Question 17 **(6 marks)**

Speed cubers are people who try to solve the Rubik's cube as quickly as possible by using pre-learned algorithms (sequences of turns). Knowing more algorithms has the potential to result in faster solution times. A speed cuber aims to learn the full ZBLL algorithm set, consisting of 493 algorithms.

Assume that the total number of ZBLL algorithms learnt, A, can be modelled by the equation

$$A(t) = b\log_4(t+1) + c$$

where t is the time in weeks since learning commenced, and b and c are constant parameters.

(a) Determine the parameters b and c, given that the speed cuber already knows 21 of the ZBLL algorithms (at $t = 0$) and learnt an additional 32 algorithms by the end of the first week. (3 marks)

(b) Determine how many of the ZBLL algorithms the speed cuber will have learnt after 26 weeks. (1 mark)

(c) Based on the assumed model, will the speed cuber learn the entire ZBLL algorithm set within their lifetime? Justify your answer. (2 marks)