What is computational/critical

Computational thinking is simply working out how to do something or:

'The ability to think logically about a problem and apply techniques for solving it'

Critical thinking is the ability to think clearly and rationally, understanding the logical connection between ideas or:

'The analysis of facts to form a judgment *or evaluation of factual evidence.*'

Both are closely related to the skill of designing algorithms which can be turned into computer programs

Task 1

There are many ways of solving a problem, including:

- simulation
- enumeration – list all cases
- trial and error
- theoretical approach
- creative solution

a. Which of the methods listed above could you use to find the cube root of 729?

   (i) Write down the answer (what is the cube root of 729)?

   (ii) Write down the steps you took to find the answer

b. What method(s) could you use to estimate the probability of throwing a double six with two dice?

c. Add up all the numbers between 1 and 50. What method of solution did you use?

d. On a computer network, if two devices using the same line try to transmit at exactly the same time, a “collision” occurs. The network detects the collision and both transmissions are discarded. Can you think of a solution to this problem? Which of the problem-solving methods is applicable?

e. Scientists working at Bletchley Park on the Enigma code during WWII eventually managed to decode the secret messages sent by the Germans, even though the “key” was changed daily. What problem solving techniques do you think would be effective in cracking what was supposed to be an “uncrackable” code?

f. Environmental scientists want to study the effects on the rabbit population in a particular area if a cull of foxes is carried out. What problem-solving method could be applied?

Task 2

This is an example of the ***Decrease and Conquer*** strategy.

A group of 10 Venture Scouts are stranded on a small island, a short distance from the mainland. Two small boys are playing on the shore in a very small rowing boat, which is only big enough to hold either the two boys or one Venture Scout.

How can all the Venture Scouts reach the mainland and leave the boys and their boat together on the island?

How many trips does the boat make from one shore to the other?

What is the answer in the general case of n Venture Scouts?

Task 3

You are lost in a jungle, walking along a narrow path. You come to a T-junction, and you are aware that one way leads out of the jungle to safety, the other to a snake infested area and almost certain death. There are two tribesmen at the T junction, and you have been informed that one of these men will always answer a question truthfully, the other will always lie. What question will you ask?

Task 4

Write an algorithm to allow the user to enter an integer number for the number of paper bags, and a second integer (which must be greater than the first) for the number of sweets. The program then tells the user whether it is possible to put an odd number of sweets in each bag.