Round 2

The factors must have some order of -2, -1, 1, and 2. Thus, the numbers are 5, 6, 8, and 9. Therefore, the sum is 28.

Round 3

Let r be the radius of the circle and a be the length of a side of the square. Since the area of the circle equals 12.5π square units, we obtain

$$\pi r^2 = 12.5\pi \quad \Rightarrow \quad r^2 = 12.5$$

Now, using the Pythagorean Theorem for the triangle marked in the picture, we obtain

$$a^2 = r^2 + r^2 = 2r^2 = 2 \times 12.5 = 25.$$

So $a = 5$ and the perimeter = $4a = 4 \times 5 = 20$ units.

Round 2 9 gtS:/ 9 H9 c m9B T t 7 79T f WBH/I7B9/AH7 6 H 9 /7I 9 7 A9W9 r e t f t q t 8 IAAAAA9H9H9 8 IAAAA

Round 5

The difference of consecutive squares is an odd number because $(x+1)^2 - x^2 = 2x+1$.

Therefore, the 964 must be the last three digits of the larger square and the last three digits of the smaller square must be either 469 or 649.

Since the rest of the digits are identical, the difference of squares must be either 964 – 469 = 495 or 964 – 649 = 315.

So either $2x+1=495$ or $2x+1=315$. Hence, either $x=247$ or $x=157$.

$247^2 = 61,009$ and $248^2 = 61,504$ do not work.

But $157^2 = 24,649$ and $158^2 = 24,964$ do work.

Therefore, the consecutive squares are 24,649 and 24,964.

Round 6

$\arctan x + \arctan b = 45^\circ \Rightarrow \arctan x = 45^\circ - \arctan b$.

So, $\tan\left(45 \quad \arctan \quad\right) \quad \frac{\tan 45 \quad \tan(\arctan b)}{1 \quad \tan 45 \quad \tan(\arctan \quad)} \quad \frac{1 \quad}{1 \quad}$

Round 8

$1\cdot 2+2\cdot 3+3\cdot 4+4\cdot 5+\ldots+98\cdot 99+99\cdot 100$

$$= (2-1)\cdot 2+(3-1)\cdot 3+(4-1)\cdot 4+\ldots+(99-1)\cdot 99+(100-1)\cdot 100$$

$$= 2\cdot 2-2+3\cdot 3-3+4\cdot 4-4+\ldots+99\cdot 99-99+100\cdot 100-100$$

$$= \left(2^2+3^2+4^2+\ldots+99^2+100^2\right)-\left(2+3+4+\ldots 99+100\right)$$

$$= \left(\qquad \right) \quad ($$