

1.  $\sqrt{\frac{8^{10} + 4^{10}}{8^4 + 4^{11}}} = ?$

Correct Answer: 16

2. Find the exact value of  $\tan \frac{2009\pi}{3}$

Correct Answer:  $-\sqrt{3}$

3. Find the real solution of the equation  $9^x + 3^{x+1} - 18 = 0$

Correct Answer:  $x = 1$

4. If in triangle ABC,  $\sin A = \frac{12}{13}$ ; then  $\cos(A + B + C) = ?$

Correct Answer:  $-1$

5. Let  $t$  and  $a$  be single digit numbers such that  $[3(230 + t)]^2 = 492a04$ . Find  $t + a$ .

Correct Answer: 12

6.  $\log_2 6 \times \log_6 4 = ?$

Correct Answer: 2

7. Dick, Roger, and Kamal run laps every day. Dick runs  $\frac{1}{3}$  lap/min; Roger runs  $\frac{1}{5}$  lap/min; Kamal,  $\frac{1}{6}$  lap/min. They agree to start running laps at the same time and continue until they all again reach the starting point at the same time. What is the total number of laps run by Dick, Roger, and Kamal?

Correct Answer: 21

8. The ages of 10 members of the Girls' Club range from 4 to 13 and each girl is a different age. Two girls from each of 5 families belong. The sums of the ages of each pair of sisters are 10, 13, 17, 22, and 23. If one girl is 7, how old is her sister?

Correct Answer: 10

9. If the area of square  $S$  is 6 times the perimeter of  $S$ , then one side of  $S$  is how long?

Correct Answer: 24

10. Who am I?



Hint: The number  $e$  is named in my honor.

Correct Answer: Leonhard Euler

11. While traveling from his house to his grandmother's house, George fell asleep when he was half of the distance to her house. When he awoke, he still had to travel half the distance that he had traveled while sleeping. For what part of the entire distance had he been asleep?

Correct Answer:  $1/3$

12. If  $a_{25} = 62$  is the 25<sup>th</sup> term of an arithmetic sequence whose sum of the first 25 terms  $S_{25} = 650$ , what is the common difference between terms of the sequence?

Correct Answer: 3

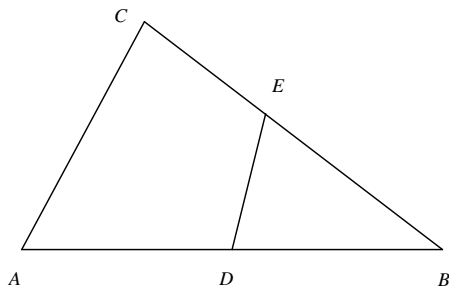
13. Solve  $x = \log_{\frac{1}{4}}\left(\frac{16^2}{2^{-3}}\right)$  for  $x$ . Write your answer in reduced fraction form.

Correct Answer:  $-\frac{11}{2}$

14. What is the sum of the ten positive integers from 991 through 1,000?

Correct Answer: 9,955

15. In triangle  $\triangle ABC$ ,  $\angle A = 50^\circ$ ,  $\angle C = 80^\circ$ , and  $BD = BE$ . Find  $\angle BED$ ?



Correct Answer:  $65^\circ$

16. Solve:  $\log_2(x+1) - \log_4 x = 1$

Correct Answer: 1

17. What is the exact numerical value of  $\tan\left(\cos^{-1}\left(-\frac{4}{5}\right)\right)$

Correct Answer:  $-\frac{3}{4}$

18. In a right triangle with sides of lengths 3, 4, and 5, what is the height of the triangle from the right angle vertex to the hypotenuse?

Correct Answer:  $\frac{12}{5}$

19. Solve the inequality  $\frac{1}{x-2} \leq 1$  and write your result in interval notation.

Correct Answer:  $(-\infty, 2) \cup [3, \infty)$

20. Who am I?



Hint: My name is associated with geometry.

Correct Answer: Bernhard Riemann