Heron of Alexandria


Since 720 has not a rational square root, we shall make a close approximation to the root in this manner. Since the square root nearest to 720 is 729, having a root of 27, divide 27 into 720; the result is 26$\frac{1}{3}$; add 27; the result is 53$\frac{5}{3}$. Take half of this; the result is 26$\frac{5}{6}$ ($=26\frac{3}{3}$). Therefore the square root of 720 will be very nearly 26$\frac{5}{6}$. For 26$\frac{5}{6}$ multiplied by itself gives 720$\frac{1}{36}$, so that the difference is $\frac{1}{36}$. If we wish to make the difference less than $\frac{1}{36}$, instead of 729 we shall take the number now found, 720$\frac{1}{36}$, and by the same method we shall find an approximation differing by much less than $\frac{1}{36}$.