1994 FG10.3

已知 $\sin 2\theta = 2\sin\theta\cos\theta$。求 c，若 $c = \dfrac{\sin 20^\circ \cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ}{\sin 160^\circ}$。

It is given that $\sin 2\theta = 2 \sin \theta \cos \theta$.

Find the value of c, if $c = \dfrac{\sin 20^\circ \cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ}{\sin 160^\circ}$.

1994 FG10.4

已知 $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$，求 d 的值，若

$d = (1 + \tan 21^\circ)(1 + \tan 22^\circ)(1 + \tan 23^\circ)(1 + \tan 24^\circ)$。

It is given that $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$. Find the value of d, if

$d = (1 + \tan 21^\circ)(1 + \tan 22^\circ)(1 + \tan 23^\circ)(1 + \tan 24^\circ)$.

1999 FI1.2

In ΔABC, $AB = 5$, $AC = 6$ and $BC = 4$. If $\dfrac{1}{Q} = \cos 2A$, find the value of Q.

(<u>Hint</u>: $\cos 2A = 2\cos^2 A - 1$)

2001 FG2.4

已知 $\cos 16^\circ = \sin 14^\circ + \sin d^\circ$ 及 $0 < d < 90$，求 d 的值。

Given that $\cos 16^\circ = \sin 14^\circ + \sin d^\circ$ and $0 < d < 90$, find the value of d.

2002 HI3

已知 $\cos 15^\circ = \dfrac{\sqrt{a} + \sqrt{b}}{4}$，且 a、b 是自然數。若 $a + b = y$，求 y 的值。

Suppose $\cos 15^\circ = \dfrac{\sqrt{a} + \sqrt{b}}{4}$ and a, b are natural numbers.

If $a + b = y$, find the value of y.

2003 HI6

若對任意 $0 < x < \dfrac{\pi}{2}$，$\cot\dfrac{1}{4}x - \cot x \equiv \dfrac{\sin kx}{\left(\sin\dfrac{1}{4}x\right)(\sin x)}$，其中 k 是一常數，

求 k 的值。

If for any $0 < x < \dfrac{\pi}{2}$, $\cot\dfrac{1}{4}x - \cot x \equiv \dfrac{\sin kx}{\left(\sin\dfrac{1}{4}x\right)(\sin x)}$, where k is a constant,

find the value of k.

2003 FG2.4

在ΔABC 中，$\cos A = \dfrac{4}{5}$ 和 $\cos B = \dfrac{7}{25}$。若 $\cos C = d$，求 d 的值。

In ΔABC, $\cos A = \dfrac{4}{5}$ and $\cos B = \dfrac{7}{25}$. If $\cos C = d$, find the value of d.

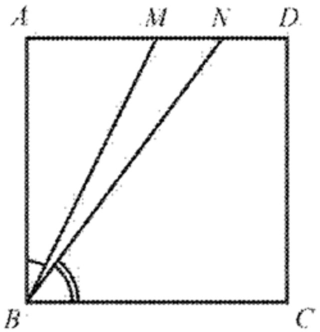
2004 FI2.1

如圖，$ABCD$ 為一正方形，M 是 AD 的中點及 N 是 MD 的中點及 N 是 MD 的中點。

若$\angle CBN : \angle MBA = P : 1$，求 P 的值。

In the figure, $ABCD$ is a square, M is the mid-point of AD and N is the mid-point of MD.

If $\angle CBN : \angle MBA = P : 1$, find the value of P.



2004 FG1.4

已知 $0 \le x_0 \le \dfrac{\pi}{2}$ 且 x_0 滿足方程 $\sqrt{\sin x + 1} - \sqrt{1 - \sin x} = \sin\dfrac{x}{2}$。

若 $d = \tan x_0$，求 d 的值。

Given that $0 \le x_0 \le \dfrac{\pi}{2}$ and x_0 satisfies the equation $\sqrt{\sin x + 1} - \sqrt{1 - \sin x} = \sin\dfrac{x}{2}$.

If $d = \tan x_0$, find the value of d.

2005 FG3.1

設 $0^\circ < \alpha < 45^\circ$。若 $\sin\alpha\cos\alpha = \dfrac{3\sqrt{7}}{16}$ 及 $A = \sin\alpha$，求 A 的值。

Let $0^\circ < \alpha < 45^\circ$. If $\sin\alpha\cos\alpha = \dfrac{3\sqrt{7}}{16}$ and $A = \sin\alpha$, find the value of A.

2006 HG6

設 a、b、c 和 d 是實數且滿足 $a^2 + b^2 = c^2 + d^2 = 1$ 及 $ac + bd = 0$。若 $R = ab + cd$，求 R 的值。

Let a, b, c and d be real numbers such that $a^2 + b^2 = c^2 + d^2 = 1$ and $ac + bd = 0$.
If $R = ab + cd$, find the value of R.

2006 FI2.3

已知 $T = \sin 50^\circ \times (1 + \sqrt{3} \times \tan 10^\circ)$，求 T 的值。

Given that $T = \sin 50^\circ \times (1 + \sqrt{3} \times \tan 10^\circ)$, find the value of T.

2006 FG3.3

已知 $\tan x + \tan y + 1 = \cot x + \cot y = 6$。若 $z = \tan(x + y)$，求 z 的值。

Given that $\tan x + \tan y + 1 = \cot x + \cot y = 6$.

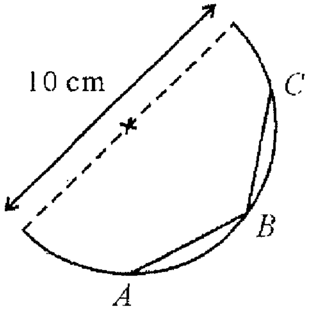
If $z = \tan(x + y)$, find the value of z.

2007 HG8

如圖三，已知半圓的直徑為 10 cm。A、B 和 C 是半圓上任意的三點使 B 在 $\overset{\frown}{AC}$ 上。設 x 為綫段 AB 及 BC 的長度之和，求 x 可取的最大值。

In figure 3, given that the diameter of the semicircle is 10 cm. A, B and C are three arbitrary points on the semi-circle where B is on $\overset{\frown}{AC}$. If x is the sum of the length of the line segments AB and BC,

find the greatest possible value of x.



2010 HI6

若 $x\sqrt{1-y^2} + y\sqrt{1-x^2} = 1$，其中 $0 \le x, y \le 1$，求 $x^2 + y^2$ 的值。

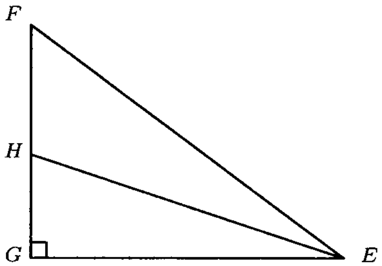
If $x\sqrt{1-y^2} + y\sqrt{1-x^2} = 1$, where $0 \le x, y \le 1$, find the value of $x^2 + y^2$.

2010 FI4.4

在圖二中，EFG 為一直角三角形。已知 H 為 FG 上的一點，使得 $GH : HF = 4 : 5$ 及 $\angle GEH = \angle FEH$。若 $EG = 1$ 及 $FG = d$，求 d 的值。

In Figure 2, EFG is a right-angled triangle. Given that H is a point on FG, such that $GH : HF = 4 : 5$ and $\angle GEH = \angle FEH$. If $EG = 1$ and $FG = d$,

find the value of d.



2011 HG6

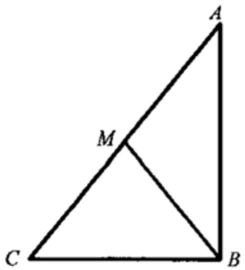
如下圖，M 為 AC 上的一點，且 $AM = MC = BM = 3$。

求 $AB + BC$ 的最大值。

In the figure below, M is a point on AC,

$AM = MC = BM = 3$.

Find the maximum value of $AB + BC$.



2011 FI4.1

考慮函數 $y = \sin x + \sqrt{3}\cos x$。設 a 為 y 的最大值。求 a 的值。

Consider the function $y = \sin x + \sqrt{3}\cos x$.

Let a be the maximum value of y. Find the value of a.

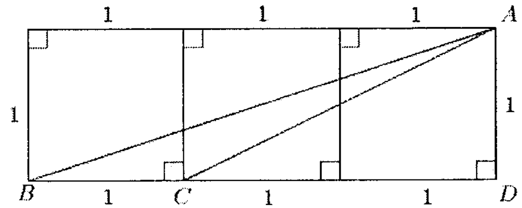
2012 FI3.1

在圖中，長方形由三個邊長為 1 之正方形組成。

若 $\alpha° = \angle ABD + \angle ACD$，求 α 的值。

In the figure, a rectangle is sub-divided into 3 identical squares of side length 1.

If $\alpha° = \angle ABD + \angle ACD$, find the value of α.



2012 FI3.2

設 ABC 為一銳角三角形。若 $\sin A = \frac{36}{45}$，$\sin B = \frac{12}{13}$ 及 $\sin C = \frac{\beta}{y}$，求 β 的值，其中 β 及 y 是最簡化之代表形式。

Let ABC be an acute-angled triangle. If $\sin A = \frac{36}{45}$, $\sin B = \frac{12}{13}$ and $\sin C = \frac{\beta}{y}$,

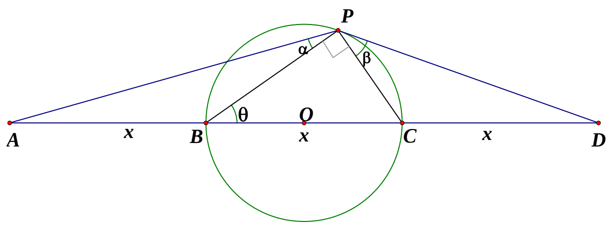
find the value of β, where β and y are in the lowest terms.

2012 FG2.4

在圖中，圓有直徑 BC，圓心在 O，P、B 及 C 皆為圓周上的點。若 $AB = BC = CD$ 及 AD 為一綫段，$\alpha = \angle APB$ 及 $\beta = \angle CPD$，求 $(\tan \alpha)(\tan \beta)$ 的值。

In the figure, P, B and C are points on a circle with centre O and diameter BC. If A, B, C, D are collinear such that $AB = BC = CD$, $\alpha = \angle APB$ and $\beta = \angle CPD$,

find the value of $(\tan \alpha)(\tan \beta)$.

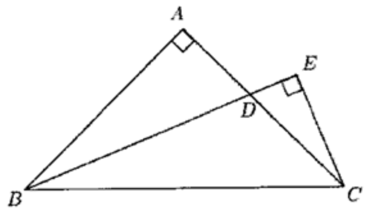


2012 FG4.1

在圖一中，ABC 及 EBC 是兩個直角三角形，$\angle BAC = \angle BEC = 90°$，$AB = AC$ 及 EDB 為 $\angle ABC$ 的角平分綫。求 $\frac{BD}{CE}$ 的值。

In figure 1, ABC and EBC are two right-angled triangles, $\angle BAC = \angle BEC = 90°$, $AB = AC$ and EDB is the angle bisector of $\angle ABC$.

Find the value of $\frac{BD}{CE}$.



2017 FI4.4

若 $\cos 2\theta = \dfrac{3}{44}$，求 $d = \sin^4\theta + \cos^4\theta$ 的值。

If $\cos 2\theta = \dfrac{3}{44}$, determine the value of $d = \sin^4\theta + \cos^4\theta$.

2018 FG4.3

求 $C = \cos\dfrac{\pi}{15}\times\cos\dfrac{2\pi}{15}\times\cos\dfrac{3\pi}{15}\times\cos\dfrac{4\pi}{15}\times\cos\dfrac{5\pi}{15}\times\cos\dfrac{6\pi}{15}\times\cos\dfrac{7\pi}{15}$ 的值。

Determine the value of

$C = \cos\dfrac{\pi}{15}\times\cos\dfrac{2\pi}{15}\times\cos\dfrac{3\pi}{15}\times\cos\dfrac{4\pi}{15}\times\cos\dfrac{5\pi}{15}\times\cos\dfrac{6\pi}{15}\times\cos\dfrac{7\pi}{15}$.

2019 HI14

已知 $3\sin x + 2\sin y = 4$。設 N 為 $3\cos x + 2\cos y$ 的最大值。

求 N 的值。

Given that $3\sin x + 2\sin y = 4$. Let N be the maximum value of $3\cos x + 2\cos y$.

Find the value of N.

2021 P1Q4

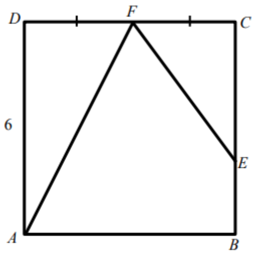
求 $8\cos^2 15°\cos^2 30° - 8\sin^2 15°\cos^2 30°$ 的值。

Find the value of $8\cos^2 15°\cos^2 30° - 8\sin^2 15°\cos^2 30°$.

2021 P2Q1

在圖一中，$ABCD$ 是一個邊長為 6 的正方形。F 是 CD 的中點。若 $\angle FAB = \angle AFE$，求 BE 的長度。

In Figure 1, $ABCD$ is a square of sides 6 units. F is the mid-point of CD. If $\angle FAB = \angle AFE$, find the length of BE.



2023 HG3

已知 $\tan\alpha$ 和 $\tan\beta$ 是二次方程 $x^2 - 4x - 2 = 0$ 的根。

求 $\sin^2(\alpha+\beta) + 2\sin(\alpha+\beta)\cos(\alpha+\beta) + 3\cos^2(\alpha+\beta)$ 的值。

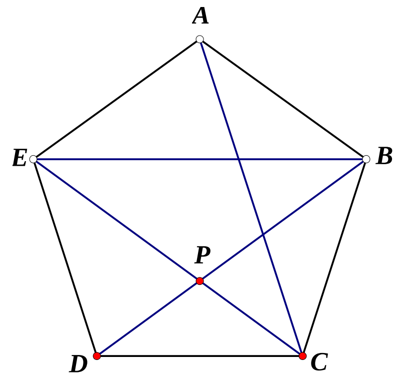
2024 HG10

在圖五中，$ABCDE$ 為一正五邊形，BD 及 CE 相交於 P。

若 ΔABE 的面積為 1，求 ΔBPC 的面積。

In Figure 5, $ABCDE$ is a regular pentagon, BD and CE intersect at P.

If the area of ΔABE is 1, find the area of ΔBPC.



圖五 Figure 5

Answers

1994 FG10.3 $\frac{1}{16}$	1994 FG10.4 4	1999 FI1.2 8	2001 FG2.4 46	2002 HI3 8
2003 HI6 $\frac{3}{4}$	2003 FG2.4 $\frac{44}{125}$	2004 FI2.1 2	2004 FG1.4 0	2005 FG3.1 $\frac{\sqrt{7}}{4}$
2006 HG6 0	2006 FI2.3 1	2006 FG3.3 30	2007 HG8 $10\sqrt{2}$	2010 HI6 1
2010 FI4.4 $\frac{3}{4}$	2011 HG6 $6\sqrt{2}$	2011 FI4.1 2	2012 FI3.1 45	2012 FI3.2 56
2012 FG2.4 $\frac{1}{4}$	2012 FG4.1 2	2017 FI4.4 $\frac{1945}{3872}$	2018 FG4.3 $\frac{1}{128}$	2019 HI14 3
2021 P1Q4 $3\sqrt{3}$	2021 P2Q1 2	2023 HG3 $\frac{67}{25}$	2024 HG10 $\frac{\sqrt{5}-1}{2}$	