

Pi and the Bible

The Problem :

Many non-Christians are fond of denying the veracity of the Bible, through its implicit assertions about the geometric constant, π .

π is the ratio of the circumference (C) to the diameter (D) of a circle.

In Euclidean geometry, Pi is the same for all circles, big or little;

$$\pi = \frac{C}{D}$$

$$\pi = 3.14159\dots$$

The issue is centered on II Chronicles 4:2, where Solomon is having built, a metal vessel. In the description of its structure, the Bible provides dimensions, describing the circumference and the diameter of the circular vessel. Taking the explicit ratio of those numbers gives a value of precisely 3.0 for π .

For the non-Christian in particular, this discrepancy (3.0 vs. 3.14159) is significant in refuting the stature, reliability, and even honesty of the Scriptures.

Here are three translations of II Chronicles 4:2...

King James Version (KJV):

Also he made a molten sea of ten cubits from brim to brim, round in compass, and five cubits the height thereof; and a line of thirty cubits did compass it round about.

Good News Bible (GNB):

He also made a round tank of bronze, 7½ feet deep, 15 feet in diameter, and 45 feet in circumference.

New International Version (NIV) :

He made the Sea of cast metal, circular in shape, measuring ten cubits from rim to rim and five cubits high. It took a line of thirty cubits to measure around it.

The values C=30 and D=10 (their ratio being 3.0 instead of 3.14159...) do not harm the veracity of the Bible. There are several ways to honestly justify the statement of II Chron. 4:2. Here are two of them...

One Way

Ultimately, these numbers are *measured* quantities. That means they are subject to being quoted with measurement uncertainties. Say for example, that the uncertainty in the circumference measurement was $\pm 5\%$ and the uncertainty in the diameter measurement was also $\pm 5\%$.

Since the circumference measurement and the diameter measurement are independent of one another, the net uncertainty in the ratio, (C/D) would be the root-mean-square of the two uncertainties. That is...

$$\text{RMS uncertainty} = \sqrt{5^2 + 5^2}$$

$$\text{RMS uncertainty} = 7.1\%$$

That means π , the ratio of C/D, has the value, $3.0 \pm 7.1\%$

This last result means that π is somewhere within the legitimate range,

$$2.93 < \pi < 3.21$$

$\pi = 3.14$ fits very nicely within this acceptable range.

Since a 5% uncertainty is quite reasonable for a circumference measurement and for a diameter measurement using a string or cord, the currently recognized value of π seems to be validated by the scriptures.

How could one make a 5% error on the measurement of (C)? Well let's see... Who was there to ensure that the cord was perfectly horizontal while it was being wrapped around the vessel? Who was there to ensure the cord was not being pulled too tightly, thus stretching it? Could the cord have sagged during the measurement? While we're at it, who ensured that during the diameter measurement, the cord passed precisely through the center of the circle forming the vessel? It's not a *diameter*, unless that cord passes directly over the center of the circular vessel.

Come to think of it, 5% uncertainties might just be too small here.

In case you're wondering why this note says a *cord* was used for the measurements, take a look at the word "line" in the KJV version of the referenced verse. Strong's Exhaustive Concordance applies #6957 to this word within the context of that verse. This number (#6957) is cross-referenced to Gesenius' Hebrew-Chaldee Lexicon. According to Gesenius, the word "line" *as used in this verse* is defined as... "a rope... a cord."

Another Way

The scriptures never correlate the dimensions. They do not indicate that the measured diameter corresponded to the inner, or outer girth measurement. Since

II Chron. 4:5 details the thickness of the vessel (at about one "hand") and expresses the volume as 3000 "baths" (the internal measure of the volume of the vessel), there is no information to deny that the circumference of the vessel was measured from the inside surface... and if (X) is the thickness, the inner diameter could easily have been (10 - 2X). The value of Pi would then be,

$$\pi = \frac{30}{10 - 2X}$$

One cubit is equivalent to about 18 inches.

One "hand" is equivalent to a thickness of about 3.5 inches.

So, 30 cubits = 30 x 18 in., or 540 inches

10 cubits = 10 x 18 in., or 180 inches

X = 3.5 inches

Therefore...

$$\pi = \frac{540}{180 - 7} \quad \text{or,}$$

$\pi = 3.12...$ pretty close to 3.14...

Now, let's anticipate the next objection the non-Christian might offer. The description of this metal vessel is not only provided in II Chron. 4:2-5. A similar description is given in I Kings 7:23-26.

In the former reference, the volume of the vessel is given as 3000 "baths," and in the latter, the volume is given as 2000 "baths." Oh no! Another contradiction? Not if you know the history of the period. According to Abingdon's Bible Handbook, there's at least a couple of centuries between the writing of I Kings, and the writing of II Chronicles. Within that period is the overtaking of that region by the Babylonians. It is generally considered that the size of the "bath" unit for measuring volumes, was changed. A similar situation would be if the USA *overran* Canada. The Canadian Dollar would jump in value by 20 - 30%, but would still be called the (US) Dollar.

Conclusion of this Paper:

The Scriptures win again.