

Hong Kong Mathematics Olympiad (1993 – 94)

Final Event – Sample (Individual)

香港數學競賽 (1993 – 94)

決賽項目 – 樣本 (個人)

- (i) The sum of two numbers is 40, their product is 20. If the sum of their reciprocals is a , find a .

$a =$

某兩數之和為 40，其積為 20。若該兩數倒數之和為 a ，求 a 。

- (ii) If $b \text{ cm}^2$ is the total surface area of a cube of side $(a+1) \text{ cm}$, find b .

$b =$

若一邊長 $(a+1)$ 厘米之正方體之總表面積為 b 平方厘米，求 b 。

- (iii) One ball is taken at random from a bag containing $(b-4)$ white balls and $(b+46)$ red balls. If $\frac{c}{6}$ is the probability that the ball is white, find c .

$c =$

一袋內有 $(b-4)$ 個白球， $(b+46)$ 個紅球。若隨意於袋內取一球，而該球為白色之概率為 $\frac{c}{6}$ ，求 c 。

- (iv) The length of a side of an equilateral triangle is $c \text{ cm}$. If its area is $d\sqrt{3} \text{ cm}^2$, find d .

$d =$

若一邊長 c 厘米之正三角形之面積 $d\sqrt{3}$ 平方厘米，求 d 。

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Final Event 1 (Individual)

香港數學競賽 (1993 – 94)

決賽項目 1 (個人)

- (i) The equation $x^2 - ax + (a+3) = 0$ has equal roots. Find a , if a is a positive integer.

$a =$

方程式 $x^2 - ax + (a+3) = 0$ 有等根。若 a 為一正整數，求 a 。

- (ii) In a test, there are 20 questions. a marks will be given to a correct answer and 3 marks will be deducted for each wrong answer. A student has done all the 20 questions and scored 48 marks. Find b , the number of questions that he has answered correctly.

$b =$

在一次測驗中，共 20 題。做對一題給 a 分，做錯一題要倒扣 3 分。一學生做了全部的 20 題，而得到 48 分。他答對了的題目數目是 b 。求 b 。

- (iii) If
若

$$x : y = 2 : 3$$

$$x : z = 4 : 5$$

$$y : z = b : c,$$

find c .

求 c 。

$c =$

- (iv) Let $P(x, d)$ be a point on the straight line $x + y = 22$ such that the slope of OP equals to c (O is the origin). Determine d .

$d =$

設 $P(x, d)$ 為直線 $x + y = 22$ 上的點，且 OP 的斜率為 c (O 為原點)。求 d 。

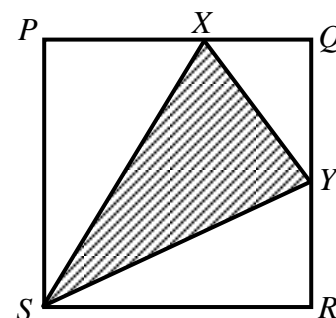
Hong Kong Mathematics Olympiad (1993 – 94)

Final Event 2 (Individual)

香港數學競賽 (1993 – 94)

決賽項目 2 (個人)

- (i) In square $PQRS$, Y is the mid-point of the side QR and $PX = \frac{3}{4}PQ$. If A is the ratio of the area of the shaded triangle to the area of the square, find A .



在正方形 $PQRS$ 中， Y 為 QR 之中點，且 $PX = \frac{3}{4}PQ$ 。若 A 為陰影部分三角形面積與正方形面積的比，求 A 。

$A =$

- (ii) A man bought a number of ping-pong balls where a $16A\%$ sales tax is added. If he did not have to pay tax he could have bought 3 more balls for the same amount of money. If B is the total number of balls that he bought, find B .

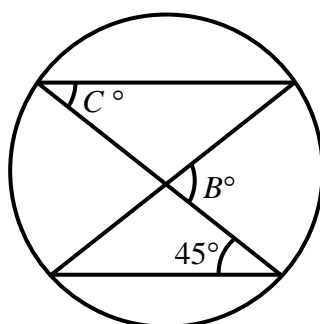
$B =$

某甲買了一些乒乓球，需多付出銷售稅 $16A\%$ 。若他毋須付稅，則可用同等金錢多買 3 個乒乓球。假設 B 是他所買乒乓球的個數，求 B 。

- (iii) Refer to the diagram, find C .

$C =$

如圖，求 C 。



- (iv) The sum of $2C$ consecutive even numbers is 1170. If D is the largest of them, find D .

$D =$

$2C$ 個連續偶數之和為 1170。若 D 為其中最大之偶數，求 D 。

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Final Event 3 (Individual)

香港數學競賽 (1993 – 94)

決賽項目 3 (個人)

- (i) If $183a8$ is a multiple of 287, find a .

$a =$

若 $183a8$ 為 287 的倍數，求 a 。

- (ii) The number of factors of a^2 is b , find b .

$b =$

a^2 這個數共有 b 個因數，求 b 。

- (iii) In an urn, there are c balls, b of them are either black or red, $(b+2)$ of them are either red or white and 12 of them are either black or white. Find c .

$c =$

瓶中有球 c 個，其中 b 個是黑色或紅色的， $(b+2)$ 個是紅色或白色的，而黑色或白色的有 12 個。求 c 。

- (iv) Given $f(3+x) = f(3-x)$ for all values of x , and the equation $f(x) = 0$ has exactly c distinct roots. Find d , the sum of these roots.

$d =$

已知對所有 x ， $f(3+x) = f(3-x)$ ，且方程式 $f(x) = 0$ 有 c 個不等根，求所有根的總和 d 。

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Final Event 4 (Individual)

香港數學競賽 (1993 – 94)

決賽項目 4 (個人)

- (i) The remainder when $x^6 - 8x^3 + 6$ is divided by $(x-1)(x-2)$ is $7x-a$, find a .

$a =$

$x^6 - 8x^3 + 6$ 除以 $(x-1)(x-2)$ ，其餘數為 $7x-a$ ，求 a 。

- (ii) If $x^2 - x + 1 = 0$ and $b = x^3 - 3x^2 + 3x + a$, find b .

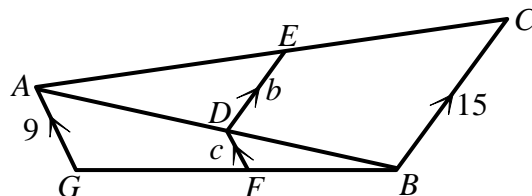
$b =$

若 $x^2 - x + 1 = 0$ 及 $b = x^3 - 3x^2 + 3x + a$ ，求 b 。

- (iii) Refer to the diagram, find c .

$c =$

如圖，求 c 。



- (iv) If c boys were all born in June 1990 and the probability that their birthdays are all different is $\frac{d}{225}$, find d .

$d =$

有 c 個兒童，他們均生於一九九零年六月，若果他們生於不同日子的概率是 $\frac{d}{225}$ ，求 d 。

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Final Event 5 (Individual)

香港數學競賽 (1993 – 94)

決賽項目 5 (個人)

- (i) Given $1 - \frac{4}{x} + \frac{4}{x^2} = 0$. If $A = \frac{2}{x}$, find A .

$A =$

已知 $1 - \frac{4}{x} + \frac{4}{x^2} = 0$ 。若 $A = \frac{2}{x}$ ，求 A 。

- (ii) If B circular pipes each with an internal diameter of A cm carry the same amount of water as a pipe with an internal diameter 6cm, find B .

$B =$

若 B 條內直徑為 A 厘米的圓形水管的輸水量與一內直徑為 6 厘米的圓形水管相等，求 B 。

- (iii) If C is the area of the triangle formed by x -axis, y -axis and the line $Bx + 9y = 18$, find C .

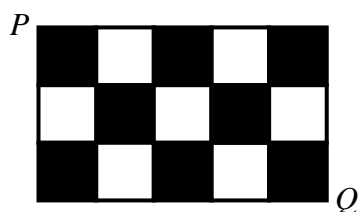
$C =$

若一個由 x 軸、 y 軸及直線 $Bx + 9y = 18$ 所圍成之三角形之面積為 C ，求 C 。

- (iv) Fifteen square tiles with side $10C$ units long are arranged as shown.

$D =$

十五塊邊長為 $10C$ 單位的正方形磚如圖排列。



An ant walks along the edges of the tiles, always keeping a black tile on its left. Find the shortest distance D that the ant would walk in going from P to Q .

一蟻沿磚之邊緣爬行，而其左邊必為一黑磚。求 D ，此蟻由 P 爬至 Q 之最短距離。