

Barbara Nunn Test

2006-2007

no calculator allowed

The abbreviation "NOTA" denotes
"None of These Answers."

$$i = \sqrt{-1}$$

1. Find the value of k such that when $x^3 - 7x^2 + kx + 4$ is divided by $x - 2$, the remainder is 8.

A. 6 B. 8
C. 12 D. 20 E. NOTA

2. The maximum value of the function $f(x) = -x^2 - 4x + 8$ is

A. 0 B. 4
C. 8 D. 12 E. NOTA

3. The slope of the line $3x + 2y = 7$ is

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

4. Find the value of $64^{\frac{2}{3}}$.

A. -16 B. $\frac{1}{16}$
C. 16 D. 512 E. NOTA

5. A number has representation 25 in base b . If the digits are reversed, the number is doubled. What is the base?

A. 1 B. 7
C. 8 D. 9 E. NOTA

6. The weight, W , that can be safely supported by a beam with rectangular cross section varies jointly as the width, x , and square of the depth, d , of the cross sections and inversely as the length L of the beam. Then a formula for W in terms of x , L and d is

A. $W = k \frac{x+d^2}{L}$

B. $W = k(x+d^2)L$

C. $W = \frac{kL}{xd^2}$

D. $W = \frac{kL}{x+d^2}$

E. NOTA

7. Find the value of y in the system:

$$\begin{cases} x = y + 2z \\ y - 1 = x + 3z \\ z = x + 4y \end{cases}$$

A. $-\frac{3}{5}$ B. $-\frac{1}{3}$

C. $\frac{1}{25}$ D. $\frac{1}{3}$ E. NOTA

8. Evaluate : $\frac{-2^4 \cdot \frac{3}{2} \cdot \frac{1}{2} \cdot -\frac{1}{2}}{3!}$

A. -1 B. $\frac{1}{2}$

C. 1 D. $\frac{5}{2}$ E. NOTA

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9. Find the solution for $\frac{2}{x-3} > \frac{1}{x-1}$.

- A. $(-\infty, -1) \cup (1, 3)$
- B. $(-1, 1) \cup (3, \infty)$
- C. $(-1, 1) \cup (1, 3) \cup (3, \infty)$
- D. $(-1, \infty)$
- E. NOTA

10. The equation $|5x + 2| = 3x$ has

- A. two negative solutions
- B. two positive solutions
- C. one positive solution
- D. no solutions
- E. NOTA

11. Find the equation of the perpendicular bisector of the line segment joining the points $(1, 2)$ and $(-2, 1)$.

- A. $3x + y = 0$
- B. $x + 3y - 7 = 0$
- C. $x - 3y + 5 = 0$
- D. $3x - y - 1 = 0$
- E. NOTA

12. If the repeating decimal $0.5\bar{3}$ were written as a simplified fraction $\frac{m}{n}$,

where m and n are relatively prime, find the value of $n^2 - m^2$.

- A. 161
- B. 247
- C. 5291
- D. 6992
- E. NOTA

13. Simplify: $(9 + 2i)(5 + i)(9 - 2i)$

- A. $425 + 85i$
- B. $43 + 19i$
- C. $43 - 19i$
- D. $405 + 4i$
- E. NOTA

14. The quadratic function

$f(x) = 3x^2 - 12x + 16$ is symmetric with respect to which of the following lines?

- A. $x = 2$
- B. $x = 12$
- C. $x = 16$
- D. $y = x$
- E. NOTA

15. If $f(x) = 3x^2 - 5x - 4$, then $f(-2x)$ is equal to:

- A. $6x^2 + 20x - 8$
- B. $-3x^2 + 5x + 4$
- C. $12x^2 - 20x - 16$
- D. $12x^2 + 10x - 4$
- E. NOTA

16. The length, width, and height of a right rectangular solid are in the ratio of 3:4:12. If the diagonal of the solid is 39 inches long, what is the length, in inches, of the longest dimension of the solid?

- A. 12
- B. 36
- C. 48
- D. 72
- E. NOTA

17. A circle with center $(4, -2)$ passes through $(7, 2)$. Which of the following is the equation of the line tangent to the circle at $(7, 2)$?

- A. $4x + 3y = 34$
- B. $2x + 3y = 20$
- C. $4x + 3y = 41$
- D. $3x + 4y = 29$
- E. NOTA

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18. The sum of the squares of two positive numbers is equal to 500. The difference of the squares of the same two numbers is -400 . Thus, the ratio of the larger number to the smaller number is

- A. 1:1 B. $5\sqrt{2}:1$
C. 3:1 D. $\sqrt{2}:10$ E. NOTA

19. How many grams of a 30% salt solution should be added to 200 g of a 12% salt solution to produce a 20% salt solution?

- A. 20 B. 40
C. 160 D. 200 E. NOTA

20. Solve for x where defined: $3 = \frac{2^x + 7}{3 - 2^x}$

- A. -1 B. $-\frac{1}{2}$
C. 0 D. $\frac{1}{2}$
E. NOTA

21. A wire x inches long is bent into the shape of a circle. Express the area of the circle in terms of x .

- A. $\frac{49}{4}\pi$ B. $\frac{x^2}{2\pi}$
C. $\frac{x^2}{4}$ D. $\frac{x^2}{4\pi}$ E. NOTA

22. On a spelling test, a student missed 3 out of the first 15 words; and thereafter, he missed 4 out of every 15 words. How many words were on the test if he spelled 75% correctly?

- A. 80 B. 70
C. 65 D. 60 E. NOTA

23. If e denotes the length of an edge of a cube, V its volume, and S its surface area, then $S=2V$ is true when $e =$

- A. 5 B. 4
C. 3 D. 2 E. NOTA

24. An equilateral triangle has altitude 6. A regular hexagon is made by cutting off a triangle from each vertex of the triangle. Find the area of the resulting hexagon.

- A. $\frac{25\sqrt{3}}{9}$ B. $\frac{25\sqrt{3}}{6}$
C. $8\sqrt{3}$ D. $18\sqrt{3}$ E. NOTA

25. An isosceles triangle has two 13-inch legs and a 10-inch base. A second isosceles triangle with 13-inch legs has the same area but a base of a different length. What is the length of that base in inches?

- A. 5 B. 12
C. 24 D. cannot be determined
E. NOTA

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26. The bases of an isosceles trapezoid have lengths $2m+n$ and $2m-n$ where $m > 2n$. One base angle is 45° . Find the area of the trapezoid in terms of m and n .

A. mn B. $2mn\sqrt{2}$
C. $2mn$ D. $4mn$ E. NOTA

27. In the magic square shown, the sum of the numbers in each row, column, and diagonal will be the same. What is the value of $x + y$?

	y	12
x		
10	15	8

A. 16 B. 17
C. 18 D. 20 E. NOTA

28. In a rectangle, the ratio of the width to the perimeter is 1:9. Find the ratio of the width to the length.

A. 1:9 B. 2:7
C. 5:7 D. 7:2 E. NOTA

29. Find the value of x that satisfies

$$\log_3 36 + 2 \log_3 x = \log_3 18 + \log_3 8.$$

A. 2 B. $2, -2$
C. 12 D. $2\sqrt{42}$ E. NOTA

30. In the diagram, a rectangle is divided by segments parallel to the sides of the rectangle as shown into four rectangles with areas 45, 25, 15, and x . Find the value of x .

25	45
15	x

A. 23 B. 27
C. 30 D. 32 E. NOTA