MATHEMATICS AND THE BIBLE

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Who we are!

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Mathematics and Religion

Pop Quiz

1. What is the biblical value of pi?
2. How many fish were caught in an unbroken net?
3. How many goats did Jacob give to Esau? How many goats should Esau have sent to Jacob in order to confirm their friendship?
4. In what context does the number 666 appear in the Bible?
5. What is the largest number mentioned in the Bible?
6. What is the smallest number not mentioned in the Bible?
7. Identify the number 969. What are some of its mathematical characteristics?
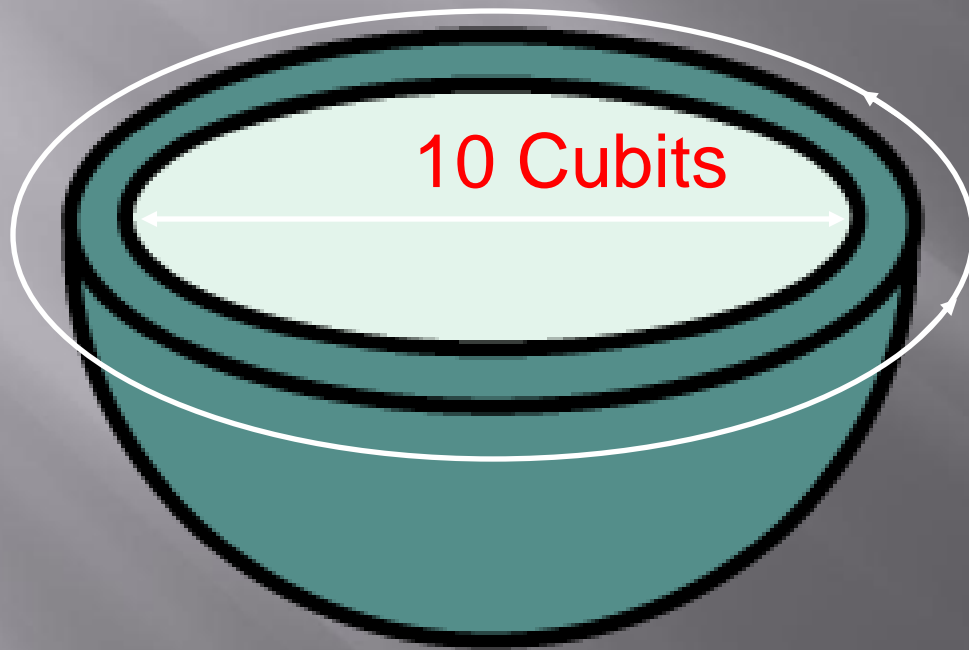
Numbers in Scripture

1. What is the biblical value of π ?

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 <u>line</u> of **thirty cubits did compass it round** about." I Kings 7: 23, II Chronicles 4:2

Numbers in Scripture

Visually:

10 Cubits

30 Cubits

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

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

Numbers in Scripture

Elijah of Vilna "Gaon of Vilna"

Late 18th 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

Gematria

Please cue the movie clip for PI.

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.

Numbers in Scripture

I Kings 7:23

$$קוה$$

$$5 + 6 + 100 = 111$$

Numbers in Scripture

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

2. 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.

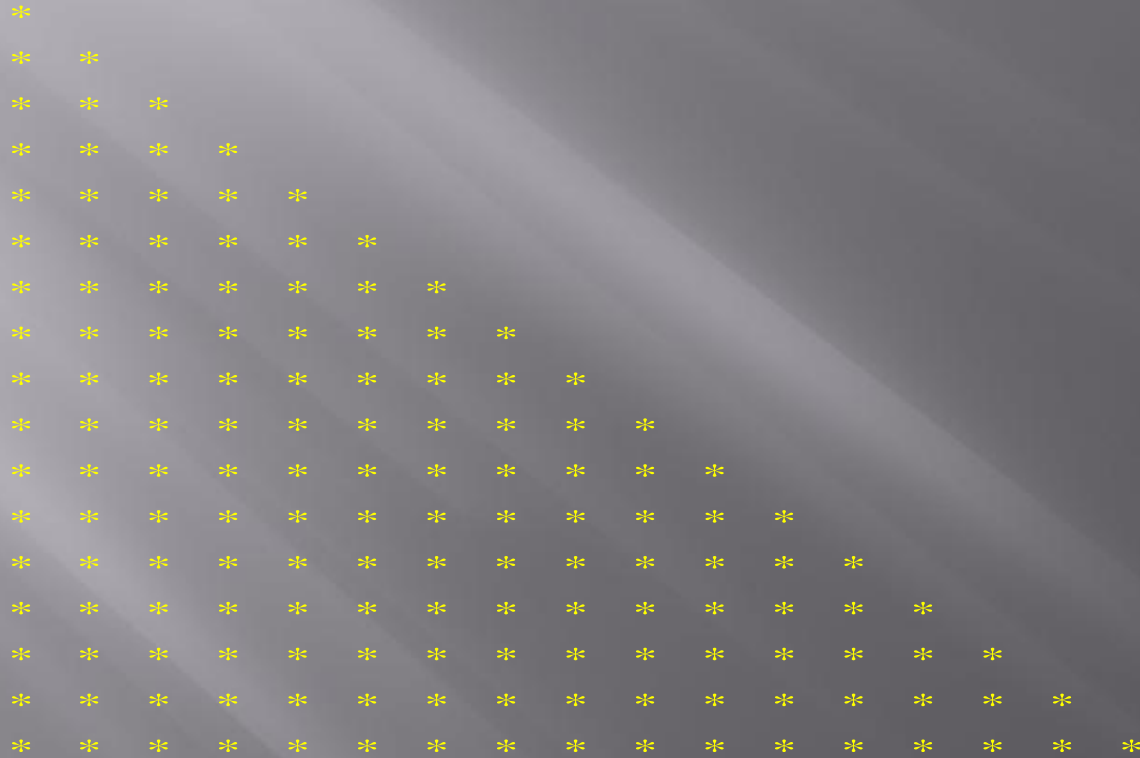Triangular numbers are the sum of the integers from 1 to n.

Examples of Triangular numbers

1:    3:   6:   10:   15:

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

Numbers in Scripture

153 = 1 + 2 + 3 + …. + 16 + 17

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a triangle with 17 rows.
Gauss?

Sum of 1 to 100

1, 2, 3, …, 49, 50, 51, …, 98, 99, 100

1+99

2+98

3+97

…

49+51

49 pairs of 100 + 100 + 50

5050 is the answer

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 x 4 x 3 x 2 x 1

153 = 1! + 2! + 3! + 4! + 5!

     = 1 + 2 + 6 + 24 + 120

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 x 153.

Numbers in Scripture

The expression, בניחאלחים "Sons of God" has gematria of 153

בניחאלחים

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

Numbers in Scripture

3. 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 - List them

1	---
2	110
4	55
5	44
10	22
11	20

Column Totals   33   +   251   = 284

Numbers in Scripture

Proper divisors of 284

1	---
2	142
4	71

1 + 2 +4 + 71 + 142 = 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

(4226269453751486407554495198125, 4240581727118860669746697184 1875) Battiato and Borho (1988)

Numbers in Scripture

4. 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

Also:

666 = 1 + 2 + 3 + 4 + … + 33 + 34 + 35 +36

Therefore it is triangular.

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

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.

Numbers in scripture

A 3x3 array with the following numbers
{1,2,3,4,5,6,7,8,9}
Summing the numbers we get:
1+2+3+4+5+6+7+8+9 = 45.
Divide by the size of the array
45/3 = 15.

Each row, column and diagonal must sum to 15.
Can you make such an array?

Numbers in Scripture

Every row, column and diagonal sums to 15.

$$\begin{bmatrix} 4 & 3 & 8 \\ 9 & 5 & 1 \\ 2 & 7 & 6 \end{bmatrix}$$

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

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
LEO D CIM   V   X
       -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≡U, thus

MARTIN   LVTERA

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

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

Numbers in Scripture

7. 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

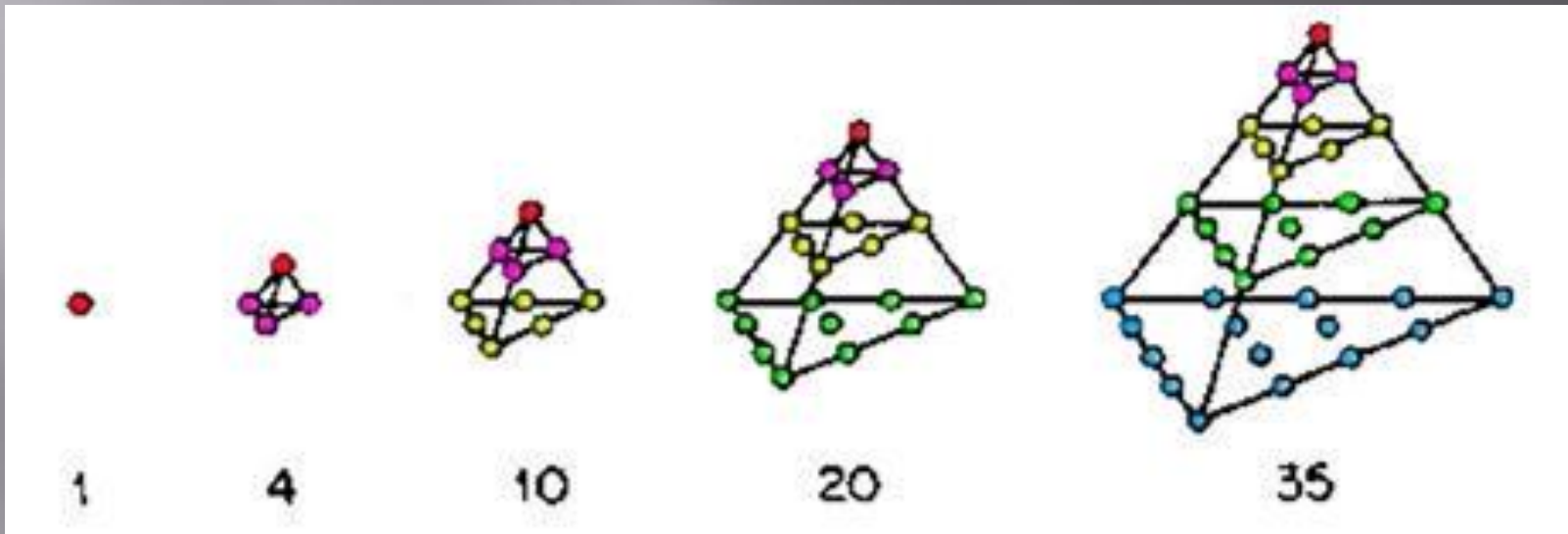969 is a palindrome

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

Numbers in Scripture

Recall the triangular numbers

1: *   3: *   6: *   10: * *   15: *
       *   *   * *   * *
       * *   * *   * * *   * * *
                      * * *   * * * *   * * * *
                                                           * * * * *

The sum of two consecutive triangular numbers is a square.
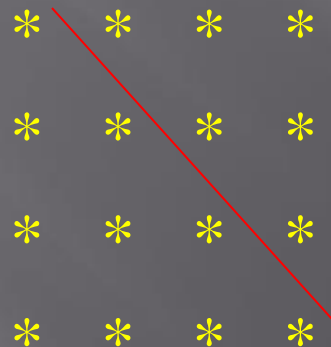
1+3   3+6   6+10   10+15

Numbers in Scripture

Regrouping

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

1 + 9 + 25 + 49 + 81 + 121 + 169 + 225 + 289

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

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

Numbers in Scripture

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

$$969 = 35^2 - 16^2$$
$$= 37^2 - 20^2$$
$$= 163^2 - 160^2$$
$$= 485^2 - 484^2$$

Numbers in Scripture

Flipping the digits gives 696

696 is also a palindrome

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

696   $= 175^2 - 173^2$
      $= 89^2 - 85^2$
      $= 61^2 - 55^2$
      $= 35^2 - 23^2$

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?

*** Answer?

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

Hrotsvit of Gandersheim
935-1000 in Saxony

A Benedictine Nun

One of the earliest European Playrights

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 went-eight** are called perfect numbers.*

These are the same perfect numbers known to Euclid.

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