

HONORS GEOMETRY



UNIT PROJECT 3
2017 - 2018

PROJECT - UNIT #3

Pi Explorations- Buffon's Experiment

Sometimes mathematics appears in the most unlikely of places. For example, a French aristocrat,

Louis LeClerc, the Comte de Buffon, conjectured that the value of n could be found by dropping needles onto a piece of paper covered with a series of parallel lines. He claimed the ratio of the number of needles tossed to the number of needles resting on the lines could be predicted using the number n .

You will replicate Buffon's experiment to experimentally verify his conjecture, which was eventually proven by a member of the French Academy some years later.

1. Fill a standard piece of 8 1/2" by 11" unlined paper with parallel lines 1" apart.
2. Cut the tops of five flat toothpicks to 1" lengths.
3. Hold the five sticks over the paper and drop them. Keep track of how many sticks come to rest on one of the parallel lines.
4. Do Step 3 twenty times, which is equivalent to dropping one shortened toothpick 100 times.
5. Evaluate the following expression:
$$\frac{\text{number of tosses}}{\text{number of hits}} \cdot 2$$

Buffon conjectured this number would be equal to n . How close did you come?

Using poster board or in a PowerPoint, make a chart showing the results of each drop and the resulting value of the expression. Demonstrate the experiment to the class.

HONORS GEOMETRY ESSAY PROJECT

For this project you will be doing some research about a mathematician chosen from the list below. In order to share your findings with the entire class, you will produce a full-sized poster board or a PowerPoint which highlights the mathematician's life and accomplishments. The poster or PowerPoint shall contain the mathematician's name with dates of birth and death prominently displayed. Include a portrait or photocopy of what the mathematician looked like. Items to be included are achievements in mathematics with a brief explanation of what the mathematician accomplished, such as the Pythagorean Theorem, complete with a diagram and/or formula. Accomplishments outside the field of mathematics such as Einstein's winning the Nobel Prize, should also be used. List at least two references you used for your research, visible on the poster board or-PowerPoint.

Be sure your poster or PowerPoint is easily read and eye-appealing.

The following is a list of mathematicians for the mathematics history project.

1. THALES
2. PYTHAGORAS
3. JOHN NAPIER
4. JOHANN KEPLER
5. LEONHARD EULER
6. ALBERT EINSTEIN
7. RENE DESCARTES
8. BLAISE PASCAL
9. ERATOSTHENES
10. GALILEO GALILEI
11. EMILIE DU CHATELET
12. APPOLONIUS OF PERGA
13. CHARLES BABBAGE
14. GRACE MURRAY HOPPER
15. EUCLID
16. BHASKARA
17. HYPATIA
18. SOPHIE GERMAIN
19. ADA LOVELACE
20. JANOS BOLYAI
21. NICCOLO TARTAGLIA
22. PIERRE DE FERMAT
23. GEORGE BOOLE
24. C.F. GAUSS
25. EVARISTE GALOIS
26. EVANGELISTA TORRICELLI
27. N.I. LOBACHEVSKI
28. ARCHIMEDES
29. G.W. LEIBNITZ
30. OMAR KAYYAM
31. MARY FAIRFAX SOMERVILLE
32. ISAAC NEWTON
33. LEWIS CARROLL
34. FIBONACCI
35. SONYA KOVALEVSKY
36. EMMY NOETHER
37. AL-KHWARIZMI
38. WITCH OF AGNES!
39. GOROLAMO CARDANO
40. SRINIVASA RAMANUJAN
41. FRANCOIS VIETE
42. HERON

The following set of books may serve as resources for any of the mathematicians listed.

Bell, T.E. (1937). *Men in Mathematics*.

Boyer, C. (1968). *The History of Mathematics*.

Burton, D. (1985). *The History of Mathematics: An Introduction*.

Cajori, F. (1928). *A History of Mathematics Notation*.

Dunham, W. (1990). *Journey Through Genius - The Great Theorems of Mathematics*.

Eves, H. (1983). *An Introduction to the History of Mathematics*.

Eves, H. (1969). *In Mathematical Circles*.

Hollingsdale, S. (1989). *Makers of Mathematics*.

Johnson, Art. (1994). *Classic Math: History Topics for the Classroom*.

National Council of Teachers of Mathematics. (1969). *History Topics for the Mathematics Classroom*.

Osen, Lynn M. (1974). *Women in Mathematics*.

Information on mathematicians can be found on the internet. Use a search engine to find information on your choice.