

The Story of π – Part II

from Harav Yitzchak Ginsburgh

π and the 32 Pathways of Wisdom

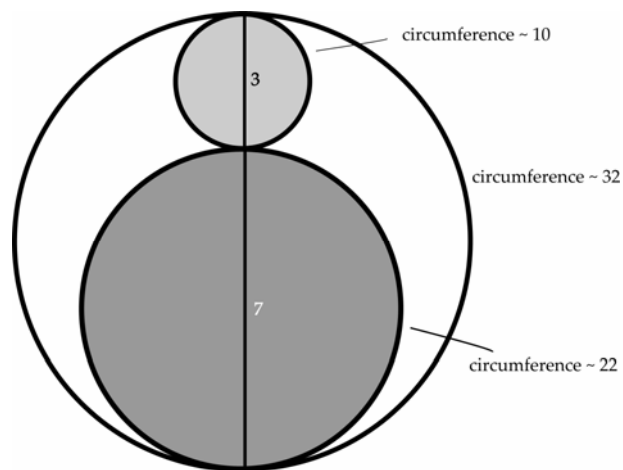
Using his method of suppressing (or submitting) its remainder, the Gaon of Vilna uses π to explain the relationship between the three basic quantities of the first chapter of the Book of Formation (*Sefer Yetzirah*):

- the 32 pathways of wisdom
- the 22 letters of the Hebrew alphabet, and
- the 10 *sefirot*.

He writes,

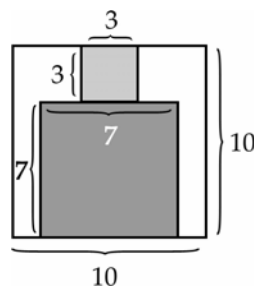
“With 32 wondrous pathways of wisdom God engraved and created His world....” As expounded in the second mishnah [of *The Book of Formation*, these are the] ten *sefirot* and twenty-two [letters]. And they [32] are the size of the circumference around a diameter of 10. And they divide into 10 [sefirot] and 22 [letters] because the diameter of 10 is divided into 3 mothers [the letters, א, ב, and ש] and 7 doubles [the letters, ב, ג, ד, כ, פ, ק, and ת]. For the diameter of 7, the circumference will be 22 and for the diameter of 3, the circumference will be 10.

The division of 10 into 3 and 7 refers not only to the mother and double letters of the Hebrew alphabet, but to the division of the 10 *sefirot* into the 3 intellectual and 7 emotive *sefirot*, as well. Thus, the picture resulting from the Gaon’s commentary is,



Let us take a moment to contemplate this diagram. The smallest circle (diameter of 3) represents the 3 intellectual *sefirot* (wisdom, understanding, and knowledge). The circle with diameter 7 represents the seven lower *sefirot* (loving-kindness, might, beauty, victory, acknowledgment, foundation, and kingdom). The larger circle that circumscribes them (with diameter 10) represents all 10 *sefirot* together.

Another way of expressing the relationship between the 3 intellectual and 7 lower *sefirot* is using squares, in which case we have a square of 3, a square of 7, and a square of 10, like so,



The area of the greater square (10 by 10) is 100, the *gematria* of “beauty” (יָפִי).¹ The area of the 3 by 3 square, representing the intellectual *sefirot*, is 9 and the area of the 7 by 7 square, representing the lower *sefirot*, is 49. Thus, the total area covered by the *sefirot*, as it were, in this depiction is 58, the *gematria* of another synonym for “beauty” (יָפִי). It follows that the area left uncovered is 42.

To analyze our circles diagram in the same way we first have to realize that each circle provides a different approximation for π . To find the area of the circle, we need to use the approximation of π that it gives us. We will call this the normalized area of the circle (normalized to the approximation of π given by this circle). In the larger circle (with diameter 10), the approximate value given for π is $32/10 = 3.2$, which then gives us a normalized area of $3.2 \cdot 5^2 = 80$. Following the same logic, the normalized area of the circle with diameter 7 is $22/7 \cdot 3.5^2 = 38.5$. And, the normalized area of the circle with diameter 3 is $10/3 \cdot 1.5^2 = 7.5$. Thus, the total normalized area covered by the two smaller circles is 46 and the normalized area left uncovered is $80 - 46 = 34$.

Following the Gaon of Vilna’s analysis, we are motivated to look further into the relationship between the 32 pathways of wisdom and π .

Given a circle with diameter 10 (corresponding, as noted by the Gaon of Vilna, to the 10 *sefirot*) its exact circumference would be 31.415926... as opposed to the approximate value of 32 (corresponding to the 32 pathways of wisdom). Thus, the remainder that is suppressed corresponds to the 32nd pathway, which, if the circle were measured exactly

would be found to be essentially unknowable, just as π cannot be perfectly known. Indeed, the 32nd pathway is considered the most mysterious of all and is alluded to in Kabbalah in the verse, “The path that no bird of prey knows.”² The 32nd pathway of wisdom is intrinsically connected with the 50th gate of understanding, which is the single gate that Moshe Rabbeinu was unable to comprehend during his lifetime and which was revealed to him only upon his parting from the physical realm.³

Looking at the words “The path that no bird of prey knows” (נְתִיב לֹא יָדְעוּ עֵיט) numerically, we find that they allude to the 32 pathways. Their *gematria* is $672 = 32 \cdot 21$ (where 21 is the value of God’s Name, *Ekyeh*, אֶהְיֶה). Just the value of the initial letters of these words (נ ל י ע) is $160 = 5 \cdot 32$ and therefore the *gematria* of the rest of the letters (א ד עו י ט) is $16 \cdot 32$ (or, half of 32^2).

That the 32 pathways are the pathways of wisdom returns us to our discussion of the suppression of the remainder of π , where we saw that the secret of π is intrinsically linked with the *sefirah* of wisdom and the Shabbat as it is rooted in the unknowable head of faith (the highest level of the crown).⁴

Creation and π

Let us concentrate on the more exact part of the Gaon of Vilna’s analysis, the ratio of 22 to 7. This ratio corresponds to the circumference of the 22 letters around the diameter of the seven emotive *sefirot* of the heart. But, as we know, the original manifestation of the seven emotive *sefirot* is found in the seven days of creation. The first day corresponds to loving-kindness, the second to might, and so on, until the Shabbat corresponds to the *sefirah* of kingdom. In fact, corresponding the diameter of 7 to the days of creation is justified even more deeply when we recall that in the sweetening approach to π ’s remainder, we found that the diameter is represented by the day (ימים).

But, this leads us to a very interesting fact about the seven days of creation. The sages point out that not all 22 letters of the *aleph-beit* are used in the Torah’s account of these seven days! One letter is missing, the *samech* (ס). Incredibly, the shape of the *samech* is that of a circle!⁵ This alludes to the fact that if the diameter of a circle is 7, its true circumference is of course a little less than 22.

Thought the first account of creation (Genesis chapter 1 and the first 3 verses of chapter 2) does not contain a *samech*, the *samech* does appear a few verses later in the second account of creation. Even more fascinating is the fact that it appears in the word “that circles” (הַסּוֹבֵב),⁶ strengthening our understanding that the *samech* is the letter most related to the circumference of the circle.

Another way of explaining the absence of the *samech* in the first account of creation relies on noting that in the second account there is no explicit mention of the 7 days of creation. In the first account the seven days are revealed but the *samech* is absent. In the second account the *samech* is present but the days are concealed. Since the 7 days correspond to the diameter and the *samech* to the circumference, we can restate this in the following way. In the first account of creation the diameter is well-defined, but the circumference is not while in the second account of creation the circumference is well-defined but the diameter is not. Indeed, this is the mystery of π . If the diameter is a whole number (in this case 7) the circumference cannot be known exactly. Likewise, if the circumference is a whole number (in this case 22), the diameter cannot be known exactly!

32 Pathways of Wisdom and 10 Utterances of Creation

So far we have interpreted the ratio of 22 to 7 as corresponding to the 7 days of creation. In reality, this interpretation is a little simplistic because the 32 pathways of wisdom are alluded to in the 32 instances of God's Name, *Elokim*, that appear in the account of the first 6 days of creation. Moreover, the diameter of 10 refers to ten specific instances of the Name *Elokim* in which the Torah describes that God (using the Name *Elokim*) speaks creation into existence. These are known as the Ten Utterances (עֲשָׂרָה (מֵאמָרוֹת) by which the world was created. Thus, an even more profound interpretation of the 32:10, circumference to diameter, ratio described in the Gaon of Vilna's commentary is the relation of the 32 pathways of wisdom to the 10 utterances with which God created the world.

The sages state, "The world was created with ten utterances."⁷ Elsewhere, they explain that the Ten Utterances refer to the ten times that the Torah writes "God said" (וַיֹּאמֶר אֱלֹהִים). Thus, the first 3 utterances correspond to the diameter of the smaller top circle (diameter 3) and the final 7 utterances correspond to the diameter of the larger circle on the bottom.

Still, the number of times this phrase appears in the first account of creation is only 9. The sages offer a number of different ways to enumerate 10 utterances. In the Talmud,⁸ the sages explain that the first verse of the Torah, "In the beginning God created the heavens and the earth" is also an utterance, even though it is not stated in the form of "God said let there be heavens and an earth."⁹ According to the Talmud the Ten Utterances are then:

1. "In the beginning God created the heavens and the earth" (verse 1).
2. "God said, "Let there be light" (v. 3).

3. "God said, 'Let there be a firmament...'" (v. 6).
4. "God said, 'Let the waters gather...'" (v. 9).
5. "God said, 'Let the earth sprout vegetation...'" (v. 11).
6. "God said, 'Let there be luminaries in the heavenly sky...'" (v. 14).
7. "God said, 'Let the waters teem with swarms of living creatures...'" (v. 20).
8. "God said, 'Let the earth bring forth living creatures...'" (v. 24).
9. "God said, 'Let us make a human...'" (v. 26).
10. "God said, 'Behold, I have given you every seed bearing plant...'" (v. 29).

About the 10th utterance there is some dispute. There are opinions that this is not an utterance as there is no explicit act of creation occurring. If this is not the tenth then the tenth utterance is to be found in the second account of creation, "God said, 'It is not good for man to be alone....'"¹⁰ Though at first glance, it may seem that it is something of a problem that this utterance does not appear in the account of the first six days of creation (where the 32 *Elokim* are found). But, upon further contemplation it becomes clear that this verse, though appearing in the second account of creation, is implicitly part of the creation in the sixth day, since it deals with the creation of Eve from Adam, the female of the human species from the male. The simplest way of understanding the relationship between the second account of creation and the first account is that the second account elaborates on particular parts of the first, without providing an explicit time-reference.

In the *Zohar*, we find a different enumeration from the Talmud.¹¹ The *Zohar* does not regard the first verse as an utterance and instead starts with "God said, 'Let there be light'" and ends with, "God said, 'It is not good for man to be alone....'"

In all, we have seen 3 different enumerations of the Ten Utterances. Let us call them Talmud₁, Talmud₂, and *Zohar*. Now let us consider the differences between them.

First, since all 32 pathways (*Elokim*) are found in the first account, it makes more sense that the Ten Utterances should all be found in the 6 days of the first account. Given this line of reasoning, Talmud₁ makes more sense than Talmud₂. In either case though, we have the first three utterances corresponding to the head (smaller circle, with diameter 3) of our figure. The first three utterances are found in the account of the first and second day of creation.¹² The next 7 utterances make up the body and are found in the third, fourth, fifth, and sixth day of creation (2, 1, 1, and 3 in each day, respectively).

However, recall that the first account of creation uses only 21 of the 22 letters of the Hebrew alphabet (the letter *samech* is missing).¹³ But, in Talmud₂ and the *Zohar*, the 10th utterance is found in the second account of creation, which does include the letter *samech* thus ensuring that all 22 letters encircle the seven final utterances. Of course, using a

more exact value of π , we know that the circumference would actually be between 21 and 22 (~21.99, as above). For this intermediate value to be suggested, in our context it would mean that both Talmud₁ and Talmud₂ are correct. Indeed, the sages teach us that whenever there is a dispute between two opinions in Torah, they are both true, “these and these are the words of the living God.” Were it not for both opinions being true (21 or 22 letters surrounding the 7 final utterances), we would not have an allusion to the exact value of the circumference being between 21 and 22!¹⁴

Since the circumferences (10, 22, and 32) correspond to the instances of “*Elokim*,” let us now look at how many “*Elokim*” encircle, as it were, the utterances. Looking at Talmud₁ and Talmud₂, we find that until the end of the 2nd day, which includes the first 3 utterances, there are 9 “*Elokim*.” But, since the upper circle has a diameter of 3 (utterances) and a circumference of 10 (“*Elokim*”), we are actually short one “*Elokim*.” Where is the 10th “*Elokim*”?

A first possibility calls upon the principle stated above that whenever there is a dispute between two Rabbinic opinions or sources, both are true. We can therefore apply the *Zohar* enumeration, which includes the first verse of the account of the third day—“God said, ‘Let the waters below the heaven be gathered to one place and dry land shall be seen,’ and so it was.” We now have one additional “*Elokim*” bringing our total to 10 “*Elokim*” in the verses up to and including the first 3 utterances.

A second possibility involves looking more closely at the account of the third day of creation. For some reason, God did not complete the creation of the waters in the second day. Rather, its completion was left for the first half of the third day. For this reason, the conclusion of the second day’s account is lacking the phrase “God saw that it was good.” Instead this phrase appears twice in the third day’s account, once right after the completion of the water-works and once again at its end. Indeed, it is quite clear then that this phrase, “God saw that it was good,” actually belongs to the second day’s account, bringing our total to 10 “*Elokim*.”

A third possibility relies entirely on the *Zohar* enumeration. If we count the instances of “*Elokim*” included in and between the first 3 utterances (from light to the waters) we will find that there are exactly 10 of them. But, there are 2 additional instances of *Elokim* that precede even the creation of light: “In the beginning God created...” and “And God’s spirit hovered over the surface of the water.”¹⁵ We may therefore conclude that these 2 earlier *Elokim* actually belong to the 22 *Elokim* that surround the larger, bottom circle of diameter 7. Why then do they precede even the 10 *Elokim* of the smaller circle? The answer is that this symbolizes the important Kabbalistic concept that the root of the seven lower *sefirot* is actually higher than the root of the 3 intellectual *sefirot*. As noted

earlier, even though the 10th utterance appears in the second account of creation, it is implicitly a part of the 6th day of creation!

Powers of π

So far, we have been studying the first power of π , i.e., π^1 . Let us now look at the higher powers of π .

$\pi^2 = 9.869604\dots$ To 3 digits, we can approximate this number with 987. 987 is the 16th love number (Fibonacci number), resulting in a surprising relation between π and the golden section.

The most relevant verse in the Torah whose value is 987 is “Today you are leaving, in the month of the spring”¹⁶ (הַיּוֹם אַתֶּם יֹצְאִים בְּחֹדֶשׁ הָאָבִיב) describing the exodus from Egypt. The Exodus from Egypt marks the victory over Pharaoh, whom we saw earlier symbolizes the circumference of the circle that was conquered as it were by Moshe’s staff. We also saw that “Pharaoh” (פֶּרַעֲוֹה) and “year” (שָׁנָה) both equal 355, the circumference in our best approximation of 355/113. 113, as we saw, is equal to the filling of the word “day” (יּוֹם וְאוֹ מִסָּ), the diameter. Indeed, in this verse, the “day” is stressed as conquering Egypt: “Today [!] you are leaving....”

Actually, the closest integer to π^2 is 10. Since the closest integer to π is 3, we have here the ratio of 10:3 that we saw above, the 10 referring to all 10 *sefirot* and the 3 referring to the 3 intellectual *sefirot*, which are considered the inner aspect of all 10 *sefirot*.¹⁷

Now that we have seen so much about π and its derivation from the Torah, the value of its next power, π^3 is astonishing. $\pi^3 = 31.006274\dots$, very close to 31, the value of God’s Name, Kel (אֱלֹהִים)! Recall that 31 was the second value in our approximation of π using limits and appeared in the verse,

I have appeared to Abraham, to Isaac, and to Jacob by the Name of Kel Shakai, but by my Name, Havayah, I was not known to them.

As the verse states, the Name *Kel Shakai* was revealed to the 3 patriarchs and now we have uncovered new meaning for these words: the cube (the third power, corresponding to the three patriarchs) of π , 31, or Kel (אֱלֹהִים), was revealed to them.

Continuing to the next power, $\pi^4 = 97.409083\dots$ The closest integer to this number is 97, the value of “time” (זְמַן) and the value of Meheitavel (מְהֵיטָבָאֵל), the wife of the final king of Edom, Hadar, listed in Genesis 33. Because Hadar was married, he is considered a rectified king and in Kabbalah symbolizes the beginning of the World of Rectification following the World of Chaos that collapsed and shattered (of each previous, unmarried

king it says “and he reigned... and he died,” but of Hadar it says only that “he reigned” but not that he died). The last two letters of Meheitavel are אַל, whose value, again is 31, the very close integer approximation of π^3 , as above. When we divide the 7 letters of her name into 2 and 5, the values are 45 (מה) and 52 (יטבאל), the secret of the unification of *mah* and *ban*, the archetypal male and female aspects of the light of the Creator in creation. When we divide them into 5 and 2, the values are 66 (מהיטב) and 31 (אל). We have already seen the significance of 31. 66 is the value of the idiom designating God’s eternity, “He was, He is, He will be” (הָיָה הוּא יְהִיָּה), again connecting her with time.

Even more astounding is the next power of π . $\pi^5 = 306.01965\dots$, whose closest integer (very close) is 306. But, 306 is the value of Hadar and Meheitavel together (הַדָּר מְהֵיטְבָאֵל). So we have here a progression from אַל to מְהֵיטְבָאֵל to הַדָּר מְהֵיטְבָאֵל! 306 is also the value of “woman” (אִשָּׁה). One of the meanings of Hadar is “to surround.” When Hadar’s name is added to his wife’s name, together they become the circumference of the wife alone (the diameter), giving new meaning to the Chassidic notion that the husband belongs, and is contained, in a sense, in his wife.¹⁸

The final power of π we will look at is $\pi^6 = 961.38902\dots$, or 961. Of course, because $\pi^6 = (\pi^3)^2$ it follows that $961 = 31^2$. 961 is also the *gematria* of the names of the first family of mankind, Adam, Eve, Cain, Abel, and Seth (אָדָם חַוָּה קַיִן הָבֶל שֵׁת) and the value of the first Jewish family, Abraham, Sarah, and Isaac (אַבְרָהָם שָׂרָה יִצְחָק). Whereas the first human family did not merit to be chosen by God to create a holy nation, Abraham’s family did merit founding the Jewish people. Thus, whereas the value of Adam’s family and Abraham’s family are the same, Adam’s family is said to equal the value of “no” (לֹא) squared, while Abraham’s family is said to equal the value of “Kel” (אֵיל) squared!¹⁹ Thus, it is Abraham’s family that represents the final state of perfection of the union of Hadar and Meheitavel, the symbols of the World of Rectification, as above.

To conclude, let us point out a couple of preliminary observations about the series of integers closest to the powers of π :

3 10 31 97 306 961

First, note that the sum of the last 3 numbers is 1364, which is $31 \cdot 44$, the sum of the first 3 numbers.

Next, note that by skipping 1 in the series we have the numbers 3, 31, and 306 whose sum is 340, one more than 3 times 113. The alternate numbers in the series are then 10, 97, and 961 whose sum is 1068, or 3 times 356, one more than 355. Thus, the ratio of 1068 to 340 is 3.1411764..., as we would expect, quite close to the ratio of 355 to 113.

Indeed, the ratio of 1068 to 340 can be reduced to 267 over 85. 267 is the value of “chariot” (מְרֻכָבָה), while 85 is the value of “circumcision” (מִילָה), alluding to the fact that

once he had performed his circumcision, Abraham became a chariot, i.e., a carrier of the Divine Presence.²⁰

Ratios that Approximate π

We have seen a number of different ratios that approximate π . Let us look at them together:

1:3
7:22
106:333
113:355

We have already noted the very interesting fact that the sum of the 2nd and 3rd approximations gives the fourth, most exact one. Explicitly, $7 \cdot 106 = 113$ and $22 \cdot 333 = 355$!

But now, let us concentrate on the right side alone. Elsewhere,²¹ we have explained that the secret of God commanding Moshe to “come to Pharaoh”²² (בֵּא אֶל פַּרְעֹה) is to give Moshe the power of the Mashiach to redeem the Jewish people, since the sum of the value of “come” (בֵּא), 3, and the value of “Pharaoh (פַּרְעֹה), 355, is 358, Mashiach (מָשִׁיחַ)! Indeed, 3 is the first number on the right side and 355 is, as noted, the sum of 22 and 333, the next two numbers. Thus, the first three numbers on the right side allude to the command “come to Pharaoh,” again recalling all that we have said about Pharaoh as a symbol of the circumference of the circle and the natural world, which by definition is curved.

Now, if we add the final value on the right side, 355, our total will come to 713, which is the *gematria* of *teshuvah* (תְּשׁוּבָה), meaning “return to God.” As Maimonides says, at the termination of the exile, we will do *teshuvah* and immediately be redeemed.²³ The coming of Mashiach is dependent only on *teshuvah*.

In our present context this implies that even our knowledge of nature depends on *teshuvah*. As explained in the introduction to our study of π , nature and our physical reality are curved, thereby necessitating our knowledge of π in order to know it properly. But, π is a transcendental number so knowing it perfectly is impossible.²⁴ As such, π represents our inability to truly understand nature and its laws.²⁵ Still, everything we have seen about π is meant to convince us that the secret of π will be revealed to those who seek God. Likewise, the secrets of nature will be revealed to us as we exercise our true ability to seek and find the Creator, and especially as He has concealed Himself within nature. The search for the unknowable part of π is vicariously the search for the Divine, the Infinite, in nature. This search will reach a fruitful

conclusion once we do *teshuvah*, once we decide to fully return to God and realize that nature can only be understood through the wider lens of the Torah and therefore necessitates the unification of science with Torah.²⁶

The sum of the four integers on the left is 227, the value of “blessing” (בְּרָכָה), suggesting an influx of blessing that enters the circle of our *teshuvah*. The ratio of 713 (*teshuvah*) to 227 (blessing) is almost 3.141. Just a drop more added to *teshuvah*—a small additional effort to return to the Almighty—will bring the ratio exactly to π . This additional drop of *teshuvah* alludes to the need for even the *tzadikim*, even the most righteous individuals alive today, to return to God, as stated in the *Zohar* and as explained in length in Chassidut.

1. There are 8 synonyms for “beauty” in Hebrew, see *The Art of Education*, pp. 246ff. In Modern Hebrew, the synonym most often used is this one, יָפִי. Note that this synonym’s value is 100 and it can be understood as an acronym for the phrase “10 times 10” (יָפִי עֲשִׂים יָ), a truly beautiful example of self-reference!

2. Job 28:7.

3. See *Tikunei Zohar* 22 (68b): “The supernal crown is the completion of the 50 gates of understanding, and it is the one that was not given to Moshe, and of it speaks the verse, ‘The path that no bird of prey knows’” (Job 28:7). And of it, it is said, “That which is wondrous to you, do not investigate.” See *Pardes Rimonim* 12:3.

4. The highest level of the crown is the ultimate origin of the transcendental numbers (like π), who appear in the World of Action. See note 24, below.

5. The sages debate whether the Torah was written in ancient Hebrew script (*ktav ra’atz*, or *da’atz*) or in block script (*Ashuri*). In the ancient Hebrew script, the *samech* is not shaped like a circle. Their conclusion is that the Torah was given to Moshe in block script, requiring that the inside of the letter *samech* (and the final *mem*, shaped like a square) miraculously float in the tablets of the covenant. See in length in Harav Kasher’s *Torah Shleimah*, v. 21 and see our class from *Tevet*, 5769 on the topic.

6. Genesis 2:13.

7. *Avot* 5:1.

8. *Rosh Hashanah* 32b.

9. *Rashi* explains that we know the heavens and earth were created by God’s speech from another verse, “With God’s word the heavens were created” (Psalms 33:6).

10. Genesis 2:18. Note that the Name of God used in this verse is the full *Havayah-Elokim*, not just *Elokim*.

11. *Zohar* III, 11b-12a. There the Talmud draws a correspondence between the Ten Utterances and the Ten Commandments. See also *The Art of Education*, pp. 237ff.

12. According to the Talmud, the first three utterances are “In the beginning,” “Let there be light,” and “Let there be a firmament.” These three correspond to the basic Kabbalistic model of creation introduced by the Arizal, referring to light, water, and firmament (אֵמֶר).

13. Noted in *Bereisheet Rabbah* 17:6. See *Zohar* I, 35a.

¹⁴. See *loc. cit.*. The sages there state that the first *samech* in the Torah is to be found in the verse, “God cast a deep sleep upon man and he slept. He then took one of his sides and closed (וַיִּסְגֵר) the flesh in its place” (Genesis 2:21). Yet, there are two earlier instances of the letter *samech* in the description of the four primordial rivers, “The name of the first [river] is *Pishon*, it is the one that encircles (הַסֹּבֵב) the entire land of *Chavilah*... And the name of the second river is *Gichon*, it is the one that encircles (הַסֹּבֵב) the entire land of *Kush*.” (Genesis 2:11). Why are they ignored? One reply is that these instances appear in what is merely a description, not an act of creation.

Given our analysis, we can add that indeed the *samech* in “closed” (וַיִּסְגֵר, referring to Eve’s creation) is indeed an extension of the Tenth Utterance (“God said, ‘It is not good for man to be alone, I will make him a compatible helper’”) and therefore truly completes the 22 letters that make up the circumference of the seven utterances. Moreover, as noted many times, in the circle, the circumference represents the feminine while the diameter represents the masculine. It is only fitting therefore that the letter *samech* (ס), whose shape is that of a circle should be introduced in the creation of the feminine.

¹⁵. Genesis 1:2.

¹⁶. Exodus 13:4.

¹⁷. As explained by the *Rashash*.

¹⁸. This idea is related in the famous story told by the Alter Rebbe, the founder of Chabad. He once heard his wife say to a friend of hers, “*Meiner zogt...*” (Mine says), referring to her husband as “mine.” The Alter Rebbe was deeply moved by this, saying, “If by one commandment that I perform I become my wife’s [the commandment to be fruitful and multiply], how much the more so that I belong to God whose myriad commandments I perform.”

¹⁹. Indeed, if we sum the *gematrias* of the three patriarchs (אַבְרָהָם יִצְחָק יַעֲקֹב) the four matriarchs (שָׂרָה רַבֵּקָה רָחֵל לֵאָה) and the 12 tribes (רְאוּבֵן שִׁמְעוֹן לֵוִי יְהוּדָה יִשְׁשָׁכָר זְבֻלוֹן דָּן נַפְתָּלִי גָד (אֲשֶׁר יוֹסֵף בְּנֵימִין)), we find that it is $4900 = 70^2$, where 70 is the value of “yes” (בָּן).

²⁰. See *Rashi* to Genesis 17:22.

²¹. See our lecture from the 4th of Shevat, 5767.

²². Exodus 7:26, 9:1, and 10:1.

²³. *Hilchot Teshuvah* 7:5.

²⁴. The value of an irrational number can also never be known exactly. Still, irrational numbers are not as transcendental as is π , for example. Modern mathematics identifies 4 types of numbers: natural numbers (including positive and negative integers), rational numbers, irrational numbers, and transcendental numbers. These four types correspond to the Four Worlds, as follows:

numbers	World	example
natural	Emanation	-1, 0, 1
rational	Creation	$\frac{1}{2}$
irrational	Formation	$\sqrt{5}$
transcendental	Action	π, e

Intuitively, we might have been inclined to think that the transcendental (as their name seems to imply) belong in the highest World, the World of Emanation. But, the principle of this model is

that “the higher something is, the lower it descends.” So it is exactly because of their unique transcendence that the transcendental numbers descended down to the World of Action.

²⁵. Referring to the previous note, it becomes clear that our inability to know π affects our ability to understand the natural world, the World of Action. For this very reason, we cannot fully comprehend the laws of nature.

²⁶. For more on this, see our upcoming (Hebrew) volume on the unification of Torah and Science.