B1.1

Approaches to computational thinking

CHAPTER ASSIGNMENT · 33 MARKS

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from *Computer Science for the IB Diploma*, 1st edition (2025), Paul Baumgarten, Ioana Ganea, Carl Turland (Hachette Learning), for classroom use.

Review Questions — Problem Specification (p. 283)

1. Identify three stakeholders in a technical shop selling gaming consoles, games and IT equipment.

2. Define the term "stakeholder".

3. Define the term "problem specification".

4. State three possible constraints and limitations when considering developing a computational solution for a school.

5. In your school, identify those operations that have already been computerized; those that might be computerized soon; and those that are unlikely ever to be computerized.

6. For those activities you have identified as being already computerized at your school (for question 5), identify the inputs and outputs of the system.

7. Identify three reasons why there is a need to formulate a problem statement precisely.

Review Questions — Computational Thinking Concepts (p. 288)

1. Identify three examples of abstraction in Computer Science.

2. Define the term "decomposition".

3. Outline the algorithm for making a cup of tea.

4. Outline an area where computational thinking is used in Computer Science.

5. Define the term "algorithm".

6. Research the bubble sort algorithm. Outline the steps for this algorithm.

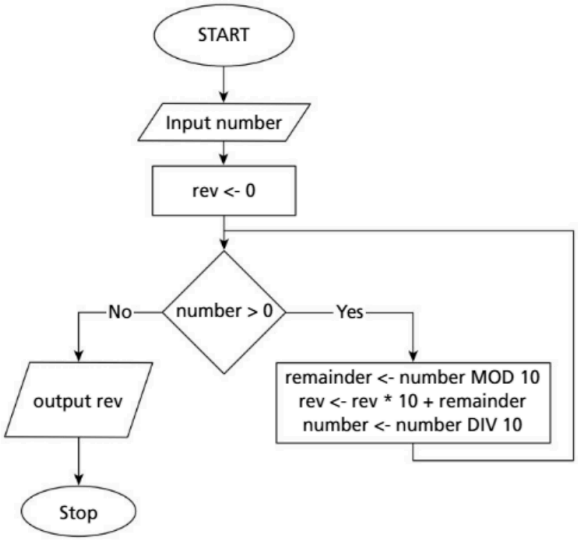
7. Research the swap puzzle activity and try to outline an algorithm to solve it in as few steps as possible.

Review Questions — Flowcharts (pp. 291–292)

1. Draw a flowchart that would represent a solution for the following problem:
   "Initialize a total to zero. Ask the user to enter 50 integer numbers, add the positive numbers to the total and count how many negative values were entered. Output the total and the count value."

2. Research the insertion sort algorithm. Draw a flowchart for this algorithm.

3 Consider the following flowchart.



(a) Research the role of the MOD and DIV functions. Trace the flowchart to find the output for the number 3452 and for the number 1760.

Input: 3452

number	rev	number > 0	remainder	output

Input: 1760

number	rev	number > 0	remainder	output

(b) Use pattern recognition to predict the output for the number 453453554651.

(c) Identify the purpose of the algorithm.

(d) Identify a problem with this algorithm.

Linking Questions (p. 293)

1. How is pattern recognition used to identify different types of traffic flowing across a network? (A2)

2. How are the concepts of computational thinking used in code when designing algorithms? (B2)

Exam Practice Questions (p. 293)

1. Define the term "computational thinking" and outline its role in problem solving. [3]

2. Outline the role computational thinking techniques like decomposition and abstraction play in software development. [4]

3. Identify three items that should be included in the problem specification and define one of them. [4]

4 Explain how pattern recognition can be used in data analysis, machine learning and database design. [6]

5 A teacher is asking 30 students how long they spend each day reading. The students will specify this duration in minutes and hours, for example 1 hour and 20 minutes. The teacher wants to write an algorithm that will output their input in minutes only.

(a) Identify the input, process and output required for this algorithm. [3]

(b) The teacher wants to create a ranking and send to parents the list of students in descending order based on their time spent reading books. Outline the steps required (the algorithm) to complete this task. [3]

(c) Identify two stakeholders involved in this process. [2]

(d) To keep their personal details anonymous, the teacher decides to create a username for each student. The username is made of the last two characters of their first name and the first three characters of their last name.

(i) The first student's name is Sam Sung. State the corresponding username. [1]

(ii) Draw a flowchart to outline the creation of usernames for the 30 students. [4]

(iii) Explain one limitation of this algorithm and propose a better one. [3]

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/ib-computer-science/b1-1-computational-thinking/