

For all items, answer "E" means "none of the above answers is correct".

1. Evaluate: 2^{3^2}

- A. 32
D. 512
- B. 36
E. NOTA
- C. 64

2. Simplify completely: $|3 - 4i|$

- A. $|3 + 4i|$
D. $12i$
- B. $-3 + 4i$
E. NOTA
- C. 5

3. Evaluate: $\log_{\sqrt{3}} \sqrt[3]{9}$

- A. $\frac{2}{3}$
D. 27
- B. $\frac{4}{3}$
E. NOTA
- C. 3

4. If w is the sum of a non-zero complex number and its conjugate, then w is always

- A. positive
D. non-zero
- B. imaginary
E. NOTA
- C. real

5. John lives 30 miles away from Betty. Yesterday, John drove to Betty's house at 40 miles per hour. When he arrived, he realized that he had forgotten his wallet, so he immediately returned home at 50 miles per hour. What was his average speed for the entire trip?

- A. 30
D. 45
- B. 35
E. NOTA
- C. 40

6. Let the base-3 number 122121_3 be converted to N in base-9. What is the base-10 sum of the digits of N ?

- A. 9
D. 21
- B. 18
E. NOTA
- C. 19

7. What is the units digit of $7^{42} + 42^7$?

- A. 7
D. 0
- B. 8
E. NOTA
- C. 9

8. In how many zeros does $626!$ end?

- A. 0
D. 156
- B. 125
E. NOTA
- C. 155

9. What is the sum of the coefficients in the expanded form of $(2x + 3y - 3z)^{10}$?

- A. 1024
D. 181,234
- B. 1458
E. NOTA
- C. 66,612

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10. If $\sqrt{34 - 24\sqrt{2}}$ is written in the form $a + b\sqrt{c}$ where a, b and c are integers, find $a + b + c$

- A. 0
B. 1
C. 3
D. 4
E. NOTA

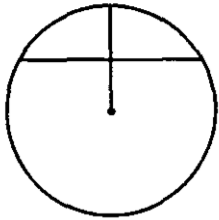
11. If $(9887)^2 = 97752769$ find the sum of the digits of $(9886)^2$

- A. 50
B. 51
C. 52
D. 53
E. NOTA

12. Write $\overline{3.192}$ as a reduced fraction, $\frac{a}{b}$. Find $a + b$

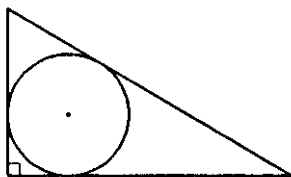
- A. 1396
B. 2892
C. 3192
D. 4188
E. NOTA

13. In a circle, a certain chord is the perpendicular bisector of a radius. If the length of the chord is $6\sqrt{3}$, what is the area of the circle.



- A. 36π
B. $36\sqrt{3}\pi$
C. 108π
D. 216π
E. NOTA

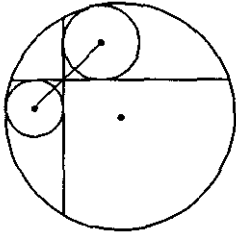
14. What is the perimeter of a right triangle with hypotenuse 65 which can be circumscribed about a circle with radius 12?



- A. 130
B. 144
C. $150\sqrt{3}$
D. 154
E. NOTA

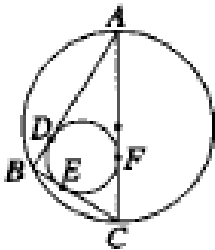
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15. Two perpendicular chords are drawn in a large circle, and two smaller circles are drawn, as shown, each tangent to the large circle and both chords. If the lengths of the radii of the two small circles are 3 and 4 respectively, what is the distance between their centers?



- A. 5
- B. $6\sqrt{3}$
- C. $7\sqrt{2}$
- D. 25
- E. NOTA

16. In $\triangle ABC$, $m\angle B = 90^\circ$. The circle circumscribed about the triangle has a radius of length 10. The circle inscribed in the triangle is tangent to \overline{AB} at D , to \overline{BC} at E , and to \overline{AC} at F . If the perimeter of the triangle is 42, what is $EB + BD$?



- A. 2
- B. $3\sqrt{2}$
- C. $2+3\pi$
- D. 8
- E. NOTA

17. $\sum_{i=0}^n C_i$ where $n > 0$

- A. 2^{n-1}
- B. 2^n
- C. 2^{n+1}
- D. n^2
- E. NOTA

18. Which values of x must be excluded from the domain of $g(x) = \frac{2}{2 - \frac{2}{2+x}}$

- A. -2
- B. 1
- C. -2, 1
- D. 2
- E. NOTA

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25. What is the center, C , and the radius, r , of the circle $(x-4)^2 + (y+3)^2 = 7$

- A. $C(-4,3), r=7$ B. $C(4,-3), r=7$ C. $C(-4,3), r=\sqrt{7}$
 D. $C(4,-3), r=\sqrt{7}$ E. NOTA

26. Solve for x : $\ln(\log_2(\log_3 x)) = 0$

- A. 0 B. 1 C. 2
 D. 9 E. NOTA

27. Find the sum of x and y for the following system:

$$\begin{cases} 2x+7y-3=0 \\ 2y-2x-6=0 \end{cases}$$

- A. -1 B. 0 C. 1
 D. 3 E. NOTA

28. Find $\frac{a}{c}$ if a is $\frac{2}{3}$ of b and b is $\frac{5}{7}$ of c .

- A. $\frac{10}{21}$ B. $\frac{14}{15}$ C. $\frac{7}{10}$
 D. $\frac{9}{8}$ E. NOTA

29. If $x^2 \cdot 8! = 9!$ then $x = ?$

- A. 9 B. 2 C. 3 or -3
 D. 10 E. NOTA

30. If the table below defines certain values of a function f , then what is $f(f(f(f(5))))$?

x	1	2	3	4	5
$f(x)$	4	1	4	0	2

- A. 0 B. 1 C. 2
 D. 4 E. NOTA