בס"ד

π

In a number of *Mishnayot* learnt this week the relationship between the circumference of a circle and its diameter is mentioned. In mathematics, this relationship is defined by an irrational constant (3.14159…). The Greek letter *Pi* (π) has been popularised due to its adoption to represent that value.

Having a mathematic and engineering background, the adoption of three in the *Mishnah* and *Gemara* had been at first surprising. Matters are further complicated as the *Gemara* (*Eiruvin* 14a) brings a *pasuk* from *Melachim* (1 7:23) in support of this position:

> And [*Shlomo Ha'Melech*] made the pool of cast metal ten *amot* from rim to rim circular all around and five *amot* was its height and a line of thirty *amot* would encircle it all around.

The *Rambam* (*Eiruvin* 1:5) notes that *Pi* is irrational and cannot be known. He adds that in his time $^{22}/_7$ (3.1429…) was the well accepted approximation. The *Rambam* explains that since the number is irrational the *Chachamim* took a large figure, the nearest integer, as a satisfactory approximation.

In this manner, the *Rosh* (*Teshovot* 2:19) answered the *Rashba's* question of why it was necessary to bring a *pasuk* in support of a matter than can be solved scientifically. He explains that the source was required to teach that an approximation of three is sufficient for legal matters. In fact the *Aruch Ha'Shulchan* (*Orach Chaim* 363:22) rules that this is indeed a divine decree that three is used for all legal questions.

Conversely, the *Tashbetz* (1:165) explains that the *Chachamim* did have accurate approximations and used them for practical applications. Nonetheless they followed the principle that "One should always teach his student in a brief manner" (*Pesachim* 3b) and the approximation of three achieved this end.

A person shared with me an insight in the name of the Vilna Gaon on this issue. The source brought for the relationship being three is from the *Yam Shel Shlomo*; a 'sea' that was one of the utensils constructed by *Shlomo Ha'Melech* in the *Beit Ha'Mikdash*. It is described in two places in *Tanach*: in *Melachim* (1 7:23) and *Divrei Ha'Yamim* (2 4:2). In *Melachim* however there appears to be a 'spelling mistake' - the word for line (קַו) is written קוה. In other words the line that is taken and multiplied by three, as stated in the *pasuk*, is distorted. Taking the numerical value (*gematria*) of קוה (111) and dividing by the numerical value of קו (106) and then multiply by three as stated, the result is 3.141509... far more accurate than $^{22}/_7$ that I grew up with![1]

To be honest I do not remember the conclusion and I have since heard different endings from the above exercise. Nonetheless, it appears to support everything stated above. The *Navi* is conveying that the value 3 is suitable for all intents and purpose – whether for teaching alone or even practical applications. Nonetheless we find, albeit encoded, a far more accurate value that aligns so perfectly with the meaning of the text. It appears to be recognition that three, or any other such value adopted for practical purpose, is just an approximation.[2]

Yisrael Yitzchak Bankier

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[1] Note that engineers use approximation to four or five decimal place.

[2] As an aside the Guinness record for reciting the digits of Pi from memory is 67,890 taking him 24 hours and 4 minutes. *Baruch sh'natan Torah l'amo Yisrael!*

Revision Questions

אהלות י"א:ד' – י"ב:ח'

- Regarding a case where a person is leaning out the window of a house over a *kever*, when is the ruling debated and when does everyone agree that the *tumah* is transferred into the house? (י"א:ד')
- Which other case is debated in a similar manner? (י"א:ה')
- Which further case that is similar to one referred to in the previous question is debated in a similar manner? (י"א:ו')
- What are the four opinions regarding a house where a dog that ate a *kezayit* from a corpse died and lay on the threshold of the house? (י"א:ז')
- How long after the dog ate the meat is it no longer a question? (י"א:ז')
- Regarding the previous question, what is the law regarding fish and birds? (י"א:ז')
- Explain the debate regarding the *chadut*, *menorah* and *chafisa*? (י"א:ח')
- In which case is there now debate? (י"א:ח')
- What is the law regarding *keilim* on the rim of the *chadut*? (י"א:ט')
- What is the law if *tumah* is found on the rim of the *chadut*? (י"א:ט')
- What is the law regarding *keilim* in the walls of the *chadut* if *tumah* is found in the house? (Include all three cases.) (י"א:ט')
- What is the law regarding *keilim* resting on a plank of wood that is placed over a new oven if *tumah* is found underneath the overhanging plank? (י"ב:א')
- How does the law change if the oven was old? (י"ב:א')
- What is the law regarding a case where a *srida* is placed tightly over an oven and *tumah* is found beneath the overhanging part? Inside the *tanur*? (י"ב:ב')
- Explain the debate regarding a case where a plank of wood is placed over an oven and only overhangs on two opposite sides and *tumah* is found under on side? (י"ב:ג')
- Explain the debate regarding a *b'tach*? (י"ב:ג')
- Explain the debate regarding a *sandel shel arisa*? (י"ב:ד')
- What is the law if regarding a case where the planks of wood on the first floor and the roof are spaced an aligned with on another of *tumah* is found on the ground floor? The first floor? The roof? (י"ב:ה')
- How would the law differ if the places in the roof aligned with the spaces left by the planks on the first floor? (י"ב:ה')
- What are the minimum dimensions of a round and square plank such that it can act as an *ohel*? (י"ב:ו')
- What must the circumference of a pillar (lying on its side) be such that *tumah* is transferred if it is found underneath (but not squashed by) the pole? (י"ב:ז')
- Explain the debate regarding a *kezayit* from a corpse that is found stuck to the threshold. (י"ב:ח')
- What is law if it stuck to the outside of the lintel? (י"ב:ח')

Local Shiurim

Sunday -Thursday
After maariv
Mizrachi Shul

Friday & Shabbat
10 minutes before mincha
Mizrachi Shul

Next Week's Mishnayot…

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	שבת קודש
9th August ט"ט אב	10th August כ' אב	11th August כ"א אב	12th August כ"ב אב	13th August כ"ג אב	14th August כ"ד אב	15th August כ"ה אב
Ohalot 13:1-2	Ohalot 13:3-4	Ohalot 13:5-6	Ohalot 14:1-2	Ohalot 14:3-4	Ohalot 14:5-6	Ohalot 14:7-15:1