iCompute

Grades: 4,5
Team Size: 1-2 competitors
Duration: 55 minutes (includes 5-10 minutes for instructions)
Supervisors: Krish Narayanan & Pasupathi Narayanan

Summary Description

Participants will be tested on the following.

- Knowledge of basic computer concepts, including hardware and software
- Understanding of how computers solve problems
- Ability to create a simple program using a graphical interface

Concepts Covered

There are three sections on the test. The following describes each section with the knowledge area italicized.

1. Multiple-choice questions on *computing basics* - hardware, software, programming languages, networks, etc.
2. Short answer question(s) on *theoretical computing* - binary, algorithms, pseudocode, flowcharts, decomposition of problems, etc.
3. Exercise on *practical computing* – creation of a program for a given task.

4. Fourth and fifth graders will both need to know similar concepts, but fifth graders will be expected to make programs that are slightly more complex.

Rules/Competition Format

All instructions for the test will be presented to the teams on a computer. Section A and B will be completed on paper. Only section C will be completed on a computer. Paper and pencil will be provided for the second section. The following rules will be followed at all times.

- Each team will have access to one computer.
- Participants are not allowed to use any other program or website during the competition.
- Each team will be provided with writing instruments.
- Participants are not allowed to bring any electronic devices.
- Participants will not be expected to read or write code in a traditional programming language, such as Java, Python, C++.

Scoring

Total Score: 50 points
Breakdown:

- Section A - 5 multiple-choice questions, 2 points each
  - Each response will either get a score of 0 or 2.
- Section B - 2 short answer questions, 5 points each
  - The questions will be broken down into parts with individual points assigned. Each response will get a score based on whether it addresses all parts of the question.
- Section C - One programming activity using Scratch offline editor, 30 points total, based on the following breakdown:
  - 10 points for a correct algorithm that uses proper programming constructs
  - 10 points for a working program
  - 5 points for attention to precision
  - 5 points for creativity and/or efficiency (tiebreaker)

Tie Break Criteria

Creativity and/or efficiency of the Scratch program

Materials Distributed by WESO

None

Additional Materials useful for practices

The following website includes a wealth of resources to help prepare for iCompute.

http://emunix.emich.edu/~krish/iCompute/

Materials to be brought to competition

none

****No cell phones or smart watches are allowed in event rooms. Participants who bring those items will be asked to leave them with the event supervisor for the duration of the event. Participants observed using them during the event will be disqualified.**

Additional Resources/References

http://www.scratch.mit.edu

The latest desktop version of Scratch (3.29) will be used at the event.

Event Questions

Please go to https://wesoscience.org/events/ for information on how to submit questions about this event.

Sample Questions

Section A

1) What is the name of the unit that helps store data in a computer?
   a. CPU
   b. Input
   c. Memory
   d. Output
2) This provides a step-by-step procedure for performing a task.
   a. Keyboard
   b. Algorithm
   c. Internet
   d. Windows
3) Which one of the following is not a programming language?
   a. Java
   b. HTML
   c. C++
   d. Binary

Section B

1) Convert 234 from decimal to binary.
   a. Show your steps for conversion. (3 pts.)
   b. Write the final answer and circle it. (2 pts.)
2) The following is the algorithm for a certain task.
   i. Add *age1* and *age2*. Store result in *x*.
   ii. Add *age3* and *age4*. Store result in *y*.
   iii. Add *age5* and *age6*. Store result in *z*.
   iv. Add *x*, *y*, and *z*. Store result in *total*.
   v. Print *total* divided by 6.
   a. Explain in a sentence or two what this algorithm is doing. What is the final result it is computing (3 pts.)
   b. If age1=3, age2=5, age3=8, age4=5, age5=9, and age6=1, execute the 5 steps in this algorithm using these values. (2 pts.)
3) You are given a bag full of coins - pennies, nickels, dimes, and quarters. You have to sort them into four boxes, each holding one type of coin only. So, the first box should have all pennies, the second all nickels, and so on. Draw a flowchart for this activity. Keep in mind you can take only one coin at a time and place it in the appropriate box before you pick another one.

Section C

1) Using Scratch, create a program that makes an actor bounce around on the screen. The actor should start on the top, left corner of the screen and move to each corner in a circular fashion. The actor should spend at least 3 seconds in each corner. Finally, the actor should stop in the center and say, “I’m done going around!”.

2) Using Scratch, create a program that says a joke. Use any two actors of your choice and make them act out the following joke. Include a backdrop for the stage and play music in the background.

Knock, knock.
Who’s there?
Canoe.
Canoe who?
Canoe help me with my homework?

3) Using Scratch, create a program that will accept a value between 0 and 100. This value represents a temperature. The program should suggest an activity based on the temperature, per the following criteria:

Temperature	Activity
0-39	Skiing
40-59	Golf
60-79	Tennis
80-100	Swimming