1. $\boxed{125}$
2. $\boxed{24}$
3. We want to know how we can make sets with these four different colored marbles. We can make $C(4,1) = 4$ sets of just one marble, $C(4,2) = 6$ sets of two marbles, $C(4,3) = 4$ sets of 3 marbles, and $C(4,4) = 1$ set of all four marbles. So there are $4 + 6 + 4 + 1 = \boxed{15}$ sets.
4. There are 9 1×1 squares, 4 2×2 squares, 1 3×3 squares, 4 $\sqrt{2} \times \sqrt{2}$ squares, and 2 $\sqrt{5} \times \sqrt{5}$ squares (one in each direction). So there are $9 + 4 + 1 + 4 + 2 = \boxed{20}$ squares.
5. $\boxed{72}$
6. There are 2 people in the first generation, 6 people in the second, 36 in the third, and 216 in the fourth. So there are $2 + 6 + 36 + 216 = 260$ people in the family tree, and half of them is $\boxed{130}$.
7. $\boxed{420}$
8. $\boxed{45}$
9. $\boxed{20}$
10. $\boxed{15}$