

Math Bowl 2004 Ciphering Questions

1. Simplify (write result in lowest reduced form) $\sqrt{\frac{1}{25} + \frac{1}{144}}$

Correct Answer: $\frac{13}{60}$

2. $(-1)^{5^3} + i^{2^5} = ?$

Correct Answer: 0

3. If five men can paint four houses in three weeks, how many houses could 10 men paint in six weeks?

Correct Answer: 16 houses

4. Simplify (write result in lowest reduced form) $\left(\sqrt[3]{\sqrt{3} + \sqrt{30}}\right)\left(\sqrt[3]{\sqrt{3} - \sqrt{30}}\right)$

Correct Answer: -3

5. Find the largest number in the set $\{-\cot(2p/3), \tan(2p/3), e^{-1}, \ln 1, \sin(2p/3)\}$

Correct Answer: $\sin(2p/3)$

6. If $yz : zx : xy = 1 : 2 : 3$, then what is $\frac{x}{yz} : \frac{y}{zx}$?

Correct Answer: 4 : 1

7. In a group of 30 students, 20 take French, 15 take Spanish, and 5 take neither language. How many students take both French and Spanish?

Correct Answer: 10

Math Bowl 2004 CIPHERING QUESTIONS

8. If $a + b = 5$ and $\frac{1}{ab} = \frac{1}{6}$, then $\frac{1}{a} + \frac{1}{b} = ?$

Correct Answer: $\frac{5}{6}$

9. The product of 2^{21} and 5^{17} is an integer. How many digits does it have?

Correct Answer: 19

10. Who am I?



Hint: He was honored by the symbol of the natural log base.

Correct Answer: Leonhard Euler

11. Express as a common fraction in lowest reduced form:

$$\left[\left(\frac{1}{2} \right)^{-1} + \left(\frac{1}{3} \right)^{-1} + \left(\frac{1}{5} \right)^{-1} + \left(\frac{1}{7} \right)^{-1} \right]^{-1}$$

Correct Answer: $\frac{1}{17}$

12. How many feet does an auto travel in 1 second if it is moving at the rate of 45 miles per hour?

Correct Answer: 66 feet

Math Bowl 2004 Cipherring Questions

13. If $f(x) = 2^{x-5}$, then $f^{-1}(32) = ?$

Correct Answer: 10

14. How many of the following four numbers in radians are integers?

- $e^{\tan(0)}$
- $\ln(e^2)$
- $\cos^{-1}(0)$
- $\sin^2(\frac{\pi}{6}) + \cos^2(\frac{5\pi}{6})$

Correct Answer: 3

15. If Pat is $33\frac{1}{3}\%$ taller than Lee, then Lee is what percent shorter than Pat?

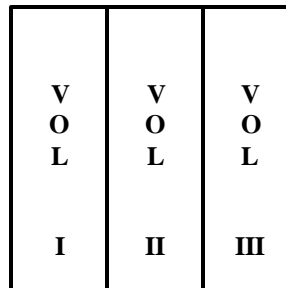
Correct Answer: 25%

16. Factor completely: $K^3 - L^3 - 3K^2L + 3KL^2$

Correct Answer: $(K - L)^3$

17. Three volumes of the series Mathematics are on a shelf with no space between the volumes as shown. Each volume is 1 inch thick without its covers. Each cover is $\frac{1}{8}$ inch thick. A bookworm bores horizontally from the first page of Volume I to the last page of Volume III. How far in inches does the bookworm travel?

Correct Answer: $1\frac{1}{2}$ inches.



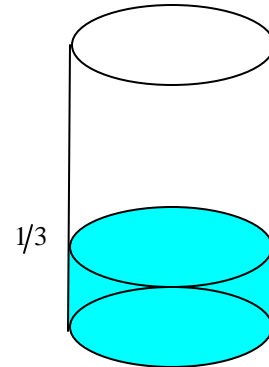
Math Bowl 2004 Ciphering Questions

18. If $x - y = 5$ and $xy = 5$, then $\frac{1}{x} - \frac{1}{y} = ?$

Correct Answer: -1

19. As shown in the figure, a right cylindrical oil tank is $\frac{1}{3}$ full. If 3 more gallons are added, the tank will be half-full. What is the capacity, in gallons of the tank?

Correct Answer: 18 gals.



20. Who am I?



Hint: He predicted and realized his own death

Correct Answer: Girolamo Cardano (Cardan)