Intuition

Let X = "AA", Y = "BB", and Z = "AB". If we have taken any of the three strings, what are the different possibilities for next string? List every possible case (there are 333 choices of both previous and current string so total 3×3=93 \times 3 = 93×3=9 cases are possible)

Current	Next	String	IsPossible
X	X	AAAA	0
X	Y	AABB	1
X	Z	AAAB	0
Y	X	BBAA	1
Y	Y	BBBB	0
Y	Z	BBAB	1
Z	X	ABAA	1
Z	Y	ABBB	0
Z	Z	ABAB	1

1. If we took X before, then we can take Y

2. If we took Y before, then we can take X or Z

3. If we took Z before, then we can take X or Z

State transition diagram for these strings will look like:
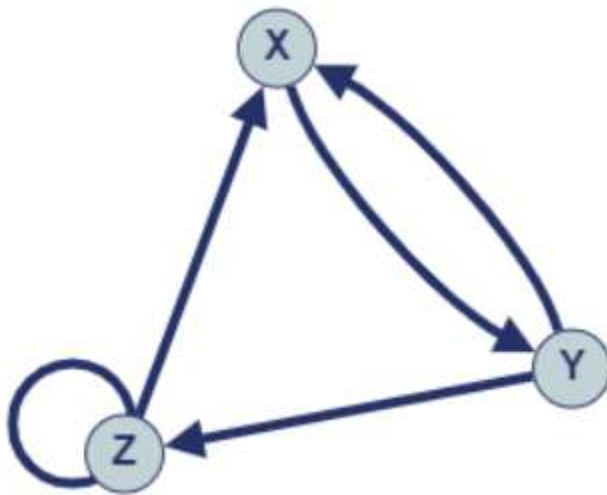
(Gives me feels of Automata)

Since Z has a self-loop, we can take Z as much as we want continuously (or as much as it is available). So, take all Zs together anytime. Now problem lies with X and Y.
With the graph, it is clear that to maximize the take of X and Y, we can alternatively take XYXYXY... or YXYXYX....

So, we have 3 cases now: x=y$x = y$x=y, x>y$x > y$x>y, and x<y$x < y$x<y.

Case 1: x = y

Optimal approach will be take all Zs together first.
From last Z, we can go to X, so take XYXYXY...XY then.

String: "ZZZ...Z XYXYXY...XY"

answer = 2 * (z + x + y)

Case 2: x > y

Optimal approach will be take all Zs together first.
From last Z, we can go to X, so start taking XYXYXY... as much as we can.
Since $x > y$, there will be a point after taking the last pair of XY (or y^{th} pair), where all Ys will be exhausted but some X will remain. At this point we can take another X at last.

String: "ZZZ...Z XYXYXY...XY X"

answer = 2 * (z + y + y + 1)

Case 3: x < y

Take all Zs together first.
From last Z, we can go to X, so start taking XYXYXY... as much as we can.
Since $x < y$, there will be a point after taking the last pair of XY (or x^{th} pair), where all Xs will be exhausted. At this point, we can't do anything as we are standing at Y. But some Y are still remaining. So, we could have taken one Y at the very beginning, then we could have taken all Zs and XY pairs.

String: "Y ZZZ...Z XYXYXY...XY"

answer = 2 * (1 + z + x + x)

Approach

Case 2 and 3 can be merged together by

answer = 2 * (2 * min(x, y) + z + 1)

Case 1 can also be merged, since min(x, y) = x = y for x = y

answer = 2 * (2 * min(x, y) + z + (x != y))

Complexity

- Time complexity: O(1)

- Space complexity: O(1)