1) 5 pts - take off 1 pt per mistake cap at 0.

2) 5 pts - take off 1 pt per mistake cap at 0.

3) 8 pts - 4 pts for rewriting exponent, 3 pts for reducing via Fermat, 1 pt for final answer mod 2099.

4) 8 pts - 3 pts for finding phi, 3 pts for rewriting exponent, 2 pts for final answer

5) 10 pts - 2 pts phi, 6 pts extended Euclidean, 1 pt for -17, 1 pt to map to 343.

6) 12 pts - 6 pts logic of which values are a1, a2 and so on. 3 pts for deriving 23, 25 and 27. 3 pts for exponentiating these and getting the right answers.

7) 6 pts - 2 pts for each value

8) 5 pts - 0 pts for no answer, 2 pts for yes, 3 pts for reason

9) 10 pts - 2 pts per test case (36, 1000000000000, 100000000282, 4238764530, 123456789)

10) 10 pts - 2 pts per test case (100000000283 and 5 - yes, 197 and 101 - no, 197 and 102 - yes, 999966000289 - not prime, 999983 and 123456 - yes)

11) 10 pts - 3 pts observation for primitive root, 7 pts completing proof

12) 6 pts - 2 pts for each

13) 5 pts - all or nothing if they got it or not.