Q. Give a formula to predict the running time of a program for a problem of size N, when doubling experiments have shown that the doubling factor is 2^b and the running time for problems of size N_0 is T.

A. Given,
$f(N_0) = T$, where f(N) is running time of algorithm with input size N

Also, given that
$f(2N) = 2^b \cdot f(N/2)$

Therefore, $f(2N_0) = 2^b \cdot T$
or, $f(2^a \cdot N_0) = 2^{ab} \cdot T$

Now, let $N = 2^a \cdot N_0$
$\implies N/N_0 = 2^a$
$\implies f(N) = T \cdot (N/N_0)^b$