

Hong Kong Mathematics Olympiad (1990 – 91)

Sample Event (Group)

香港數學競賽 (1990 – 91)

決賽項目 – 樣本 (團體)

- (i) The height of an equilateral triangle is $8\sqrt{3}$ cm and the area of the triangle is $a\sqrt{3}$ cm². Find a .

$a =$

一等邊三角形的高是 $8\sqrt{3}$ cm，面積是 $a\sqrt{3}$ cm²。求 a 。

- (ii) Given that $\sum_{x=1}^n \frac{1}{x} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$, and $\sum_{x=4}^{10} \frac{1}{x-2} - \sum_{x=4}^{10} \frac{1}{x-1} = \frac{b}{18}$. Find b .

$b =$

已知 $\sum_{x=1}^n \frac{1}{x} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$ ，及 $\sum_{x=4}^{10} \frac{1}{x-2} - \sum_{x=4}^{10} \frac{1}{x-1} = \frac{b}{18}$ 。求 b 。

A boy tries to find the area of a parallelogram by multiplying together the lengths of two adjacent sides. His answer is double the correct answer. If the acute angle and the obtuse angle of the figure are h° and k° respectively,

某童把一平行四邊形兩鄰邊相乘當作該圖形之面積，其結果為正確答案之兩倍。若該圖形之銳角及鈍角依次為 h° 及 k° ，

- (iii) find h .

$h =$

求 h 。

- (iv) find k .

$k =$

求 k 。

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Event 6 (Group)

香港數學競賽(1990 – 91)

決賽項目 6 (團體)

A 2-digit number x has M as the units digit and N as the tens digit. Another 2-digit number y has N as the units digit and M as the tens digit. If $x > y$ and their sum is equal to eleven times their differences,

某兩位數 x 之個位數字是 M ，十位數字是 N 。另一兩位數 y 之個位數字是 N ，十位數字是 M 。若 $x > y$ ，且他們的和是他們的差的十一倍，

- (i) find M .

求 M 。

$M =$

- (ii) find N .

求 N 。

$N =$

- (iii) The sum of two numbers is 20 and their product is 5. If the sum of their reciprocals is z , find z .

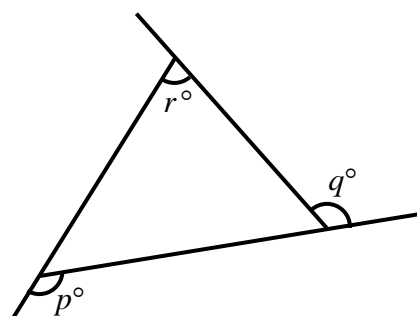
兩數之和是 20，積是 5。若該兩數倒數之和是 z ，求 z 。

$z =$

- (iv) In the figure, the average of p and q is $121 + z$. Find r .

圖中， p 與 q 的平均值是 $121 + z$ 。求 r 。

$r =$



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Event 7 (Group)

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決賽項目 7 (團體)

- (i) 5 printing machines can print 5 books in 5 days. If n printing machines are required in order to have 100 books printed in 100 days, find n .

$n =$

5 部印刷機可在 5 天內印 5 本書。若要在 100 天內印 100 本書，則需要 n 部印刷機，求 n 。

- (ii) If the equation $x^2 + 2x + c = 0$ has no real root and c is an integer less than 3, find c .

$c =$

某方程 $x^2 + 2x + c = 0$ 無實根，且 c 為小於 3 之整數，求 c 。

Chicken eggs cost \$ 0.50 each, duck eggs cost \$ 0.60 each and goose eggs cost \$ 0.90 each. A man sold x chicken eggs, y duck eggs, z goose eggs and received \$ 60. If x, y, z are all positive numbers with $x + y + z = 100$ and two of the values x, y, z are equal,

雞蛋每只 \$ 0.50，鴨蛋每只 \$ 0.60，鵝蛋每只 \$ 0.90。某人賣出 x 只雞蛋， y 只鴨蛋， z 只鵝蛋，共得 \$ 60。若 x, y, z 皆為正數，且 $x + y + z = 100$ ，及在 x, y, z 中有兩數相同，

- (iii) find x .

$x =$

求 x 。

- (iv) find y .

$y =$

求 y 。

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Event 8 (Group)

香港數學競賽(1990 – 91)

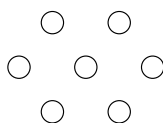
決賽項目 8 (團體)

Consider the following hexagonal numbers :

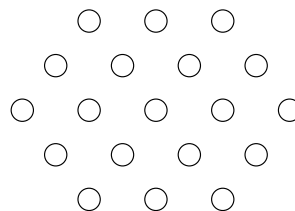
細看以下之六邊形數：



$$H_1 = 1$$



$$H_2 = 7$$



$$H_3 = 19$$

- (i) Find H_5 .

$$H_5 =$$

求 H_5 。

- (ii) If $H_n = an^2 + bn + c$, where n is any positive integer, find a .

$$a =$$

若 $H_n = an^2 + bn + c$, 其中 n 為正整數, 求 a 。

- (iii) If $p : q = 2 : 3$, $q : r = 4 : 5$ and $p : q : r = 8 : t : 15$, find t .

$$t =$$

若 $p : q = 2 : 3$, $q : r = 4 : 5$, 且 $p : q : r = 8 : t : 15$, 求 t 。

- (iv) If $\frac{1}{x} : \frac{1}{y} = 4 : 3$ and $\frac{1}{x+y} : \frac{1}{x} = 3 : m$, find m .

$$m =$$

若 $\frac{1}{x} : \frac{1}{y} = 4 : 3$, 且 $\frac{1}{x+y} : \frac{1}{x} = 3 : m$, 求 m 。

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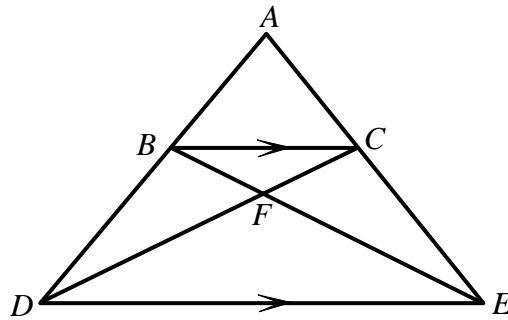
Event 9 (Group)

香港數學競賽(1990 – 91)

決賽項目 9 (團體)

In the figure, BC is parallel to DE . If $AB : BC : BF : CF : FE = 5 : 4 : 2 : 3 : 5$ and the area of $\triangle BCF$ is 12, find

圖中， BC 與 DE 平行。若 $AB : BC : BF : CF : FE = 5 : 4 : 2 : 3 : 5$ ，且 $\triangle BCF$ 之面積為 12，求



- (i) the area of $\triangle BDF$

$\triangle BDF$ 之面積

Area of $\triangle BDF$	=
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- (ii) the area of $\triangle FDE$

$\triangle FDE$ 之面積

Area of $\triangle FDE$	=
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- (iii) the area of $\triangle ABC$

$\triangle ABC$ 之面積

Area of $\triangle ABC$	=
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- (iv) If the volume of a sphere is increased by 72.8 %, then the surface area of the sphere is increased by x %. Find x .

x	=
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若一球體之體積增加 72.8 %，則其表面面積增加 x %。求 x 。

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Event 10 (Group)

香港數學競賽(1990 – 91)

決賽項目 10 (團體)

In the attached division

在所附除法算式中

$$\begin{array}{r}
 \overline{) 7 9 } \\
 \overline{) } \\
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 \end{array}$$

(i) find A .

求 A 。

A =

(ii) find B .

求 B 。

B =

(iii) find C .

求 C 。

C =

(iv) find D .

求 D 。

D =