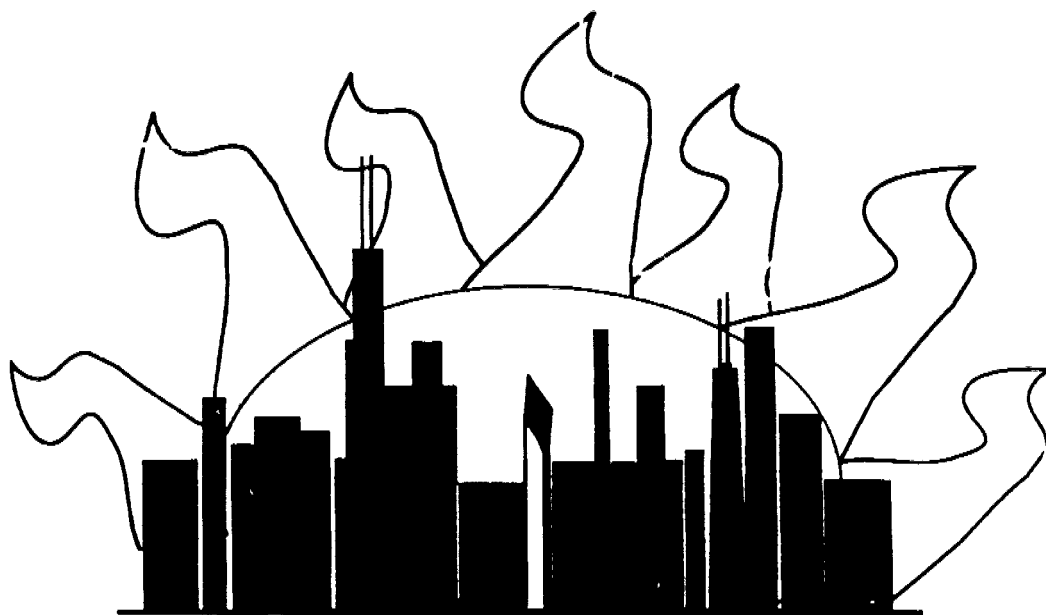


Alpha Division

Topic Test 3

History of Mathematics



**Mu Alpha Theta National Convention
Chicago 1998**

General Instructions:

Select the number of the answer that best fits the question and bubble in that number on the answer sheet. "NOTA" stands for "none of the above".

Questions

1. American poet and scholar Henry Wadsworth Longfellow resigned his position as a professor of modern languages at Harvard University to find time to write and his writings included some words about mathematics, a subject for which he had a deep appreciation. Solve this problem posed by Longfellow in one of his verses:

One-third of a collection of beautiful water lilies is offered to Mahadev, one-fifth to Huri, one-sixth to the Sun, one-fourth To Devi, and six which remain are present to the spiritual teacher.

Find the number of water lilies.

- 1) 114 2) 246 3) 120 4) 27 5) NOTA

2. The most important discovery ascribed to the Pythagoreans was the discovery of the irrational by means of incommensurable line segments. This discovery may have resulted because of their interest in _____.

- 1) the golden ratio 2) the geometric mean 3) triangular numbers
4) regular polygons 5) NOTA

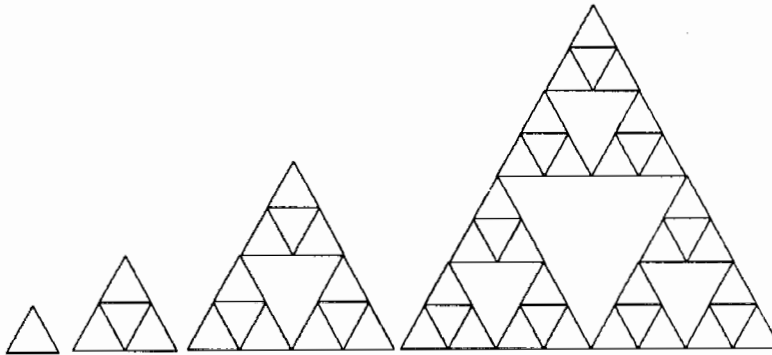
3. The "guards" of Plato's republic had to study the "QUADRIVIUM" in order to understand the laws of the universe. A "QUADRIVIUM" consisted of

- I. arithmetic and geometry
II. astronomy and music
III. philosophy and personal ethics

- 1) I and II 2) I and III 3) II and III
4) All of the above 5) NOTA

4. His writing *SPAERICA* contained a geometry of the sphere with a discussion of the spherical triangles, a subject which is missing in Euclid's writings. Who was this mathematician?
- 1) Ptolemy
2) Menelaus
3) Heron
4) Diophantos
5) NOTA
5. This woman taught herself calculus, but she is probably better known for her innovative realization that students can learn mathematics and science through hand-on activities, as contrasted to rote memorization. She made educators think about how children learn mathematics. Who was this mathematics educator?
- 1) Maggie Lena Walker
2) Ada Byron Lovelace
3) Mary Fairfax Somerville
4) Mary Everest Boole
5) NOTA
6. Euclid's textbook *The Elements* contained 13 chapters not devoted entirely to geometry but also discussed the topics of
- I algebra
I. number theory
II. trigonometry
- 1) I only
2) I and II
3) II and III
4) All of the above
5) NOTA
7. Using transformations, translations, rotations, and reflections on grids of equilateral triangles and certain regular polygons. This artist created tessellations or tilings.
- 1) M. C. Escher
2) P. Picasso
3) A. Warhoff
4) W. Homer
5) NOTA

8. In 1916, Waclaw Sierpinski, introduced the triangle which is composed of the set of points in the plane that will result if you repeat the process of connecting the midpoints of the triangle's sides then removing the middle triangle again and again with the smaller triangle. Consider only one face of the Sierpinski triangle that was built the first night of the convention. If the length of one side of the triangle solid is 2 cm long. What is the lateral area of one face of Sierpinski's triangle at stage 4?



1) $3\sqrt{3}$

2) $27\sqrt{3}$

3) $81\sqrt{3}$

4) $256\sqrt{3}$

5) NOTA

9. On Christmas Eve of 1888, this woman was presented the famous Prix Bordin of the French Academy of Science in recognition of her winning memoir on *the Problem of the Rotation of a Solid Body about a Fixed Point*. Who was this woman?

1) Mary Somerville

2) Anna Carlotta

3) Sophi Germain

4) Emmy (Amalie) Noether

5) NOTA

10. Decartes applied the branch of mathematics known as analytic geometry to the real space of two dimensions. Which of the following mathematicians was the first to apply it to the real space of three-dimensions?

1) Fermat

2) Hilbert

3) Gauss

4) Pascal

5) NOTA

11. Moebius, the discover of the *moebius strip*, the first example of a non-orientable surface, is one of the founders of the branch of mathematics known as _____.

- 1) projective geometry 2) fractals 3) topology
4) transformational geometry 5) NOTA

12. The Law of Quadratic Reciprocity states

$$X^2 = q \pmod{p} \text{ and } X^2 = p \pmod{q} \text{ where both } p \text{ and } q \text{ are primes.}$$

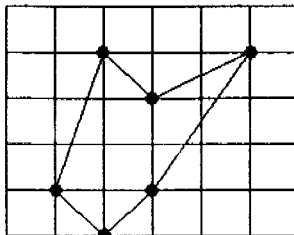
Both congruences are solvable or unsolvable, unless both p and q leave the remainder of 3 when divided by 4. In such a case one of the congruences is solvable and the other is not. This baffled many mathematicians but was finally proved by _____.

- 1) Euler 2) Legendre 3) Gauss
4) W.W.Ball 5) NOTA

13. Which President of the United States developed a proof for the Pythagorean Theorem while he was a member of the House of Representatives?

- 1) James A. Garfield 2) William McKinley 3) Abraham Lincoln
4) John Adams 5) NOTA

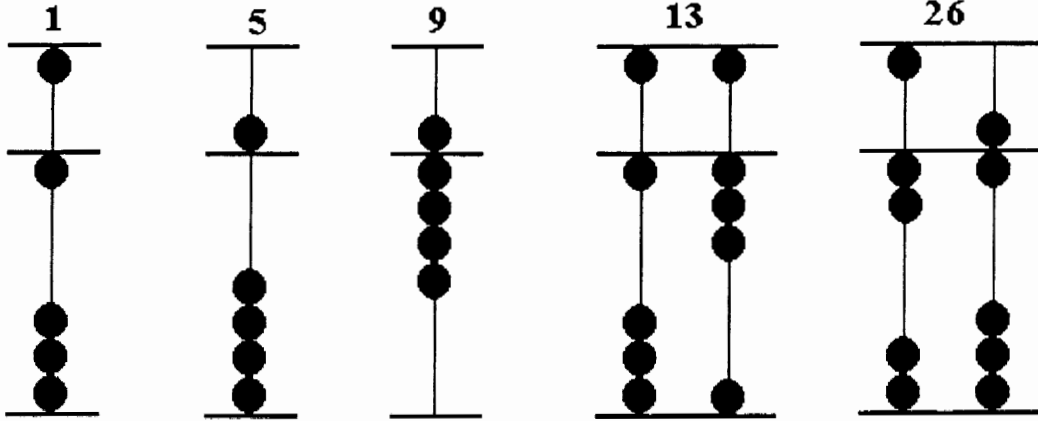
14. In 1899 G. Pick discovered a simple method of finding the area of a polygon whose vertices lie on the points of a plane square grid. If N is the number of points of the lattice inside the polygon, and B is the number of lattice points on the boundary, including the vertices, then the area equals $N + (1/2) * B - 1$. Find the area of the polygon below.



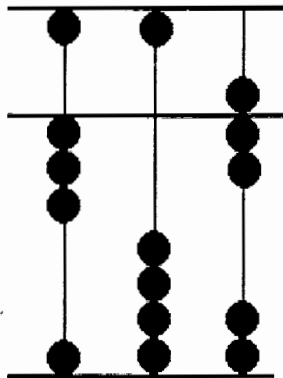
- 1) 4 2) 6 3) 7 4) 9 5) NOTA

15. After studying engineering and physics George Udny Yale decided to go into the field of statistics. He developed the approach to correlation via regression using
- 1) Least Square Method 2) Estimation 3) Median-Median
4) Sum of the residuals 5) NOTA
16. In geometry who is credited with the few simple propositions listed below that relate to plane figures?
- I. Any circle is bisected by its diameter.
II. The angles at the base of an isosceles triangle are equal.
III. When two lines intersect, the vertical angles are equal.
- 1) Thales 2) Nicolo Tartaglia 3) The Pythagoreans
4) Euclid 5) NOTA
17. The first person to suggest using i for the $\sqrt{-1}$ was _____.
- 1) Girolamo Cardano 2) Descartes 3) Euler
4) Gauss 5) NOTA
18. The history of Greek mathematics is written in the commentaries of many famous authors. Which author wrote the commentaries on Euclid's Book I?
- 1) Eutocius 2) Hypatia 3) Proclus
4) Theon of Alexandria 5) NOTA
19. Which coordinate system is used to define a rucket line?
- 1) bi-polar 2) polar 3) Cartesian
4) spherical 5) NOTA

20. In the Japanese abacus, the upper part of the rods contain one bead, and the lower part contains four beads. The 5 figures below indicate where to place the beads to represent various numbers.



What number is represented by the figure below?



- 1) 354 2) 307 3) 357 4) 304 5) NOTA