Hong Kong Mathematics Olympiad (1993 – 94)

Final Event – Sample (Individual)

香港数学竞赛 (1993 – 94)

决赛项目 – 样本 (个人)

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

某两数之和为 40，其积为 20。 若该两数倒数之和为 a，求 a。

$a =$

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

若一边长 $(a+1)$ 厘米之正方体之总表面积为 b 平方厘米，求 b。

$b =$

(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.

一袋内有 $(b-4)$ 个白球，$(b+46)$ 个红球。若随意于袋内取 一球，而该球为白色之概率为 $\frac{c}{6}$，求 c。

$c =$

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

若一边长 c 厘米之正三角形之面积 $d\sqrt{3}$ 平方厘米，求 d。

$d =$

Hong Kong Mathematics Olympiad (1993 – 94)

Final Event 1 (Individual)

香港数学竞赛 (1993 – 94)

决赛项目 1 (个人)

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

方程式 $x^2 - ax + (a+3) = 0$ 有等根。若 a 为一正整数，求 a。

$a =$

(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.

在一次测验中，共 20 题。做对一题给 a 分，做 错一题要倒扣 3 分。一学生做了全部的 20 题，而得到 48 分。他答对了的题目数目是 b。求 b。

$b =$

(iii) If

若

$$x : y = 2 : 3$$
$$x : z = 4 : 5$$
$$y : z = b : c,$$

find c.

求 c。

$c =$

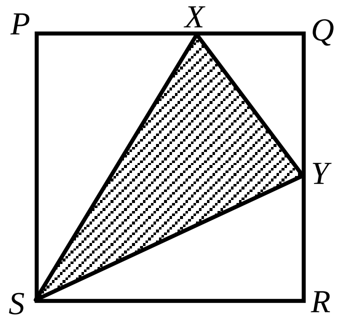
(iv) Let $P(x, d)$ be a point on the straight line $x + y = 22$ such that the slope of OP equals to c (O is the origin). Determine d.

设 $P(x, d)$ 为直线 $x + y = 22$ 上的点，且 OP 的斜率为 c (O 为原点)。求 d。

$d =$

Hong Kong Mathematics Olympiad (1993 – 94)
Final Event 2 (Individual)
香港数学竞赛 (1993 – 94)
决赛项目 2 (个人)

(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 为 QR 之中点，且 $PX = \frac{3}{4}PQ$。若 A 为阴影部分三角形面积与正方形面积的比，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.

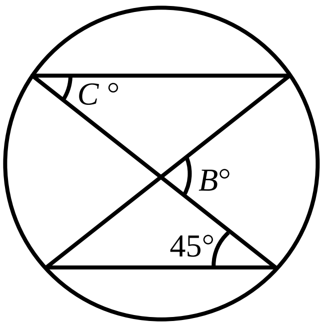
$B =$

某甲买了一些乒乓球，需多付出销售税 $16A\,\%$。若他毋须付税，则可用同等金钱多买 3 个乒乓球。假设 B 是他所买乒乓球的个数，求 B。

(iii) Refer to the diagram, find C.

$C =$

如图，求 C。



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

$D =$

$2C$ 个连续偶数之和为 1170。若 D 为其中最大之偶数，求 D。

Hong Kong Mathematics Olympiad (1993 – 94)
Final Event 3 (Individual)
香港数学竞赛 (1993 – 94)
决赛项目 3 (个人)

(i) If $183a8$ is a mu1tiple of 287, find a。

若 $183a8$ 为 287 的倍数，求 a。

$a =$

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

a^2 这个数共有 b 个因子，求 b。

$b =$

(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.

瓶中有球 c 个，其中 b 个是黑色或红色的，$(b+2)$ 个是红色或白色的，而黑色或白色的有 12 个。求 c。

$c =$

(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.

已知对所有 x，$f(3+x)=f(3-x)$，且方程式 $f(x)=0$ 有 c 个不等根，求所有根的总和 d。

$d =$

Hong Kong Mathematics Olympiad (1993 – 94)

Final Event 4 (Individual)

香港数学竞赛 (1993 – 94)

决赛项目 4 (个人)

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

$x^6 - 8x^3 + 6$ 除以 $(x-1)(x-2)$，其余数为 $7x - a$，求 a。

$a =$

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

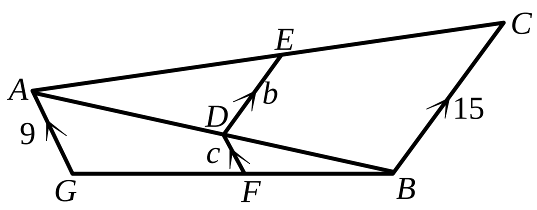
若 $x^2 - x + 1 = 0$ 及 $b = x^3 - 3x^2 + 3x + a$，求 b。

$b =$

(iii) Refer to the diagram, find c.

如图，求 c。

$c =$



(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.

有 c 个儿童，他们均生于一九九零年六月，若果他们生于不同日子的概率是 $\frac{d}{225}$，求 d。

$d =$

Hong Kong Mathematics Olympiad (1993 – 94)
Final Event 5 (Individual)
香港数学竞赛 (1993 – 94)
决赛项目 5 (个人)

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

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

$A =$

(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.

若 B 条内直径为 A 厘米的圆形水管的输水量与一内直径为 6 厘米的圆形水管相等，求 B。

$B =$

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

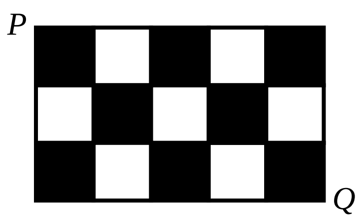
若一个由 x 轴、y 轴及直线 $Bx+9y=18$ 所围成之三角形之面积为 C，求 C。

$C =$

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

十五块边长为 $10C$ 单位的正方形砖如图排列。

$D =$



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.

一蚁沿砖之边缘爬行，而其左边必为一黑砖。求 D，此蚁由 P 爬至 Q 之最短距离。