

**Hong Kong Mathematics Olympiad 2000-2001**  
**Heat Event (Group)**

除非特別聲明，答案須精確且用數字表達，並化至最簡。

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

1. 現在鐘面上的時間是一時正。 $p$  分鐘後，分針與時針剛好重疊，求  $p$  的最小值。

The time on the clock face is now one o'clock. After  $p$  minutes, the minute hand overlaps with the hour hand, find the minimum value of  $p$ .

2. 把 10 個完全相同的球放入 3 個不同的盒子裏，使得沒有一個盒子是空的，共有多少種放法？

In how many ways can 10 identical balls be distributed into 3 different boxes such that no box is to be empty?

3. 設  $x = \sqrt{3-\sqrt{5}} + \sqrt{3+\sqrt{5}}$  及  $y = x^2$ ，求  $y$  的值。

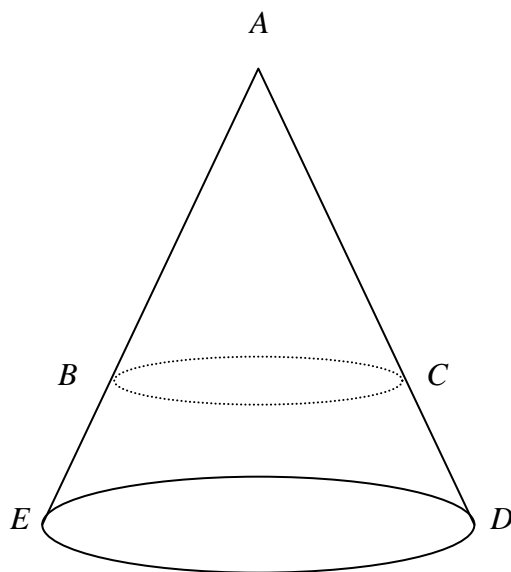
Let  $x = \sqrt{3-\sqrt{5}} + \sqrt{3+\sqrt{5}}$  and  $y = x^2$ , find the value of  $y$ .

4. 如果  $\frac{4a}{1-x^{16}} \equiv \frac{2}{1-x} + \frac{2}{1+x} + \frac{4}{1+x^2} + \frac{8}{1+x^4} + \frac{16}{1+x^8}$ ，求  $a$  的值。

If  $\frac{4a}{1-x^{16}} \equiv \frac{2}{1-x} + \frac{2}{1+x} + \frac{4}{1+x^2} + \frac{8}{1+x^4} + \frac{16}{1+x^8}$ , find the value of  $a$ .

5. 如圖一， $ADE$  是一個直立圓錐體。如果從底部向上並在  $\frac{1}{4}$  的高度平行底部橫切，上面細錐體  $ABC$  斜面與餘下底部  $BCDE$  斜面的面積的比為  $1:k$ ，求  $k$  的值。

In figure 1,  $ADE$  is a right circular cone. Suppose the cone is divided into two parts by a cut running parallel to the base and made  $\frac{1}{4}$  of the way up, the ratio of the slant surface of the small cone  $ABC$  to that of the truncated base  $BCDE$  is  $1:k$ , find the value of  $k$ .



圖一 Figure 1

6. 如果十位數  $2468m\ 2468m$  可被 3 整除，求  $m$  的最大值。

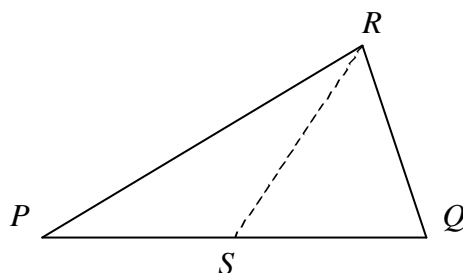
If a ten-digit number  $2468m\ 2468m$  is divisible by 3, find the maximum value of  $m$ .

7. 求由  $x$ -軸及直線  $x-3y=0$ 、 $x+y-4=0$  圍出的面積。

Find the area enclosed by the  $x$ -axis and the straight lines  $x-3y=0$ ,  $x+y-4=0$ .

8. 如圖二， $PQR$  是一個三角形， $S$  是  $PQ$  上的中點， $RQ = PS = SQ$ ，且  $\angle RQS = 2\angle RPS^\circ$ 。設  $\angle PSR = x^\circ$ ，求  $x$  的值。

In figure 2,  $PQR$  is a triangle,  $S$  is the mid-point of  $PQ$ ,  $RQ = PS = SQ$ , and  $\angle RQS = 2\angle RPS^\circ$ . Let  $\angle PSR = x^\circ$ , find the value of  $x$ .



圖二 Figure 2

9. 如果  $x$  滿足方程  $|x-3| + |x-5| = 2$ ，求  $x$  的最小值。

If  $x$  satisfies the equation  $|x-3| + |x-5| = 2$ , find the minimum value of  $x$ .

10. 從 6 對不同型號的鞋子中任取 3 只，求 3 只鞋子中恰有 2 只是同一型號的概率。

3 shoes are chosen randomly from 6 pairs of shoes with different models, find the probability that exactly two out of the three shoes are of the same model.

\*\*\* 全卷完 \*\*\*

\*\*\* *End of Paper* \*\*\*