^\circ$. [4]

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