

Hong Kong Mathematics Olympiad (1987 – 1988)

Sample Event (Individual)

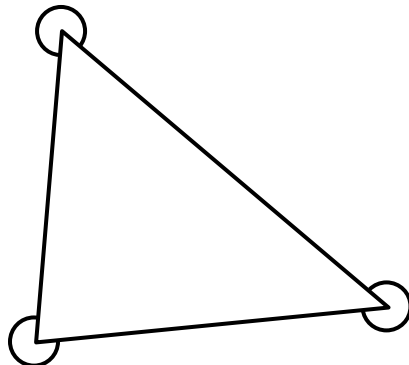
Unless otherwise stated, all answers should be expressed in numerals in their simplest form.

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

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Total score

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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 $N(t) = 100 \times 18^t$ ，且 $P = N(0)$ ，求 P 的值。

If $N(t) = 100 \times 18^t$ 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 .

$S =$

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Score for accuracy

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Total score

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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。

$k =$

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 .

(ii) 若 $50m = 54^2 - k^2$ ，求 m 的值。

$m =$

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

(iii) 若 $(m + 6)^a = 2^{12}$ ，求 a 的值。

$a =$

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

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

$b =$

A, B and C are the points $(a, 5)$, $(2, 3)$ and $(4, b)$ respectively.

If $AB \perp BC$, find the value of b .

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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 $\frac{\sqrt{3}}{2\sqrt{7}-\sqrt{3}} = \frac{2\sqrt{21}+h}{25}$ ，求 h 的值。

$h =$

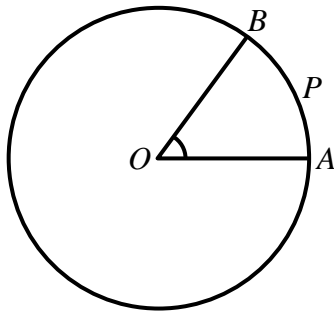
If $\frac{\sqrt{3}}{2\sqrt{7}-\sqrt{3}} = \frac{2\sqrt{21}+h}{25}$, find the value of h .

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

$k =$

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

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

$m =$

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 .

(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

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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。

$a =$

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

- (ii) 若 $a + 9 = 12Q + r$ ，其中 Q, r 是整數，且 $0 < r < 12$ ，求 r 的值。

$r =$

If $a + 9 = 12Q + r$, where Q, r are integers and $0 < r < 12$, find the value of r .

- (iii) x, y 是實數。若 $x + y = r$ ，且 M 是 xy 的最大值，求 M 的值。

$M =$

x, y are real numbers. If $x + y = r$ and M is the maximum value of xy , find the value of M .

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

$w =$

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

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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 $0.3\dot{5}\dot{7} = \frac{177}{a}$ ，求 a 的值。

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

$a =$

(ii) 若 $\tan^2 a^\circ + 1 = b$ ，求 b 的值。

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

$b =$

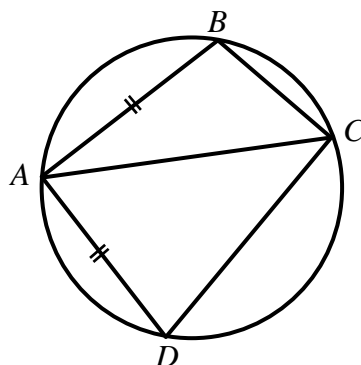
(iii) 附圖中， $AB = AD$ ， $\angle BAC = 26^\circ + b^\circ$ ， $\angle BCD = 106^\circ$ 。

若 $\angle ABC = x^\circ$ ，求 x 的值。

In the figure, $AB = AD$, $\angle BAC = 26^\circ + b^\circ$, $\angle BCD = 106^\circ$.

If $\angle ABC = x^\circ$, find the value of x .

$x =$



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

If $(h \ k) \begin{pmatrix} m & p \\ n & q \end{pmatrix} = (hm + kn \quad hp + kq)$ and $(1 \ 2) \begin{pmatrix} 3 & x \\ 4 & 5 \end{pmatrix} = (11 \ Y)$,

find the value of Y .

$Y =$

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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 .

- (ii) 在 $\triangle ABC$ 中， $\angle B = \angle C = p^\circ$ 。若 $q = \sin A$ ，求 q 的值。

In $\triangle ABC$, $\angle B = \angle C = p^\circ$. If $q = \sin A$, find the value of q .

- (iii) 三點 $(1, 3)$ 、 $(2, 5)$ 、 $(4, a)$ 共線，求 a 的值。

The 3 points $(1, 3)$, $(2, 5)$, $(4, a)$ are collinear. Find the value of 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 .

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Hong Kong Mathematics Olympiad (1987 – 1988)

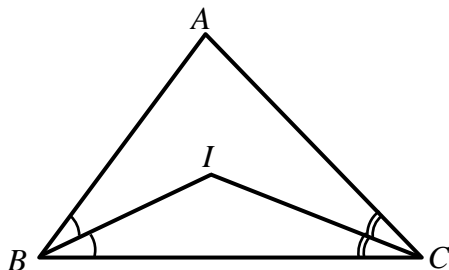
Final Event 6 (Group)

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 $\angle A = 70^\circ$ ， $\angle BIC = x^\circ$ ，求 x 的值。

In the figure, the bisectors of $\angle B$ and $\angle C$ meet at I . If $\angle A = 70^\circ$ and $\angle BIC = x^\circ$, 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 $K = 1 + 2 - 3 - 4 + 5 + 6 - 7 - 8 + \dots + 1001 + 1002$, 求 K 的值。

If $K = 1 + 2 - 3 - 4 + 5 + 6 - 7 - 8 + \dots + 1001 + 1002$, find the value of K .

 $K =$

FOR OFFICIAL USE

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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 $(12, -3)$ 的直線方程是 $\frac{x}{a} + \frac{y}{b} = 1$ 。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

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Total score

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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。

$S =$

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

- (ii) 若直線 $x + 5y = 0$ 及 $Tx - Sy = 0$ 互相垂直，求 T 的值。

$T =$

If the lines $x + 5y = 0$ and $Tx - Sy = 0$ are perpendicular to each other, find the value of 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。

$A =$

Find the value of A .

- (iv) 求 B 的值。

$B =$

Find the value of B .

FOR OFFICIAL USE

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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 $C = \frac{3^{4n} \cdot 9^{n+4}}{27^{2n+2}}$ ，求 C 的值。

If $C = \frac{3^{4n} \cdot 9^{n+4}}{27^{2n+2}}$, find the value of C .

$C =$

FOR OFFICIAL USE

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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 .

$n =$

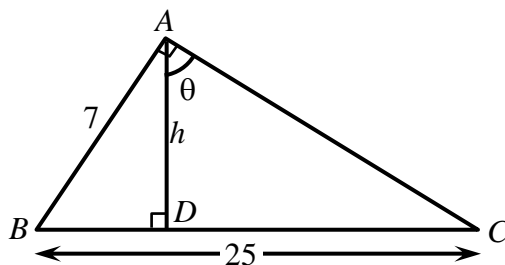
- (ii) 某年五月第 n 日是星期五。同年五月第 k 日是星期二，且 $20 < k < 26$ 。
 求 k 的值。

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 .

$h =$

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