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CS 139 Activity – Exploring Algorithms Individual NOTE SHEET

Content Objectives: At the conclusion of this activity students will be able to:

- Identify the four structures of an algorithm
- Evaluate an algorithm for the 5 properties of a good algorithm
- Write a simple algorithm that adheres to the 5 properties

Roles for this activity – Choose these from among your group.

- **MANAGER**: Keep the group on task.
- **RECORDER**: Write the group consensus on your worksheet. This is the worksheet that will be turned in.
- **PRESENTER**: Write the group consensus on the board and be prepared to explain.
- **REFLECTOR**: Watch the process of working through the exercise. Complete the Exit Pass. If this person is not on your team, the Recorder should fill in the exit pass with input from the others.

PART 1 – What is an algorithm?

Read the instructions for making Jello that you find on the last page of this packet.

This is an example of an algorithm.

The instructions that you made for guiding the characters through the maze yesterday were also algorithms.

Discuss with your team and then write down your own definition of what an algorithm is?

An algorithm is:

STOP HERE!

PUT ALL of the worksheets into the folder. We will finish this activity next week.

PART 2 – Examine an algorithm

Read the algorithm for making Jello and then answer the questions that follow:

1. **BOARD** - There are four kinds of statements in the Jello algorithm: action, decision, repetition, and reference (referring to an outside instruction). For each type of statement (use A, D, R, X for action, decision, repetition, and reference respectively) provide one example from the algorithm. On the board, list each type of statement and then the line number of that example. Prop the board when done for instructor review.

A-action

D-decision

R-repetition

X-reference

2. The following questions relate to the quality of this algorithm.
   a. Are there any steps that have more than one action associated with them? If so, which one(s).

   b. Are there any unnecessary steps? If so, which one(s).

   c. Are there any steps that are not clear (are ambiguous or could be interpreted in more than one way? If so, which ones(s).

d. Will this algorithm complete? In other words, can you get to the point of serving the Jello. If not, where can it go wrong?

e. Will this algorithm make Jello (it is correct)?

f. Are there any steps in which we abstract a step (refer to the detail located somewhere else)? If so, which ones?

3. The following questions relate to the quality of the printing algorithm that you find at the end of this packet.
   a. Are there any steps above that have more than one action associated with them? If so, which one(s)?

   b. Are there any unnecessary steps? If so, which one(s)?

   c. Are there any steps that are not clear (are ambiguous or could be interpreted in more than one way? If so, which ones(s)?

   d. Will this algorithm complete? In other words, can you get to the point of printing to the printer. If not, where can it go wrong?

   e. Will this algorithm correctly print a document on the printer (it is correct)?

   f. Are there any steps in which we abstract a step (have the detail located somewhere else)? If so, which ones?

4. In your own words, what makes a good algorithm? In the box below, write down the characteristics of the good algorithm.

A good algorithm ….

PART 3 – Wrap up, clean up.

Recorder, make sure that your worksheet has the consensus answers. Put that into the folder on the right hand side.
Manager, make sure that someone from your team erases your section of the white board.

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Algorithms:

Jello Directions

1. Get a medium sized bowl
2. Get a one or two cup measuring cup
3. Choose the box containing the flavor of Jello that you want
4. Open the Jello box
5. Remove the interior packet from the box
6. Open the packet
7. Empty the packet contents into the bowl
8. Measure a cup of water
9. Heat the cup of water in the microwave until boiling (about 2 minutes)
10. Empty the water into the bowl with the Jello
11. While the Jello is not dissolved (about 2 minutes)
    a. Stir the Jello
12. Add 1 cup of cold water to the Jello
13. If you want to mold the Jello
    a. Choose an appropriately sized mold
    b. Spray the inside of the mold with non-stick spray
    c. Pour the Jello from the bowl into the mold
14. Place the container with the Jello into the refrigerator
15. While the Jello is not set (about 4 hours)
    a. Leave the Jello in the refrigerator
16. If you are ready to serve the Jello
    a. If you put the Jello in a mold
        i. Unmold the Jello *
    b. Serve

* This step is described elsewhere in more detail

Directions for using the printer from room 248

1. Hit the print button.
2. Go to the printer to the left of the door to the lab.
3. Find your workstation number in the list of workstations displayed on the monitor.
4. Your workstation id is found on the monitor at your workstation. Write this down if you can't remember it.
5. Swipe your JAC card.
6. But only after you have chosen the item to print.
7. If you don't have enough money on your JAC card, you need to go to the DART machine in the basement of HHS and put more money on. Printing costs .05 per page.