

雪兰莪暨吉隆坡福建会馆
新纪元大学学院

联合主办

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

第三十四届 (2019 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-34 (2019)**

~~初中组~~

BAHAGIAN MENENGAH RENDAH

日期 : 2019 年 7 月 7 日 (星期日)

Tarikh : 7 Julai 2019 (Hari Ahad)

时间 : 10:00→12:00 (两小时)

Masa : 10:00→12:00 (2 jam)

地点 : 新纪元大学学院黄迺莱活动中心

Tempat : Ng Ah Choo Multipurpose Hall, Kolej Universiti 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 are 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”.

1. $\frac{2-0+1 \times 9}{2^0 \times 1^9} =$

- A. -7 B. -3.5 C. 5.5 D. 11 E. ***

2. $2020 \times 20192018 - 2019 \times 20202018 =$

- A. 0 B. 2018 C. 2019 D. 2020 E. ***

3. 在图 1 的魔方阵，每行，每列及对角线上的数字和相等。求 X 之值。

In the magic square shown in Figure 1, the sums of the numbers in each row, each column and each diagonal are all equal. What is the value of X?

X		41
42		34
	40	

- A. 35 B. 36 C. 37
D. 38 E. 39

图 1
Figure 1

4. 已知 a , b 及 c 是三个连续的整数，其中 $a < b < c$ ，且其积等于其和，即 $abc = a + b + c$ 。有多少个这样的 (a, b, c) ?

Given that a , b and c are three consecutive integers, where $a < b < c$, such that its product is the same as its sum, that is $abc = a + b + c$, how many such (a, b, c) ?

- A. 0 B. 1 C. 2 D. 3 E. 4

5. 若 $x = \sqrt{1 + \sqrt{2}}$ ，求 $x^4 + \frac{1}{x^4}$ 之值。

If $x = \sqrt{1 + \sqrt{2}}$, find the value of $x^4 + \frac{1}{x^4}$.

- A. 6 B. 6.5 C. 7 D. 7.5 E. ***

6. 如图 2 所示, 已知 $ABCD$ 是个正方形, $AE = BF = CG = DH$ 及每个区域里的码号表示该区域的面积, 求 X 之值。

Given that $ABCD$ is a square (as shown in Figure 2), $AE = BF = CG = DH$ and the number within each region represents the area of that region, find the value of X .

- A. 60 B. 61 C. 62
D. 63 E. 64

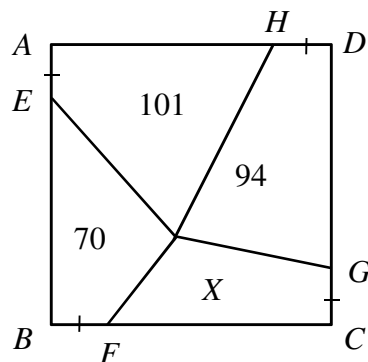


图 2
Figure 2

7. 已知 a, b, c, d, e 及 f 是正整数, 其中 $a < b < c < d < e < f$ 且 $a + b + c + d + e + f = 100$, 求 e 的最大值。

Given that a, b, c, d, e and f are positive integers where $a < b < c < d < e < f$ and $a + b + c + d + e + f = 100$, find the largest value of e .

- A. 46 B. 45 C. 44 D. 43 E. ***

8. 有多少个 3 位数号码, 其各个数字之和为 10? (例: 334, 523 及 910)

How many 3-digit positive integers are there such the sum of the digits is 10? (Examples: 334, 523 and 910)

- A. 54 B. 55 C. 56 D. 57 E. ***

9. 求 12 的所有正因数的倒数之和。

Find sum of the reciprocals of all positive factors of 12.

- A. $\frac{29}{12}$ B. $\frac{7}{3}$ C. $\frac{9}{4}$ D. $\frac{13}{6}$ E. $\frac{25}{12}$

10. 一开始, 某公司员工的平均年龄等于员工的数量。当一位 51 岁的新员工加入, 新的员工平均年龄仍然等于员工 (新的) 数量。那么该公司现在有几个员工?

At first, the average age of the staffs in a company was equal to the number of staffs. When a new 51-year-old staff joins the company, the new average age of the staffs is again equal to the (new) number of staffs in the company. How many staffs are there in this company now?

- A. 25 B. 26 C. 27 D. 50 E. 51

11. 若 $\sqrt{213-4x^2} - 2\sqrt{12-x^2} = 11$, 求 $\sqrt{213-4x^2} + 2\sqrt{12-x^2}$ 之值。

If $\sqrt{213-4x^2} - 2\sqrt{12-x^2} = 11$, find the value of $\sqrt{213-4x^2} + 2\sqrt{12-x^2}$.

- A. $\sqrt{165}$ B. $8\sqrt{3}$ C. 15 D. $\sqrt{261}$ E. 16

12. 已知 $\frac{\log a}{b-c} = \frac{\log b}{c-a} = \frac{\log c}{a-b}$, 求 $a^a b^b c^c$ 之值。

Given that $\frac{\log a}{b-c} = \frac{\log b}{c-a} = \frac{\log c}{a-b}$, find the value of $a^a b^b c^c$.

- A. $\frac{1}{10}$ B. $\frac{1}{2}$ C. 1 D. 2 E. 10

13. 已知 $3^{2019} + k$ 是11的倍数, 求正整数 k 的最小值。

If $3^{2019} + k$ is a multiple of 11, find the smallest positive integer k .

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

14. 若 $x^{x^4} = 4$, 求 $x^{x^2} + x^{x^8}$ 之值。

Given that $x^{x^4} = 4$, find the value of $x^{x^2} + x^{x^8}$.

- A. 18 B. 68 C. 130 D. 258 E. 514

15. 若 R 是九个相异的正整数的集合。 R 其中六个元素为2, 3, 4, 6, 9 及 12。 R 可能的中位数有几个?

Let R be a set of nine distinct positive integers. Six of the elements in R are 2, 3, 4, 6, 9 and 12. What is the number of possible values of the median of R ?

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

16. 三角形 P 的边长为 10, 13, 13, 而三角形 Q 的边长为 13, 13, 24。求 P 的面积对 Q 的面积的比例。

The triangle P has sides of length 10, 13, 13 while the triangle Q has sides of length 13, 13, 24. Find the ratio of area P : area Q .

- A. 5 : 12 B. 10 : 13 C. 13 : 24 D. 1 : 1 E. 13 : 10

17. 求 $2^{12} + 2^{10} - 5$ 最大的素因数。

Find the greatest prime factor of $2^{12} + 2^{10} - 5$.

- A. 3 B. 5 C. 11 D. 31 E. 37

18. 若 $2019 = \overline{ABCD}_8$, 求 $(A+B+C+D)_{10}$ 之值。

If $2019 = \overline{ABCD}_8$, find the value of $(A+B+C+D)_{10}$.

- A. 17 B. 18 C. 19 D. 20 E. 21

19. 若 $\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \frac{1}{7 \times 9} + \cdots + \frac{1}{2017 \times 2019} = \frac{x}{y}$, 且 $\frac{x}{y}$ 为最简分数, 求 $x+y$ 之值。

If $\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \frac{1}{7 \times 9} + \cdots + \frac{1}{2017 \times 2019} = \frac{x}{y}$ where $\frac{x}{y}$ in its lower terms, find the value of $x+y$.

- A. 3027 B. 3028 C. 4037 D. 6055 E. 6056

20. 下列的 A, B, C, D, E 及 F 代表数字。那么 D 是

The alphabets A, B, C, D, E and F below represent digits. Then the value of D is

$$\begin{array}{r} ABCDEF \\ \times \quad \quad 4 \\ \hline FEDCBA \end{array}$$

- A. 9 B. 8 C. 7 D. 6 E. 5

21. 若 a 及 b 是实数, 那么以下命题中, 有几项是必定是对的?

Suppose a and b are real numbers. How many statements below must be true?

(I) $\sqrt{ab} = \sqrt{a}\sqrt{b}$

(II) $\log a^2 = 2\log a$

(III) $\frac{a^2}{a} = a$

(IV) $a+b^2 \geq a$

- A. 0 B. 1 C. 2 D. 3 E. 4

22. 已知 $x+y=2$ 及 $x^2+y^2=6$, 求 x^3+y^3 之值。

Given that $x+y=2$ and $x^2+y^2=6$, find the value of x^3+y^3 .

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

23. 若某五边形的内角之比 $2:3:4:5:6$, 求该五边形最大的内角。

If the ratio of angles in a pentagon is $2:3:4:5:6$, what is the largest angle of the pentagon?

- A. 164° B. 162° C. 160° D. 158° E. ***

24. 求 $x(x+2)(x+4)(x+6)$ 的最小值。

Find the minimum value of $x(x+2)(x+4)(x+6)$.

- A. -17 B. -16 C. -15 D. 0 E. 9

25. 王先生从家开车上班，时速为每小时 99 公里。傍晚下班回家，他的车为时速每小时 X 公里。已知整个行程的平均时速为每小时 77 公里，求 X 之值。

Mr Ong drove his car from his home to the office at 99 km/h. At the evening, he drove back home at a speed X km/h. It is known that the average speed of his journey was 77 km/h, find the value of X .

- A. 88 B. 80 C. 75 D. 63 E. 60

26. 图 3 的图形里共有多少个正方形？

How many squares are there in Figure 3?

- A. 45 B. 49 C. 50
D. 51 E. 52

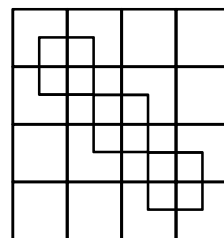
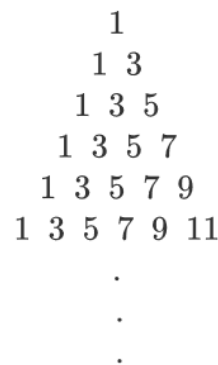


图 3
Figure 3

27. 正奇数被排成如图 4 所示，第一排由码号 1 组成，第二排由码号 1 和 3 组成，以此类推。已知第 100 排及第 120 排的码号之和分别为 A 及 B ，求 $\frac{B-A}{100}$ 之值。

Positive odd integers are arranged in the pattern shown in Figure 4, where the 1st row consists of 1, the 2nd row consists of 1 and 3 and so. Given that the sum of all the numbers in the 100th row and 120th row is A and B respectively, find the value of $\frac{B-A}{100}$.

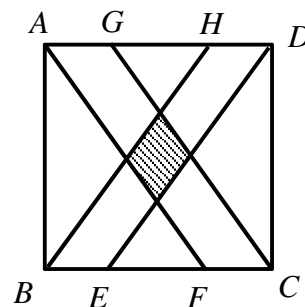


- A. 44 B. 42 C. 33
D. 22 E. ***

图 4
Figure 4

28. 如图 5， $ABCD$ 是个正方形，其面积为 120。点 E 及 F 在线 BC 上，点 G 及 H 在线 AD 上。已知 $BE = EF = FC = AG = GH = HD$ ，求阴影部分的面积。

As shown in Figure 5, $ABCD$ is a square with area 120. The points E and F are on BC while the points G and H are on AD . It is known that $BE = EF = FC = AG = GH = HD$, find the area of the shaded region.



- A. 8 B. 9 C. 10
D. 12 E. ***

图 5
Figure 5

29. 如图 6, 阴影部分是由四个相互重叠的圆形组成的, 它们的中心分别为 A, B, C 及 D 。每个圆形的周长为 24, 求阴影部分的周长。

As shown in Figure 6, the shaded region is made up of four overlapping circles, with centers at A, B, C and D respectively. The circumference of each circle is 24, find the perimeter of the shaded region.

- A. 32 B. 30 C. 28
D. 26 E. ***

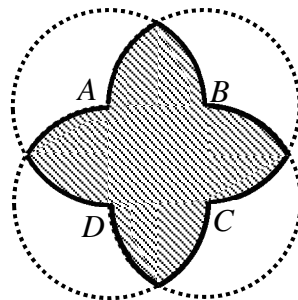


图 6
Figure 6

30. 如图 7, $ABCD$ 是个正方形。点 E 是 $ABCD$ 的中心, 点 F 在线 AE 上使得 $\angle ADF = 15^\circ$ 。已知 $FE = 4$, 求正方形 $ABCD$ 的面积。

As shown in Figure 7, $ABCD$ is a square. The point E is the center of the square while the point F is on AE such that $\angle ADF = 15^\circ$. Given that $FE = 4$, find the area of the square $ABCD$.

- A. 96 B. $56\sqrt{3}$ C. 98
D. 100 E. ***

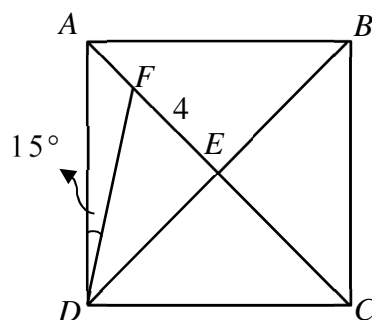


图 7
Figure 7

31. 如图 8, 一圆内切于直角梯形 $ABCD$, 其中 $AD = 8$ 及 $BC = 12$ 。求 CD 的长度。

As shown in Figure 8, a circle is inscribed in the right trapezoid $ABCD$ with $AD = 8$ and $BC = 12$. Find the length of CD .

- A. 10 B. 10.2 C. 10.4
D. 10.6 E. ***

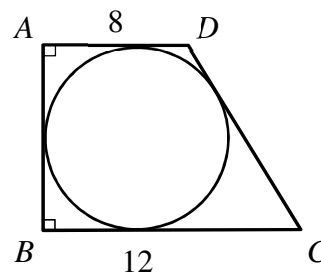


图 8
Figure 8

32. 如图 9, AB 为圆的直径, $AB = 13$ 。已知 $BC = 5$, 圆内的弧都是半圆, 求阴影部分的面积。

As shown in Figure 9, the diameter of the circle is $AB = 13$. Given that $BC = 5$ and the arcs within the circle are semicircles, find the total area of the shaded regions.

- A. 65 B. 63 C. 62
D. 60 E. ***

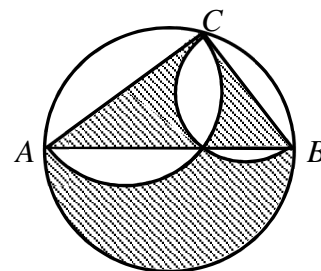


图 9
Figure 9

33. 如图 10, $ABCD$ 是个四边形, BE 是 $\angle ABD$ 的角平分线, CE 是 $\angle ACD$ 的角平分线。已知 $\angle BAC = 42^\circ$ 及 $\angle BDC = 50^\circ$, 求 $\angle BEC$ 。

As shown in Figure 10, $ABCD$ is a quadrilateral with BE angle bisector of $\angle ABD$ and CE angle bisector of $\angle ACD$. Given that $\angle BAC = 42^\circ$ and $\angle BDC = 50^\circ$, find $\angle BEC$.

- A. 42° B. 44° C. 46°
D. 50° E. ***

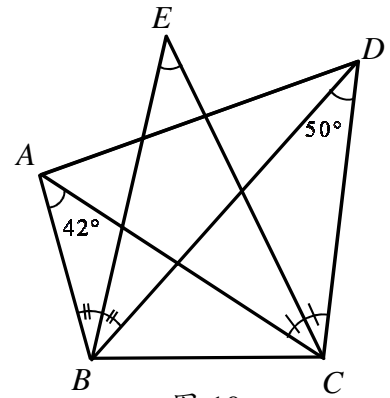


图 10
Figure 10

34. 若 $f(x)$ 为实函数且 $f(2x) = x + f(x)$ 及 $f(1) = 2$, 求 $f(64)$ 之值。

If $f(x)$ is a function defined for all real numbers such that $f(2x) = x + f(x)$ and $f(1) = 2$, find the value of $f(64)$.

- A. 63 B. 64 C. 65 D. 66 E. ***

35.
$$\frac{2019! + 2018!}{2018!} =$$

- A. 2017 B. 2018 C. 2019 D. 2020 E. ***

~~~~~ 完 END ~~~~~