

2006 Bellevue BATH Competition

Individual Test

Scoring: Correct = +1, Blank = -1, Incorrect = -3

Rules: You have 30 minutes for this test. Follow *any* directions given to you later on in the test. Only answers on your official answer sheet will be graded. Choice E is always NOTA - None of the Above. The scoring system is described above.

1. 20 minutes into the test, stand up and spin in a circle 3 times or risk disqualification.

A) Okay. B) No way. C) I'm going to forget. D) What?

2. Evaluate $4x^4 + 20x^3 + 100x^2 + 500x + \dots$ for $x = -10$.

A) 25000 B) $\frac{40000}{3}$ C) $\frac{80000}{3}$ D) 30000

3. $ABCD$ is a square. Find the area of right triangle XYZ .

A) 12 B) 15 C) 18 D) 20

4. Person A picks up paper at the rate of 2 pieces per minute. If there are 657,431,556 pieces of paper in the school, and he takes a 10 minute break every hour, a 1 hour eating break every 6 hours, a 8 hour sleeping break after 16 hours, a 2 day weekend break every 5 days, and a 3 month summer break every 9 months. Person B is evil and is littering with pieces of paper at a rate of 5 pieces every 3 minutes. Note that exclamation points will never represent the factorial sign in any problems on this test. Person B also takes a 10 minute break every hour, a 1 hour eating break every 6 hours, a 8 hour sleeping break after 16 hours, a 2 day weekend break every 5 days, and a 3 month summer break every 9 months. Any overlaps in breaks are counted only once. After 32,871,576 hours of brute picking, how many pieces of paper are left on the ground?

A) 4 B) 9 C) 25 D) 36

5. What is the probability of rolling a sum of 41323 with 6887 standard six-sided dice?

A) $\frac{1}{6^{6887}}$ B) $\frac{6887}{6^{6887}}$ C) $\frac{6887^2}{6^{6887}}$ D) $\frac{6887^3}{6^{6887}}$

6. Find the maximum distance between the curve πe^{-x^2} and the x-axis.

A) 1 B) e C) π D) $e \cdot \pi$

7. The number of questions on the AMC added to the number of questions on the AIME is:

A) 40 B) 45 C) 50 D) 60

8. Two people are running around a track. One runs at 10 meters per second and the other at 9 meters per second. They are running in the same direction. If it takes a minute for one person to lap the other, how long is the track (in meters)?

A) 1 B) 10 C) 60 D) ∞

9. Find the number of zeros at the end of 2006!

A) 299 B) 300 C) 301 D) 2002

10. Determine the minimum value of $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$ for $a, b, c < 0$.

A) 3 B) -3 C) 0 D) $-\infty$

11. Circle the same answer as question 11₉.

12. a and b are two positive integers. Find the maximum value of the GCD of a and b if $ax + by = 10$ for some integers x, y .

A) 1 B) 10 C) 100 D) ∞

13. O is the center of a circle. If O is the origin, what is the sum of the squares of the coordinates of O ?

A) 0 B) 1 C) 4 D) 9

14. Find the minimum radius of the circle above given that $(29, 420)$ is on the circle.

A) 421 B) 422 C) 423 D) 424

15. The Bellevue High School Math Club meets on:

A) Monday. B) Wednesday. C) Friday. D) Everyday.

16. Three people are each wearing one hat. One is red, one is green, one is blue. How many colors of hats are there?

A) 1 B) 2 C) 3 D) 4

17. Running down the hall, a wall hit Edward in the face. How fast was Edward running, in meters per second, given that it took 3 seconds for impact and they were initially 12 meters apart (Edward runs at a constant speed)?

A) 1 B) 2 C) 3 D) 4

18. You have a pile of 10 stones. If you make 3 bowls of stone soup, each of which requires 3 stones, how many stones will you have left in your pile?

A) 0 B) 1 C) Too many. D) ∞

19. Solve this system of equations for us (we're too lazy):

me+you = us
me+them = us
you+them = you
use = theme

A) Not enough information. B) -1 C) 0 D) 1

20. Which is bigger: (1) 2006 or (2) 2006!?

A) (1) B) (2) C) They're equal. D) (3)

21. The product of the smallest and largest positive divisors of n is m . Find $\frac{m}{n}$.

A) Not enough information. B) Undefined. C) ∞ D) 1

22. Rip up a piece of scratch paper. The answer should be clear.

34. What has been the lowest AIME qualification score for the AMC12 since 2000?
- A) 78 B) 84 C) 90 D) 96
35. Find the number of permutations of the acronym of the high school math competition in which only 6 students from each country participate in.
- A) 6 B) 24 C) 120 D) 720
36. ABC is a scalene triangle. Let D, E, F be the feet of the altitudes from A, B, C , respectively. Let G, H, I be the angle bisectors from A, B, C , respectively. Let J, K, L be the midpoints of BC, CA, AB , respectively. Find the number of different lines that exist between any of the 12 points.
- A) 36 B) 45 C) 55 D) 66
37. Find the sum of the coefficients of $(100^3 - (356x + 643y)^2 - (11y - z)^3 - (20x - 10w)^3)^{200}$.
- A) 0 B) 1 C) 200^{200} D) 2006
38. There are A TON of what answer on this test?
39. Qiaochu was walking up the street. A spherical bomb of radius 3 exploded, causing Qiaochu to blow up. Ow! What is the volume of the bomb?
- A) 3π B) 16π C) 36π D) 45π
40. The painfulness of a problem is directly proportional to the largest square divisor of the problem number and inversely proportional to the largest odd divisor of the problem number. How painful is this problem?
- A) More painful than 36. B) Less painful than 36. C) As painful as 36. D) SO PAINFUL.
41. Evaluate $(x - a)(x - b) \cdots (x - y)(x - z)$.
- A) 0 B) Not enough information. C) 1 D) x^{26}
42. is the answer to
- A) this question. B) the previous question. C) every question. D) life, the universe, and everything.
43. How many months have 28 days?
- A) 1 B) Usually 1 C) 0 D) Usually 0
44. There is an ant on a vertex of a cube. Given that the ant moves one edge every second, find the probability that it will end up on a vertex adjacent to its original after 10 minutes.
- A) $\frac{1}{81}$ B) $\frac{1}{27}$ C) $\frac{2}{9}$ D) $\frac{3}{8}$
45. A set is uber if and only if it has at least 3 elements and any two elements are relatively prime. Find the number of uber subsets of $\{1, 2, 3, 4, 5, 6\}$.
- A) 0 B) 3 C) 10 D) 64

46. Edward is playing DDR. The song he is playing has 104 steps. Edward can only get combos of length 96 and 3. Given that he has to miss at least one step between each combo, how many ways can Edward play the song?

A) He can't. B) 1 C) 2 D) ∞

47. Which of the following are true?

I. i am real.

II. i is real.

III. i am imaginary.

IV. i is imaginary.

V. i am imagining (hint: true)

A) I, IV, and V only. B) III and V only. C) I and V only. D) V only.

48. Let a_1, a_2, \dots, a_k be positive rational numbers and n an integer such that $a_1 + a_2 + \dots + a_k = a_1 \cdot a_2 \cdot \dots \cdot a_k = n$. Which is a possible value of n ?

A) 2 B) 3 C) 5 D) 7

49. How many stickers are on a Rubik's Cube?

A) 54 B) 60 C) 66 D) 72

50.

You might know me, I might know you.

Now look at problem number two.

And number fourteen and seven,

Numbers twenty and eleven.

He who wrote them all,

You might see him in the hall.

Black hair on his head,

Many teams he has led.

At ARML he will compete this year,

And never has he received a jeer.

At Geometry he won 1st place,

More hard competition he will face.

USAMO qualifier twice,

To all people he is nice.

Many competitions he has won,

All the AIMEs he has done.

An officer of the math club,

Helping run the Bellevue BATH TUB!

1st place team he was in, at Blaine,

1st place individual also was his name.

Calculus, calculus, he took Calc BC,

Who might this person be?

A) Justin. B) Edward. C) Jeffrey. D) Willy.