

**Fall Classic 2004
Individual Test**

- 1) Which of the following fractions is closest to $\frac{11}{38}$?
- a) $\frac{3}{11}$ b) $\frac{2}{9}$ c) $\frac{5}{17}$ d) $\frac{4}{13}$ e) NOTA
- 2) What is the product of 9,999 and 8,888?
- a) 88,871,112 b) 88,871,122 c) 88,871,132 d) 88,871,142 e) NOTA
- 3) How many even two-digit perfect squares exist?
- a) 0 b) 1 c) 2 d) 3 e) NOTA
- 4) What is the sum of the arithmetic sequence 1, 6, 11, 16,.....126?
- a) 1,651 b) 1,561 c) 2,841 d) 2,481 e) NOTA
- 5) What digit can replace K in the number 9K73K0 so that 9K73K0 is divisible by 60?
- a) 4 b) 6 c) 8 d) 0 e) NOTA
- 6) If $n = -1\frac{1}{2}$, which of the following is the smallest?
- a) n^{-1} b) n^{-3} c) $(-n)^n$ d) $n - \frac{1}{n}$ e) NOTA
- 7) What is $182^2 - 18^2$?
- a) 42,800 b) 34,800 c) 28,800 d) 24,800 e) NOTA
- 8) In terms of π , what is the volume of a right circular cylinder with a radius of 6cm and a height of 8cm?
- a) $288\pi cm^3$ b) $384\pi cm^3$ c) $486\pi cm^3$ d) $576\pi cm^3$ e) NOTA

9) $\sum_{n=1}^8 \frac{1}{n} =$

- a) $\frac{2383}{840}$ b) $\frac{2131}{840}$ c) $\frac{1631}{840}$ d) $\frac{1543}{840}$ e) NOTA

10) What is $3\frac{3}{4}\%$ of the greatest two-digit composite number?

- a) $\frac{333}{40}$ b) $\frac{891}{400}$ c) $\frac{297}{80}$ d) $\frac{1841}{160}$ e) NOTA

11) Given the following addition problem, with digits A, B, and C:
 $AB + AB = CC$, and $A \neq B \neq C$, how many distinct ordered triples (A, B, C) exist?

- a) 1 b) 2 c) 3 d) 4 e) NOTA

12) The sum of the lengths of the diagonals of a square is 24. Find the area of the square.

- a) 72 b) 48 c) 36 d) 18 e) NOTA

13) If the perimeter of a triangle is 30, then its area is less than or equal to k. If k is an integer what is the smallest value for k?

- a) 45 b) 44 c) 43 d) It Depends e) NOTA

14) How many distinct arrangements of the letters in HAWAII are there?

- a) 360 b) 270 c) 180 d) 6! e) NOTA

15) Simplify the following.

$$3 + \frac{2}{1 + \frac{3}{5 + \frac{1}{4+1}}}$$

- a) $\frac{175}{41}$ b) $4\frac{1}{5}$ c) $\frac{181}{35}$ d) $4\frac{11}{15}$ e) NOTA

16) A fair six-sided die is rolled 6 times. What is the probability that the result is odd every time but once?

- a) $\frac{1}{64}$ b) $\frac{1}{32}$ c) $\frac{3}{64}$ d) $\frac{3}{32}$ e) NOTA

17) What is the smallest four-digit whole number divisible by 9, that has exactly two odd digits?

- a) 1449 b) 2589 c) 1242 d) 1269 e) NOTA

18) The sum of 21 consecutive integers is 21. What is the product of the smallest and the largest?

- a) -100 b) -110 c) -99 d) -210 e) NOTA

19) What is the probability of randomly selecting two letters from HAWAII and having exactly one letter be an A and the other letter NOT be an I?

- a) $\frac{2}{5}$ b) $\frac{1}{5}$ c) $\frac{2}{15}$ d) $\frac{8}{15}$ e) NOTA

20) A regular hexagon and an equilateral triangle have equal perimeters. What is the ratio of the area of the hexagon to the area of the triangle?

- a) $\frac{17}{6}$ b) $\frac{19}{6}$ c) $\frac{19}{9}$ d) $\frac{16}{9}$ e) NOTA

21) Two triangles, a 30-60-90 degree and a 45-45-90 degree, both have a hypotenuse of 8 cm. The hypotenuses are attached and a quadrilateral is formed. In which of the following intervals is the length of the perimeter of this quadrilateral contained?

- a) 20-22cm b) 22-24cm c) 24-26cm d) 26-28cm e) NOTA

22) What is the value of $2c + d - 3e$, if $a, b, c, d,$ and e are all distinct integers and satisfy the system below?

$$3a + b + c + d + e = 14$$

$$a + 3b + c + d + e = 26$$

$$a + b + 3c + d + e = 24$$

$$a + b + c + 3d + e = 34$$

$$a + b + c + d + 3e = 42$$

- a) -44 b) -22 c) 2 d) 32 e) NOTA

23) Add the following:

1) The 2nd perfect number

2) The 20th Fibonacci number

3) The 5th triangular number

- a) 4147 b) 4170 c) 6701 d) 6808 e) NOTA

24) An automobile radiator contains 16 liters of antifreeze and water. This mixture is 30% antifreeze. How many liters of this mixture should be drained and replaced with pure antifreeze so there will be 50% antifreeze?

- a) 4 b) $3\frac{1}{4}$ c) $4\frac{5}{9}$ d) $3\frac{4}{5}$ e) NOTA

25) Hal gives Tom as many raffle tickets as Tom has and Gary as many as Gary has. In a like manner, Tom then gives Hal and Gary as many tickets as each then has. Similarly, Gary gives Hal and Tom as many tickets as each then has. If each finally has 40 tickets, with how many tickets does Tom begin?

- a) 40 b) 35 c) 30 d) 25 e) NOTA

26) Solve for x : $2^{\frac{2}{x}} - 3 \cdot 2^{\frac{1}{x}} - 4 = 0$

- a) ϕ b) 2 c) $\frac{1}{2}$ d) $\frac{1}{4}$ e) NOTA

27) Find the radius of a circle that is inscribed in a triangle that has sides lengths of 4, 5, and 7.

- a) $2\sqrt{5}$ b) $\frac{\sqrt{6}}{2}$ c) $\frac{\sqrt{3}}{2}$ d) $\frac{\sqrt{2}}{2}$ e) NOTA

28) If $f(3) = 9$ and $f(7) = 15$, and f is linear find $f(-3)$.

- a) -9 b) -5 c) -3 d) 0 e) NOTA

29) The region bounded by the lines $y = \frac{2}{3}x + 6$, $x = 0$, $y = 0$ is rotated about the y -axis. What is the volume of the figure that is formed?

- a) 486π b) 243π c) 162π d) 108π e) NOTA

30) A piece of paper in the shape of a semicircle with radius 8 is folded into a cone with no overlapping. What is the height of the cone?

- a) $4\sqrt{2}$ b) $4\sqrt{3}$ c) 4 d) 6 e) NOTA

31) This French born mathematician discovered the “bell shaped” normal distribution curve.

- a) Bernoulli b) DeMoivre c) Fermat d) Pascal e) NOTA

32) What is the sum of the digits of the two-digit solution to the following equation?

$$\frac{n!}{6!} = \frac{(n-1)!}{4!}$$

- a) 6 b) 3 c) 9 d) 4 e) NOTA

33) The line that passes through the point $(3, -3)$ with a slope $\frac{-8}{3}$ also passes through the point $(-6, k)$. Find the value of k .

- a) $\frac{3}{8}$ b) 3 c) 10 d) 21 e) NOTA

34) Using the digits from the set {1, 2, 3, 4, 5} without repetition, how many positive 3-digit multiples of 11 can be formed?

- a) 2 b) 4 c) 8 d) 12 e) NOTA

35) A semi-circle with a radius of 8 is rotated 90° about the diameter. What is the volume of the resulting figure?

- a) $\frac{512\pi}{3}$ b) $\frac{1024\pi}{3}$ c) $\frac{128\pi}{3}$ d) $\frac{256\pi}{3}$ e) NOTA

36) On a 26-question test, 6 points are deducted for each wrong answer, and x points are credited for each correct answer, with x being an integer less than 20 but greater than 6. If all questions are answered, how many are correct if the score is zero?

- a) 6 b) 9 c) 12 d) 15 e) NOTA

37) What is the least common multiple of 1, 2, 3, 4, 5, 6, 7, and 8?

- a) 1680 b) 840 c) 420 d) 240 e) NOTA

38) What is the greatest integer value of x such that $3^x < 1000$?

- a) 5 b) 7 c) 4 d) 8 e) NOTA

39) What is the 5th term of this geometric sequence, 180, 150, 125,?

- a) $\frac{15625}{1296}$ b) $\frac{15625}{7776}$ c) $\frac{3125}{1296}$ d) $\frac{3125}{7776}$ e) NOTA

40) Solve for x : $3^{2x} + 19 = 10^x$.

- a) 23 b) 25 c) 27 d) 29 e) NOTA

41) For how many integers x does a triangle with side lengths 10, 24, and x have all its angles acute?

- a) 4 b) 5 c) 6 d) 7 e) NOTA

42) How many integers x satisfy the equation

$$(x^2 - x - 1)^{(x+2)} = 1$$

- a) 2 b) 3 c) 4 d) 5 e) NOTA

43) If $(\log_3 x)(\log_x 2x)(\log_{2x} y) = \log_x x^2$, then y equals:

- a) 9 b) 18 c) 27 d) 81 e) NOTA

44) In the expansion of $(a + b)^n$ there are $n + 1$ dissimilar terms. The number of dissimilar terms in the expansion of $(a + b + c)^{10}$ is?

- a) 11 b) 33 c) 55 d) 66 e) NOTA

45) Two perpendicular chords intersect in a circle. The segments of one chord are 3 and 4, and the segments of the other are 6 and 2. Then the diameter of the circle is?

- a) $\sqrt{89}$ b) $\sqrt{56}$ c) $\sqrt{61}$ d) $\sqrt{65}$ e) NOTA

46) A man born in the first half of the nineteenth century was x years old in the year x^2 . In what year was he born?

- a) 1849 b) 1825 c) 1812 d) 1836 e) NOTA

47) Which of the following when divided by 10 leaves a remainder of 9, when divided by 9 leaves a remainder of 8, by 8 leaves a remainder of 7, etc., down to where, when divided by 2 leaves a remainder of 1?

- a) 419 b) 1259 c) 2519 d) 4219 e) NOTA

48) A check is written for x dollars and y cents, x and y are both two-digit numbers. In error it is cashed for y dollars and x cents, the incorrect amount exceeding the correct amount by \$17.82. Then:

- a) x cannot exceed 70
b) the amount of the check cannot be a multiple of 5 cents
c) y can equal $2x$
d) the incorrect amount can equal twice the correct amount
e) NOTA

49) Two high school classes took the same test. One class of 20 students made an average grade of 80%; and the other class of 30 students made an average of 70%. The average for all the students in both classes is?

- a) 75% b) 74% c) 72% d) 76% e) NOTA

50) What is the largest 2-digit prime factor of the integer $n = \binom{200}{100}$?

- a) 13 b) 23 c) 59 d) 61 e) NOTA

Answers Fall Classic 2004

1c 46e 1806

2a 47c

3d 48c

4a 49b

5a 50d

6d

7e 32,800

8a

9e $761/280$

10c

11e 0

12a

13b

14c

15a

16d

17e 1089

18c

19e $4/15$

20e $3/2$

21b

22b

23d

24e $4\text{and}4/7$

25b

26c

27b

28d

29c

30b

31b

32b

33d

34c

35a

36c

37b

38e6

39e $3125/36$

40e2

41a

42c

43a

44d

45d