

## Math Bowl 2005 Ciphering

1. How many integers between 10 and 100 inclusive are evenly divisible by both 5 and 6?

Correct Answer: 3

2.  $i \cdot i^2 \cdot i^3 \dots i^{98} \cdot i^{99} \cdot i^{100} = ?$

Correct Answer: -1

3. Find the real solution of the equation  $4^x - 7(2^x) - 8 = 0$

Correct Answer:  $x = 3$

4. Write the product  $\sqrt[3]{x} \cdot \sqrt[4]{x}$  as a single radical with the lowest index.

Correct Answer:  $\sqrt[12]{x^7}$

5. The ratio of  $w$  to  $x$  is 1:2 and the ratio of  $wz$  to  $yx$  is 3:4. What is the ratio of  $y$  to  $z$ .

Correct Answer: 2:3

6. Find the exact value of  $\cos 30^\circ \sec 120^\circ \sin 150^\circ \cot 90^\circ \csc 315^\circ$

Correct Answer: 0

7. Find  $x$  if  $x \log_2 3 = \log 3$ . Write your result as a single logarithm.

Correct Answer:  $x = \log 2$

8. Write  $\frac{(2^4)^8}{(4^8)^2}$  in the simplest reduced form

Correct Answer: 1

9. Find the exact value of  $e^{\ln 0.5} + \ln e^{0.5} + \sin(\sin^{-1} 0.5) + \cos^{-1}(\cos 0.5)$

Correct Answer: 2

10. Who am I?



Correct Answer: Archimedes

11. If  $2^x = 8^{y+1}$ , and  $9^y = 3^{x-9}$ , then  $x + y = ?$

Correct Answer: 27

12. The graph of  $f(x) = \log_b x$  goes through the point (64,3).  $b = ?$

Correct Answer: 4

13. In what number base does  $1 + 2 = 10$

Correct Answer: Base 3

14. Write  $9^{\log_3 4}$  in the simplest form.

Correct Answer: 16

15. Find the determinant of the matrix  $\begin{bmatrix} e & f & g & h \\ 0 & a & b & c \\ 0 & 0 & s & t \\ 0 & 0 & 0 & y \end{bmatrix}$ .

Correct Answer: easy

16. Given the  $\log_{10} 3 = 0.4771$ , find  $\log_{10} 300$ .

Correct Answer: 2.4771

17. Give the domain of the function  $f(x) = \frac{1}{\sqrt{x-3}}$

Correct Answer:  $\{x \mid x > 3\}$  or  $(3, \infty)$

18. The  $\log_3 32$  lies between what two consecutive integers?

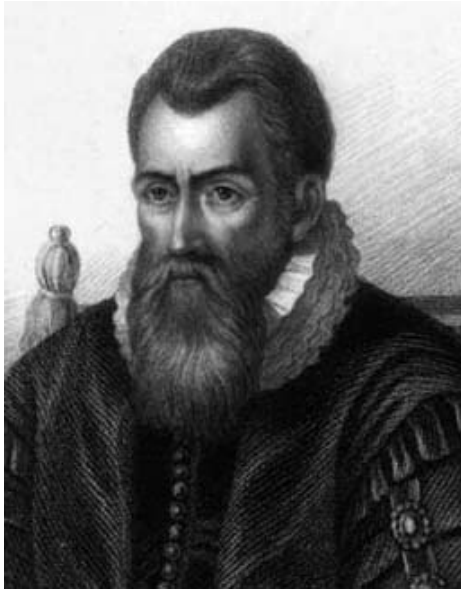
Correct Answer: 3 and 4

19. Select the negation of the statement: "Some students are not smiling."

- A "Some students are smiling."
- B "All the students are smiling."
- C "No student is smiling."
- D "All the students are not smiling."

Correct Answer: B.

20. Who am I?



Correct Answer: John Napier