

雪兰莪暨吉隆坡福建会馆
新纪元学院

联合主办

**ANJURAN BERSAMA
PERSATUAN HOKKIEN SELANGOR DAN KUALA LUMPUR
&
KOLEJ NEW ERA**

第三十届 (2015 年度)

雪隆中学华罗庚杯数学比赛

**PERTANDINGAN MATEMATIK PIALA HUA LO-GENG
ANTARA SEKOLAH-SEKOLAH MENENGAH
DI NEGERI SELANGOR DAN KUALA LUMPUR
YANG KE-30(2015)**

~~初中组~~

BAHAGIAN MENENGAH RENDAH

日期 : 2015 年 8 月 9 日 (星期日)

Tarikh : 09 Ogos 2015 (Hari Ahad)

时间 : 10:00→12:00 (两小时)

Masa : 10:00→12:00 (2 jam)

地点 : 新纪元学院黄迺菜活动中心

Tempat : NG AH CHOO MULTIPURPOSE HALL Kolej New Era
Block C, Lot 5, Seksyen 10, Jalan Bukit,
43000 Kajang, Selangor

说明

1. 不准使用计算机。
2. 不必使用对数表。
3. 对一题得4分，错一题倒扣1分。

INSTRUCTIONS

1. Calculators not allowed.
 2. Logarithm table is not to be used.
 3. 4 marks will be awarded for each correct answer and 1 mark will be deducted for each wrong answer.
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1. 以数字来更换以下的字母，使到任何三个相邻的数字之和为2015。

670, A, B, C, D, E, F, G, H, I, 672

字母 E 应当以_____来更换。

Replace the letters by numbers so that the sum of any three consecutive numbers is of sum 2015.

670, A, B, C, D, E, F, G, H, I, 672

The letter E should be replaced by _____.

- A. 607 B. 671 C. 672 D. 673 E. 674

2. 已知 $\frac{1}{60} + \frac{1}{140} = \frac{1}{k}$ ，求 k 之值。

Given that $\frac{1}{60} + \frac{1}{140} = \frac{1}{k}$, find the value of k.

- A. 21 B. 24 C. 35 D. 42 E. 45

3. 某店的所有商品都需要附上6%的消费税(GST)。比如，顾客需要付RM1060来买售价RM1000的商品。若王先生付了RM2597来买电视机，求该电视机的售价。

The Goods and Services Tax (GST) of 6% is charged for all appliances at a shop. For example, customers need to pay RM1060 to buy an appliance with selling price RM1000. If Mr. Heng paid RM2597 for a TV set, find the selling price of the TV set.

- A. RM2400 B. RM2450 C. RM2460 D. RM2480 E. RM2500

4. 已知 $2a+7b=5(3a-b)$, 求 $\frac{a}{b}$ 之值。

Given that $2a+7b=5(3a-b)$, find the value of $\frac{a}{b}$.

- A. $\frac{13}{8}$ B. $\frac{13}{12}$ C. $\frac{12}{13}$ D. $\frac{12}{17}$ E. $\frac{8}{13}$

5. 求奇数 n 的最小值使到 $1+3+5+7+9+\dots+n>300$ 。

Find the smallest odd integer n such that $1+3+5+7+9+\dots+n>300$.

- A. 29 B. 31 C. 33 D. 35 E. 37

6. 某 2015 个号码的平均数是 2015。当其中某个号码被移走之后, 新的平均数是 2014。求该被移走的号码之值。

The average of 2015 numbers is 2015. After one of the numbers is removed, the new average is 2014. Find the value of that removed number.

- A. 4029 B. 4027 C. 2015 D. 2014 E. 1008

7. $2015-2014+2013-2012+\dots+3-2+1=$

- A. 1005 B. 1006 C. 1007 D. 1008 E. 1009

8. $10!=1\times 2\times 3\times \dots\times 10=3628800$ 的最后一个非零数字为 8。求 $20!=1\times 2\times 3\times \dots\times 20$ 的最后一个非零数字。

The last non-zero digit of $10!=1\times 2\times 3\times \dots\times 10=3628800$ is 8. Find the last non-zero digit of $20!=1\times 2\times 3\times \dots\times 20$.

- A. 2 B. 4 C. 6 D. 8 E. 9

9. 如图 2, $ABCD$ 是一个长方形, 对角线 $BD=10$ 。求 $ABCD$ 面积的最大值。

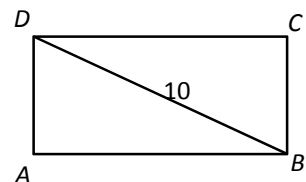


图 2

As shown in Figure 2, $ABCD$ is a rectangle where the diagonal $BD=10$. Find the greatest value of the area of $ABCD$.

Figure 2

- A. 48 B. 49 C. 50 D. 51 E. 52

14. 若 $a = \sqrt{2015^2 - 4030}$, $b = \sqrt{2013^2 + 4026}$ 及 $c = 2014$ 。那么以下哪项正确?

If $a = \sqrt{2015^2 - 4030}$, $b = \sqrt{2013^2 + 4026}$ and $c = 2014$, then which of the following statements is true?

- A. $a < b < c$ B. $a = b < c$ C. $b < a < c$ D. $c < b = a$ E. $a = b = c$

15. 在一个数学比赛, 共有 30 题。每答对一题得 5 分, 答错一题扣 2 分, 没有作答的题目没有分。某个学生没有作答一些题目, 共得 87 分。有多少题目他/她没有作答呢?

At a math contest, 30 problems were given. Each correct answer earned 5 points, and 2 points were deducted for each incorrect answer. No point if a problem is not answered. A particular student did not answer some problems, receiving a score of 87. How many questions did he/she not answer?

- A. 7 B. 6 C. 5 D. 4 E. 3

16. 在 2015 年, 爷爷的岁数是他孙子的岁数的 7 倍。在 2017 年, 爷爷的岁数将是他孙子的岁数的 6 倍, 那么在 _____ 年, 爷爷的岁数将是他孙子的岁数的 5 倍。

In year 2015, grandpa's age is 7 times of his grandson's age. In year 2017, grandpa's age will be 6 times of his grandson's age then; in year _____ , grandpa's age will be 5 times of his grandson's age then.

- A. 2018 B. 2019 C. 2020 D. 2021 E. 2022

17. 某个直角三角形的边长分别为 $3x$, $4x - 8$ 及 $4x + 1$ 。求该三角形的面积。

A right angled triangle has sides measuring $3x$, $4x - 8$ and $4x + 1$. Find the area of that triangle.

- A. 220 B. 210 C. 190 D. 180 E. 170

18. 已知 $x^2 + 2y = 7 = y^2 + 2x$, 且 $x > y$ 。求 $x - y$ 之值。

Given that $x^2 + 2y = 7 = y^2 + 2x$ where $x > y$, find the value of $x - y$.

- A. 5 B. 4 C. 3 D. 2 E. 1

19. 将整数1至2015排在一起，形成一个新的号码，如下

1234567...201320142015

当这个号码除以9时，余数是多少？

A number is formed by writing the integers from 1 to 2015 in a connected way, as follows:

1234567...201320142015

What is the remainder when the above number is divided by 9?

- A. 0 B. 1 C. 3 D. 6 E. 8
20. 已知 $u^2 + 5u + 3 = 0$ 及 $3v^2 + 5v + 1 = 0$ ，且 $uv \neq 1$ 。求 $\frac{uv + 3u + 1}{v}$ 之值。

Given that $u^2 + 5u + 3 = 0$ and $3v^2 + 5v + 1 = 0$ where $uv \neq 1$, find the value of $\frac{uv + 3u + 1}{v}$.

- A. 4 B. 5 C. 6 D. 7 E. 8

21. 已知 $a_1 \times a_2 \times a_3 \times \cdots \times a_{100} = 100$ ， a_i 是正整数。求 $a_1 + a_2 + a_3 + \cdots + a_{100}$ 的最小值。

Given that $a_1 \times a_2 \times a_3 \times \cdots \times a_{100} = 100$ where each a_i is a positive integer, find the least possible value of $a_1 + a_2 + a_3 + \cdots + a_{100}$.

- A. 100 B. 105 C. 110 D. 118 E. 199

22.
$$2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{\ddots}}}}} =$$

- A. $1 + \sqrt{2}$ B. $\sqrt{2} - 1$ C. $1 - \sqrt{2}$ D. $2 - \sqrt{2}$ E. $2 + \sqrt{2}$

23. 如图1, 正方形DEFG内接于直角三角形ABC。
已知 $AD = 20$ 及 $EB = 45$, 求DE的长度。

As shown in Figure 1, square $DEFG$ is inscribed in the right triangle ABC . It is known that $AD = 20$ and $EB = 45$, find the length of DE .

- A. 28 B. 29 C. 30
D. 31 E. 32

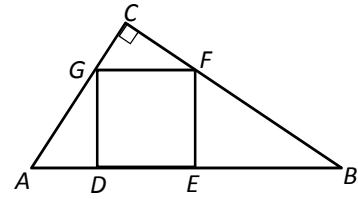


图 1

Figure 1

24. 如图3, 一个直径为24的半圆覆盖着另一个直径为12的半圆。求阴影部分的周长。

As shown in Figure 3, a semicircle with diameter 24 overlaps another semicircle with diameter 12. Find the perimeter of the shaded region.

- A. 7π B. 8π C. 9π
D. 10π E. 11π

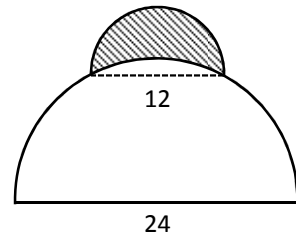


图 3

Figure 3

25. 完全平方数是指可以写成某个整数的平方, 如 0, 1, 4, 9 等等。

共有多少个整数 n 使得 $\frac{n}{100-n}$ 是个完全平方数?

A perfect square can be written as square of some integer, for example 0, 1, 4, 9 etc.

How many integers n are there such that $\frac{n}{100-n}$ is a perfect square?

- A. 3 B. 4 C. 5 D. 6 E. 7

26. 如图6, O 是圆的中心, AC 是圆的切线, B 是 AO 与圆的交点。已知 $AC = 24$ 及 $AB = 16$, 求 BO 的长度。

As shown in Figure 6, O is the center of the circle, AC is a tangent to the circle at C while B is the intersection point of the circle and AO . Given that $AC = 24$ and $AB = 16$, find the length of BO .

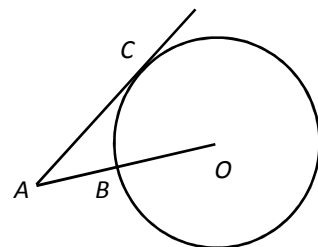


图 6

Figure 6

- A. 10 B. 11 C. 12
D. 13 E. 14

27. 如图7, ABC 是等腰三角形, $AB = AC = 7$ 。点 D 在线 BC 上使到 $AD = 6$ 。求 $BD \times DC$ 之值。

As shown in Figure 7, ABC is an isosceles triangle with $AB = AC = 7$, D is on BC such that $AD = 6$. Find the value of $BD \times DC$.

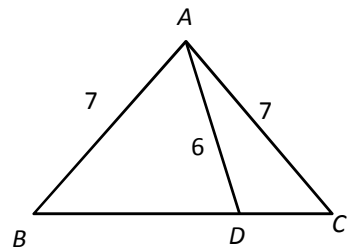


图 7

Figure 7

- A. 12 B. 13 C. 14
D. 15 E. 16

28. 如图8, ABCD 是平行四边形, 点 P 在 ABD 内使到三角形 APB 的面积为 12, 三角形 PBC 的面积为 20。求三角形 BDP 的面积。

As shown in Figure 8, ABCD is a parallelogram and P is a point in ABD such that the area of triangle APB is 12 while the area of the triangle PBC is 20. Find the area of triangle BDP.

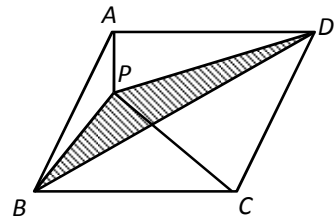


图 8

Figure 8

- A. 14 B. 11 C. 9
D. 8 E. 7

29. 以下哪些是对的?

Which of the following is/are true?

I. $1^3 + 2^3 + 3^3 + 4^3 = (1 + 2 + 3 + 4)^2$

II. $1^3 + 2^3 + 2^3 + 4^3 = (1 + 2 + 2 + 4)^2$

III. $1^3 + 3^3 + 3^3 + 4^3 = (1 + 3 + 3 + 4)^2$

- A. I, II, III B. I, II C. I, III D. I E. II, III

30. $\frac{(x^x y^y)^2}{x^y y^x} =$

- A. $\left(\frac{x}{y}\right)^{2x-y}$ B. $\left(\frac{x}{y}\right)^{x^2-y}$ C. $\frac{x^{2x-y}}{y^{x-2y}}$ D. $\frac{x^{x^2-y}}{y^{x-y^2}}$ E. $\frac{x^{2x-y}}{y^{2y-x}}$

31. 若 $\overline{abcd} = 9 \times \overline{dcba}$ ，其中 a, b, c 及 d 代表不同的号码，求 c 之值。

If $\overline{abcd} = 9 \times \overline{dcba}$, where a, b, c and d represent different digits, find the value of c .

- A. 0 B. 2 C. 4 D. 6 E. 8

32. 若 $\frac{2}{5} < \frac{x}{y} < \frac{1}{2}$ ，其中 x 及 y 是正整数，求 y 的最小值。

If $\frac{2}{5} < \frac{x}{y} < \frac{1}{2}$, where x and y are positive integers, find the smallest possible value of y .

- A. 6 B. 7 C. 10 D. 20 E. 25

33. 若 $2 \log_n(n-2) + \log_{n-2}(n) = 3$ ，求 n 之值。

If $2 \log_n(n-2) + \log_{n-2}(n) = 3$, find the value of n .

- A. 1 B. 3 C. 4 D. 5 E. 10

34. 号码 1, 2, 3, 4, 5, 6, 7 及 9 被用来组成四个 2 位数质数，每个号码只用一次。求这四个质数的和。

The digits 1, 2, 3, 4, 5, 6, 7, and 9 are used to form four 2-digit prime numbers, with each digit used exactly once. Find the sum of these four primes.

- A. 190 B. 180 C. 170 D. 160 E. 150

35. $0.201515151515\dots =$

- A. $\frac{2015}{9900}$ B. $\frac{1995}{9990}$ C. $\frac{1995}{9900}$ D. $\frac{2015}{9990}$ E. $\frac{2015}{9999}$