Hong Kong Mathematics Olympiad (1983 – 84)

Sample Event (Group)

香港数学竞赛 (1983 – 84)

决赛项目 – 样本 (团体)

(i) The sum of 2 numbers is 20, their product is 10. If the sum of their reciprocals is a, find a.

某两数之和为 20，其积为 10，若该两数倒数之和为 a，求 a。

$a =$

(ii) $1^2 - 1 = 0 \times 2$, $2^2 - 1 = 1 \times 3$, $3^2 - 1 = 2 \times 4$, …, $b^2 - 1 = 135 \times 137$, find b.

$1^2 - 1 = 0 \times 2$，$2^2 - 1 = 1 \times 3$，$3^2 - 1 = 2 \times 4$，…，$b^2 - 1 = 135 \times 137$，求 b。

$b =$

(iii) If the lines $x + 2y + 1 = 0$ and $cx + 3y + 1 = 0$ are perpendicular, find c.

若两直线 $x + 2y + 1 = 0$ 及 $cx + 3y + 1 = 0$ 互相垂直，求 c。

$c =$

(iv) The points $(2, -1)$, $(0, 1)$, (c, d) are collinear, find d.

$(2, -1)$、$(0, 1)$、(c, d) 三点共线，求 d。

$d =$

Hong Kong Mathematics Olympiad (1983 – 84)

Event 6 (Group)

香港数学竞赛 (1983 – 84)

决赛项目 6 (团体)

(i) If $p = \dfrac{21^3 - 11^3}{21^2 + 21 \times 11 + 11^2}$, find p.

若 $p = \dfrac{21^3 - 11^3}{21^2 + 21 \times 11 + 11^2}$，求 p。

$p =$

(ii) If p men can do a job in 6 days and 4 men can do the same job in q days, find q.

若 p 人可在 6 日完成某一工程，且 4 人可在 q 日完成同一工程，求 q。

$q =$

(iii) If the q^{th} day of March in a year is Wednesday and the r^{th} day of March in the same year is Friday, where $18 < r < 26$, find r.

某年三月第 q 日为星期三，而同年三月第 r 日为星期五，且 $18 < r < 26$，求 r。

$r =$

(iv) If $a * b = ab + 1$, and $s = (3 * 4) * 2$, find s.

若 $a * b = ab + 1$，且 $s = (3 * 4) * 2$，求 s。

$s =$

Hong Kong Mathematics Olympiad (1983 – 84)

Event 7 (Group)

香港数学竞赛 (1983 – 84)

决赛项目 7 (团体)

(i) The acute angle between the 2 hands of a clock at 3:30 a.m. is $p°$. Find p .

$p =$

凌晨三点卅分，时钟两针间之锐角为 $p°$，求 p。

(ii) In ΔABC, $\angle B = \angle C = p°$. If $q = \sin A$, find q .

$q =$

在 ΔABC 中，$\angle B = \angle C = p°$。若 $q = \sin A$，求 q。

(iii) The 3 points $(1, 3)$, $(a, 5)$, $(4, 9)$ are collinear. Find a .

$a =$

三点 (1, 3)，(a, 5)，(4, 9) 共线，求 a。

(iv) The average of 7, 9, x, y, 17 is 10 . If m is the average of $x + 3$, $x + 5$, $y + 2$, 8 , $y + 18$, find m .

$m =$

7, 9, x, y, 17 之平均数为 10。若 m 为 $x + 3$，$x + 5$，$y + 2$，8，$y + 18$ 之平均数，求 m。

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Event 8 (Group)

香港数学竞赛 (1983 – 84)

决赛项目 8 (团体)

In the addition shown, each letter represents a different digit ranging from zero to nine.
It is already known that

S = 9
O = zero,
E = 5.

Find the numbers represented by

(i) M
(ii) N
(iii) R
(iv) Y

$$\begin{array}{cccccc} & & S & E & N & D \\ + & & M & O & R & E \\ \hline & M & O & N & E & Y \end{array}$$

M =

N =

如图所示加法中，每字母代表由零至九之不同整数。已知

S = 9
O = 零
E = 5。

求下列字母所代表之数字：

(i) M
(ii) N
(iii) R
(iv) Y

$$\begin{array}{cccccc} & & S & E & N & D \\ + & & M & O & R & E \\ \hline & M & O & N & E & Y \end{array}$$

R =

Y =

Hong Kong Mathematics Olympiad (1983 – 84)

Event 9 (Group)

香港数学竞赛 (1983 – 84)

决赛项目 9 (团体)

(i) If $x=\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\cdots\left(1-\frac{1}{100}\right)$, find x in the simplest fractional form.

若 $x=\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\cdots\left(1-\frac{1}{100}\right)$，试以最简单的分数表 x 。

$x =$

(ii) The length, width and height of a rectangular block are 2, 3 and 4 respectively. Its total surface area is A, find A.

一长方体之长、阔、高依次为 2，3 及 4。若其总面积为 A，求 A。

$A =$

(iii) The average of the integers $1, 2, 3, \ldots, 1001$ is m. Find m.

若 m 为 $1, 2, 3, \ldots, 1001$ 之平均数，求 m。

$m =$

(iv) The area of a circle inscribed in an equilateral triangle is 12π. If P is the perimeter of this triangle, find P.

一面积为 12π 之圆，内接于一周界为 P 之等边三角形，求 P。

$P =$

Hong Kong Mathematics Olympiad (1983 – 84)

Event 10 (Group)

香港数学竞赛 (1983 – 84)

决赛项目 10 (团体)

(i) If A is the area of a square inscribed in a circle of diameter 10, find A.

一正方形内接于一直径为 10 之圆。若 A 为正方形的面积，求 A。

$A =$

(ii) If $a+\frac{1}{a}=2$, and $S=a^3+\frac{1}{a^3}$, find S.

若 $a+\frac{1}{a}=2$，及 $S=a^3+\frac{1}{a^3}$，求 S。

$S =$

(iii) An n-sided convex polygon has 14 diagonals. Find n.

一凸 n 边形有 14 条对角线，求 n。

$n =$

(iv) If d is the distance between the 2 points $(2, 3)$ and $(-1, 7)$, find d.

若 d 为两点 $(2, 3)$ 及 $(-1, 7)$ 间之距离，求 d。

$d =$