WHY MATH?

http://mathforum.org/dr.math/faq/faq.why.math.html

Careers

http://www.maa.org/careers/index.html

MATH PROJECT SELECTION LIST

http://mathforum.org/library/drmath/view/56711.html

1. Investigate the five "perfect" (or Platonic) solids and explain

why there are only five. References: "The Mathematics Teacher", April

'77, p. 335.

2. Research an invention based on unusual geometric properties or

configurations (e.g. Rolamite Bearing, Wankel Engine, Holograms,

etc.). References: "Popular Science", Feb. '76, p. 106; "Popular

Science", Aug. '76, p. 84; "Scientific American", Aug. '72, p. 15;

Edmund Scientific Catalog; Student Math Notes, March 1989, Consortium

Fall 1995(#55).

3. Learn about the Escher variety of periodic drawings and learn how

to analyze an Escher drawing to find the unit cell, etc. References:

"The Mathematics Teacher", April '74,; "The Mathematics Teacher", Dec.

'76, p. 647.

4. Investigate tiling the plane with similar figures (tessellation).

References: "Scientific American", July '75, p. 112; "Scientific

American", Aug. '75, p. 112; Sachs, ed. Student Merit Awards, pp.

108ff.

5. Analyze and describe the construction of an accurate sundial

(gnomon). Reference: "The Mathematics Teacher", May '75, p. 438;

Waugh, Sundials, Their Theory and Construction, '73, New York, Dover.

6. Make and use a clinometer (sextant) to indirectly measure five

lengths. Do this project only after having studied similar triangles.

Reference: "The Mathematics Teacher", Feb. '76, p. 135.

7. Investigate the field of topology. References: Life Science

Library, Mathematics, pp. 176-191; Sharp, A New Mathematics Reader

(JML), Chapter 11; "The Mathematics Teacher", Mar. '76, p. 215; "The

Mathematics Teacher", Dec. '75, p. 647; Sachs, ed. Student Merit

Awards, p. 34 ff; NCTM, Enrichment Mathematics for High School;

Francis, The Mathematician's Coloring Book, COMAP; Student Math Notes,

Nov. 1990

8. Research the application of mathematical principles in the world

of art with a written description of those principles and their

application. References: "The Mathematics Teacher", April '77, p. 298;

also February '91, p 133; The Life Science Library, Mathematics, pp.

84-10, Consortium #46.

9. Make a display and write a report on ancient number systems.

References: "The Mathematics Teacher", May '75, p. 393; Life Science

Library, Mathematics, Chapter 1; "The Mathematics Teacher", April '76,

p. 296; Sachs, ed. Student Merit Awards, p. 130. Chance, Rhind

Mathematical Papyrus.

10. Investigate the connection between economics and math. References:

"The Mathematics Teacher", Mar. '75, p. 189; "The Mathematics

Teacher", Sept. '79, p. 450; "The Mathematics Teacher", Feb. '79,

p. 134; Kastner, Applications of Secondary School Mathematics, pp.

49ff.

11. Investigate and report on financial institutions and simulate

investing in the stock market. References: "The Mathematics Teacher",

Sept. '77, p. 493; HiMAP module in Consortium Fall '95.

12. Investigate and report on the careers of architect, civil

engineer, and land surveyor. Reference: "The Mathematics Teacher",

Sept. '77, p. 495.

13. Research the role of geometric shapes and properties in

architecture and construction. Reference: A fine example of this kind

of display can be found in the Life Science Library, Mathematics,

pp. 94 ff.

14. Calculate the average distance to a McDonald's. Consortium #34

(Summer, 1990); Student Math Notes, March 1988.

15. Archimedes. Reference: Sachs, ed. Student Merit Awards.

16. Pythagoras and His Theorem, Reference: Sachs, ed. Student Merit

Awards.

17. Music and Mathematics. Reference: Kastner, Applications of

Secondary School Mathematics. Maor, "What is there so Mathematical

about Music?" from "The Mathematics Teacher" Sept '79, pp 414-422;

O'Shea, "Geometric Transformations and Musical Composition." from "The

Mathematics Teacher" '72, PP 523-528, Garland and Kahn, Math and

Music, (510 GAR)

18. Minimal surface experiments with soap bubbles.

19. Ciphers, Codes and the way they are broken Reference: The

Mathematical Tourist, "An Application of Number Theory to Cryptology",

"The Mathematics Teacher", Jan '89, p.18. "The Mathematics Teacher"

Jan 91, "The Mathematics Teacher" Dec '96 p 743, also Oct 1984;

Consortium Winter 1991; Malkevitch, Loads of Codes, COMAP; Consortium

#37 p 3.

20. Investigate the Golden Proportion and the Golden Rectangle in art

and nature. Reference: "The Mathematics Teacher" Nov. '96 p. 680.

21. How Eratosthenes Measured the circumference of the earth.

22. The theory of perspective in drawing: Consortium # 46.

23. Measurement of the distance from the earth to the moon by simple

geometry. Reference: Project STAR, Where We Are in Space and Time,

Unit II, Activity 7.

24. Statistics. Reference: Sachs, ed. Student Merit Awards.

25. Non-Euclidean Geometry. Many attempts have been made to prove

Euclid's fifth postulate, all unsuccessful. A system of geometry that

is constructed without the use of the Parallel Postulate is known as

a non-Euclidean geometry. What is absolute geometry? hyperbolic

geometry? elliptical geometry? Reference: Courant, What is

Mathematics? New York: Oxford University Press, 1978; Insights into

Modern Mathematics. Twenty-third Yearbook of the National Council of

Teachers of Mathematics. Washington, D.C.: The Council, 1957;

Consortium #53. "The Mathematics Teacher" Sept 1980, April 1977, Sept

1985, Oct 1977.

26. Fibonacci Numbers. In 1202 the mathematician Fibonacci wrote about

a problem concerning the breeding of rabbits. The pattern of

population growth under the given constraints formed a sequence now

known as a Fibonacci Sequence, famous for its applications in many

fields of mathematics and nature. The Phyllotactic ratio .Reference:

Brown, "From the Golden Rectangle and Fibonacci to Pedagogy and

Problem Posing." "The Mathematics Teacher" 69: 180-188; Dalton, Topics

for Mathematics Clubs. 2nd ed. Reston, VA: National Council of

Teachers of Mathematics, 1983; Gardner. "The Multiple Fascinations of

the Fibonacci Sequence." Scientific American, Vol. 220 No. 3, pp 116-

120; March, 1969

27. Investigation Beyond the Third Dimension. We perceive our world as

one of three dimensions. Mathematicians of vision, however, have

ventured beyond these limits, conceptualizing "spaces" of four and

even more dimensions. How can we use algebra and geometry to extend

our knowledge of the first three dimensions? Can you build a model of

a tesseract, the fourth-dimensional equivalent of a cube? Reference:

Abbot. Flatland. Many editions; Burger. Sphereland. (trans. by

Rheinboldt) Scranton, PA: Apollo Editions (distributed by Harper and

Row Publishers, Inc. NY); Henry. "The Fourth Dimension and Beyond...

with a Surprise Ending!" "The Mathematics Teacher" 67:274-279; Hess.

Four-Dimensional Geometry Reston, VA: National Council of Teachers of

Mathematics, 1977; Manning. The Fourth Dimension Simply Explained. New

York: Dover Publications, 1960; Marr. 4-Dimensional Geometry, Boston:

Houghton Mifflin Company, 1970; Sommerville. An Introduction to

Geometry of N Dimensions, New York: Dover Publications,1958;

http://www.students.uiuc.edu/~ferrar/java/hypercuber/HyperCuber.html .

28. Some Special Numbers. The constants 0, 1, i, and e have many

important and unique properties. What are these numbers? How are they

related to each other? How did they develop in the history of

mathematics? References: Bell. Men of Mathematics. New York: Simon and

Shuster, 1937; Gardner. "Mathematical Games." Scientific American,

Vol. 241, No 2, pp. 18-24; June, 1976; Historical Topics for the

Mathematics Classroom. Thirty-first Yearbook of the National Council

of Teachers of Mathematics, Washington, D.C.: The Council, 1969;

Kasner. Mathematics and the Imagination. New York: Simon and

Shuster,1940; Mathematics in the Modern World: Readings from

"Scientific American." San Francisco: W.H. Freeman and Co., 1968;

29. Use a spreadsheet program on the computer to investigate

mathematical formulas. Reference: "The Mathematics Teacher" 85,

May 1992, pp 346-347.

30. Investigate the use of check digits and error detecting codes in

use today. UPC bar coding, Social Security numbers, etc. References:

"Consortium" Spring, 1987; "Consortium" Summer 1987; Mlkevitch.

Codes Galore, COMAP

31. Investigate the curvature of surfaces. References: "The

Mathematics Teacher", February '94.

32. Explore Fractals and objects having non-integral dimensions.

References: Student Math Notes, Nov 1991; Consortium #41 and 45; "The

Mathematics Teacher" Jan '97 p. 35.

33. Game Theory. Investigate the application of mathematics to game

strategies. Zero-sum games, etc. References: Student Math Notes:

May 1987. Consortium #52.

34. Investigate the technique of linear programming. "Consortium"

Winter 1991 and Summer 1992.