1. Let's look at the sequence for a pattern:

$$\begin{aligned} a_1 &= 2 \\ a_2 &= 2+2=4 \\ a_3 &= 4+4=8 \\ a_4 &= 8+6=14 \\ a_5 &= 14+8=22 \\ &\vdots \end{aligned}$$

Notice that we can get the following for a_5:

$$\begin{aligned} a_5 &= 22 \\ &= 14+8 \\ &= 8+6+4+4 \\ &= 8+6+4+2+2 \end{aligned}$$

And for a_4:

$$\begin{aligned} a_4 &= 14 \\ &= 8+6 \\ &= 6+4+4 \\ &= 6+4+2+2 \end{aligned}$$

The pattern shows that $a_n = 2+[2+4+6+\cdots+2(n-1)] = 2+2[1+2+3+\cdots+(n-1)]$. We can plug in $n=100$ to get:

$$\begin{aligned} a_{100} &= 2+2[1+2+3+\cdots+99] \\ a_{100} &= 2+2\left[\frac{99(100)}{2}\right] \\ a_{100} &= 2+9900 = 9902 \boxed{\text{B}} \end{aligned}$$

2. $\boxed{\text{C}}$

3. $\boxed{\text{B}}$

4. $\boxed{\text{B}}$

5. $\boxed{\text{A}}$

6. $\boxed{\text{A}}$

7. $\boxed{\text{B}}$

8. The difference between each a_{k-1} and a_k is a constant, call it m. Then we know that $a_7 = a_4 + 3m, a_{10} = a_4 + 6m$, giving us $3a_4 + 9m = 17$.

   The second equation can similarly be changed into $11a_4 + 55m = 77$. We can now solve this system of equations to find $a_4 = \frac{11}{3}, m = \frac{2}{3}$. We can show that $a_k = a_4 + (k-4)m$ similarly to how we changed all of our a_n into linear combinations of a_4, m. Now plugging in all the information we have:

$$\begin{aligned} 13 &= \frac{11}{3} + \frac{2}{3}(k-4) \\ 39 &= 11 + 2(k-4) \\ 39 &= 11 + 2k - 8 \\ 39 &= 3 + 2k \\ 36 &= 2k \\ k &= 18\ \boxed{\text{B}} \end{aligned}$$

9. There are three different cases for which we can obtain 1 from our expression:

   Case 1: $x^2 - x - 1 = 1$.

$$\begin{aligned} x^2 - x - 1 &= 1 \\ x^2 - x - 2 &= 0 \\ (x-2)(x+1) &= 0 \\ x &= \boxed{-1, 2} \end{aligned}$$

   Case 2: $x + 2 = 0$. This obviously gives us $x = \boxed{-2}$.

   Case 3: $x^2 - x - 1 = -1$ AND $(x+2)$ is even. We first solve the quadratic and see which solutions give us $(x+2)$ even:

$$\begin{aligned} x^2 - x - 1 &= -1 \\ x^2 - x &= 0 \\ x(x-1) &= 0 \\ x &= 0, 1 \end{aligned}$$

   However, plugging them in we see that only $x = \boxed{0}$ gives us $(x+2)$ even.

   This is a total of 4 integers. $\boxed{\text{C}}$

10. Since the roots of $x^2 + ax + 2b = 0$ are both real, this means that the discriminant, $a^2 - 8b$ is nonnegative. In other words $a^2 \geq 8b$. Similarly, the roots of $x^2 + 2bx + a = 0$ are both real so $4b^2 - 4b \geq 0$ or $b^2 \geq a$.

    We can combine these inequalities if we first show $a^4 \geq 64b^2$ from squaring the first inequality and $64b^2 \geq 64a$ from multiplying the second inequality by 64.

    This gives us $a^4 \geq 64b^2 \geq 64a$.

    Using the fact that $a^4 \geq 64a$, we get that $a \geq 4$. If $a = 4$ then $b = 2$, satisfying all of the conditions. Then the minimum value for $a + b = 6$. $\boxed{\text{E}}$