

# Teaching Abstraction in Computer Science to 7<sup>th</sup> grade students

Department of Science Teaching

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## Pre-test

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### Question 1: Concepts

A list of concepts follows. Write a short explanation for each one.

If the concept is not familiar, write X.

<b>Concept</b>	<b>Explanation</b>
algorithm	
initialization	
message passing	
condition	
loop / repetitive run	
output	

## Question 2

Assume that you work in a computer environment in which performing arithmetic operations is difficult (that is, it takes a long time for the computer to perform division, multiplication, addition, subtraction, etc.). Moreover, as the numbers become bigger, it takes longer to perform the operation (for example, calculating  $108/9$  will take more time than calculating  $108/2$ ). Now suppose you are given a program, A, which works in this environment efficiently and quickly and solves the problem of division by 7. That is, the program receives a number and responds "yes" if the given number is divisible by 7 and "no" if it is not. For example, program A will respond "yes" if it receives the number 28 or the number 21. However, it will respond "no" if it receives the number 20.

Describe a program, B, which quickly solves the problem of division by 14. That is, program B will respond "yes" if it receives the number 28, whereas for the numbers 21 and 20 it will respond "no". Program B is allowed to use program A.

### Question 3

A sequence of instructions follows:

1. Stand at the origin and turn to the north (up)
2. Carry out 3 times the following instructions:
  - 2.1. Move 10 steps
  - 2.2. Turn right

(a) If you carry out these instructions, you will follow a path that results in a particular form. What is it?



(b) Modify the sequence of instructions so that the path obtained will be a square.



(c) Write a sequence of instructions that results in a rectangle.

