1. $\boxed{34}$

2. $\boxed{15}$

3. The even positive integers are an arithmetic sequence with $e_1 = 2$ and a common difference of 2. This gives us $e_n = 2 + 2(n-1) = 2 + 2n - 2 = 2n$. Plug in $n = 171$ for the 171st even positive integer to be $e_171 = 2(171) = 342$.

   The odd positive integers are an arithmetic sequence with $o_1 = 1$ and a common difference of 2. This gives us $o_n = 1 + 2(n-1) = 1 + 2n - 2 = 2n - 1$. Plug in $n = 219$ for the 219th odd positive integer to be $o_219 = 2(219) - 1 = 437$.

   The difference between the two is $437 - 342 = \boxed{95}$.

4. (a) $\boxed{6,\ 11,\ 16,\ 21,\ 26;\ a_n = 6 + 5(n-1) = 5n + 1}$

   (b) $\boxed{72,\ 66,\ 60,\ 54,\ 48;\ a_n = 72 - 6(n-1) = 78 - 6n}$

   (c) $\boxed{0.375,\ 0.625,\ 0.875,\ 1.125,\ 1.375;\ a_n = 0.375 + 0.25(n-1) = 0.25n + 0.125}$

5. $\boxed{d = 2, a_1 = 7}$

6. (a) $\boxed{a_1 = 5, d = 3}$

   (b) $\boxed{5,\ 8,\ 11,\ 14,\ 17}$

   (c) $\boxed{62}$

   (d) $\boxed{a_{100}}$

7. Let the two numbers be x, y with $x < y$ and the common difference be d. Then our arithmetic sequence is $64, x, y, 27$.

   From this we get a system of three linear equations:

   $$\begin{cases} x - 64 = d \\ y - x = d \\ 27 - y = d \end{cases}$$

   Solving for this system, we get $d = -\frac{37}{3}$ and $\boxed{(x, y) = (51\frac{2}{3}, 39\frac{1}{3})}$.

8. $\boxed{590}$

9. $\boxed{23}$

10. This is an arithmetic sequence with $a_1 = 5100$ and $d = 75$. Then $a_n = 5100 + 75(n-1) = 5025 + 75n$. If we let $a_n = 7200$, then n will be the year at which the worker will be earning the maximum salary.

$$\begin{aligned} 7200 &= 5025 + 75n \\ 2175 &= 75n \\ n &= 29 \end{aligned}$$

This means in his 29th year he will be making the maximum salary so it takes the worker $\boxed{28}$ years to earn this salary.