

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**

第三十一届（2016 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-31(2016)**

~~初中组~~

BAHAGIAN MENENGAH RENDAH

日期 : 2016 年 8 月 21 日（星期日）

Tarikh : 21 Ogos 2016 (Hari Ahad)

时间 : 10:00→12:00（两小时）

Masa : 10:00→12:00（2 jam）

地点 : 新纪元学院黄迺莱活动中心

Tempat : Ng Ah Choo Multipurpose Hall, Kolej New Era
UG, 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。
4. 答案 E：若是“以上皆非”或“不能确定”，一律以“***”代替之。

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.
 4. (E)***indicates “none of the above”.
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1. $20162014^2 + 8 \times 20162016 =$

- A. 20162016^2 B. 20162018^2 C. 20162022^2 D. 20162028^2 E. ***

2. 某个老师在白板上写了六个连续整数。之后他将其中两个， x 及 y 擦掉。剩下的四个整数的积为 2016。求 $|x - y|$ 之值。

A teacher wrote six consecutive integers on the white board. He then erased two of them, says x and y . The product of the remaining four integers is 2016. Find the value of $|x - y|$.

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

3. 某十个正整数的平均数为 10，中位数为 8。已知 M 是这十个正整数中最大的号码，求 M 的最大值。

Ten positive integers have a mean of 10 and median of 8. It is known that M is the largest number among these ten positive integers; find the largest possible value of M .

- A. 26 B. 27 C. 40 D. 56 E. ***

4. 明华在一张纸上写他妈妈的年龄，然后他接着写下他爸爸的年龄（在他妈妈年龄的右边），这样他得到一个 4 位数号码。接着，他把这 4 位数号码加上他双亲的年龄之和，得到的号码是 4942。求他爸爸的岁数。

Ming Hua wrote his mother's age on a paper, then he wrote his father's age (to the right of his mother's age) to form a 4-digit number. After that he added this 4-digit number with the sum of his parents' age, and obtained 4942. Find his father's age.

- A. 47 B. 48 C. 49 D. 50 E. ***

5. 求一元二次方程式 $2x^2 - 1008x + 2015 = 0$ ，二根之平均值。

Find the average of the roots for the quadratic equation $2x^2 - 1008x + 2015 = 0$.

- A. 252 B. 503.75 C. 504 D. 1007.5 E. ***

6. $\log_{\sqrt{10}} \sqrt{10\sqrt{10}} =$

- A. $\frac{8}{5}$ B. $\frac{4}{3}$ C. $\frac{3}{2}$ D. 2 E. ***

7. 已知 $n! = 1 \times 2 \times 3 \times \cdots \times n$ ，求 $2016! + 2017!$ 除以 2018 的余数。

Given that $n! = 1 \times 2 \times 3 \times \cdots \times n$ ，find the remainder when $2016! + 2017!$ is divided by 2018.

- A. 0 B. 1009 C. 2016 D. 2017 E. ***

8. 已知实数 a 满足 $|2016 - a| + \sqrt{a - 2017} = a$ ，求 $a - 2016^2$ 之值。

Given that the real a satisfy $|2016 - a| + \sqrt{a - 2017} = a$ ，find the value of $a - 2016^2$.

- A. 2015 B. 2016 C. 2017 D. 2018 E. ***

9. 若 $x^2 + 7x - 1 = 0$ ，求 $x^2 + \frac{1}{x^2}$ 之值。

If $x^2 + 7x - 1 = 0$ ，find the value of $x^2 + \frac{1}{x^2}$.

- A. 47 B. 49 C. 51 D. 54 E. ***

10. 已知 a 与 b 是质数，有多少满足 $17a^2 - ab + 210 = 0$ ？

Given that a and b are prime numbers, how many (a, b) satisfy $17a^2 - ab + 210 = 0$.

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

11. 求 $\frac{4 + \log_3 5}{2 + \log_3 5} + \frac{4 + 6\log_5 3}{1 + 2\log_5 3}$ 之值。

Find the value of $\frac{4 + \log_3 5}{2 + \log_3 5} + \frac{4 + 6\log_5 3}{1 + 2\log_5 3}$.

- A. 4 B. 4.2 C. 4.5 D. 5 E. ***

12. 若 $x > 10$, 求 $4x + \frac{9}{x-10}$ 的最小值。

If $x > 10$, find the minimum value of $4x + \frac{9}{x-10}$.

A. 51 B. 52 C. 52.5 D. 53 E. ***

13. 若 $1+2+3+4+\cdots+n=2016$, 以下哪些正确?

If $1+2+3+4+\cdots+n=2016$, which of the following statements correct?

I. $n > 70$

II. n 是奇数。
 n is an odd number.

III. n 是 9 的倍数。
 n is a multiple of 9.

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

14. 若 $x, y, z > 0$ 及 $\begin{cases} (x+y)(y+z) = 70 \\ (y+z)(z+x) = 40 \\ (z+x)(x+y) = 28 \end{cases}$, 求 $2(x+y+z)$ 之值。

If $x, y, z > 0$ and $\begin{cases} (x+y)(y+z) = 70 \\ (y+z)(z+x) = 40 \\ (z+x)(x+y) = 28 \end{cases}$, find the value of $2(x+y+z)$.

A. 19 B. 20 C. 21 D. 23 E. ***

15. 某一平行四边形的边长为 7 及 11。此平行四边形较短的对角线长度为 12, 求较长的对角线长度。

A parallelogram has sides measuring 7 and 11. Its shorter diagonal has a length of 12. Find the measure of the longer diagonal.

A. 13 B. 14 C. 15 D. 16 E. ***

16. 若 n 是正整数, 设 $\Delta(n)$ 为 n 的各个奇数之和。若 n 不含奇数, $\Delta(n)=0$ 。例 $\Delta(2016)=1$, $\Delta(3578)=3+5+7=15$ 及 $\Delta(2886)=0$ 。求 $\Delta(1)+\Delta(2)+\Delta(3)+\cdots+\Delta(100)$ 之值。

For each positive integer n , let $\Delta(n)$ be the sum of odd digits in n . Let $\Delta(n)$ be 0 if there is no odd digit. Example $\Delta(2016)=1$, $\Delta(3578)=3+5+7=15$ and $\Delta(2886)=0$. Find the value of $\Delta(1)+\Delta(2)+\Delta(3)+\cdots+\Delta(100)$.

A. 400 B. 420 C. 500 D. 501 E. ***

17. 一开始，箱子A，箱子B及箱子C里的书的数量之比为8:9:10。这三箱子的书数量少于200。李先生这三个箱子共取走了21书。现在箱子A，箱子B及箱子C里的书的数量之比为3:2:3。那么箱子A一开始有几本书？

At first, the numbers of books in box A, box B and box C was in the ratio 8:9:10. The total number of books in these three boxes was less than 200. Mr. Lee took a total of 21 books from these three boxes. Now the numbers of books in box A, box B and box C are in the ratio 3:2:3. How many books were in box A at first?

- A. 40 B. 48 C. 56 D. 64 E. ***

18. 若6位数 \overline{abcdef} 与另一个6位数 \overline{defabc} 之比为2:11，求 \overline{abc} 的最小值。

If the ratio of the 6-digit number \overline{abcdef} to the other 6-digit number \overline{defabc} is 2:11, find the smallest possible value of \overline{abc} .

- A. 102 B. 103 C. 104 D. 105 E. ***

19. 已知 $3^{20} = 3486N84401$ 是一个10位数号码，N是其中一个数字，求N之值。

Given that $3^{20} = 3486N84401$ is a 10-digit number where N is one of the digit, find the value of N.

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

20. 求 $\sqrt{23-8\sqrt{7}} + \sqrt{23+8\sqrt{7}}$ 之值。

Find the value of $\sqrt{23-8\sqrt{7}} + \sqrt{23+8\sqrt{7}}$.

- A. 7 B. 8 C. 9 D. 10 E. ***

21. 在12个小时当中，共有多少次时针与分针形成60度？
(例:在两点钟时，它们形成60度。)

How many times in 12 hours the minute and hour hands make a 60 degree?
(Example: they form 60 degrees at 2 o'clock)



- A. 20 B. 22 C. 23
D. 24 E. ***

22. 已知整数 x 及 y 满足 $\frac{5}{x} - \frac{6}{y} = 3$, 求所有的 y 之和。

Given that x and y are integers that satisfy $\frac{5}{x} - \frac{6}{y} = 3$, find the sum of possible value of y .

- A. -12 B. -3 C. 0 D. 3 E. ***

23. 以下哪一项是 $x^4 + 64$ 的因子?

Which of the following is a factor of $x^4 + 64$?

- A. $x + 2$ B. $x^2 + 8$ C. $x^2 + 4x + 8$ D. $x^2 + 4x - 8$ E. ***

24. 若 $f(x) = \frac{x}{\sqrt{1+x^2}}$, 求 $f(f(f(1)))$ 之值。

Given that $f(x) = \frac{x}{\sqrt{1+x^2}}$, find the value of $f(f(f(1)))$.

- A. $\frac{1}{2}$ B. $\frac{1}{3}$ C. $\frac{1}{4}$ D. $\frac{1}{5}$ E. ***

25. 在一 n 边形, 其内角最小为 105° , 接下来每个角增加 6° , 求 n 之值。

In a n -sided polygon, the smallest interior angle is 105° , then it increase 6° for each angle, find the value of n .

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

26. 如图 1, 求 $\angle BCD$ 。

As shown in Figure 1, find $\angle BCD$.

- A. 150° B. 148° C. 145°
D. 140° E. ***

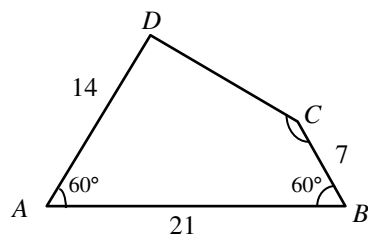


图 1

Figure 1

27. 如图 2, $ABCD$ 是一个面积为 480 的正方形。点 E 及 F 分别为 CD 及 DA 的中点。点 G 在 EB 使到 $3BG = GE$ 。求阴影部分的面积。

As shown in Figure 2, $ABCD$ is a square of area 480. E and F midpoint of CD and DA respectively, G on EB where $3BG = GE$. Find the area of shade region.

- A. 95 B. 100 C. 105 D. 110 E. ***

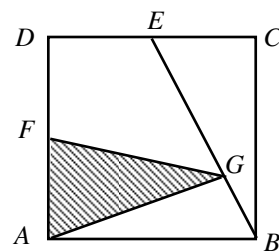


图 2

Figure 2

28. 如图3, 正方形 $ABCD$ 的边长为41, 内接正方形 $EFGH$ 的边长为29。已知 $AE < EB$, 求 AE 的长度

As shown in Figure 3, $ABCD$ is a square of side length 41, while the inscribed square $EFGH$ is of side length 29. Given that $AE < EB$, find the length of AE .

- A. 20 B. 21 C. 22
D. 24 E. ***

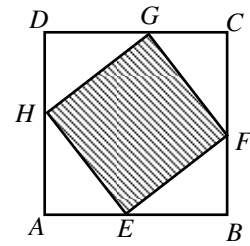


图 3
Figure 3

29. 如图4, 弦 AB 及弦 CD 相互垂直, 交与点 E 。已知 $AB=56$, $ED=3$ 及 $EC=93$, 求该圆的半径。

As shown in Figure 4, chord AB is perpendicular to chord CD , the intersection point is E . Given that $AB=56$, $ED=3$ and $EC=93$, find the radius of this circle.

- A. 51 B. 53 C. 55
D. 57 E. ***

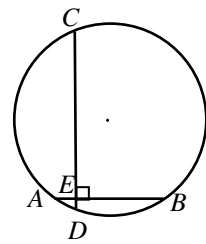


图 4
Figure 4

30. 若 $2x+3y-4=0$, 则 $4^x \times 8^y =$

If $2x+3y-4=0$, then $4^x \times 8^y =$

- A. 4 B. 8 C. 16 D. 32 E. ***

31. 有多少不同的正整数组 (x, y) 使到 $7x+5y=2016$?

How many ordered pairs of positive integers (x, y) are there such that $7x+5y=2016$?

- A. 55 B. 56 C. 57 D. 58 E. ***

32. 若 $a^2+b^2=25$, $c^2+d^2=4$ 及 $ac-bd=8$, 求 $ad+bc$ 之正值。

If $a^2+b^2=25$, $c^2+d^2=4$ and $ac-bd=8$, find the positive value of $ad+bc$.

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

33. 已知 y 轴是 $y=a(x-2)^2+3x$ 的对称轴, 求 a 之值。

Given that y -axis is the symmetry axis of the graph $y=a(x-2)^2+3x$, find the value of a .

- A. $\frac{2}{3}$ B. $\frac{3}{4}$ C. $\frac{4}{3}$ D. $\frac{3}{2}$ E. ***

34. 已知 $\overline{ABCDE} \times 9 = \overline{EDCBA}$ ，求 C 之值。

Given that $\overline{ABCDE} \times 9 = \overline{EDCBA}$, find the value of C .

- A. 9 B. 8 C. 7 D. 6 E. ***

35.
$$\frac{1}{\frac{1}{10 \times 11} + \frac{1}{11 \times 12} + \frac{1}{12 \times 13} + \frac{1}{13}} =$$

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