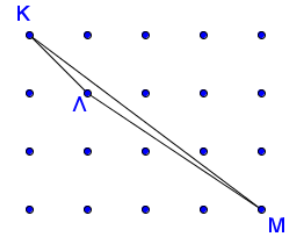


1. The roots of the equation $x(x^2 + 8x + 16)(4 - x) = 0$ are:

- A. 0 only
- B. 0 or 4 only
- Γ. 0 or 4 or -4
- Δ. 4 or -4 only
- E. the equation has no real roots

2. In the diagram the horizontal and vertical distances of two adjacent dots is 2 cm. The area of the triangle KΛM is:



- A. 10 cm^2
- B. 1 cm^2
- Γ. 2 cm^2
- Δ. 4 cm^2
- E. 6 cm^2

3. If a new mathematical operation \diamond is defined by $\alpha \diamond \beta = \frac{\alpha}{\alpha + \beta}$ then $1 \diamond (2 \diamond 3)$ is equal to :

- A. $\frac{1}{2}$
- B. $\frac{2}{3}$
- Γ. $\frac{5}{7}$
- Δ. $\frac{3}{8}$
- E. $\frac{7}{9}$

4. If $\frac{2^{2012} - 4^{1005}}{3} = 2^x$ then x is equal to:

- A. 2012
- B. 2011
- Γ. 2010
- Δ. 2
- E. $\frac{1}{180}$

5. Consider the pattern shown below

Row 1 :	1			
Row 2 :	3	5		
Row 3 :	7	9	11	
Row 4 :	13	15	17	19

.....
 The last number of «Row 80» is:

- A. 6479
- B. 6319
- Γ. 6481
- Δ. 6379
- E. 6531

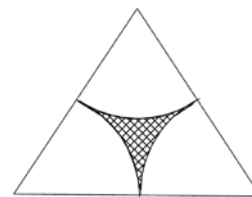
6. If $x - y = 1$, then the value of the expression $K = x^2 + x - 2xy + y^2 - y$ is equal to

- A. 0
- B. 1
- Γ. 2
- Δ. -1
- E. -2

7. If x and y are real numbers and $\sqrt{x+1} + (y-x)^{100} = 0$ then the value of $|x+2y|$ is equal to

- A. 1
- B. 2
- Γ. 3
- Δ. 4
- E. doesn't exist

8. Three equal arcs of circles are drawn with centers on the vertices of an equilateral triangle. The sides of the triangle are of length 2 units. Each arc passes through the midpoint of two sides of the triangle. Then the area of the shaded region is



- A. $\frac{\sqrt{3}}{2} - \pi$ B. $\frac{\sqrt{3}}{2} - \frac{\pi}{2}$ Γ. $\sqrt{3} - \frac{\pi}{2}$ Δ. $2\sqrt{3} - \pi$ E. $2\sqrt{3} - 2\pi$

9. The expression $\frac{(x^2+3x+2)(x^2+2x-3)}{(x^2-1)(x+2)}$ is equal to:

- A. $x + 3$ B. $\frac{x+2}{x-1}$ Γ. 1 Δ. $\frac{x-1}{x+2}$ E. x

10. How many digits are there in the outcome of the expression $2^{13} \cdot (4 + 1)^9$

- A. 10 B. 11 Γ. 13 Δ. 22 E. 9

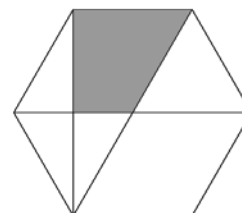
11. The value of the expression $\frac{100-99+98-97+96-95+\dots+2-1}{1-2+3-4+5-6+\dots+99}$ is equal to

- A. -1 B. 1 Γ. 50 Δ. 99 E. 100

12. The number $\omega(\omega + 3)$, where ω a natural number is always

- A. Even B. Odd Γ. Multiple of 3 Δ. Multiple of 5 E. None of these

13. In the adjacent figure the area of the regular hexagon is $24m^2$. Then the area of the shaded region is equal to



- A. 3 B. 4 Γ. 5 Δ. 6 E. 10

14. If $\alpha^2 = 3\alpha - 1$ then the value of $\frac{\alpha^3}{\alpha^6+1}$ is equal to

- A. $\frac{1}{15}$ B. $\frac{1}{16}$ Γ. $\frac{1}{17}$ Δ. $\frac{1}{18}$ E. $\frac{1}{19}$

15. The operation \oplus is defined by the relation $\alpha \oplus \beta = \alpha^2 - \beta$ and the operation \odot is defined by the relation $\alpha \odot \beta = \alpha + \beta^2$. Then the value of $(\alpha \odot \beta) \oplus \beta$ is equal to:

- A. $\alpha^2 + \beta^2 + 2\beta^4 - \beta$ B. $\alpha^2 + 2\beta^2 - \alpha + \beta$ Γ. $\alpha^4 - 2\beta^2 + \alpha\beta + \alpha$
 Δ. $\alpha^2 + 2\alpha\beta^2 + \beta^4 - \beta$ E. $\beta^2 - \alpha^2 + \alpha\beta - \alpha$

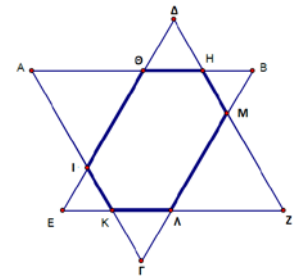
16. If in a square, of side α , the lengths of one of the pairs of opposite sides are increased by 40% and the lengths of the other pair are decreased by 40% then the area of the new figure will be equal to:

- A. $\frac{84\alpha^2}{100}$ B. $\frac{120\alpha^2}{100}$ Γ. $\frac{80\alpha^2}{100}$ Δ. $\frac{116\alpha^2}{100}$ E. α^2

17. If $0 < x < y < 1$, which of the following is not always correct?

- A. $(x - y)^2 < x^2$ B. $(x - y)^2 < y^2$ Γ. $x^2 < 2y^2$ Δ. $x^3 - y^3 < x^2$ E. $y^3 - x^3 < y^3$

18. Two equilateral triangles $AB\Gamma$ and ΔEZ , each of perimeter 1 cm are placed one on the other so that their sides are parallel, as can be seen in the adjacent figure. Then the perimeter of the hexagon $H\Theta IKAM$ is equal to:



- A. 12cm B. 13cm Γ. 14cm Δ. 18cm E. 9cm

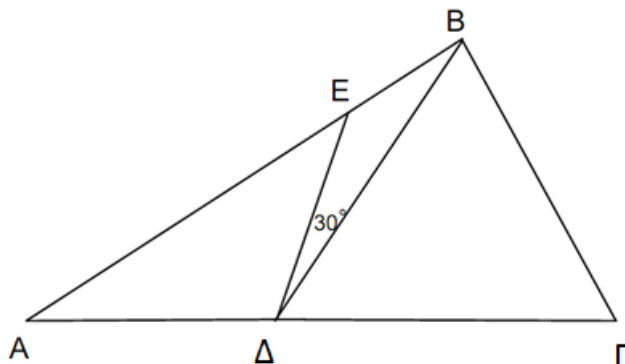
19. If $x - y = 3$ and $x^2 - y^2 = 9$, then xy is equal to:

- A. 0 B. 1 Γ. 2 Δ. 3 E. 4

20. How many pairs (x,y) of positive integers satisfy the equation $3x + 6y = 2012$?

- A. Infinite B. one Γ. two Δ. four E. none

21. In the diagram below $AB = A\Gamma$, $B\Gamma = B\Delta$ and $\Delta E = A\Delta$ and $\widehat{E\Delta B} = 30^\circ$. Then $\widehat{B\Delta\Gamma}$ is equal to



- A. 24° B. 32° Γ. 40° Δ. 48° E. 60°

22. If x and y are positive integers and $\frac{x+y}{x} = \frac{2x}{y}$, the value of the ratio $\frac{x}{y}$ is equal to:

- A.1 B. 2 Γ. 3 Δ. $\frac{1}{2}$ E. $\frac{1}{3}$

23. If $x + y = t$ and $x - y = v$, then xy is equal to:

- A. tv B. $\frac{t-v}{2}$ Γ. $\frac{t+v}{2}$ Δ. $\frac{t^2-v^2}{2}$ E. $\frac{t^2-v^2}{4}$

24. The sum of digits of the outcome of $10^{20} - 2$ is equal to:

- A. 180 B. 3 Γ. 171 Δ. 170 E. 179

25. If $\left(\frac{2^2-1}{2^2}\right)\left(\frac{3^2-1}{3^2}\right)\left(\frac{4^2-1}{4^2}\right)\cdots\left(\frac{2011^2-1}{2011^2}\right) = \frac{x}{2 \cdot 2011}$ then the value of x is equal to:

- A.1 B. 1005 Γ.1006 Δ. 2011 E. 2012