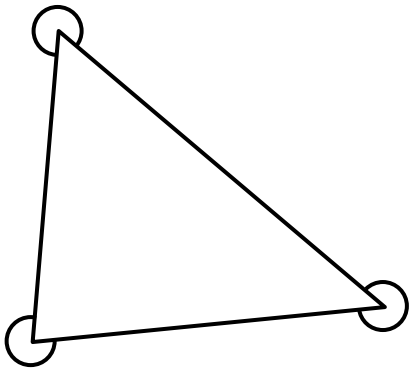
Hong Kong Mathematics Olympiad (1987 – 1988)
Sample Event (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 附圖所示三角的和是 $a°$，求 a 的值。
In the given diagram, the sum of the three marked angles is $a°$.
Find the value of a.



$a =$

(ii) 一正 b 邊形的內角和為 $a°$，求 b 的值。
The sum of the interior angles of a regular b-sided polygon is $a°$.
Find the value of b.

$b =$

(iii) 若 $8^b = p^{21}$，求 p 的值。
If $8^b = p^{21}$, find the value of p.

$p =$

(iv) 若 $p = \log_q 81$，求 q 的值。
If $p = \log_q 81$, find the value of q.

$q =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
				+	Bonus score		Time		
					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 1 (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $N(t) = 100\times18^t$，且 $P = N(0)$，求 P 的值。
If $N(t) = 100\times18^t$ and $P = N(0)$, find the value of P.

$P =$

(ii) A fox ate P grapes in 5 days, each day eating 6 more than on the previous day.
If he ate Q grapes on the first day, find the value of Q.
一狐狸在 5 天內吃提子 P 粒，而每天較前一天多吃 6 粒。假如牠在第一天吃了 Q 粒提子，求 Q 的值。

$Q =$

(iii) 若 $\frac{25}{32}$ 的 $Q\%$是 R 的 $\frac{1}{Q}\%$，求 R 的值。
If $Q\%$ of $\frac{25}{32}$ is $\frac{1}{Q}\%$ of R, find the value of R.

$R =$

(iv) 若 $3x^2 - ax + R = 0$ 的其中一根是 $\frac{50}{9}$，而另一根是 S，求 S 的值。
If one root of the equation $3x^2 - ax + R = 0$ is $\frac{50}{9}$ and the other root is S, find the value of S.

$S =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
				+	Bonus score		Time		
					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 2 (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$，且 $\begin{vmatrix} 3 & 4 \\ 2 & k \end{vmatrix} = k$，求 k 的值。

If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$ and $\begin{vmatrix} 3 & 4 \\ 2 & k \end{vmatrix} = k$, find the value of k.

$k =$

(ii) 若 $50m = 54^2 - k^2$，求 m 的值。

If $50m = 54^2 - k^2$, find the value of m.

$m =$

(iii) 若 $(m + 6)^a = 2^{12}$，求 a 的值。

If $(m + 6)^a = 2^{12}$, find the value of a.

$a =$

(iv) A、B 及 C 依次為 $(a, 5)$、$(2, 3)$ 及 $(4, b)$。若 $AB \perp BC$，求 b 的值。

A, B and C are the points $(a, 5)$, $(2, 3)$ and $(4, b)$ respectively.
If $AB \perp BC$, find the value of b.

$b =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.	
			+ Bonus score				Time		
			Total score				Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 3 (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $\dfrac{\sqrt{3}}{2\sqrt{7}-\sqrt{3}}=\dfrac{2\sqrt{21}+h}{25}$，求 h 的值。

If $\dfrac{\sqrt{3}}{2\sqrt{7}-\sqrt{3}}=\dfrac{2\sqrt{21}+h}{25}$, find the value of h.

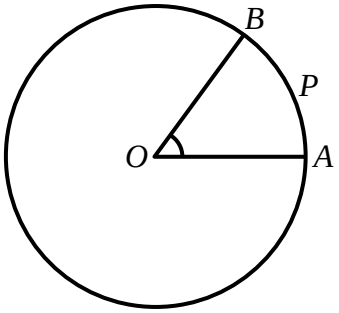
$h=$

(ii) 附圖所示圓形的半徑是 $2h$ cm，圓心是 O。若 $\angle AOB=\dfrac{\pi}{3}$，且扇形 $AOBP$ 的面積是 $k\pi$ cm^2，求 k 的值。

The given figure shows a circle of radius $2h$ cm, centre O.

If $\angle AOB=\dfrac{\pi}{3}$, and the area of sector $AOBP$ is $k\pi$ cm^2, find the value of k.

$k=$



(iii) 甲可在 k 日完成某一工程，乙可在 $(k+6)$ 日完成同一工程。
假如甲、乙合作，可在 m 日完成該工程。求 m 的值。

A can do a job in k days, B can do the same job in $(k+6)$ days.
If they work together, they can finish the job in m days. Find the value of m.

$m=$

(iv) 同時擲 m 個硬幣。若其中至少有一個正面出現的概率是 p，求 p 的值。

m coins are tossed. If the probability of obtaining at least one head is p, find the value of p.

$p=$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
					+ Bonus score		Time		
					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 4 (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $f(t) = 2 - \frac{t}{3}$，且 $f(a) = -4$，求 a 的值。

If $f(t) = 2 - \frac{t}{3}$, and $f(a) = -4$, find the value of a.

$a =$

(ii) 若 $a + 9 = 12Q + r$，其中 Q、r 是整數，且 $0 < r < 12$，求 r 的值。
If $a + 9 = 12Q + r$, where Q, r are integers and $0 < r < 12$, find the value of r.

$r =$

(iii) x、y 是實數。若 $x + y = r$，且 M 是 xy 的最大值，求 M 的值。
x, y are real numbers. If $x + y = r$ and M is the maximum value of xy, find the value of M.

$M =$

(iv) 若 w 是實數，且 $2^{2w} - 2^w - \frac{8}{9}M = 0$，求 w 的值。

If w is a real number and $2^{2w} - 2^w - \frac{8}{9}M = 0$, find the value of w.

$w =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
				+	Bonus score		Time		
					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 5 (Individual)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $0.3\dot{5}\dot{7} = \dfrac{177}{a}$，求 a 的值。

If $0.3\dot{5}\dot{7} = \dfrac{177}{a}$, find the value of a.

$a =$

(ii) 若 $\tan^2 a° + 1 = b$，求 b 的值。

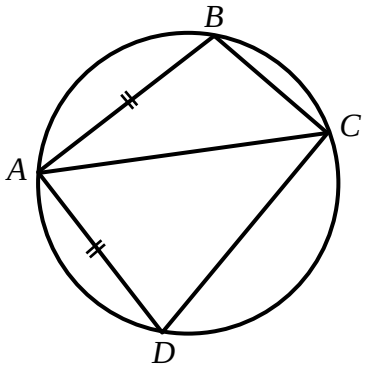
If $\tan^2 a° + 1 = b$, find the value of b.

$b =$

(iii) 附圖中，$AB = AD$，$\angle BAC = 26° + b°$，$\angle BCD = 106°$。
若 $\angle ABC = x°$，求 x 的值。

In the figure, $AB = AD$, $\angle BAC = 26° + b°$, $\angle BCD = 106°$.
If $\angle ABC = x°$, find the value of x.

$x =$



(iv) 若 $\begin{pmatrix} h & k \end{pmatrix}\begin{pmatrix} m & p \\ n & q \end{pmatrix} = \begin{pmatrix} hm+kn & hp+kq \end{pmatrix}$，且 $\begin{pmatrix} 1 & 2 \end{pmatrix}\begin{pmatrix} 3 & x \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 11 & Y \end{pmatrix}$，求 Y 的值。

If $\begin{pmatrix} h & k \end{pmatrix}\begin{pmatrix} m & p \\ n & q \end{pmatrix} = \begin{pmatrix} hm+kn & hp+kq \end{pmatrix}$ and $\begin{pmatrix} 1 & 2 \end{pmatrix}\begin{pmatrix} 3 & x \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 11 & Y \end{pmatrix}$,
find the value of Y.

$Y =$

FOR OFFICIAL USE

Score for accuracy	×	Mult. factor for speed	=		Team No.	
			+	Bonus score	Time	
				Total score	Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Sample Event (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 在下午三點卅分，時鐘兩針間之銳角為 $p°$，求 p 的值。
The acute angle between the 2 hands of a clock at 3:30 p.m. is $p°$. Find the value of p.

$p =$

(ii) 在 ΔABC 中，$\angle B = \angle C = p°$。若 $q = \sin A$，求 q 的值。
In ΔABC, $\angle B = \angle C = p°$. If $q = \sin A$, find the value of q.

$q =$

(iii) 三點(1, 3)、(2, 5)、(4, a)共綫，求 a 的值。
The 3 points (1, 3), (2, 5), (4, a) are collinear. Find the value of a.

$a =$

(iv) 7、9、x、y 及 17 之平均數為 10。
若 $x + 3$、$x + 5$、$y + 2$、8 及 $y + 18$ 的平均數是 m，求 m 的值。
The average of 7 , 9 , x , y and 17 is 10 .
If the average of $x + 3$, $x + 5$, $y + 2$, 8 and $y + 18$ is m, find the value of m.

$m =$

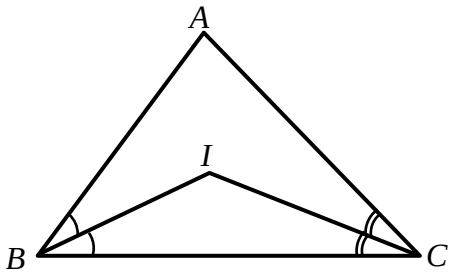
FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
					+ Bonus score		Time		
					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 6 (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 附圖中 $\angle B$ 及 $\angle C$ 的平分線相交於 I。若 $\angle A = 70°$，$\angle BIC = x°$，求 x 的值。
In the figure, the bisectors of $\angle B$ and $\angle C$ meet at I. If $\angle A = 70°$ and $\angle BIC = x°$, find the value of x.



$x =$

(ii) 一凸 n 邊形有 35 條對角綫。求 n 的值。
A convex n-sided polygon has 35 diagonals. Find the value of n.

$n =$

(iii) 若 $y = ab - a + b - 1$，且 $a = 49$，$b = 21$，求 y 的值。
If $y = ab - a + b - 1$ and $a = 49$, $b = 21$, find the value of y.

$y =$

(iv) 若 $K = 1 + 2 - 3 - 4 + 5 + 6 - 7 - 8 + \ldots + 1001 + 1002$，求 K 的值。
If $K = 1 + 2 - 3 - 4 + 5 + 6 - 7 - 8 + \ldots + 1001 + 1002$, find the value of K.

$K =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
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					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 7 (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

M、N 是小於 10 的正整數，且 $8M420852 \times 9 = N9889788 \times 11$。

M, N are positive integers less than 10 and $8M420852 \times 9 = N9889788 \times 11$.

(i) 求 M 的值。
Find the value of M.

$M =$

(ii) 求 N 的值。
Find the value of N.

$N =$

(iii) 經過 (4, 3) 及 (12, –3) 的直綫方程是 $\frac{x}{a}+\frac{y}{b}=1$。求 a 的值。

The equation of the line through (4, 3) and (12, –3) is $\frac{x}{a}+\frac{y}{b}=1$.

Find the value of a.

$a =$

(iv) 若 $x + k$ 是 $3x^2 + 14x + a$ 的因式，求 k 的值。(k 是整數)
If $x + k$ is a factor of $3x^2 + 14x + a$, find the value of k. (k is an integer.)

$k =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
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				Total score				Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 8 (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 若 $\log_9 S = \frac{3}{2}$，求 S 的值。

If $\log_9 S = \frac{3}{2}$, find the value of S.

$S =$

(ii) 若直綫 $x + 5y = 0$ 及 $Tx - Sy = 0$ 互相垂直，求 T 的值。
If the lines $x + 5y = 0$ and $Tx - Sy = 0$ are perpendicular to each other, find the value of T.

$T =$

三位數 AAA(其中 $A \neq 0$)及六位數 $AAABBB$ 滿足下列等式：$AAA \times AAA + AAA = AAABBB$。
The 3-digit number AAA, where $A \neq 0$, and the 6-digit number $AAABBB$ satisfy the following equality: $AAA \times AAA + AAA = AAABBB$.

(iii) 求 A 的值。
Find the value of A.

$A =$

(iv) 求 B 的值。
Find the value of B.

$B =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
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Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 9 (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

(i) 一正三角形的面積是 $50\sqrt{12}$。若它的周界是 p，求 p 的值。
The area of an equilateral triangle is $50\sqrt{12}$.
If its perimeter is p, find the value of p.

$p =$

(ii) q、y、z 的平均數是 14。q、y、z、t 的平均數是 13。求 t 的值。
The average of q, y, z is 14. The average of q, y, z, t is 13. Find the value of t.

$t =$

(iii) 若 $7 - 24x - 4x^2 \equiv K + A(x + B)^2$，且 K、A、B 是常數，求 K 的值。
If $7 - 24x - 4x^2 \equiv K + A(x + B)^2$, where K, A, B are constants, find the value of K.

$K =$

(iv) 若 $C = \dfrac{3^{4n} \cdot 9^{n+4}}{27^{2n+2}}$，求 C 的值。
If $C = \dfrac{3^{4n} \cdot 9^{n+4}}{27^{2n+2}}$, find the value of C.

$C =$

FOR OFFICIAL USE

Score for accuracy		×	Mult. factor for speed		=		Team No.		
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					Total score			Min.	Sec.

Hong Kong Mathematics Olympiad (1987 – 1988)
Final Event 10 (Group)

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.
除非特別聲明，答案須用數字表達，並化至最簡。

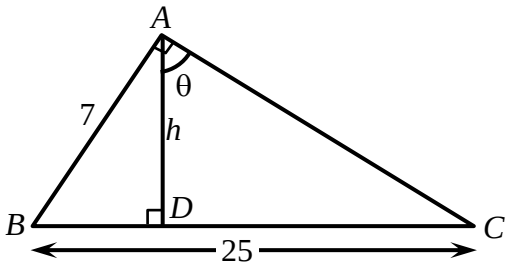
(i) 一正 n 邊形每一內角是 160°。求 n 的值。
Each interior angle of an n-sided regular polygon is 160°. Find the value of n.

$n =$

(ii) 某年五月第 n 日是星期五。同年五月第 k 日是星期二，且 $20 < k < 26$。求 k 的值。
The n^{th} day of May in a year is Friday. The k^{th} day of May in the same year is Tuesday, where $20 < k < 26$. Find the value of k.

$k =$

在圖中，$AD \perp BC$，$BA \perp CA$，$AB = 7$，$BC = 25$，$AD = h$ 及 $\angle CAD = \theta$。
In the figure, $AD \perp BC$, $BA \perp CA$, $AB = 7$, $BC = 25$, $AD = h$ and $\angle CAD = \theta$.



(iii) 若 $100 \sin\theta = t$，求 t 的值。
If $100 \sin\theta = t$, find the value of t.

$t =$

(iv) 求 h 的值。
Find the value of h.

$h =$

FOR OFFICIAL USE

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