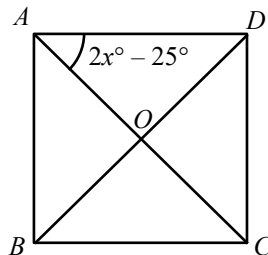


MathConception 2019 S3

- 1) Find the median of the data set 23, 45, 64, 23, 46, 23, 46, 64. [3.0%]
求數據組 23, 45, 64, 23, 46, 23, 46, 64 的中位數。

- 2) $ABCD$ is a square. Find x .
 $ABCD$ 是一個正方形。求 x 。



[3.1%]

- 3) How many planes of reflection does a regular tetrahedron have? [3.2%]
一個正四面體有多少個反射平面？

- 4) The volume of a triangular pyramid is 30 cm^3 . If the base area and the height of a triangular prism are the same as the triangular pyramid, find the volume of the triangular prism in cm^3 . [3.3%]
一個三角錐體的體積是 30 cm^3 ，若一個三角柱體的底面積和高與該三角錐體相同，這個三角柱體的體積是多少立方厘米？

- 5) If $6 - (3x - 1) \geq x + 1$, where x is an integer, find the largest possible value of x . [3.4%]
若 $6 - (3x - 1) \geq x + 1$ 且 x 為整數，求 x 的最大可能值。

- 6) Eric deposits a sum of money into a bank. If the annual interest rate is increased from 2.5% p.a. to 3.5% p.a., the simple interest obtained after 2 years will be increased by \$150. What is the sum of money he deposits in the bank? [3.5%]
小明將一筆錢存入銀行。如果年利率從每年 2.5% 增加到每年 3.5%，2 年後的單利息將增加 150 元。小明共存了多少錢入銀行？

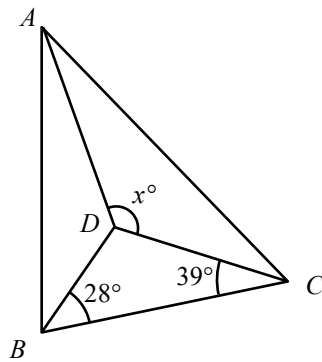
MathConception 2019 S3

- 7) If the base of a triangle is increased by 25% and its height is decreased by $x\%$, [3.6%]
its area remains unchanged. Find x .

一個三角形的底增加了 25%，高減少了 $x\%$ ，面積沒有改變。求 x 。

- 8) In the figure, D is the incentre of $\triangle ABC$. If $\angle CBD = 28^\circ$ and $\angle BCD = 39^\circ$, [3.7%]
find x .

在圖中， D 是 $\triangle ABC$ 的內心。已知 $\angle CBD = 28^\circ$ 和 $\angle BCD = 39^\circ$ ，求 x 。



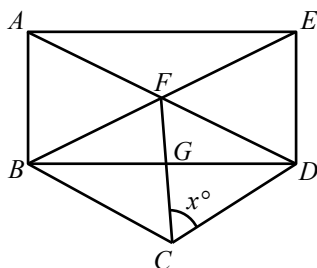
MathConception 2019 S3

- 9) If the base radius of a cone is increased by 30% and the height is decreased by 35%, the volume is increased by $x\%$. Find x . [4.8%]

如果圓錐體的底部半徑增加 30% 和高度減少 35%，體積增加了 $x\%$ 。
求 x 。

- 10) In the figure, $ABDE$ is a rectangle and $\triangle CBF$ is an equilateral triangle. If $\angle BAD = 56^\circ$, find x . [4.9%]

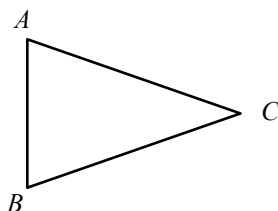
在圖中， $ABDE$ 是一個長方形， $\triangle CBF$ 是一個等邊三角形。如果 $\angle BAD = 56^\circ$ ，求 x 。



- 11) Find the arithmetic mean of the data set $2^{4x+1}, 2^{4x+1}, 4^{2x+1}, 16^{x+1}$. [5.1%]
求數據組 $2^{4x+1}, 2^{4x+1}, 4^{2x+1}, 16^{x+1}$ 的算術平均數。

- 12) In the figure, ABC is an isosceles triangle with $AC = BC$. The length of BC is less than 4 times the length of AB by 12. If the perimeter of the triangle is not greater than 39, find the greatest possible length of BC . [5.2%]

在圖中， ABC 是等腰三角形， $AC = BC$ ， BC 的長度比 AB 長度的 4 倍小 12。如果三角形的周長不大於 39，求 BC 的最大長度。



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- 13) Find the value of $\frac{\sin^2 89^\circ + \sin^2 88^\circ + \sin^2 87^\circ + \dots + \sin^2 2^\circ + \sin^2 1^\circ}{\tan^2 89^\circ \tan^2 88^\circ \tan^2 87^\circ \dots \tan^2 2^\circ \tan^2 1^\circ}$. [6.3%]

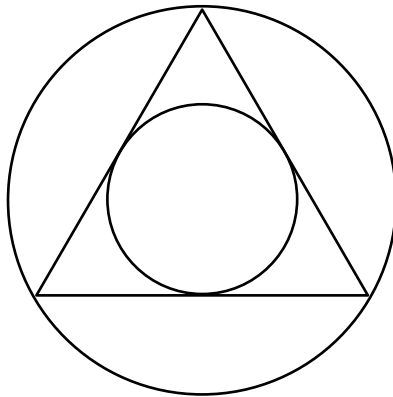
求 $\frac{\sin^2 89^\circ + \sin^2 88^\circ + \sin^2 87^\circ + \dots + \sin^2 2^\circ + \sin^2 1^\circ}{\tan^2 89^\circ \tan^2 88^\circ \tan^2 87^\circ \dots \tan^2 2^\circ \tan^2 1^\circ}$ 的值。

- 14) Find the minimum value of $x^2 - 8x + 21$. [6.4%]

求 $x^2 - 8x + 21$ 的最小值。

- 15) In the figure, an equilateral triangle is inscribed in the larger circle and a smaller circle is inscribed in the equilateral triangle. The area of the smaller circle is $n\%$ that of the larger circle. Find n . [6.5%]

圖中，大圓內接等邊三角形，等邊三角形內接小圓。小圓的面積是大圓的面積的 $n\%$ 。求 n 。



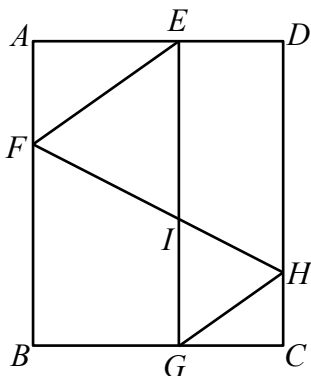
- 16) Find the remainder of $(2019^{19} + 19)^{19}$ divided by 19. [6.6%]

求 $(2019^{19} + 19)^{19}$ 除以 19 所得的餘數。

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- 17) In rectangle $ABCD$, E and G are points on AD and BC respectively such that $AB \parallel EG \parallel CD$. F and H are points on AB and CD respectively such that $EF \parallel GH$. EG and FH intersect at I . If the area of $\triangle EFI$ and $\triangle GHI$ are 49 and 25 respectively, find the area of $ABCD$. [6.7%]

在長方形 $ABCD$ 中， E 和 G 分別為 AD 和 BC 上的點，使得 $AB \parallel EG \parallel CD$ 。 F 和 H 分別為 AB 和 CD 上的點，使得 $EF \parallel GH$ 。 EG 和 FH 相交於 I 。若 $\triangle EFI$ 和 $\triangle GHI$ 的面積分別為 49 和 25，求 $ABCD$ 的面積。



- 18) Solve $\frac{16x^6 + 24x^5 + 20x^4 + 2x + 1}{4x^2 + 6x + 5} - \frac{24x^6 - 48x^5 - 68x^4 + 3x - 9}{6x^2 - 12x - 17} = 0$. [6.8%]

解 $\frac{16x^6 + 24x^5 + 20x^4 + 2x + 1}{4x^2 + 6x + 5} - \frac{24x^6 - 48x^5 - 68x^4 + 3x - 9}{6x^2 - 12x - 17} = 0$ 。

- 19) In $\triangle ABC$, a , b , and c are the opposite sides of angles A , B , and C , respectively and $\frac{a+b}{12} = \frac{a+c}{9} = \frac{b+c}{13}$. Find $\sin^2 A : \sin^2 B : \sin^2 C$. [6.9%]

在 $\triangle ABC$ 中， a 、 b 和 c 分別為角 A 、 B 和 C 的對邊，且

$\frac{a+b}{12} = \frac{a+c}{9} = \frac{b+c}{13}$ ，求 $\sin^2 A : \sin^2 B : \sin^2 C$ 。

- 20) Given that n is a natural number. If the roots of the quadratic equation $3x^2 - 8nx + 7x + 42 - 5n + n^2 = 0$ are both prime numbers, find n . [7.0%]

已知 n 為自然數，若一元二次方程 $3x^2 - 8nx + 7x + 42 - 5n + n^2 = 0$ 的兩根為質數，求 n 。

End of paper



ANSWER SHEET

REG NO		
NAME		
GROUP		
SEAT		

ANSWER			ANSWER		
1	45.5	<input type="radio"/>	11	$3 \cdot 2^{4x+1}$	<input type="radio"/>
2	35	<input type="radio"/>	12	16	<input type="radio"/>
3	6	<input type="radio"/>	13	44.5	<input type="radio"/>
4	90	<input type="radio"/>	14	5	<input type="radio"/>
5	1	<input type="radio"/>	15	25	<input type="radio"/>
6	7500	<input type="radio"/>	16	5	<input type="radio"/>
7	20	<input type="radio"/>	17	288	<input type="radio"/>
8	118	<input type="radio"/>	18	4	<input type="radio"/>
9	9.85	<input type="radio"/>	19	16:64:25	<input type="radio"/>
10	64	<input type="radio"/>	20	17	<input type="radio"/>