

NOTA means "None of These Answers."
Diagrams are not necessarily drawn to scale.

1. What is the sum of the two arithmetic means between -4 and 14 ?

A. 4 B. 5
C. 6 D. 10
E. NOTA

2. Which arithmetic sequence does NOT include the term 34 ?

A. 2, 6, 10, ...
B. 1, 4, 7, ...
C. 4, 6, 8, ...
D. 6, 10, 14, ...
E. NOTA

3. The sum of the first 8 terms of an arithmetic series is 440. If the common difference of the series is 6, give the 3rd term of the series.

A. 32 B. 34
C. 44 D. 46
E. NOTA

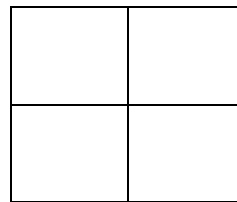
4. $\sum_{n=-4}^4 (n+1) =$

A. 0 B. 4
C. 8 D. 9
E. NOTA

5. The sequence 4, 10, 16, ... has 101 terms. What is the sum of these 101 terms?

A. 600 B. 604
C. 30704 D. 60800 E. NOTA

6. The grid shown to the right shows 5 squares. Which series shows the number of squares in a 4×4 grid?



A. $\sum_{n=1}^4 2n$ B. $\sum_{n=1}^4 n^2$
C. $\sum_{n=1}^4 (4n)^2$ D. $\sum_{n=1}^4 (n+1)$
E. NOTA

7. The harmonic mean of 5 and x is 8. Give the sum of the digits of x .

A. 2 B. 3
C. 5 D. 6
E. NOTA

8. $\sqrt{ab + \sqrt{ab + \sqrt{ab + \sqrt{\dots}}}} = 5$. Which must be true if a and b are real?

A. $a = \frac{30}{b} - 1$ B. $a = 25 - b$
C. $a = \frac{20}{b}$ D. $a = b(30 - b)$
E. NOTA

9. The first and third terms of an arithmetic sequence are the ratio of 5:4. What is the ratio of the 1st and 2nd terms?

A. 10:9 B. 5:2
C. 5:8 D. 5:9
E. NOTA

10. If $S = \frac{3}{2} + \frac{5}{4} + \frac{7}{8} + \dots + \frac{2n+1}{2^n} + \dots$ where $n = 1, 2, 3, \dots$, then find the value of S .

- A. 5 B. 6
C. 8 D. 16
E. NOTA

11. An infinite geometric sequence

$2, \frac{2}{x}, \frac{2}{x^2}, \dots$ has sum 8. What is the value of x ?

- A. $\frac{1}{4}$ B. $\frac{4}{3}$
C. 2 D. 4
E. NOTA

12. A sequence has ten terms with first term i , for $i = \sqrt{-1}$. Each subsequent term is $2i$ times its previous term. That is, the 2nd term is $i^2 2i$. The sum of this sequence is $a + bi$. What is the value of $|a + b|$?

- A. 512 B. 256
C. 240 D. 205
E. NOTA

13. A polynomial function

$f(x) = x^4 - 10x^2 + hx + k$ has 4 real zeros $-r, -s, r$, and s which can be arranged in an arithmetic sequence. Give the value of $h + k$.

- A. 12 B. 10
C. 9 D. 5
E. NOTA

14. The terms $-2, 1 + 2k, 4 + 4k, \dots$ form an arithmetic sequence. If the sum of the first 10 terms is $a + bk$ then give the value of $a - b$.

- A. 15 B. 25
C. 35 D. 55 E. NOTA

15. For $ab \neq 0$, the terms

$a, a + b\sqrt{3}, a + b\sqrt{6}$ form a geometric sequence. If the ratio $a : b$ is written as $-\frac{\sqrt{3}}{2}(\sqrt{m} + n)$ for m and n rational, then $m + n =$

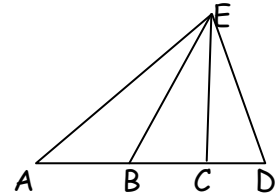
- A. 5 B. 4
C. 3 D. 2
E. NOTA

16. Points A, B, C and D

are collinear as shown. Lengths AB, AC and AD

form a geometric sequence, with common ratio $\frac{3}{2}$. Give the ratio of the area of

$\triangle CDE$ to the area of $\triangle ABE$.



- A. $\frac{9}{4}$ B. $\frac{3}{2}$
C. $\frac{3}{4}$ D. $\frac{1}{4}$
E. NOTA

17. The cost of a coat increased by 40% for two consecutive years and the 3 costs (including the original cost) form a geometric sequence. What is the common ratio of that sequence?

- A. 0.16 B. 0.4
C. 1.04 D. 1.4 E. NOTA

18. The two real geometric means between 4 and $64\sqrt{2}$ are a and b , respectively. Give the value of a .

- A. $8\sqrt{2}$ B. 16
C. $16\sqrt{2}$ D. 32
E. NOTA

19. The terms $\sqrt{x+1}$, $\sqrt{x+\frac{49}{4}}$, 6 form an arithmetic sequence, in the order given. Give the sum of the possible real values of x .

- A. 8 B. 7
C. 6 D. 3.5
E. NOTA

20. A recursive sequence is defined by

$$a_{(n+1)} = (a_n)^{\left(\frac{n-2}{n-1}\right)} \text{ for } n > 2. \text{ If}$$

$a_4 = 8$ then out of the set

$\{a_3, a_4, a_5, \dots, a_{10}\}$ give the sum of the **integer** members of the set.

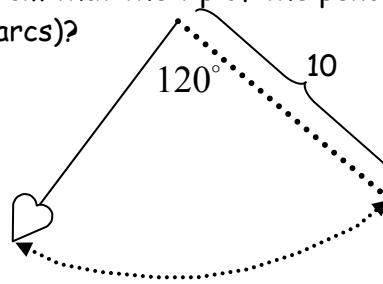
- A. 78 B. 72
C. 64 D. 16
E. NOTA

21. The 4th and 6th terms of a geometric sequence are in the ratio of 1:2. What is the ratio of the 5th and 6th terms?

- A. 1:4 B. $\sqrt{2} : 2$
C. 1:1 D. $\sqrt{2} : 1$
E. NOTA

22. A pendulum and string have total length 10 cm. The first swing is 120° , and each subsequent swing has $\frac{4}{5}$ of the previous

degree measure. What is the total distance in cm that the tip of the pendulum travels (arcs)?



- A. $\frac{500\pi}{3}$ B. $\frac{100\pi}{3}$
C. $\frac{25\pi}{3}$ D. $\frac{10\pi}{3}$ E. NOTA

$$23. \sum_{m=1}^3 \left(\sum_{n=1}^3 n \right) =$$

- A. 6 B. 12
C. 18 D. 54
E. NOTA

24. An equilateral triangle (T_1) has perimeter 9. A second triangle T_2 is formed with vertices on the midpoints of the sides of T_1 . T_3 has vertices on the midpoints of the sides of T_2 , and so on, with an infinite number of triangles formed. Give the sum of the perimeters of these triangles.

- A. 27 B. 13.5
C. 18 D. 9
E. NOTA

25. Find the sum of the first 20 terms of the series $1 + \frac{1}{5} + \frac{1}{50} + \frac{1}{500} + \dots$ to the nearest hundredth place.

- A. 1.56 B. 1.50
C. 1.32 D. 1.22
E. NOTA

26. The 4th term of an arithmetic series is 8 and the 12th term is 32. What is the 2nd term?

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

27. Which is the sum of the first 16 terms of the sequence 4, -8, 16, -32, ... ?

- A. $\frac{4-2^{18}}{3}$ B. $4(1-2^{16})$
C. $\frac{4(1+2^{16})}{3}$ D. $\frac{4-2^{15}}{3}$
E. NOTA

28. The sequence $\frac{1}{2}, \frac{1}{3}, \frac{5}{6}, \frac{7}{6}, \dots$

has Fibonacci aspirations. What is the sum of the 5th and 8th terms?

- A. $\frac{19}{6}$ B. $\frac{31}{6}$
C. $\frac{19}{3}$ D. $\frac{25}{3}$
E. NOTA

29. The solutions to the equations

$$25x^2 - 20x + 4 = 0,$$

$$\frac{3}{2}(2-y) = y,$$

and $\frac{36z^{-1} - 1}{18z^{-1} + 1} = \frac{3}{2}$ form a geometric

sequence $x, y,$ and z . The next term of the sequence is ___.

- A. $\frac{22}{5}$ B. $\frac{5}{36}$
C. $\frac{54}{5}$ D. $\frac{27}{125}$
E. NOTA

30. The terms $|1-3x|, |3x+9|, |4x-12|$, in that order, form an arithmetic sequence. Give the least possible value of x .

- A. $-\frac{5}{13}$ B. $-\frac{11}{5}$
C. $-\frac{29}{5}$ D. -31
E. NOTA