From the diagram, we can see:

- $a^2 + b^2 = r^2$
- a+1 = r
- r+a = 2b

Let's rewrite the third equation as b = (r+a)/2.

Next, substitute that for b in the first equation:

$a^2 + (\frac{r+a}{2})^2 = r^2$

Let's rewrite the second equation as a = r-1.

Next, substitute that for a in the equation two steps back.

$(r-1)^2 + (\frac{r+r-1}{2})^2 = r^2$

$(r-1)^2 + (\frac{2r-1}{2})^2 = r^2$

r^2-2r+1 + ($4r^2$-4r+1)/4 = r^2

r^2-2r+1 + r^2-r+1/4 = r^2

r^2-3r+5/4 = 0

Using the quadratic formula, r = 5/2 or ½. The only viable solution is 5/2.

We can go back to the formulas at the beginning to get:

a = r-1 = 2.5 -1 = 1.5

b = (r+a)/2 = 4/2 = 2

The side of the square is 2b = 4. The area of the square is b^2 = 4^2 = 16