Challenge 6 – Properties of Regular Languages

A team is considering the implementation of a recognizer of the strings belonging to specific sublanguage cases of the language Lcp = $\{a^{c+pi} \mid i \geq 0$ and c, p are positive integers$\}$ where c and p represent constant values (e.g., a specific case of Lcp is the language L23 = $\{a^{2+3i} \mid i \geq 0\}$). They are now verifying if it is possible to implement the recognizer of specific language cases of Lcp with DFAs.

(a) Does any of the specific cases of Lcp satisfy the pumping lemma of regular languages? How? If so, can you conclude based on the results of the pumping lemma that any specific case of Lcp can be represented by a DFA?
(b) Can any specific case of Lcp be represented by an FA? Justify your answer (you can use the L23 example).
(c) Can the Lcp language be represented by an FA? Justify your answer.