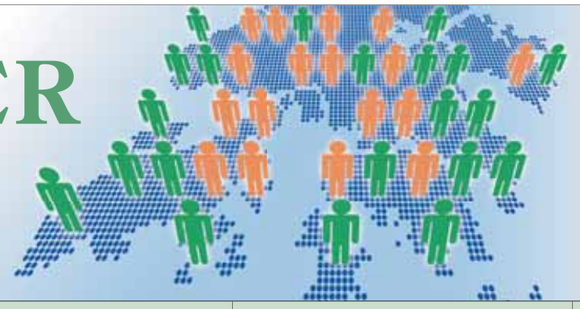
| SUN 日 | MON 一 | TUE 二 | WED 三 | THU 四 | FRI 五 | SAT 六 |
|---|---|---|---|---|---|---|

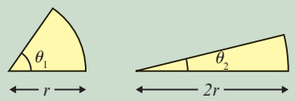
# OCTOBER
# 十月 2009



## 香港人口普查

香港統計處每10年進行一次人口普查，並在兩次人口普查之間進行一次中期人口統計。透過抽樣調查，以問卷收集市民的資料，然後以統計學上的計算方法，推算出香港人口的特徵。

The figure shows two sectors with radii $r$ and $2r$. If these two sectors are equal in area, then $\theta_1 : \theta_2 = 4 : s$, find $s$.




**1** 國慶日 十三

Given $x = \frac{1}{1} + \frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \ldots$, find $x$.

**2** 十四

When $0° \le \theta \le 360°$, how many roots are there in the equation $2\cos^2\theta - 5\sin\theta - 2 = 0$?

**3** 中秋節 十五

$\sqrt[256]{(2^1+1)(2^2+1)(2^4+1)(2^8+1)\ldots(2^{256}+1)+1} = ?$

**4** 十六

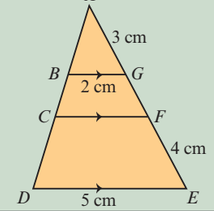
If $133^n + 110^n + 84^n + 27^n = 144^n$ where $n$ is a positive integer, find $n$.

**5** 十七

The radius of a sector is 3 cm and the perimeter is 10 cm. What is the area of the sector?

**6** 十八

$ABCD$ and $AGFE$ are straight lines. If $CF = \frac{k}{3}$, find $k$.

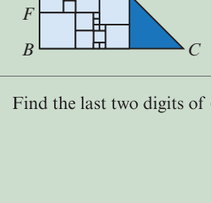



**7** 十九

Find $R$ if "$\overline{SEND} + \overline{MORE} = \overline{MONEY}$".

**8** 寒露

Squares with different sizes are drawn in $\triangle ABC$. If $AB = BC = 8$, $AE : EB = 7 : 5$, $EF : FB = 2 : 3$ and $AD : DE = 1 : 1$, find the shaded area.




**9** 廿一

Two dice are thrown. The probability of having the sum less than or equal to 5 is $\frac{R}{36}$, find $R$.

**10** 廿二

Given $f(x) = 4x^2 + ax - 25$ and $f(x) = f(-x)$, find $f(3)$.

**11** 廿三

Two men cycle round a circular track which is 3 km long. If they start at the same time and at the same spot but go in opposite directions with speeds 6 km/h and 9 km/h respectively, for how long in minutes must they cycle before they meet for the first time?

**12** 廿四

Find the number of roots for $\sin(6x) = 1 - \frac{x}{\pi}$, where $x$ is measured in radians.

**13** 廿五

Given $f(x + x^{-1}) = x^2 + x^{-2}$, then $f(4) = ?$

**14** 廿六

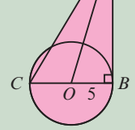
Find the number of triangles in the figure.

**15** 廿七

Find the last two digits of $6^{888}$.

**16** 廿八

In the figure, $O$ is the centre of the circle of radius 5. $AB$ is a tangent and $AO = \sqrt{214}$. $AC = ?$




**17** 廿九

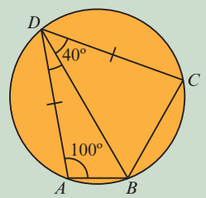
Given $f(x + x^{-1}) = x^3 + x^{-3}$, then $f(3) = ?$

**18** 九月

Given $1^3 + 2^3 + \ldots + n^3 = 190^2$, find $n$.

**19** 初二

$DA$ and $DC$ are equal chords of the circle $ABCD$. $\angle CDB = 40°$ and $\angle DAB = 100°$. $\angle ADB = ?$




**20** 初三

Given a sequence 0, 1, 1, 2, 3, 5, 8, 13, $x$, find $x$.

**21** 初四

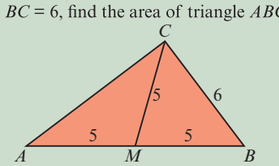
The sum of the four integers $a$, $b$, $c$ and $d$ is 90. If $a + 2$, $b - 2$, $2c$ and $\frac{d}{2}$ have the same value, find $b$.

**22** 初五

In an arithmetic sequence, if $T_3 = 13$ and $T_{10} = 48$, find $T_5$.

**23** 霜降

In the figure, $AM = MC = MB = 5$ and $BC = 6$, find the area of triangle $ABC$.




**24** 初七

A treasure of $\$X$ is divided by 5 men in order as follows: the $j$th man receives $j$ dollars and $\frac{1}{6}$ of what remains where $1 \le j \le 4$, and the 5th man receives the rest. Find $X$ if they get the same amount?

**25** 初八

Given $1^3 + 2^3 + \ldots + D^3 = 351^2$, find $D$.

**26** 重陽節 初九

Find $A$ if $1 + \ln 3 + \frac{(\ln 3)^2}{2!} + \ldots + \frac{(\ln 3)^n}{n!} + \ldots = \frac{A}{9}$.

**27** 初十

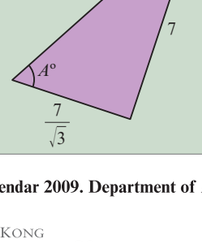
Find the number of permutations of arranging 6 red balls and 2 blue balls in a row.

**28** 十一

If $(\sqrt{2} + \sqrt{1})^{-1} + (\sqrt{3} + \sqrt{2})^{-1} + \ldots + (\sqrt{900} + \sqrt{899})^{-1} = A$, find $A$.

**29** 十二

If $A° = 60°$, find $B$.




**30** 十三

Given $f(x) = x^4 - 3x^3 - 2x^2 - 1$, find the remainder when $f(x)$ is divided by $(x + 2)$.

**31** 十四


**Produced by:**

Mathematics Education Section
Education Bureau

**Contents from Maths Calendar 2009. Department of Applied Mathematics, The Hong Kong Polytechnic University**

The Hong Kong Polytechnic University 香港理工大學
Department of Applied Mathematics 應用數學系