Learning Computer Science Concepts in Scratch

Department of Science Teaching

Weizmann Institute of Science

Pretest

General questions

1. Grade _____

2. Do you surf the Internet? Yes/No

3. Do you play computer games? Yes/No

4. Have you ever written a computer program? Yes/No.
   If Yes, in which language? _____

5. Are you a member of a social network? Yes/No. If Yes, which one? _____

6. Which software applications do you use? _____

7. What do you use the computer for? Check all that applies

   1. listening to music;
   2. watching films;
   3. downloading files

8. Do you participate in a computer club? Yes/No. If yes, where?
   _____

9. Do you think that you will choose to study computer science in high school? Yes/No

Concepts

Here is a list of concepts. Write a short explanation of each one.

If the concept is not familiar, write X.

Concept	Explanation
algorithm	(multi understanding)
initialization	(multi understanding)
variable	(multi understanding)
input/output	(multi understanding)
loop / repetitive run	(multi understanding)
condition	(multi understanding)
event	(multi understanding)
function	(multi understanding)
message passing	(multi understanding)
concurrency	(multi understanding)

Question 1

There are three playing cards laid out in a row on a table; each card is labeled with a number. You are given the following sequence of instructions:

1. Compare the number on the left-hand card with the number on the center card
2. If the number on the left-hand card is greater than the number on the center card

    2.1. exchange the two cards

3. Compare the number on the center card with the number on the right-hand card
4. If the number on the center card is greater than the number on the right-hand card

    4.1. exchange the two cards

(a) (multi applying) On the table are the following cards:

| 24 | 2 | 15 |

Describe the state of the cards after you carry out the instructions:

| | | |

(b) (relational understanding) What is the purpose of the sequence of instructions?

Question 2

Here is a sequence of instructions:

1. Stand at the origin
2. Turn left
3. Carry out 10 times:

    3.1. Move 5 steps

4. Turn right
5. Carry out 10 times:

    5.1. Move 5 steps

6. Turn right
7. Carry out 10 times:

    7.1. Move 5 steps

(a) (multi applying) If you carry out these instructions, you will follow a path that is the form of some letter in English. What is it? (You can also draw the path.)

(b) (multi creating) Add more instructions at the end of the list so that the path obtained will be a square.

Question 3

Two groups of kids are competing in a relay race. There are 10 kids in each group. Each one runs to the other side of the yard and back, and hands over the baton to the next kid. It takes 5 minutes for each kid in the first group to run back and forth, and 7 minutes for each kid in the second group to run back and forth. The first group consists of Mark followed by Mary followed by Dan. The second group consists of Eli followed by Molly followed by Steve. See the following diagram:

starting line   finish line

forward

Dan   Mary   Mark

back

Steve   Molly   Eli
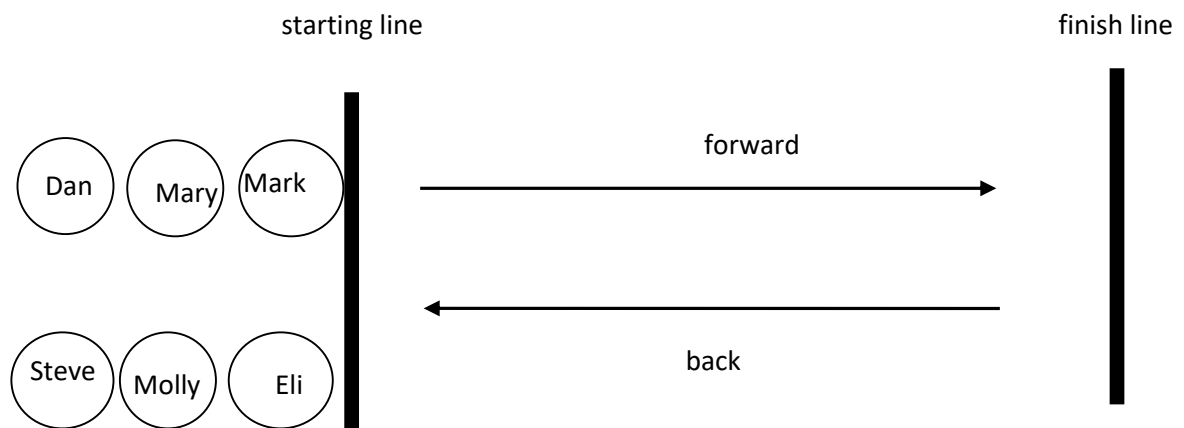
(a) (uni understanding) Whose turn is it to run after Mary's?

(b) (uni understanding) Molly's turn comes before whose turn?

(c) (multi applying) How much time will pass until it is Dan's turn?

(d) (multi applying) How much time will pass until all members of the first team finish?

(e) (multi applying) How much time will pass until all members of the second team finish?

(f) (relational applying) How much time will the whole race take?

(g) (relational applying) What will happen if Mary loses the baton while she is running?