Mu Alpha Theta National Convention: Denver, 2001
History of Mathematics Topic Test – Open Division

1. What ancient Chinese counting device is still frequently used today in place of a calculator?

    (A) stylus   (B) Tower of Hanoi
    (C) abacus   (D) compass   (E) NOTA

2. Archimedes requested that his tombstone commemorate his being the first to determine the formula for what?

    (A) area of a circle   (B) volume of a cone
    (C) sum of an arithmetic series   (D) volume of a sphere   (E) NOTA

3. What modern mathematician finally proved Fermat's Last Theorem?

    (A) Paul Erdös   (B) Andrew Wiles
    (C) Noam Elkies   (D) Richard Feynman   (E) NOTA

4. The letter *e* used as the base of natural logarithms is in honor of which mathematician?

    (A) Einstein   (B) Euclid   (C) Euler   (D) Erdös   (E) NOTA

5. The Pythagoreans of ancient Greece had a special obsession with what type of numbers?

    (A) imaginary   (B) transcendental
    (C) negative   (D) positive integers   (E) NOTA

6. This mathematician and philosopher has lent his name both to the coordinate plane and a polynomial factoring tool.

    (A) Euler   (B) Gauss   (C) Descartes   (D) Archimedes   (E) NOTA

7. This mathematician's triangle is often used in probability and combinatorics.

    (A) Babbage   (B) Ptolemy   (C) Napier   (D) Pascal   (E) NOTA

8. According to legend, what geometric figures were Archimedes drawing on the beach when he was slain?

    (A) triangles   (B) circles   (C) squares   (D) cubes   (E) NOTA

9. Which of the following quantities was unknown to the Greeks?

    (A) $\dfrac{1}{2}$ (B) -1   (C) 2   (D) 2.2   (E) NOTA

10. Which society introduced the concept of zero to the western world?

    (A) Hindu-Arabic (B) Greek   (C) Babylonian   (D) Roman   (E) NOTA

11. While studying the motion of planets, Kepler continued the Greeks obsession with the regular polyhedra. Inspired by the signs of the zodiac, which of the regular polyhedra did Kepler suggest represented the universe?

    (A) cube   (B) icosahedron   (C) tetrahedron   (D) dodecahedron (E) NOTA

12. Kulik, a professor at the University of Prague in the nineteenth century produced a table of all these numbers which are less than 100,000,000.

    (A) perfect squares   (B) perfect numbers
    (C) prime numbers   (D) triangular numbers   (E) NOTA

13. In which war did noted British mathematician Alan Turing help Great Britain by leading a group of codebreakers?

    (A) World War I   (B) The War of 1812
    (C) World War II   (D) The Napoleonic War   (E) NOTA

14. How did father of modern algebra, Evariste Galois, die?

    (A) died in a battle for the French Revolution
    (B) shot in a duel
    (C) suicide
    (D) mountain climbing accident
    (E) NOTA

15. Carl Friedrich Gauss received a letter from Wolfgang Bolyai about his (Bolyai's) son's work on hyperbolic geometry. How did Gauss react?

    (A) Gauss stole the idea and achieved fame passing it off as his own.
    (B) Gauss said he had already developed that math, but had not revealed it because it was too revolutionary.
    (C) Gauss said that Bolyai was wrong.
    (D) Gauss introduced Bolyai and his argument to the mathematical world , thus ending the search for a proof of the parallel postulate.
    (E) NOTA

16. Whose Incompleteness Theorem dashed Bertrand Russell's hopes of being able to develop all of number theory from a fixed set of axioms?

    (A) Hardy's   (B) Ramanujan's   (C) Gödel's   (D) Euler's   (E) NOTA

17. Which of the following compass and straightedge constructions has not been shown to be impossible?

    (A) trisecting an angle
    (B) given a square, construct a circle with area equal to that of the square
    (C) trisecting a segment
    (D) given an edge of a cube which has volume 1, construct an edge of a cube of volume 2
    (E) NOTA

18. What column launched a bit of a feud among some mathematicians by discussing the famous Monty Hall problem?

    (A) *Parade'*s Ask Marilyn   (B) Dear Abby
    (C) Dear Heloise   (D) *Newsweek*'s Last Word   (E) NOTA

19. This branch of mathematics was not well-known until the twentieth century, when applications to advanced physics concepts forced mathematicians and physicists to become more familiar with it.

    (A) calculus   (B) linear algebra
    (C) number theory   (D) Euclidean geometry   (E) NOTA

20. The British mathematician G.H. Hardy had a very close relationship with the Indian prodigy Ramanujan. When Hardy went to visit Ramanujan in the hospital, he told Ramanujan what cab number he had been in. Ramanujan immediately noted that the number was the smallest positive number expressible as the sum of two positive perfect cubes in two different ways. What was the number?

    (A) 1440   (B) 1729   (C) 9632   (D) 4523   (E) NOTA

21. In the 1970s, with the aid of a computer, it was finally demonstrated that any map on a plane can be colored such that no two bordering countries have the same color using no more than how many colors?

    (A) 4   (B) 5   (C) 6   (D) 7   (E) NOTA

22. Which of the axioms of Euclid's *Elements* is refuted in the non-Euclidean hyperbolic and spherical geometries?

    (A) Given a line, l, and a point not on the line, there is exactly one line through the point parallel to l.
    (B) All right angles are congruent.
    (C) A straight line segment can be drawn joining any two points.
    (D) Any straight line segment can be extended continuously in a straight line.
    (E) NOTA

23. What is the closest equivalent in mathematics to the Nobel Prize?

    (A) The Gauss Prize   (B) The Jenkins Award
    (C) The Fields Medal   (D) The Fullbright Fellowship   (E) NOTA

24. Mathematicians who have contributed to this topic of mathematics include Cauchy, Schwartz, Chebyshev, and Jensen.

    (A) Inequalities   (B) Spherical geometry
    (C) Differential geometry   (D) Vector calculus   (E) NOTA

25. Despite Newton's best efforts to deny him credit, who is the other man generally acknowledged to have fathered calculus?

    (A) Leibniz   (B) Gauss   (C) Fermat   (D) Descartes   (E) NOTA

26. Which of the following mathematical principles remains unproved?

    (A) There does not exist a perfect cube which is the sum of two other positive perfect cubes.
    (B) There are infinitely many prime numbers.
    (C) The square root of two cannot be expressed as the ratio of two integers.
    (D) Every even number greater than 4 can be expressed as the sum of two prime numbers.
    (E) NOTA

27. In 1994 mathematician John Nash won a Nobel Prize in what discipline?

    (A) physics   (B) mathematics   (C) peace   (D) economics   (E) NOTA

28. Despite suffering from this malady during the last decade of his life, Euler still regularly produced innovative mathematics.

    (A) deafness   (B) missing his right hand
    (C) schizophrenia   (D) blindness   (E) NOTA

29. Euler solved the famous bridge problem of this Prussian city.

   (A) Berlin   (B) Grozny   (C) Königsberg   (D) Frankfurt   (E) NOTA

30. Take a line segment and cut out the middle third. Cut out the middle third of each of the
   remaining two segments. Cut out the middle third of each of the subsequent four segments.
   Continue this process indefinitely. The set of points thus formed is named after what
   mathematician?

   (A) Cantor   (B) Bell   (C) Bernoulli   (D) Descartes   (E) NOTA

31. Gauss was so proud of his construction of this regular polygon that he allegedly asked that
   his tombstone commemorate his achievement.

   (A) pentagon   (B) nonagon   (C) 17-gon   (D) 23-gon   (E) NOTA

32. Paul Wolfskehl credits this problem with saving his life. Consequently, he established an
   endowment to pay an award to whomever finally solved the problem.

   (A) Goldbach Conjecture   (B) The four-color problem
   (C) Riemann Conjecture   (D) Fermat's Last Theorem   (E) NOTA

33. It was not used by scholars in Europe until at least the tenth century AD. Among the earliest
   known uses of it on gravestones and coins were in 1371AD and 1424 AD, respectively.
   What is it?

   (A) Arabic numerals   (B) A symbol for zero
   (C) Fractional notation   (D) The decimal point   (E) NOTA

34. What mathematician first gained international fame for calculating the orbit of Ceres, thus
   allowing astronomers to find this lost asteroid?

   (A) Kepler   (B) Copernicus   (C) Euler   (D) Gauss   (E) NOTA

35. List all the odd integers from 2 to 999. Cross out all the multiples of 3 greater than 3, then
   those of 5 greater than 5, then those of 7, 11, 13, 17, 19, 23, 29, 31 (except for these numbers
   themselves). The numbers left are all the prime numbers less than 1000. This method is
   called the sieve of what mathematician?

   (A) Euclid   (B) Eratosthenes   (C) Fermat   (D) Aristotle   (E) NOTA

36. What mathematician, famed for posing little conjectures without providing proof, suggested that if n is a prime number, then every number of the form $a^n - a$ is divisible by n?

    (A) Euler   (B) Fermat   (C) Erdös   (D) Gauss   (E) NOTA

37. What modern mathematician invented "The Game of Life"?

    (A) Conway   (B) Erdös   (C) Elkies   (D) Wiles   (E) NOTA

38. Which mathematician is considered to be the father of game theory for proving the minimax theory for a wide class of games?

    (A) Conway   (B) Nash   (C) Hilbert   (D) von Neumann (E) NOTA

39. French philosopher Denis Diderot was spreading an idea in Russia thought by Catherine the Great to be very dangerous. Catherine called upon Euler for defense. At a great debate Euler challenged Diderot: "Sir, $(a+b^n)/n = x$, hence

    (A) there are infinitely many primes"
    (B) there are imaginary numbers"
    (C) God exists"
    (D) democracy will fail"
    (E) NOTA

40. Vestiges of the Babylonian number system still exist today. Their number system was not base 10; they used a base with far more factors. What was it?

    (A) 60   (B) 12   (C) 36   (D) 24   (E) NOTA