

## CIPHERING

1. The bacteria count in a 2-liter bottle doubles every minute. After 60 minutes the bottle is full. How long did it take to fill half the bottle?

Correct Answer: 59 minutes

2. How many complex solutions are there to the equation  $|x^2| = 9$ ?

Correct Answer: 4 (3, -3, 3i, -3i)

3.  $(\log_2 4)(\log_4 6)(\log_6 8) = ?$

Correct Answer: 3

4. If we know  $\begin{vmatrix} x & y & z \\ u & v & w \\ 1 & 2 & 3 \end{vmatrix} = 6$ , then the value of  $\begin{vmatrix} x & y & z \\ -3 & -6 & -9 \\ u & v & w \end{vmatrix}$  is?

Correct Answer: 18

5. Simplify  $(1+i)^7$  and write the result in the standard form  $a+bi$

Correct Answer:  $8-8i$

6. If a circle of radius 10 meters has its radius decreased by 5 meters, by what percent does the area decrease?

Correct Answer: 75%

7. What is the remainder when  $x^{30} + 3x^7 + 5$  is divided by  $x+1$ ?

Correct Answer: 3

8. If  $y$  varies directly with  $x$  and inversely as the cube of  $z$ , by what factor is  $y$  multiplied if  $x$  is tripled and  $z$  is doubled?

Correct Answer:  $3/8$

9.  $i^{14} + i^{15} + i^{16} + i^{17} = ?$

Correct Answer: 0

10. Who am I?



I have a "beautiful Mind"!

Correct Answer: John Nash

11. The sum of the zeros of  $f(x) = x^3 - 3x^2 - 4x + 12$  is

Correct Answer: 3

12. If  $4^{-x} = 9$  what's  $2^x$ ?

Correct Answer:  $\frac{1}{3}$

13. Four students belong to both the baseball and the basketball teams at Euclid High School. These students represent 10% of the baseball team and 25% of the basketball team. How many students belong to only one of these teams?

Correct Answer: 48

14. 
$$2 + \frac{1}{3 + \frac{1}{2 + \frac{1}{3}}} = ?$$

Correct Answer:  $\frac{55}{24}$

15. Simplify  $\frac{x! \cdot 3^{x+3}}{(x+2)! \cdot 3^x}$

Correct Answer:  $\frac{27}{(x+2)(x+1)}$

16.  $\frac{8^{29} - 8^{28}}{8^{27}} = ?$

Correct Answer: 56

17. If 15 students in a class average 80 on an English exam and 10 other students average 90 on the same exam, then what is the average in percent for all 25 students on this exam?

Correct Answer: 84%

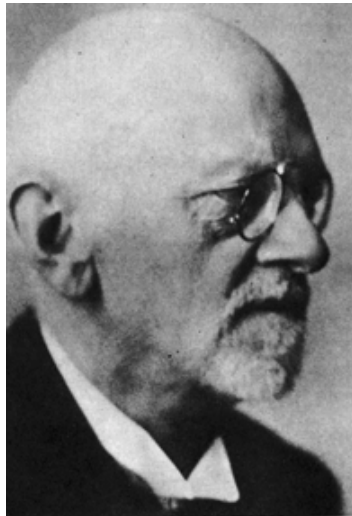
18. If  $x$  is 30% of 60 and 20% of  $y$  is 4, then what is  $\frac{x^2 y}{5(x - y)^2}$ .

Correct Answer: 324

19. A bag contains 20 gumballs. If there are 8 red, 7 white, and 5 green, what is the minimum number of gumballs one must pick from the bag to be assured of one of each color?

Correct Answer: 16

20. Who am I?



I proposed ten mathematical problems in 1900.

Correct Answer: David Hilbert