

### 第三十五屆香港數學競賽 (2017/18)

#### 決賽規則

1. 競賽共分八項，個人及團體各佔四項。
2. 每隊由已報名參加初賽的同學組成。其中任何四位可參加「個人項目」；又其中任何四位可參加「團體項目」。不足四位同學的隊伍將不獲准出賽。
3. 每隊隊員必須穿著整齊校服，並由負責老師帶領，於上午9時正或以前向會場接待處註冊，同時必須出示身分證/學生證明文件，否則將被撤銷參賽資格。
4. 粵語將會被採用為指示語言。若參賽者不諳粵語，則可獲發給一份中、英文指示。比賽題目則中、英並列。
5. 每一「個人項目」包括四部份。每一隊員回答其中一部份，其他隊友不得從旁協助，否則此項目所得分數會被取消。
6. 「個人項目」中，四部份互有關連。解答第二部份之隊員需利用第一部份之答案，如此類推。
7. 每一「團體項目」亦包括四部份。但各部份不一定相關，且可由全隊共同作答。各隊員可進行討論，但必須將聲浪降至最低。
8. 比賽時，參賽者不可使用計算工具，違例者將被取消資格或扣分。
9. 參賽者如有攜帶電子通訊器材（包括平板電腦、手提電話、多媒體播放器、電子字典、具文字顯示功能的手錶、智能手錶或其他穿戴式附有通訊或資料貯存功能之科技用品）或其他響鬧裝置，應把它關掉，並放入手提包內或座位的椅下，否則大會有權取消該隊參賽資格。
10. 除另有聲明外，所有答案須為數字，並應化簡，但無需呈交證明及算草。
11. 每一項目限時五分鐘。
12. 計分辦法如下：

(甲) 準確分:	個人項目	積分	團體項目	積分
	答對第一部分	1	答對任何一部分	2
	答對第二部分	2	答對任何兩部分	4
	答對第三部分	3	答對任何三部分	7
	答對第四部分	4	答對所有四部分	10
	合共	10		

(乙) 快捷分	積分所乘倍數
參賽隊伍完成並交出答案的時間 < 1 分鐘	4
1 分鐘 ≤ 參賽隊伍完成並交出答案的時間 < 2 分鐘	3
2 分鐘 ≤ 參賽隊伍完成並交出答案的時間 < 3 分鐘	2
參賽隊伍完成並交出答案的時間 ≥ 3 分鐘	1

#### (丙) 獎勵分

任何一隊在某一個人/團體項目競賽中，若全部答對時，可額外獲得 20 分。

#### (丁) 每項目之總分

準確分×倍數 + 獎勵分

13. 如有任何疑問，參賽者須於最後一項個人/團體賽完畢後 10 分鐘內向評判團提出。所有提出之疑問，將由評判團作最後裁決。
14. 得分最高之三隊將獲得獎盃及獎品。冠軍學校可保存總冠軍盾牌至下一屆香港數學競賽。
15. 總成績將由評判團作最後裁決。

## The Thirty-fifth Hong Kong Mathematics Olympiad (2017/18)

### Regulations (Final Events)

1. The competition consists of 8 events, which are divided into 4 individual events and 4 group events.
2. Each participating team should consist of students who have enrolled in the heat event. Any 4 of them may take part in the individual event and any 4 of them may take part in the group event. Teams of less than 4 members will not be allowed to participate.
3. Members of each team, **accompanied by the teacher-in-charge, should wear proper school uniform** and present **ID Card or student identification document** when registering at the venue reception **not later than 9:00 a.m.** Failing to do so, the team **will be disqualified.**
4. Verbal instructions will be given in Cantonese. However, for competitors who do not understand Cantonese, instructions written in both Chinese and English will be provided. Question papers are printed in both English and Chinese.
5. Each individual event consists of 4 parts. Each part must be completed by one member of the team. Help from other team members would result in disqualification for that particular event.
6. In an individual event, the four parts are interrelated. When solving Part 2, one has to make use of the answer obtained in Part 1, and so on.
7. In a group event, the four parts are to be done by the whole team and the parts may or may not be interrelated. Discussions are allowed provided that voice level is kept to a minimum.
8. Use of calculating devices will not be allowed; otherwise the team will risk disqualification or deduction of marks.
9. Participants having electronic communication devices (include tablets, mobile phones, multimedia players, electronic dictionaries, databank watches, smart watches or other wearable technologies with communication or data storage functions) or any alarm device(s), should turned them off and put them inside their bags or under their chairs. Failing to do so, the team **will risk disqualification.**
10. All answers should be numerical and reduced to the simplest form unless stated otherwise. No proof or working is required.
11. The time limit for each event is 5 minutes.
12. The Marking System is as follows:
  - (a) Scores for accuracy:

<u>Individual Events</u>	<u>Scores</u>	<u>Group Events</u>	<u>Scores</u>
Part 1 correct ...	1	Any 1 part correct	...2
Part 2 correct ...	2	Any 2 parts correct	...4
Part 3 correct ...	3	Any 3 parts correct	...7
Part 4 correct ...	4	All 4 parts correct	...10
Total .....	10		
  - (b) Multiplying factors for speed:

<i>Time taken for the teams to hand in their answer &lt; 1 min.</i>	<i>4</i>
<i>1 min. ≤ Time taken for the teams to hand in their answer &lt; 2 min.</i>	<i>3</i>
<i>2 min. ≤ Time taken for the teams to hand in their answer &lt; 3 min.</i>	<i>2</i>
<i>Time taken for the teams to hand in their answer ≥ 3 min.</i>	<i>1</i>
  - (c) Bonus Score:

Teams, which hand in their answers of anyone individual/group event have all the answers in that event correct, will be awarded a bonus score of 20 marks.
  - (d) Total score for each event:

(Score for accuracy) × (Multiplying factor) + (Bonus score)
13. Any queries should reach the Judging Panel within 10 minutes after the end of the last individual group event. The decision of the Judging Panel on the queries is final.
14. Trophies and prizes will be given to the three schools achieving the highest scores. The champion school may keep the Champion shield until the next Hong Kong Mathematics Olympiad.
15. The decision of the Judging Panel on the overall results is final.

## 決賽名單：

School ID	Name of School	school = new school entering final event this year
FE-01	Baptist Lui Ming Choi Secondary School	
FE-02	Bishop Hall Jubilee School	
FE-03	Buddhist Sin Tak College	
FE-04	Carmel Divine Grace Foundation Secondary School	
FE-05	Carmel Pak U Secondary School	
FE-06	CCC Ming Yin College	
FE-07	Chiu Lut Sau Memorial Secondary School	
FE-08	Christian Alliance S.C. Chan Memorial College	
FE-09	Diocesan Boys' School	
FE-10	Diocesan Girls' School	
FE-11	G.T. (Ellen Yeung) College	
FE-12	Good Hope School	
FE-13	Heung To Middle School	
FE-14	HKMA K S Lo College	
FE-15	HKSYC & IA Wong Tai Shan Memorial College	
FE-16	HKTA Tang Hin Memorial Secondary School	
FE-17	Hoi Ping Chamber of Commerce Secondary School	
FE-18	Hong Kong Chinese Women's Club College	
FE-19	Kiangsu-Chekiang College (Shatin)	
FE-20	King's College	
FE-21	Kwun Tong Government Secondary School	
FE-22	La Salle College	
FE-23	Maryknoll Convent School (Secondary Section)	
FE-24	Munsang College	
FE-25	Munsang College (Hong Kong Island)	
FE-26	NTHYK Yuen Long District Secondary School	
FE-27	Po Leung Kuk Centenary Li Shiu Chung Memorial College	
FE-28	Po Leung Kuk Laws Foundation College	
FE-29	Po Leung Kuk No. 1 WH Cheung College	
FE-30	Po On Commerce Association Wong Siu Ching Secondary School	
FE-31	Pui Ching Middle School	
FE-32	Queen Elizabeth School	
FE-33	Queen's College	
FE-34	Shatin Tsung Tsin Secondary School	
FE-35	Sing Yin Secondary School	
FE-36	SKH Lam Woo Memorial Secondary School	
FE-37	St Joseph's College	
FE-38	St Paul's Co-Educational College	
FE-39	St Paul's College	
FE-40	STFA Lee Shau Kee College	
FE-41	The ELCHK Yuen Long Lutheran Secondary School	
FE-42	Tseung Kwan O Government Secondary School	
FE-43	Tsuen Wan Government Secondary School	
FE-44	TWGH Kap Yan Directors' College	
FE-45	Wa Ying College	
FE-46	Wah Yan College, Hong Kong	
FE-47	Wah Yan College, Kowloon	
FE-48	Wong Shiu Chi Secondary School	
FE-49	Ying Wa College	
FE-50	Yuen Long Merchants Association Secondary School	

# Hong Kong Mathematics Olympiad (2017 – 2018)

## Final Event 1 (Individual)

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

除非特別聲明，答案須用數字表達，並化至最簡。

1. 已知  $x^2 = y^2 - 4y$ ，其中  $x$  及  $y$  為整數。求  $A = x + y$  的最大值。

Given that  $x^2 = y^2 - 4y$ , where  $x$  and  $y$  are integers.

Determine the largest value of  $A = x + y$ .

$A =$

2. 已知  $y = \sqrt{9A^2 - 12A + 4} \pm \sqrt{A^2 - 4A + 4} \pm \sqrt{A^2 + 6A + 9}$ ，且  $B$  是  $y$  的最小值，求  $B$  的值。

Given that  $y = \sqrt{9A^2 - 12A + 4} \pm \sqrt{A^2 - 4A + 4} \pm \sqrt{A^2 + 6A + 9}$ ,  
and  $B$  is the least value of  $y$ , determine the value of  $B$ .

$B =$

3. 設  $C$  為正整數。已知  $144 + (B + 1)^C$  為平方數，求  $C$  的值。

Let  $C$  be a positive integer. Given that  $144 + (B + 1)^C$  is a perfect square, determine the value of  $C$ .

$C =$

4. 已知  $x + \frac{1}{x} = C$ ，求  $D = x^3 + \frac{1}{x^3}$  的值。

Given that  $x + \frac{1}{x} = C$ , determine the value of  $D = x^3 + \frac{1}{x^3}$ .

$D =$

### FOR OFFICIAL USE

Score for  
accuracy

×

Mult. factor for  
speed

=

Team No.

+ Bonus  
score

Time



Total score

Min.

Sec.

**Hong Kong Mathematics Olympiad (2017 – 2018)**  
**Final Event 2 (Individual)**

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.  
 除非特別聲明，答案須用數字表達，並化至最簡。

1.  $7778^2 - 2223^2$  之值的所有數字之和是  $a$ ，求  $a$  的值。

Determine the value of  $a$ , where  $a$  is the sum of all digits of  $7778^2 - 2223^2$ .

$a =$

2. 若  $b$  是乘積  $a \times (a-1) \times (a-2) \times \cdots \times 2 \times 1$  的尾隨零的數量。求  $b$  的值。

$a \times (a-1) \times (a-2) \times \cdots \times 2 \times 1 = \overbrace{\cdots * 00 \cdots 0}^{\text{"0" 的數量是 } b}$ ,  $*$  代表非零數字。

$b =$

If the number of trailing zeros of the product  $a \times (a-1) \times (a-2) \times \cdots \times 2 \times 1$  is  $b$ , determine the value of  $b$ .

$a \times (a-1) \times (a-2) \times \cdots \times 2 \times 1 = \overbrace{\cdots * 00 \cdots 0}^{\text{The number of "0" is } b}$ ,  $*$  represents a non-zero digit.

3. 若  $c$  是  $2^{10} - 2^8 + 2^6 - 2^4 + 2^2$  除以  $b$  的餘數，求  $c$  的值。

If  $c$  is the remainder **when**  $2^{10} - 2^8 + 2^6 - 2^4 + 2^2$  **is** divided by  $b$ , determine the value of  $c$ .

$c =$

4. 求整數  $d$ ，使得對於任何實數  $x$ ， $x^{13} + cx + 90$  可被  $x^2 - x + d$  整除。

Determine the **integral** value of  $d$ , so that  $x^{13} + cx + 90$  is divisible by  $x^2 - x + d$  for any real number  $x$ .

$d =$

**FOR OFFICIAL USE**

Score for  
accuracy

$\times$

Mult. factor for  
speed

$=$

Team No.

$+$   
Bonus  
score

Time



Total score

Min.

Sec.

**Hong Kong Mathematics Olympiad (2017 – 2018)**  
**Final Event 3 (Individual)**

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

除非特別聲明，答案須用數字表達，並化至最簡。

1. 已知  $a, b, c$  為實數，且  $A = (3a - X)^2 + (3b - X)^2 + (3c - X)^2 + 6$  .

若  $X = a + b + c$  及  $X^2 = a^2 + b^2 + c^2$ ，求  $A$  的最小值。

Given that  $a, b, c$  are real numbers and  $A = (3a - X)^2 + (3b - X)^2 + (3c - X)^2 + 6$  .

If  $X = a + b + c$  及  $X^2 = a^2 + b^2 + c^2$ , determine the least value of  $A$  .

$A =$

2. 假設班中有  $A$  名男同學及  $30 - A$  名女同學。若男同學的平均體重為 60 kg，女同學的平均體重為 45 kg 及全班同學的平均體重為  $B$  kg，求  $B$  的值。

Suppose that there are  $A$  boys and  $30 - A$  girls in a class. If the average weight of the boys is 60 kg, the average weight of the girls is 45 kg, and the average weight of the students in the class is  $B$  kg, determine the value of  $B$  .

$B =$

3. 若  $n$  是正整數、 $a_1 = B$  及  $a_{n+1} = \begin{cases} \frac{a_n}{2} & \text{若 } a_n \text{ 是偶數;} \\ 3a_n + 1 & \text{若 } a_n \text{ 是奇數。} \end{cases}$  求  $C = a_{2018}$  的值。

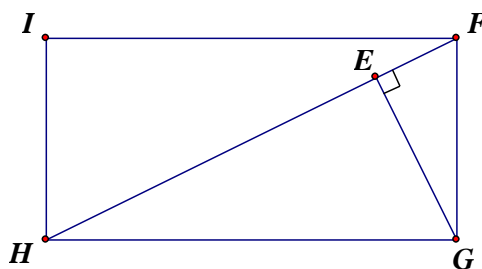
If  $n$  is a positive integer  $a_1 = B$  and  $a_{n+1} = \begin{cases} \frac{a_n}{2} & \text{if } a_n \text{ is even;} \\ 3a_n + 1 & \text{if } a_n \text{ is odd.} \end{cases}$

determine the value of  $C = a_{2018}$  .

$C =$

4. 長方形  $FGHI$  被直綫  $FH$  分為兩個直角三角形。三角形  $\triangle FGH$  被直綫  $EG$  分為另外兩個直角三角形。若  $FH : FG = C : 1$  及三角形  $\triangle EGH$  與三角形  $\triangle FEG$  的面積比為  $D : 1$ ，求  $D$  的值。

Suppose that a rectangle  $FGHI$  is divided into two right-angled triangles by line  $FH$ . The triangle  $\triangle FGH$  is then divided into two right-angled triangles by line  $EG$ . If the ratio of lengths  $FH : FG$  is  $C : 1$  and the ratio of the areas of  $\triangle EGH$  to  $\triangle FEG$  is  $D : 1$ , determine the value of  $D$ .



$D =$

**FOR OFFICIAL USE**

Score for accuracy

×

Mult. factor for speed

=

Team No.

+ Bonus score

Time



Total score

Min.

Sec.

**Hong Kong Mathematics Olympiad (2017 – 2018)**  
**Final Event 4 (Individual)**

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.  
 除非特別聲明，答案須用數字表達，並化至最簡。

1. 若  $a$  為  $(1^{2018} + 2^{2018} + 3^{2018} + 4^{2018}) \div 5$  的餘數，求  $a$  的值。

If  $a$  is the remainder of  $(1^{2018} + 2^{2018} + 3^{2018} + 4^{2018}) \div 5$ , determine the value of  $a$ .

$a =$

2. 若  $x, y$  為正整數及  $b$  為  $x, y$  組合的數量使得它們的乘積  $x \times y = \overline{1aa}$ ，求  $b$  的值。

If  $x, y$  are positive integers numbers and  $b$  is the number of **groups** of  $x, y$  such that the product  $x \times y = \overline{1aa}$ , determine the value of  $b$ .

$b =$

3. 若對於正整數  $x > y > z$ ， $xyz + xy + xz + yz + x + y + z + 1 = 30b + 87$ 。

求  $c = x + y + z$  的值。

If  $xyz + xy + xz + yz + x + y + z + 1 = 30b + 87$  for positive integers  $x > y > z$ , determine the value of  $c = x + y + z$ .

$c =$

4. 若某長方形的面積為  $d \text{ cm}^2$ ，它能被邊長為  $\frac{c}{3} \text{ cm}$  的正方形階磚密鋪，若該長方形

亦能被闊度為  $\frac{c}{2} \text{ cm}$ 、長度為  $7 \text{ cm}$  的長方形階磚密鋪，求  $d$  的最小值。

Let  $d \text{ cm}^2$  be the area of a rectangle that can be tessellated by square tiles with sides length of  $\frac{c}{3} \text{ cm}$ . If the rectangle can also be tessellated by rectangular tiles with width of

$\frac{c}{2} \text{ cm}$  and length of  $7 \text{ cm}$ , determine the least value of  $d$ .

$d =$

**FOR OFFICIAL USE**

Score for  
accuracy

$\times$

Mult. factor for  
speed

$=$

Team No.

$+$   
Bonus  
score

Time



Total score

Min.

Sec.

**Hong Kong Mathematics Olympiad (2017–2018)**  
**Final Event 1 (Group)**

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.  
除非特別聲明，答案須用數字表達，並化至最簡。

1. 瑪莉和小明在中文科、英文科及數學科獲得的分數為  $s$  或  $t$ ，及  $s > t > 0$ 。若瑪莉於中文科的分數比小明的高以及小明於英文的分數比瑪莉的高，而瑪莉和小明的總分分別為 12 分和 9 分。求  $s$  的值。

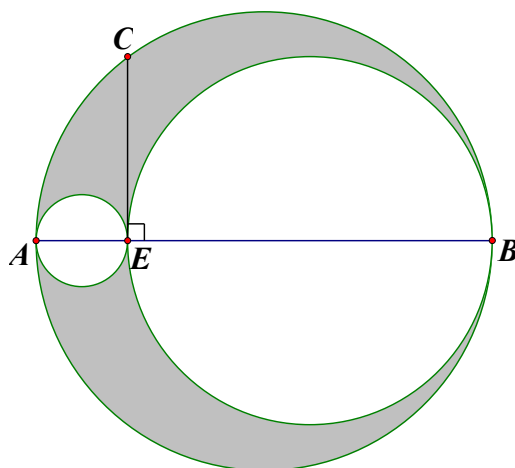
Suppose that Mary and Ming obtained a score of either  $s$  or  $t$  in each of the subjects: Chinese, English and Mathematics, where  $s > t > 0$ . It is known that Mary did better in Chinese but Ming did better in English. Mary's and Ming's total scores are 12 and 9 respectively. Determine the value of  $s$ .

$s =$

2. 已知兩圓的直徑為  $AE$  及  $BE$ ，內接於直徑為  $AB$  的圓中。若  $CE \perp AB$ ， $AB = 10$ ， $CE = 4$  及陰影部份總面積為  $w\pi$ ，求  $w$  的值。

Given that the two circles, one with diameter  $AE$  and the other with diameter  $BE$ , are inscribed by a larger circle with diameter  $AB$ . If  $CE \perp AB$  with  $AB = 10$  and  $CE = 4$ , and the total area of the shaded regions is  $w\pi$ , determine the value of  $w$ .

$w =$



3. 設  $m$  及  $r$  為非負整數。若  $f(7m + r) = r$ ，求  $q = f(2^{2018})$  的值。

Let  $m$  and  $r$  be non-negative integers.

If  $f(7m + r) = r$ , determine the value of  $q = f(2^{2018})$ .

$q =$

4. 在五進制中，若  $v$  為  $234234_5 \div 234_5$  的餘數，求  $v$  的值。

In base 5 system, if  $v$  is the remainder of  $234234_5 \div 234_5$ , determine the value of  $v$ .

$v =$

**FOR OFFICIAL USE**

Score for  
accuracy

$\times$

Mult. factor for  
speed

$=$

Team No.

$+$   
Bonus  
score

Time



Total score

Min.

Sec.



**Hong Kong Mathematics Olympiad (2017 – 2018)**  
**Final Event 2 (Group)**

Unless otherwise stated, all answers should be expressed in numerals in their simplest form.  
 除非特別聲明，答案須用數字表達，並化至最簡。

1. 已知  $\frac{1-2^{-1/u}}{2^{-1/u}-2^{-2/u}}=4$ ，求  $u$  的值。

Given that  $\frac{1-2^{-1/u}}{2^{-1/u}-2^{-2/u}}=4$ , determine the value of  $u$ .

$u =$

2. 已知  $b \geq 1$ 、 $a - 12b = 15$  及  $x$  是實數，求  $v = \frac{(x-a)^2}{2b} + 5x$  的最小值。

Given that  $b \geq 1$ ,  $a - 12b = 15$  and  $x$  is a real number,

determine the least value of  $v = \frac{(x-a)^2}{2b} + 5x$ .

$v =$

3. 若班中有 20 位男同學及 15 位女同學參加兩次考試。已知 8 位同學在第一次考試中不合格，12 位同學在第二次考試中不合格，及 6 位同學於兩次考試均不合格。若 5 位男同學在第一次考試中不合格，7 位男同學在第二次考試中不合格，4 位男同學兩次考試均不合格及  $n$  位女同學兩次考試均合格，求  $n$  的值。

Suppose that there were 20 boys and 15 girls in a class taking two examinations. Given that 8 students failed in the first examinations, 12 students failed in the second examinations, and 6 students failed in both examinations. If 5 boys failed in the first examinations, 7 boys failed in the second examinations, 4 boys failed in both examinations, and  $n$  girls passed in both examinations, determine the value of  $n$ .

$n =$

4. 求最小正整數  $m$ ，使得  $m^{200} > 6^{300}$ 。

Determine the least positive integer  $m$  such that  $m^{200} > 6^{300}$ .

$m =$

**FOR OFFICIAL USE**

Score for  
accuracy

×

Mult. factor for  
speed

=

Team No.

+ Bonus  
score

Time



Total score

Min.

Sec.

# Hong Kong Mathematics Olympiad (2017 – 2018)

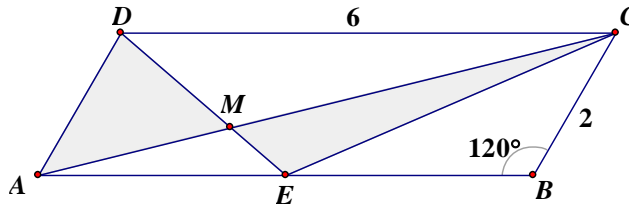
## Final Event 3 (Group)

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

除非特別聲明，答案須用數字表達，並化至最簡。

1.  $AC$  是平行四邊形  $ABCD$  的對角線， $CD=6$ ， $BC=2$  及  $\angle ABC=120^\circ$ 。若  $E$  是  $AB$  的中點， $AC$  與  $DE$  相交於  $M$  及陰影部分的總面積是  $\alpha$ ，求  $\alpha$  的值。

$ABCD$  is a parallelogram with diagonal  $AC$ ,  $CD=6$ ,  $BC=2$ , and  $\angle ABC=120^\circ$ . If  $E$  is the midpoint of  $AB$ ,  $AC$  and  $DE$  intersect at  $M$ , and the total area of the shaded regions in  $\alpha$ , determine the value of  $\alpha$ .



$\alpha =$

2. 設  $\beta$  為三位正整數且能被 11 整除，且其商相等於其值的各數字之和的三倍，求  $\beta$  的值。

If  $\beta$  is a 3-digit positive integer that is divisible by 11 and whose quotient when divided by 11 is 3 times the sum of its digits, determine the value of  $\beta$ .

$\beta =$

3. 求  $\varphi$  的最大實數值，使不等式  $\sqrt{1-\varphi}-\sqrt{1+\varphi}\geq 1$  成立。

Determine the largest real value of  $\varphi$  such that the inequality  $\sqrt{1-\varphi}-\sqrt{1+\varphi}\geq 1$  holds.

$\varphi =$

4. 設  $\theta$  及  $\gamma$  為正整數，當中  $\theta < \gamma$ 。若  $\frac{\theta+\gamma}{2}:\sqrt{\theta\gamma}=13:12$ ，求  $\gamma$  的最小值。

Suppose that  $\theta$  and  $\gamma$  are positive integers, where  $\theta < \gamma$ .

If  $\frac{\theta+\gamma}{2}:\sqrt{\theta\gamma}=13:12$ , determine the least value of  $\gamma$ .

$\gamma =$

### FOR OFFICIAL USE

Score for accuracy

$\times$

Mult. factor for speed

$=$

Team No.

$+$

Bonus score

Time



Total score

Min.

Sec.

# Hong Kong Mathematics Olympiad (2017 – 2018)

## Final Event 4 (Group)

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

除非特別聲明，答案須用數字表達，並化至最簡。

1. 設  $X = \sqrt{2018 - \sqrt{A}}$  是正整數，求  $A$  的最大值。

Let  $X = \sqrt{2018 - \sqrt{A}}$  be a positive integer. Determine the largest value of  $A$ .

$A =$

2. 求方程  $(12x - 1)(6x - 1)(4x - 1)(3x - 1) = 5$  的所有實根之乘積  $B$  的值。

Determine the value of  $B$ , the product of all real roots of  $(12x - 1)(6x - 1)(4x - 1)(3x - 1) = 5$ .

$B =$

3. 求  $C = \cos \frac{\pi}{15} \times \cos \frac{2\pi}{15} \times \cos \frac{3\pi}{15} \times \cos \frac{4\pi}{15} \times \cos \frac{5\pi}{15} \times \cos \frac{6\pi}{15} \times \cos \frac{7\pi}{15}$  的值。

Determine the value of

$$C = \cos \frac{\pi}{15} \times \cos \frac{2\pi}{15} \times \cos \frac{3\pi}{15} \times \cos \frac{4\pi}{15} \times \cos \frac{5\pi}{15} \times \cos \frac{6\pi}{15} \times \cos \frac{7\pi}{15}.$$

$C =$

4. 設  $r, s$  及  $t$  是正實數，且  $r^2 + s^2 + t^2 = rs + st + rt$ 。若  $r = 1$ ，求  $D = s + t$  的值。

Let  $r, s$  and  $t$  be positive real numbers with  $r^2 + s^2 + t^2 = rs + st + rt$ .

If  $r = 1$ , determine the value of  $D = s + t$ .

$D =$

### FOR OFFICIAL USE

Score for  
accuracy

$\times$

Mult. factor for  
speed

$=$

Team No.

$+$   
Bonus  
score

Time



Total score

Min.

Sec.

# 成績 Results

		Ind				Isum Group				Gsum Total rank			
School code	School Name	Event 1	Event 2	Event 3	Event 4		Event 1	Event 2	Event 3	Event 4			
FE-01	Baptist Lui Ming Choi Secondary School	0	6	1	3	10	30	7			37	47	18
FE-02	Bishop Hall Jubilee School	3	1	0	9	13	6	2			8	21	33
FE-03	Buddhist Sin Tak College	6	7	3	2	18	7	2			9	27	26
FE-04	Carmel Divine Grace Foundation Secondary School	3	1	3	0	7	14	4			18	25	29
FE-05	Carmel Pak U Secondary School	1	0	1	0	2	0	2			2	4	50
FE-06	CCC Ming Yin College	0	5	0	1	6	2	2			4	10	48
FE-07	Chiu Lut Sau Memorial Secondary School	1	3	6	6	16	14	7			21	37	23
FE-08	Christian Alliance S.C. Chan Memorial College	30	30	3	3	66	40	7			47	113	6
FE-09	Diocesan Boys' School	30	6	30	0	66	60	4			64	130	2
FE-10	Diocesan Girls' School	6	7	0	0	13	50	0			50	63	12
FE-11	G.T. (Ellen Yeung) College	0	3	1	1	5	14	4			18	23	31
FE-12	Good Hope School	0	1	3	1	5	4	30			34	39	21
FE-13	Heung To Middle School	3	1	0	3	7	4	8			12	19	37
FE-14	HKMA K S Lo College	3	3	3	0	9	7	4			11	20	35
FE-15	HKSYC & IA Wong Tai Shan Memorial College	1	0	0	0	1	7	7			14	15	42
FE-16	HKTA Tang Hin Memorial Secondary School	0	3	3	4	10	40	7			47	57	15
FE-17	Hoi Ping Chamber of Commerce Secondary School	5	6	6	1	18	40	7			47	65	11
FE-18	Hong Kong Chinese Women's Club College	30	30	3	30	93	30	7			37	130	2
FE-19	Kiangsu-Chekiang College (Shatin)	0	0	0	3	3	14	14			28	31	25
FE-20	King's College	0	6	30	0	36	30	4			34	70	10
FE-21	Kwun Tong Government Secondary School	2	0	0	1	3	4	4			8	11	47
FE-22	La Salle College	0	0	30	40	70	40	7			47	117	5
FE-23	Maryknoll Convent School (Secondary Section)	0	7	6	3	16	4	14			18	34	24
FE-24	Munsang College	0	0	1	1	2	7	7			14	16	41
FE-25	Munsang College (Hong Kong Island)	0	0	3	0	3	7	4			11	14	43
FE-26	NTHYK Yuen Long District Secondary School	6	0	1	3	10	30	14			44	54	17
FE-27	Po Leung Kuk Centenary Li Shiu Chung Memorial College	0	30	0	3	33	4	2			6	39	21

## 成績 Results

FE-28	Po Leung Kuk Laws Foundation College	0	0	2	0	2	7	0			7	9	49
FE-29	Po Leung Kuk No. 1 WH Cheung College	0	6	0	1	7	14	4			18	25	29
FE-30	Po On Commerce Association Wong Siu Ching Secondary School	0	0	0	3	3	30	14			44	47	18
FE-31	Pui Ching Middle School	30	30	6	30	96	50	4			54	150	1
FE-32	Queen Elizabeth School	0	1	7	1	9	7	4			11	20	35
FE-33	Queen's College	30	4	8	1	43	50	7			57	100	8
FE-34	Shatin Tsung Tsin Secondary School	4	7	30	0	41	7	7			14	55	16
FE-35	Sing Yin Secondary School	1	30	1	30	62	12	39			51	113	6
FE-36	SKH Lam Woo Memorial Secondary School	0	0	3	3	6	4	2			6	12	45
FE-37	St Joseph's College	0	3	6	3	12	7	4			11	23	31
FE-38	St Paul's Co-Educational College	9	40	3	30	82	30	7			37	119	4
FE-39	St Paul's College	6	12	1	6	25	30	7			37	62	14
FE-40	STFA Lee Shau Kee College	0	1	3	1	5	7	7			14	19	37
FE-41	The ELCHK Yuen Long Lutheran Secondary School	1	0	3	3	7	7	7			14	21	33
FE-42	Tseung Kwan O Government Secondary School	0	4	0	1	5	7	0			7	12	45
FE-43	Tsuen Wan Government Secondary School	6	1	30	4	41	40	7			47	88	9
FE-44	TWGH Kap Yan Directors' College	0	0	1	1	2	7	4			11	13	44
FE-45	Wa Ying College	1	3	3	1	8	7	2			9	17	40
FE-46	Wah Yan College, Hong Kong	6	1	0	1	8	30	4			34	42	20
FE-47	Wah Yan College, Kowloon	5	1	6	1	13	7	7			14	27	26
FE-48	Wong Shiu Chi Secondary School	0	0	7	1	8	8	2			10	18	39
FE-49	Ying Wa College	0	6	0	0	6	50	7			57	63	12
FE-50	Yuen Long Merchants Association Secondary School	1	4	0	3	8	4	14			18	26	28

Champion	Pui Ching Middle School
1st runner up	Hong Kong Chinese Women's Club College
2nd runner up	Diocesan Boys' School