



# Mathematics and Religion: The Intersection is Not Empty

---

Robert McGee  
Kathleen Acker  
Carol Serotta  
Cabrini College

November 14, 2005  
Colloquium



# Numbers in Scripture

---

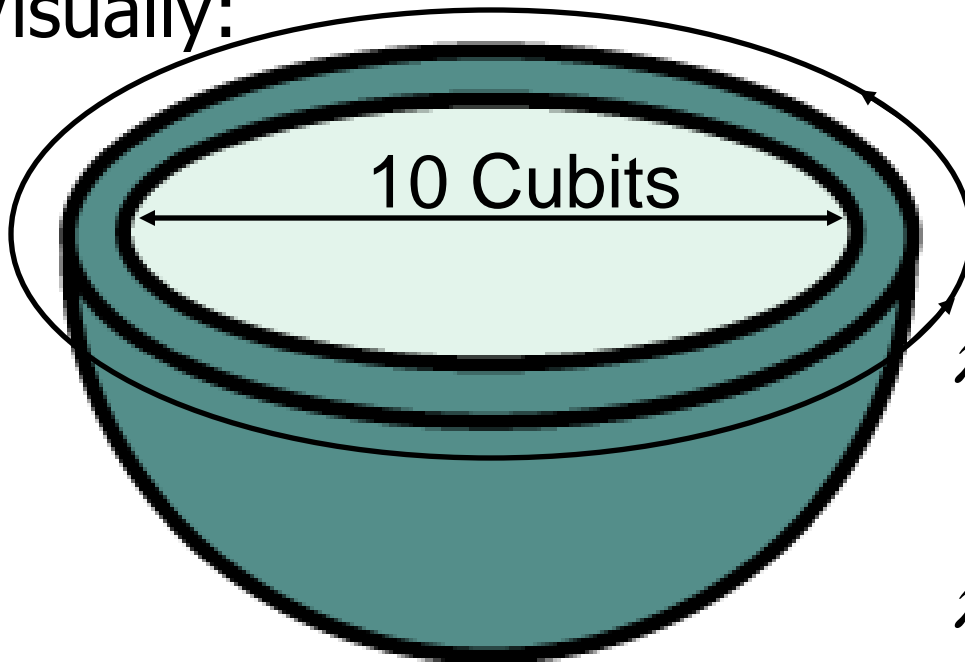
## What is the biblical value of $\pi$ ?

A structure in King Solomon's temple described:  
“And he made the molten sea of **ten cubits from brim to brim**, round in compass, and the height thereof was five cubits; and a **line of thirty cubits did compass it round** about.”

I Kings 7: 23, II Chronicles 4:2

# Numbers in Scripture

Visually:



30 Cubits

$$\pi = \frac{\textit{Circumference}}{\textit{Diameter}}$$

$$\pi = \frac{30}{10} = 3$$



# Numbers in Scripture

---

**Gematria** is the calculation of the numerical equivalence of letters, words, or phrases, and, on that basis, gaining, insight into interrelation of different concepts and exploring the interrelationship between words and ideas.

אבגדהוזחטיךכלםמקו

200 100 50 40 30 20 10 9 8 7 6 5 4 3 2 1

# Numbers in Scripture

Elijah of Vilna "Gaon of Vilna"

Late 18<sup>th</sup> century Polish rabbi

Hebrew word for "line measure" was written differently in each of the verses.

With gematria, demonstrated that the biblical estimation is correct to four decimal places.





# Numbers in Scripture

אבגדהוזחטיךכלםמקר

200 100 50 40 30 20 10 9 8 7 6 5 4 3 2 1

**I Kings 7:23**

קוה

$$5 + 6 + 100 = 111$$

**II Chronicles 4:2**

קו

$$6 + 100 = 106$$



# Numbers in Scripture

---

Creating a ratio:

$$\frac{111}{106} = 1.0472$$

$$3 * 1.0472 = 3.1416$$



# Numbers in Scripture

---

**How many fish were caught in an unbroken net?**

**153**

“Simon Peter went up and drew the net to land, full of large fish, a hundred and fifty-three, and although there were so many, the net was not torn.”

John 21:11





# Numbers in Scripture

---

The number 153 has many interesting properties

153 is a triangular number. Triangular numbers are the sum of the integers from 1 to  $n$ .



# Numbers in Scripture

---

## Examples of Triangular numbers



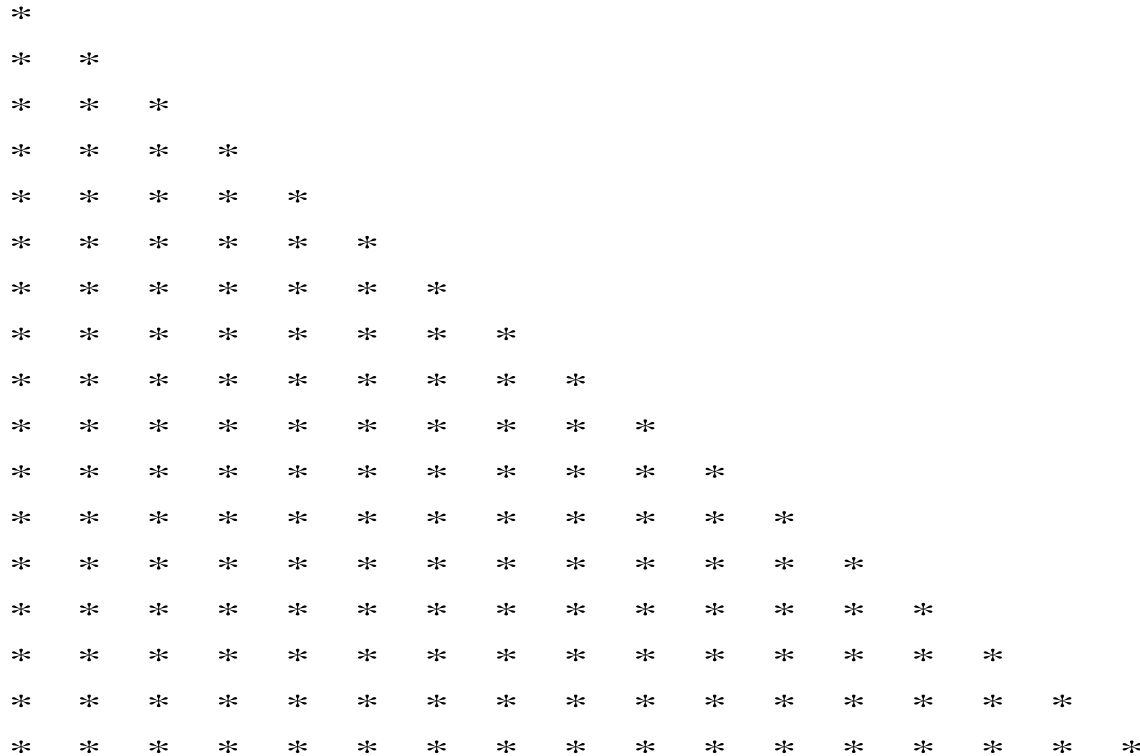
1      1+2      1+2+3      1+2+3+4      1+2+3+4+5



# Numbers in Scripture

---

$$153 = 1 + 2 + 3 + \dots + 16 + 17$$



a triangle with 17 rows.



# Numbers in Scripture

---

$153 = 1^3 + 5^3 + 3^3$ , that is 153 can be written as the sum of the cubes of its digits.

Question to Ponder:

If you think that this is a common feature of numbers, then see how many other three digit numbers you can find with this property.



# Numbers in Scripture

---

There are four three digit numbers that can be expressed as the cubes of their digits.

$$3^3 + 7^3 + 0^3 = 370$$

$$3^3 + 7^3 + 1^3 = 371$$

$$4^3 + 0^3 + 7^3 = 407$$

$$1^3 + 5^3 + 3^3 = 153$$



# Numbers in Scripture

---

$153 = 12^2 + 3^2$ , that is 153 can be written as the sum of two squares.

Not all numbers have this property.

The numbers 3 and 12 themselves have special significance.



# Numbers in Scripture

---

Factorial!

$$5! = 5 \times 4 \times 3 \times 2 \times 1$$

$$\begin{aligned} 153 &= 1! + 2! + 3! + 4! + 5! \\ &= 1 + 2 + 6 + 24 + 120 \end{aligned}$$



# Numbers in Scripture

---

Binary Numbers (Base 2 system)

153 in binary is 10011001.

This number is a palindrome, i.e., it reads the same forward and backward.





# Numbers in Scripture

---

The Greek word for fishes "ichthus"  
ΙΧΘΥΣ, by Gematria is 1224 or  $8 \times 153$ .



# Numbers in Scripture

---

The expression, בְּנֵי־הָאֱלֹהִים “Sons of God” has gematria of 153

בְּנֵי־הָאֱלֹהִים

$$40 + 10 + 5 + 30 + 1 + 5 + 10 + 50 + 2 = 153$$



# Numbers in Scripture

---

## **In what context does the number 666 appear in the Bible?**

“ Here is wisdom, let him who has understanding calculate the number of the beast, for the number is that of a man, and the number is six hundred and sixty six.” Revelation 13:28



# Numbers in Scripture

---

666 is a palindrome

666 is triangular.

$$666 = 1 + 2 + 3 + 4 + \dots + 33 + 34 + 35 + 36$$



# Numbers in Scripture

---

**In the Roman numeration system, the first six numbers are I, V, X, L, C, D**

**D     500**

**C     100**

**L     50**

**X     10**

**V     5**

**I     1**

**666**



# Numbers in Scripture

---

However the number 666 has its most intriguing application in the sport of “beasting” (i.e. showing that someone has the number of the beast). This was great fun during the Reformation.

Example 1: Beasting Pope Leo X

LEO DECIMUS	LEO X
L D CIMV	X
<hr/>	
-M (MYSTERIUM)	

---

$$L+D+C+I+V+X = 666$$



# Numbers in Scripture

---

## Example 2: Beasting Martin Luther

A-I

K-S

T-Z

1-9

10-90

100-500

Latin lacks J, W,  $V \equiv U$ , thus

MARTIN

LVTERA

$$30+1+80+100+9+40 + 20+200+100+5+80+1 = 666$$



# Numbers in Scripture

---

Can you think of a way to best  
someone's name?





# Numbers in Scripture

---

**How many goats did Jacob give to Esau?  
How many goats should Esau have  
sent to Jacob in order to confirm their  
friendship?**

“ ..... Then he selected from what he had with him a present for his brother Esau: two hundred female goats and twenty male goats....”

Genesis 32:13



# Numbers in Scripture

---

## **Amicable Numbers**

Amicable numbers: The pair of numbers  $a$  and  $b$  are called **Amicable** if the proper divisors of  $a$  sum to  $b$  and if the proper divisors of  $b$  sum to  $a$ .



# Numbers in Scripture

---

## Proper divisors of 220

	1		---	
	2		110	
	4		55	
	5		44	
	10		22	
	<u>11</u>		<u>20</u>	
Column Totals	33	+	251	= <u>284</u>



# Numbers in Scripture

---

## Proper divisors of 284

1	---
2	142
4	71

$$1 + 2 + 4 + 71 + 142 = \underline{220}$$

220 and 284 are amicable numbers.



# Numbers in Scripture

---

Therefore 220 and 284 are a pair of amicable numbers and hence Esau should send Jacob 284 animals as a sign of friendship.



# Numbers in Scripture

---

(17296, 18416) Fermat 1636

(9363584, 9437056) Descartes 1638

(1184, 1210) Nicolo Paganini, age 16, 1866

(42262694537514864075544955198125,  
42405817271188606697466971841875) Battiato  
and Borho (1988)



# Numbers in Scripture

---

**Identify the number 969.**

**What are some of its mathematical characteristics?**

“ So all the days of Methuselah were nine hundred and sixty-nine years.”  
Genesis 5:27



# Numbers in Scripture

---

969 is a palindrome

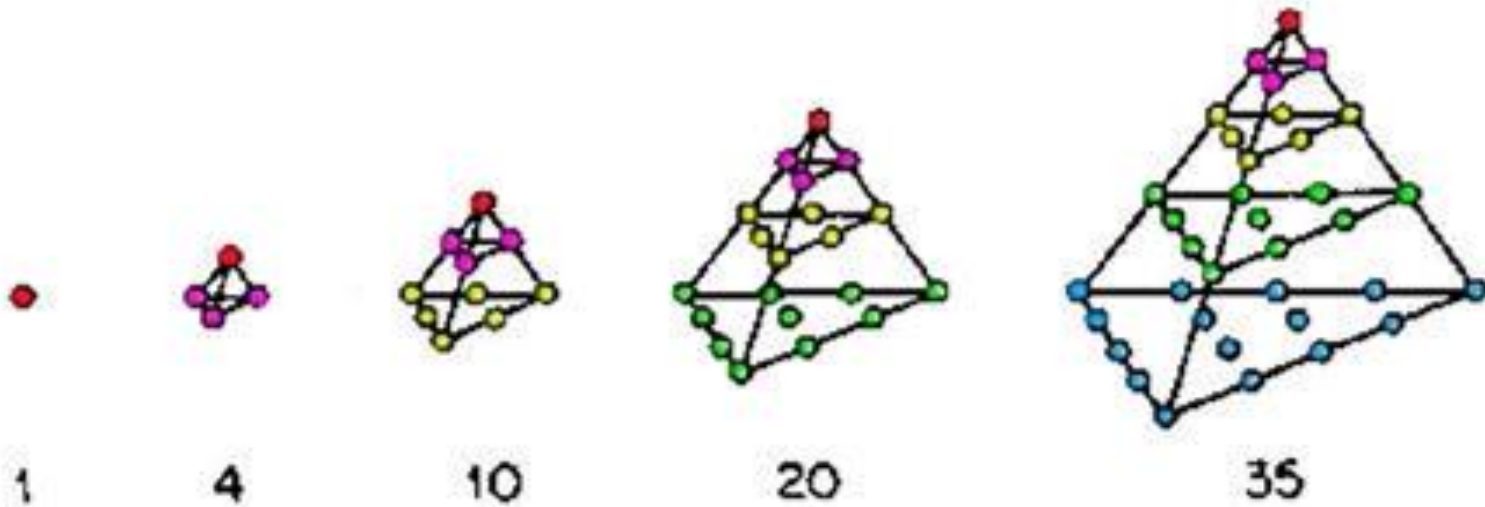
969 is the sum of the first 17 triangular numbers.

$$1+3+6+10+15+21+28+36+45+55+66+78+91+105+120+136+153 = 969$$



# Numbers in Scripture

Summing triangular numbers creates tetrahedral numbers



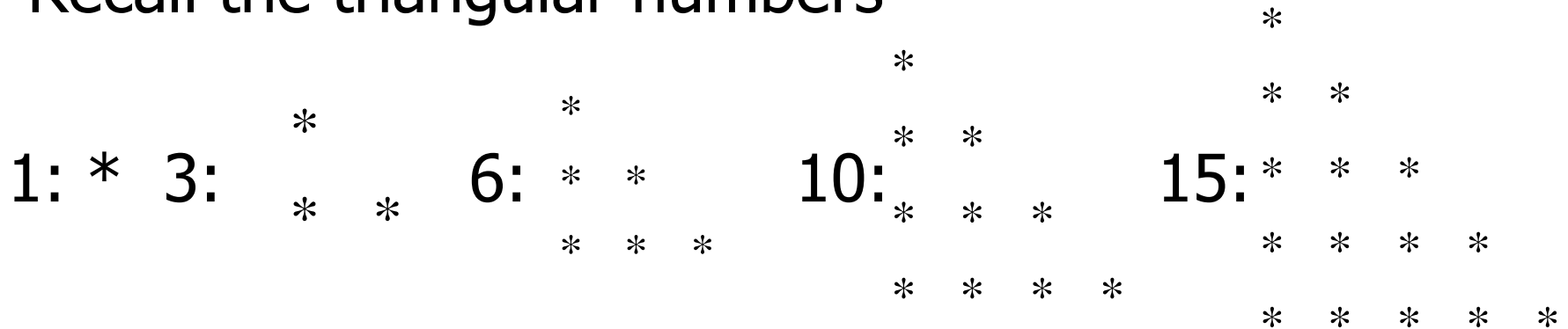
969 is a tetrahedral number.



# Numbers in Scripture

---

Recall the triangular numbers



What happens when you add consecutive triangular numbers?

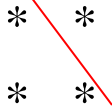


# Numbers in Scripture

---

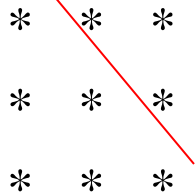
The sum of two consecutive triangular numbers is a square.

1+3



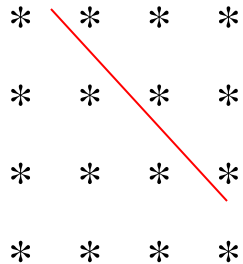
\* \*  
\* \*

3+6



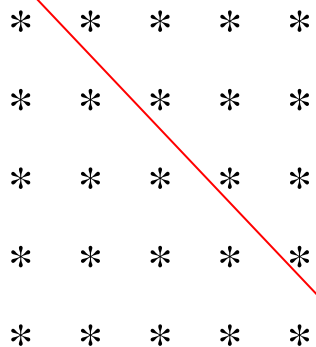
\* \* \*  
\* \* \*  
\* \* \*

6+10



\* \* \* \*  
\* \* \* \*  
\* \* \* \*  
\* \* \* \*

10+15



\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*



# Numbers in Scripture

---

$$969 = 1 + 3 + 6 + 10 + 15 + 21 + 28 + 36 + 45 + 55 + 66 + 78 + 91 + 105 + 120 + 136 + 153$$

$$969 = 1 + (3+6) + (10+15) + (21+28) + (36+45) + (55+66) + (78+91) + (105+120) + (136+153)$$

$$969 = 1 + 9 + 25 + 49 + 81 + 121 + 169 + 225 + 289$$

$$969 = 1^2 + 3^2 + 5^2 + 7^2 + 9^2 + 11^2 + 13^2 + 15^2 + 17^2$$

969 is the sum of the squares of the odd integers from 1 to 17.



# Numbers in Scripture

---

969 can be expressed four ways as the difference of two squares.

$$\begin{aligned} 969 &= 35^2 - 16^2 \quad (\text{What are the rest?}) \\ &= 37^2 - 20^2 \\ &= 163^2 - 160^2 \\ &= 485^2 - 484^2 \end{aligned}$$



# Numbers in Scripture

---

Flipping the digits gives 696, also a palindrome

696 can be expressed four ways as the difference of two squares.

$$\begin{aligned}696 &= 175^2 - 173^2 \quad (\text{What are the rest?}) \\ &= 89^2 - 85^2 \\ &= 61^2 - 55^2 \\ &= 35^2 - 23^2\end{aligned}$$



# Numbers in Scripture

---

H.S.M. Coxeter observed that in addition to the above the bible states that at age 187 Methuselah begat Lamech and that when Lamech was 182 years old he begat Noah and Noah was 600 years old when the flood began. Using this to calculate Methuselah's age in the year of the flood, we get  $187 + 182 + 600 = 969$ . Did Noah not bring his grandfather on the ark?



# Mathematicians

---

## Part II

## Mathematicians





# Mathematicians

---

Euclid in Book 7 of the *Elements*, defines a **perfect number** as that which is equal to its own parts. For example,  $6 = 1 + 2 + 3$ .

Geometrically this is

|\_\_1\_\_|\_\_2\_\_|\_\_3\_\_|

|\_\_\_\_\_6\_\_\_\_\_|

The divisors of 6 are 1, 2, and 3. Do not include 6.

$$1+2+3 = 6$$



# Mathematicians

---

Question to ponder: can you think of another number, less than 50 that is perfect?

28

$$1+2+4+7+14$$



# Mathematicians

---

In Book 9, Proposition 36, Euclid proves:

If as many numbers as we please beginning from an unit be set out continuously in **double** proportion until the **sum of all become prime**, and if the **sum multiplied into the last number** makes some number, then the product will be perfect.



# Mathematicians

---

To clarify:

$$1 + \mathbf{2} = \mathbf{3} \text{ prime} \rightarrow 2 \times 3 = 6 \text{ perfect}$$

$$1 + 2 + \mathbf{4} = \mathbf{7} \text{ prime} \rightarrow 4 \times 7 = 28 \text{ perfect}$$

$$1 + 2 + 4 + 8 = 15 \text{ not prime}$$

$$1 + 2 + 4 + 8 + \mathbf{16} = \mathbf{31} \text{ prime} \rightarrow 16 \times 31 \\ = 496 \text{ perfect}$$

$$1 + 2 + 4 + 8 + 16 + 32 = 63 \text{ not a prime}$$

$$1 + 2 + 4 + 8 + 16 + 32 + \mathbf{64} = \mathbf{127} \text{ prime} \\ \rightarrow 64 \times 127 = 8128 \text{ perfect}$$



# Mathematicians

---

6, 28, 496, and 8128 were the only perfect numbers that Euclid would have known, which makes the Proposition 36 even more remarkable.



# Mathematicians

---

Euclid's Book 9, Proposition 36 in modern notation:

If  $1 + 2 + \dots + 2^{n-1} = 2^n - 1$  is a prime,  
then  $2^{n-1}(2^n - 1)$  is a

**Fact:**  $n$  must be a prime for the sum to be prime

**Challenge:** Not all  $2^p - 1$  are prime if  $p$  is prime.



# Mathematicians

---

In a 1997 article in the *Mathematics Teacher*, entitled, ***Even Perfect Numbers: (Update)2***, Stanley Bezuszka and Margaret Kenney update an earlier article about perfect numbers.

This article provides a segue in this part of our talk. Father Bezuszka is a Jesuit priest, on the faculty of Boston College, who has been extremely active in the field of mathematics and mathematics education. In the article we are introduced to many people who were involved with perfect numbers.

# Mathematicians

Hrotsvit of Gandersheim  
(935-1000) Saxony

A Benedictine Nun

One of the earliest  
European Playwrights







# Mathematicians

---

*Sapientia*, a play, has the following lines appear:

*I should not leave unmentioned the principal numbers ....*

*Those which are called "**perfect numbers**." These have parts which are neither larger nor smaller than the number itself, such as the number six, whose parts, three, two, and one, add up to exactly the same sum as the number itself. For the same reason **twenty-eight**, **four hundred ninety-six**, and **eight thousand one hundred twenty-eight** are called perfect numbers.*

These are the same perfect numbers known to Euclid.

# Mathematicians

Prime numbers in the form  $2^p - 1$  are called Mersenne primes, after the French monk, Marin Mersenne.

Perhaps his most significant contribution to the history of mathematics was the fact that he served as a conduit for the spread of mathematical ideas.

Corresponded with Fermat, Descartes, Pascal, Huygens, Galileo, Robertval, and many others, thus acting as a stimulus to scientific and mathematical research.



**Marin Mersenne (1588-1648)**



# Mathematicians

---

Mersenne worked on problems involving perfect numbers with mixed results.

We know from Euclid that if  $2^p - 1$  is a prime then  $2^{p-1}(2^p - 1)$  is a perfect number.

Thus every Mersenne prime leads to a perfect number.

Research on perfect numbers today is directed at finding Mersenne primes.

# Mathematicians

Alcuin of York

735 - 804

Cathedral School of York

Student

Teacher

Headmaster

Retired to become the abbot  
of St. Martin of Tours  
Monastery





# Mathematician

---

In 781 he was invited by Charlemagne to direct his palace school. His work at the school led to major reforms in education and set the stage for the revival of learning in Europe.

In 796 he retired from the palace school and became the abbot of the St. Martin of Tours Monastery. He died in 804.

Alcuin himself wrote numerous textbooks in arithmetic, geometry and astronomy. *Propositiones ad acuendos juvenes* (*Problems to sharpen the young*). This text contains probably the earliest collection of problems written in Latin.



# Mathematicians

---

## *De obitu cuiusdam patrisfamilias*

### **A dying man's will**

A dying man left 960 shillings and a pregnant wife. He directed that if a boy was born he should receive  $\frac{9}{12}$  of the estate and the mother should receive  $\frac{3}{12}$ . If however a daughter was born, she should receive  $\frac{7}{12}$  of the estate and the mother should receive  $\frac{5}{12}$ . It happened however that twins were born, a boy and a girl. How much should the mother receive, how much the son, how much the daughter?



# Mathematicians

---

## *De obitu cuiusdam patrisfamilias* **A dying man's will**

Solution: 9 and 3 makes 12 and 12 ounces make a pound. Similarly 7 and 5 also make 12: and twice 12 is 24. 24 ounces make two pounds, that is 40 shillings. Hence divide 960 shillings into 24 parts; the twenty-fourth part is 40. Then take nine parts of 40 shillings; the son receives these 9 40s, which is 18 pounds, making 360 shillings. Now the mother takes three parts compared to the son and five compared to the daughter, and 3 and 5 make 8. Then take 8 parts of 40. The mother receives eight 40s, that is 16 pounds, which is 320 shillings. Then take what remains, which make seven parts, seven parts of 40, which is 14 pounds or 280 shillings. This is what the daughter receives. Adding 360 and 320 and 280 gives 960 shillings or 48 pounds.

**This answer is wrong!**



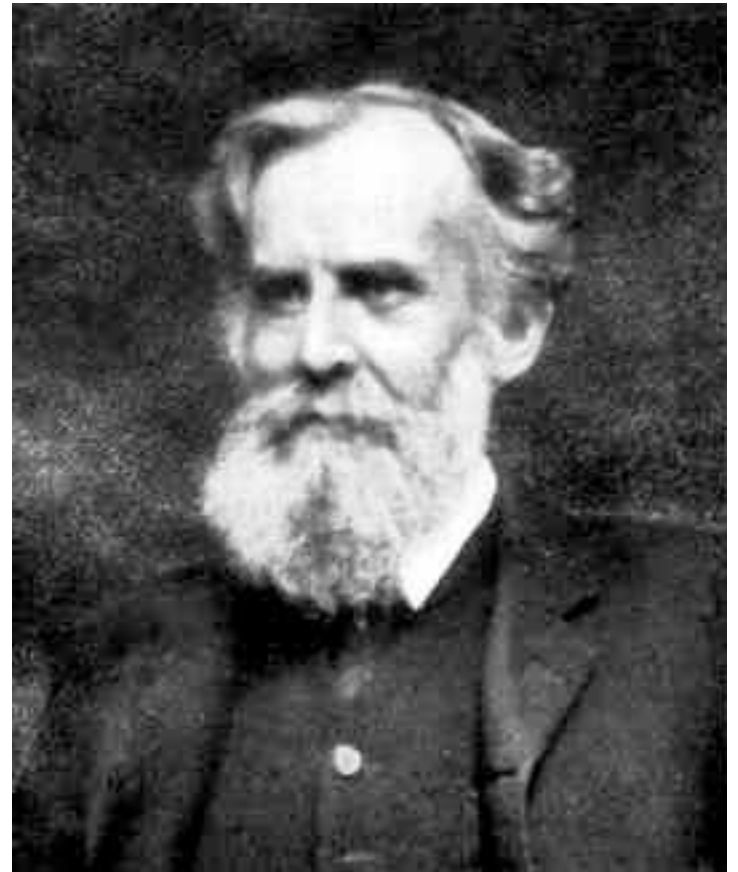
# Mathematicians

---

John Venn (1834-1923)

Raised in a family of  
clergy

Given credit for the use  
of Euler Circles



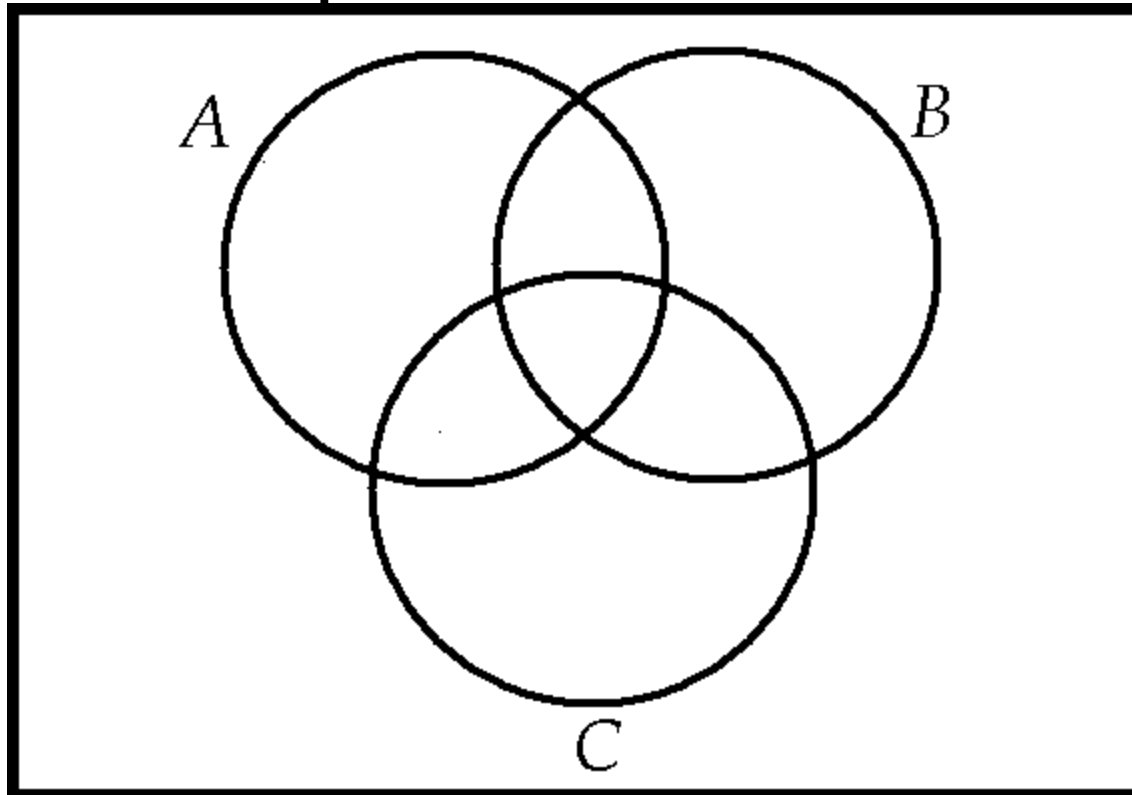




# Mathematicians

---

- For example:





# Mathematicians

---

## Rabbi ben Ezra (1092 -1167)

Born and raised in Muslim Spain

Inspiration for Robert Browning's "Rabbi Ben Ezra"

Spread the work of Arabs through Europe

He is generally given credit for introducing Europe to the

Indian symbols: 1 2 3 4 5 6 7 8 9

With special emphasis on the number zero.



# Mathematicians

---

Levi ben Gershon (1288 - 1344)

French Rabbi

Philosopher

Astronomer

Scientist

Biblical commentator

Mathematician

Prolific Author

Many about math, all in Hebrew



# Mathematicians

---

## Levi's Work included:

Earliest rigorous use of Mathematical Induction

Combinatorics

Algorithms for square and cube root extraction

Solutions to simultaneous linear equations

Attempted proof of Euclid's 5<sup>th</sup> postulate

Trigonometry

Harmonic Numbers

Inventor of Jacob's Staff

# Mathematicians

Jacob's Staff was a surveying instrument.

The pole was marked in degrees, and the altitude of the stars could be determined by using a sliding wooden panel on the rod.





# Mathematicians

---

*Maaseh Hoshev (The Art of Calculation), 1321*

This text focused primarily on proof by induction

Without modern notation he proved:

$$(1 + 2 + 3 + \dots + n)^2 = 1^3 + 2^3 + 3^3 + \dots + n^3$$



# Mathematicians

---

Modern Proof

$$(1 + 2 + 3 + \dots + n)^2 = 1^3 + 2^3 + 3^3 + \dots + n^3$$

Recall  $1 + 2 + 3 + \dots + n = n(n+1)/2$

$$\text{So } (1/4)n^2(n + 1)^2 = 1^3 + 2^3 + 3^3 + \dots + n^3$$

Let  $n = 1$

$$(1/4)(1)^2(1+1)^2 = 1^3$$

$1=1$  True



# Mathematicians

---

Assume that it is true for  $k$ .

$$(1/4) k^2 (k + 1)^2 = 1^3 + 2^3 + 3^3 + \dots + k^3$$

Therefore

$$(1/4) k^2 (k + 1)^2 + (k+1)^3 = 1^3 + 2^3 + 3^3 + \dots + k^3 + (k+1)^3$$

$$(1/4) (k + 1)^2 [k^2 + 4(k+1)]$$

$$(1/4) (k + 1)^2 [k^2 + 4k+4)$$





# Mathematicians

---

$$(1/4) (k + 1)^2 (k+2)^2$$

$$(1/4) (k + 1)^2 ([k+1]+1)^2$$

Therefore the statement works for  $k + 1$  integers.  
Therefore the statement holds true for all integer values of  $n$ .

$$(1/4)n^2(n + 1)^2 = 1^3 + 2^3 + 3^3 + \dots + n^3$$



# Mathematicians

---

Giovanni Saccheri (1667-1733)

Italian Jesuit Priest

Author of *Euclides ab omni Naevo Vindicates*  
(Euclid freed from every flaw )

Unknowingly proved many theorems of  
non-Euclidean geometry.

Gauss, Bolyai and Lobachevski are given  
credit for discovering non-Euclidean  
geometry a century later.



# Mathematicians

---

When Euclid wrote the *Elements* in 300 B.C., he set down a list of postulates for geometry. His fifth postulate attracted the most attention.

**Postulate V. *If a straight line falling on two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than two right angles.***

In textbooks today this would be stated as: Given a line and a point not on the line, there exist exactly one line through the point parallel to the given line.



# Mathematicians

---

This postulate is much longer and more complex than the other postulates of Euclid. It almost seems like it should be a theorem.

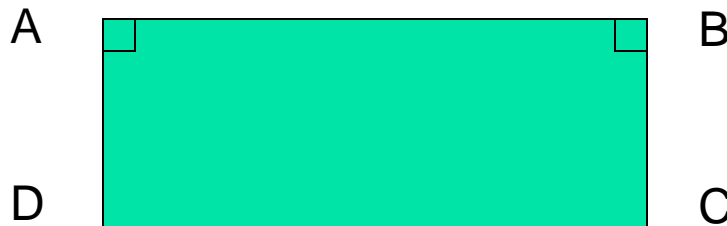
Euclid may have felt the same way. He did not use this postulate until Theorem 29 of Book I.

Many important theorems of Euclidean Geometry flow from this postulate.

Many geometers attempted to fix the problem of Postulate V, including Saccheri.

# Mathematicians

Saccheri started with a quadrilateral  $ABCD$ , with  $AD$  and  $BC$  being equal in length and perpendicular to  $AB$ .



It is easy to prove, without using Postulate V that angles  $ADC$  and  $BCD$  are equal. There are then three possibilities:

- |                          |                                |
|--------------------------|--------------------------------|
| 1. The angles are obtuse | Hypothesis of the obtuse angle |
| 2. The angles are right  | Hypothesis of the right angle  |
| 3. The angles are acute  | Hypothesis of the acute angle  |



# Mathematicians

---

The hypothesis of the right angle is Euclidean geometry, the only geometry. The plan was to eliminate the hypotheses of the obtuse and the acute angle.

Saccheri quickly disposed of the hypothesis of the obtuse angle. He spent over two hundred pages attacking the hypothesis of the acute angle. He proved theorem after theorem, hoping to come up with a contradiction. In the end he almost literally waved his hands and said that the hypothesis of the acute angle was wrong. He thought that he had freed Euclid from every flaw, although he was perhaps to good a logician to really believe it. What is actually contained in this book are many, many theorems of non-Euclidean geometry. It would take others with a different focus to realize this.



# Mathematicians

---

- Stop



# Mathematicians

---

## *De emptore in C dinariis*

### **A merchant and 100 pence**

A merchant wanted to buy a hundred pigs for a hundred pence. For a boar he would pay 10 pence; and for a sow 5 pence; while he would pay one penny for a couple of piglets. How many boars, sow, and piglets must there have been for him to have paid exactly 100 pence for the 100 animals?





# Mathematicians

---

*De emptore in C dinariis*

**A merchant and 100 pence**

**Solution:** Take 9 sows and a boar, to the value of 55 pence altogether, and 80 piglets at 40 pence, which bring the total to 90. For the other 5 pence take 10 piglets, and that brings the total of pigs and pence to 100.



# Mathematicians

---

*De homine qui obviavit scholaris*

**A man meeting some scholars**

A man met some scholars and said to them: "How many are there in your school?" One of them answered: "I don't want to tell you that. Count us twice and multiply by three. Then divide into four parts. If you add me to the fourth part, you will have a hundred." How many did he meet walking on the road?



# Mathematicians

---

*De homine qui obviavit scholaris*

**A man meeting some scholars**

**Solution:** Twice thirty-three is 66. This is the number that he met walking . Twice this number is 132. This multiplied by three makes 396. The fourth part of this is 99. Adding the boy who answered makes 100.



# Mathematicians

---

***De duobus hominibus boves ducentibus***  
**Two men leading oxen**

Two men were leading oxen along a road and one said to the other; "Give me two oxen and I'll have as many as you have." Then the other said: "Now you give me two oxen and I'll have double the number you have." How many oxen were there, and how many did each have?



# Mathematicians

---

*De duobus hominibus boves ducentibus*

**Two men leading oxen**

**Solution:** The one who asked for two oxen to be given to him had 4, and the one who was asked had 8. The latter gave two oxen to the one who requested them, and each had 6. The one who first received now gave back two oxen to the other who had 6 and so now had 8 which is twice 4, and the other was left with 4 which is half 8.



# Mathematicians

---

## *De sode et scrofa*

### **A breeding sow and a pigsty.**

A farmer created a new yard in which he put a breeding sow, which produced a litter of 7 piglets in the centre, which with the mother makes 8. They bear litters of 7 piglets each in the first corner of the yard; then all of them bear litters of 7 each in the next corner and so on for all four corners. Finally they all bear litters of 7 in the centre pigsty. How many pigs are there now altogether, including the mothers?



# Mathematicians

---

*De sode et scrofa*

**A breeding sow and a pigsty.**

**Solution:** At the first birth, in the centre pigsty, there are 7 piglets and the mother makes eight. Eight eights are 64. That is the number of pigs, including mothers in the first corner. The eight sixty-fours are 512. That is the number of pigs in the second corner. Again eight times 512 is 4096. That is the number of pigs and mothers in the third corner. If one multiplies this by eight there are 32,768. That is the number of pigs in the fourth corner. Multiplying this by eight gives 262,144. That is the total number of pigs after the final litters are produced in the centre pigsty.



# Religious Use of Mathematics

---

## Part III

# Religious Use of Mathematics





# Religious Use of Mathematics

---

## Gregorian Calendar

Pope Gregory VIII

Commissioned mathematicians and astronomers and clerics to revise the Julian Calendar.

Revision was necessary due to the leap year

Issue: Tropical year (average interval between vernal equinoxes) and Julian Calendar out of sync by 1 day, every 131 years.

Essentially the date for Easter needed to easily be determined.



# Religious Use of Mathematics

---

Christopher Clavius (1537-1612) receives most credit for the reform.

In 1582 it was determined that the length of a tropical year was 365.2422



# Religious Use of Mathematics

---

Converting the decimal .2422

$$\begin{aligned} .2422 = & \frac{1}{4 + \frac{1}{7 + \frac{1}{1 + \frac{1}{3 + \frac{1}{4 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}}}}}} \end{aligned}$$



# Religious Use of Mathematics

---

$$\frac{1}{4}, \frac{7}{29}, \frac{8}{33}, \frac{31}{128}, \frac{132}{545}, \textit{etc}$$

The first value suggests that we add a leap day every four years.

The second suggests that we add seven leap days every 29 years.



# Religious Use of Mathematics

---

## Julian Calendar

Add an extra day added every four years

## Gregorian Calendar –

Every year that is exactly divisible by four is a leap year, except for years that are exactly divisible by 100. For example, the year 1900 is not a leap year; the year 2000 is a leap year. The centurial years that are exactly divisible by 400 are still leap years.



# Religious Use of Mathematics

---

All discussion ended in 1972 when Coordinated Universal Time became effective internationally and the Gregorian Calendar is the standard.



# Religious Use of Mathematics

---

Easter falls on the first Sunday following the first ecclesiastical full moon that occurs on or after the day of the vernal equinox; this particular ecclesiastical full moon is the 14th day of a tabular lunation (new moon); and the vernal equinox is fixed as March 21.



# References

---

Bezuszka, S. and M. Kenney. Even perfect numbers: (Update)2 , *Mathematics Teacher*, November, 1997.

Bullinger, E.W. *Number in Scripture*, Kregel Publications, 1967.

Bunt, L., P. Jones, and J. Bedient. *The Historical Roots of Elementary Mathematics*, Dover Publications, 1988.

Coxeter, H. An ancient tragedy, *The Mathematical Gazette*, June, 1977.

Davis, J.J. *Biblical Numerology*, Baker Book House Co., 1968.

Eves, H. *An Introduction to the History of Mathematics*, Fifth edition, Saunders College Publication, 1983.

Gardner, M. Dr. Matrix finds numerological wonders in the King James Bible, *Scientific American*, Sept., 1975.





# References

---

- Ginsburg, J. Rabbi ben Ezra on permutations and combinations, *Mathematics Teacher*, Oct., 1922.
- Posamentier, A.S. and Gordon, N. An astounding revelation on the history of pi, *Mathematics Teacher*, Jan., 1985.
- Shai Simonson The Mathematics of Levi ben Gershon, *Bekhol Derakhekha Daehu* **10**, Bar-Ilan University Press, pp. 5-21, Winter 2000
- Shai Simonson The Hebrew Mathematical Tradition, with T. Langermann, for *Mathematics Across Cultures: A History of Western Mathematics*, editor Helaine Selin, Kluwer Publishing, 2000. (Online version corrects some typos in published version).
- Singmaster, David and Hadley, John. " Problems to sharpen the young". *The Mathematic Gazette*, March, 1992
- Rickey, V. F. Mathematics of the Gregorian Calendar, *The Mathematics Intelligencer*, 1985
- Turetsky, M. Permutations in the 16th century Cabala, *Mathematics Teacher*, Jan., 1923.



# References

---

<http://inet.lasierra.edu/~wclarke/syllabi/mathhist.pdf>

<http://etext.lib.virginia.edu/ebooks/subjects/subjects-bible.html#kjvbrowseold>

<http://www.inner.org/gematria/gemexamp.htm>

<http://www-groups.dcs.st-and.ac.uk/~history/PictDisplay/Alcuin.html>

<http://www-groups.dcs.st-and.ac.uk/~history/PictDisplay/Mersenne.html>

<http://milan.milanovic.org/math/english/tetrahedral/tetrahedral.html>

<http://www.answers.com/topic/hasidic-judaism>



# References

---

<http://mathworld.wolfram.com/AmicablePair.html>

<http://bailiwick.lib.uiowa.edu/wstudies/gallery.html>

<http://go.owu.edu/~o5medww/hrotsvit/>

<http://www-groups.dcs.st-and.ac.uk/~history/PictDisplay/Venn.html>

<http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Ezra.html>

<http://www.encyclopedia.com/html/I/IbnE1zra.asp>

<http://jeff560.tripod.com/jacob.jpg>

<http://aa.usno.navy.mil/faq/docs/easter.html>

<http://aa.usno.navy.mil/faq/docs/calendars.html>



# Numbers in scripture

---

Magic Squares contain rows and columns of whole numbers with the property that every row, and every column, and the diagonals sum to the same value.

666 defines one such magic square.



# Numbers in scripture

---

To begin creating a magic square we must first determine the magic sum. For an  $n \times n$  square, sum the numbers from 1 to  $m$ , where  $m = n^2$ . is the total number of entries in the square. Then divide by  $n$ .

Ex. 3x3 has 9 numbers.

$$1+2+3+4+5+6+7+8+9 = 45.$$

$$45/3 = 15.$$

Each row, column and diagonal must sum to 15.



# Numbers in Scripture

---

To find the magic sum for a 6x6 magic square, begin by summing the integers 1 to 36, which equals 666.

$$666/6 = 111$$

Sum is 111.

6	32	3	34	33	1
7	11	27	28	8	30
19	14	16	15	23	24
18	20	22	21	17	13
25	29	10	9	26	12
36	5	33	4	2	31



# Numbers in Scripture

---

## **5. What is the largest number mentioned in the Bible?**

Myriad is Greek for 10,000



# Numbers in Scripture

---

“... thousand thousands ministered unto him, and ten thousand times ten thousand stood before him...” Daniel 7:10

“And the number of the army of the horsemen were two hundred thousand thousand... Rev 9:16

**Two myriad myriad (2 x 10000 x 10000 )is the largest number in the bible.**

This is also the largest number named by the Ancient Greeks.





# Numbers in Scripture

---

**6. What is the smallest number not mentioned in the bible?**

**43**