

Hong Kong Mathematics Olympiad (2004 – 2005)

Final Event 1 (Group)

香港数学竞赛 (2004 – 2005)

决赛项目 1 (团体)

除非特别声明，答案须用数字表达，并化至最简。

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

1. 一个动物园内有 a 头骆驼，单峰的比双峰的多 10 头。若牠们共有 55 个峰，求 a 的值。

There are a camels in a zoo. The number of one-hump camels exceeds that of two-hump camels by 10. If there have 55 humps altogether, find the value of a .

2. 若 $\text{LCM}(a, b) = 280$ 及 $\text{HCF}(a, b) = 10$ ，求 b 的值。

If $\text{LCM}(a, b) = 280$ and $\text{HCF}(a, b) = 10$, find the value of b .

3. 设 C 是一正整数且小于 \sqrt{b} 。若 b 除以 C ，余数是 2。除以 $(C+2)$ ，余数是 C ，求 C 的值。

Let C be a positive integer less than \sqrt{b} . If b is divided by C , the remainder is 2; when divided by $C+2$, the remainder is C , find the value of C .

4. 一个正 $2C$ 边形共有 d 条对角线，求 d 的值。
(注：对角线是连接两个不在同一边上的顶点的直线。)

A regular $2C$ -sided polygon has d diagonals, find the value of d .
(NB: a diagonal is a straight line joining two vertices not on the same side.)

Hong Kong Mathematics Olympiad (2004 – 2005)

Final Event 2 (Group)

香港数学竞赛 (2004 – 2005)

决赛项目 2 (团体)

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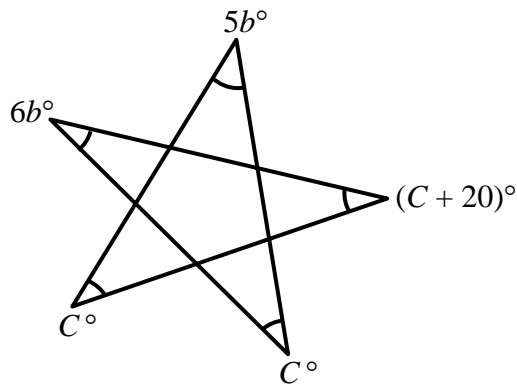
1. 陈先生有 8 个儿子和 a 个女儿，他的每个儿子都有 8 个儿子和 a 个女儿。他的每个女儿都有 a 个儿子和 8 个女儿。已知陈先生的男孙比女孙多 1 个及 a 是个质数，求 a 的值。

Mr. Chan has 8 sons and a daughters. Each of his sons has 8 sons and a daughters. Each of his daughters has a sons and 8 daughters. It is known that the number of his grand sons is one more than the number of his grand daughters and a is a prime number, find the value of a .

2. 设 $\frac{a}{7} = \sqrt[3]{2 + \sqrt{b}} + \sqrt[3]{2 - \sqrt{b}}$ ，求 b 的值。

Let $\frac{a}{7} = \sqrt[3]{2 + \sqrt{b}} + \sqrt[3]{2 - \sqrt{b}}$. Find the value of b .

- 3.



图一

Figure 1

如图一，求 C 的值。

In Figure 1, find the value of C .

4. 已知 P_1, P_2, \dots, P_d 是 d 个连续质数。若 $P_1 + P_2 + \dots + P_{d-2} = P_{d-1} + P_d = C + 1$, 求 d 的值。

Given that P_1, P_2, \dots, P_d are d consecutive prime numbers . If $P_1 + P_2 + \dots + P_{d-2} = P_{d-1} + P_d = C + 1$, find the value of d .



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Final Event 3 (Group)

香港数学竞赛 (2004 – 2005)

决赛项目 3 (团体)

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

1. 已知 a 是方程 $2^{x+1} = 8^{\frac{1}{x} - \frac{1}{3}}$ 的正实数解，求 a 的值。

Given that a is a positive real root of the equation $2^{x+1} = 8^{\frac{1}{x} - \frac{1}{3}}$. Find the value of a .

2. 在周界为 a 米的长方形中，最大面积的一个长方形的面积是 b 平方米，求 b 的值。

The area of the largest rectangle with perimeter a meter is b square meter, find the value of b .

3. 若 $c = (1234^3 - 1232 \times (1234^2 + 2472)) \times b$ ，求 c 的值。

If $c = (1234^3 - 1232 \times (1234^2 + 2472)) \times b$, find the value of c .

4. 若 $\frac{1}{(c+1)(c+2)} + \frac{1}{(c+2)(c+3)} + \cdots + \frac{1}{(c+d)(c+d+1)} = \frac{8}{15}$ ，求 d 的值。

If $\frac{1}{(c+1)(c+2)} + \frac{1}{(c+2)(c+3)} + \cdots + \frac{1}{(c+d)(c+d+1)} = \frac{8}{15}$, find the value of d .

Hong Kong Mathematics Olympiad (2004 – 2005)

Final Event 4 (Group)

香港数学竞赛 (2004 – 2005)

决赛项目 4 (团体)

除非特别声明，答案须用数字表达，并化至最简。

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

1. 若 $A^2 + B^2 + C^2 = AB + BC + CA = 3$ 及 $a = A^2$ ，求 a 的值。

If $A^2 + B^2 + C^2 = AB + BC + CA = 3$ and $a = A^2$, find the value of a .

2. 已知 n 及 b 是整数，并满足方程 $29n + 42b = a$ ，若 $5 < b < 10$ ，求 b 的值。

Given that n and b are integers satisfying the equation $29n + 42b = a$. If $5 < b < 10$, find the value b .

3. 若 $\frac{\sqrt{3} - \sqrt{5} + \sqrt{7}}{\sqrt{3} + \sqrt{5} + \sqrt{7}} = \frac{c\sqrt{21} - 18\sqrt{15} - 2\sqrt{35} + b}{59}$ ，求 c 的值。

If $\frac{\sqrt{3} - \sqrt{5} + \sqrt{7}}{\sqrt{3} + \sqrt{5} + \sqrt{7}} = \frac{c\sqrt{21} - 18\sqrt{15} - 2\sqrt{35} + b}{59}$, find the value of c .

4. 若 c 有 d 个正因子，求 d 的值。

If c has d positive factors, find the value of d .