

1. Evaluate

$$\frac{(10^4 + 64)(18^4 + 64)(26^4 + 64)(34^4 + 64)}{(6^4 + 64)(14^4 + 64)(22^4 + 64)(30^4 + 64)}$$

- (A) 30 (B) 65 (C) 100 (D) 130 (E) 170

2. Two sides of an isosceles triangle are 18 and 41. Compute the area of the triangle.

- (A) 360 (B) 380 (C) 400 (D) 420 (E) 440

3. How many integers $1 \leq n \leq 2013$ are divisible by 9 or 21 but not both?

- (A) 223 (B) 254 (C) 256 (D) 287 (E) 318

4. How many pairs of integers (m, n) satisfy the equation $mn = m + n$?

- (A) 5 (B) 4 (C) 3 (D) 2 (E) 1

5. A function f has the property that $2f(x) + f(1-x) = x^2$ for any number x . Find $f(1) = ?$

- (A) $\frac{15}{4}$ (B) $\frac{21}{5}$ (C) $\frac{25}{3}$ (D) $\frac{27}{4}$ (E) $\frac{2}{3}$

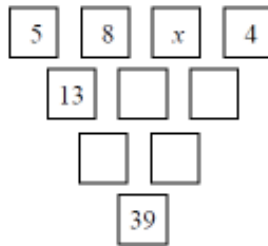
6. Let ABC be a triangle with sides 1, 2 and x . For how many values of x this triangle will be a right angled triangle?

- (A) 4 (B) 3 (C) 2 (D) 1 (E) 0

7. For $x \neq y$ one has that $\frac{3}{x} + 7y = \frac{3}{y} + 7x$. Then compute the product xy

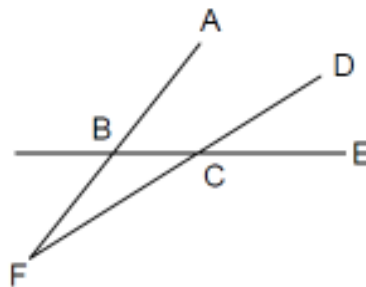
- (A) -3 (B) 7 (C) -21 (D) $\frac{7}{3}$ (E) $-\frac{3}{7}$

8. In the puzzle below, the number in each empty square is obtained by adding the two numbers in the row directly above, for example $5 + 8 = 13$. What is the value of x ?



- (A) 2 (B) 3 (C) 6 (D) 7 (E) 9

9. If the angle $\angle ABE$ is 6 degrees greater than the angle $\angle DCE$, then compute $\angle AFD$.

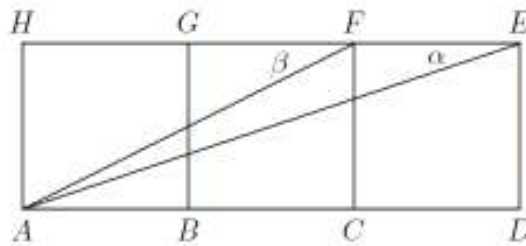


- (A) 4° (B) 6° (C) 8° (D) 10° (E) 16°

10. If a, b and c are three distinct numbers such that $a^2 - bc = 2013$, $b^2 + ac = 2013$, and $c^2 + ab = 2013$. Then compute $a^2 + b^2 + c^2$

- (A) 2013 (B) 2014 (C) 4028 (D) 4026 (E) 2012

11. In the following picture, $ABGH$, $BCFG$ and $CDEF$ are all squares with the same side length. If $\alpha = \angle AEH$ and $\beta = \angle AFH$ then compute $\alpha + \beta = ?$



- (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{8}$ (D) $\frac{\pi}{3}$ (E) $\frac{\pi}{2}$

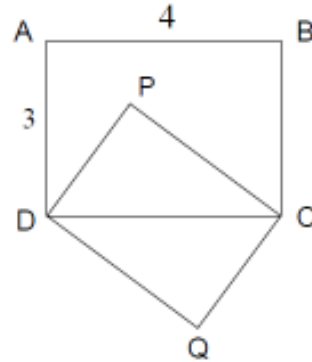
12. How many integer solutions (x, y) are there of the equation $(x - 2)(x - 10) = 3^y$?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

13. What is the smallest positive integer n such that $\sqrt{n} - \sqrt{n-1} < \frac{1}{60}$

- (A) 2013 (B) 2012 (C) 900 (D) 899 (E) 901

14. A rectangle ABCD has sides of length 3 and 4. A rectangle PCQD is similar to rectangle ABCD, with P inside rectangle ABCD. Compute the distance from P to AB.



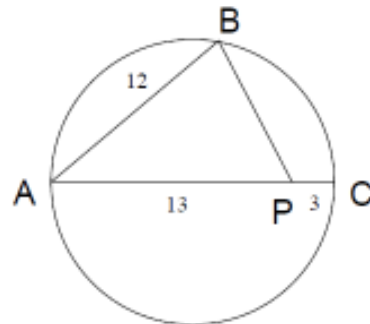
- (A) 1 (B) $\frac{4}{3}$ (C) $\frac{27}{25}$ (D) $\frac{21}{17}$ (E) $\frac{7}{5}$

15. Evaluate

$$\frac{1}{1+\sqrt{2}+\sqrt{3}} + \frac{1}{1-\sqrt{2}+\sqrt{3}} + \frac{1}{1+\sqrt{2}-\sqrt{3}} + \frac{1}{1-\sqrt{2}-\sqrt{3}}$$

- (A) 1 (B) -1 (C) -2 (D) 2 (E) 3

16. In the picture, point P is chosen on the diameter AC of a circle so that it is 3 units from the circle. The diameter of the circle has length 16. Chord AB is 12 units. Find PB=?



- (A) 5 (B) $\sqrt{65}$ (C) 9 (D) $\sqrt{105}$ (E) $\sqrt{79}$

17. Find solution of the following inequality $\frac{1}{x} > x^2$

- (A) (0, 1) (B) (-1, 1) (C) $(-\infty, -1) \cup (0, 1)$ (D) $(-1, 0) \cup (1, +\infty)$ (E) (-1, 0)

18. It is clear that 23 is a 2-digit prime number in which its both digits 2 and 3 are also primes. How many 2-digit prime numbers are there in which its both digits are also primes?

- (A) 7 (B) 6 (C) 5 (D) 4 (E) 1

19. What is the last digit of 2012^{2013} ?

- (A) 0 (B) 2 (C) 4 (D) 6 (E) 8

20. How many triples (x, y, z) of real numbers are solutions of the system of equations

$$\begin{cases} x + y = 2 \\ xy - z^2 = 1 \end{cases}$$

- (A) 3 (B) 2 (C) 1 (D) Many solutions (E) No Solutions

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