

## THEME B: COMPUTATIONAL THINKING · B1.1

**Approaches to computational thinking**

Original practice questions · 33 marks · about 50 minutes · covers B1.1.1–B1.1.4

**Instructions.** Answer all questions. The maximum mark for this paper is [33 marks]. The marks available are shown in brackets. Parts badged **HL** assess higher level only content; standard level students may leave these out.

**1****Total: 6 marks**

A school wants software that allocates each student to one of its after-school clubs. Every student submits three choices. Each club has a maximum number of places.

- (a) State **two** things that a problem specification should contain. [2]

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- (b) Construct an input specification and an output specification for this system. [4]

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**2****Total: 6 marks**

The developers apply the fundamental concepts of computational thinking to the club allocation problem.

- (a) Describe what is meant by decomposition. [2]

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- (b) Describe what is meant by abstraction. [2]

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- (c) Outline how pattern recognition would help the developers of this system. [2]

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The developers must now turn the problem into something they can build.

Explain how decomposition and abstraction would each be applied when designing the club allocation system.

**[5]**

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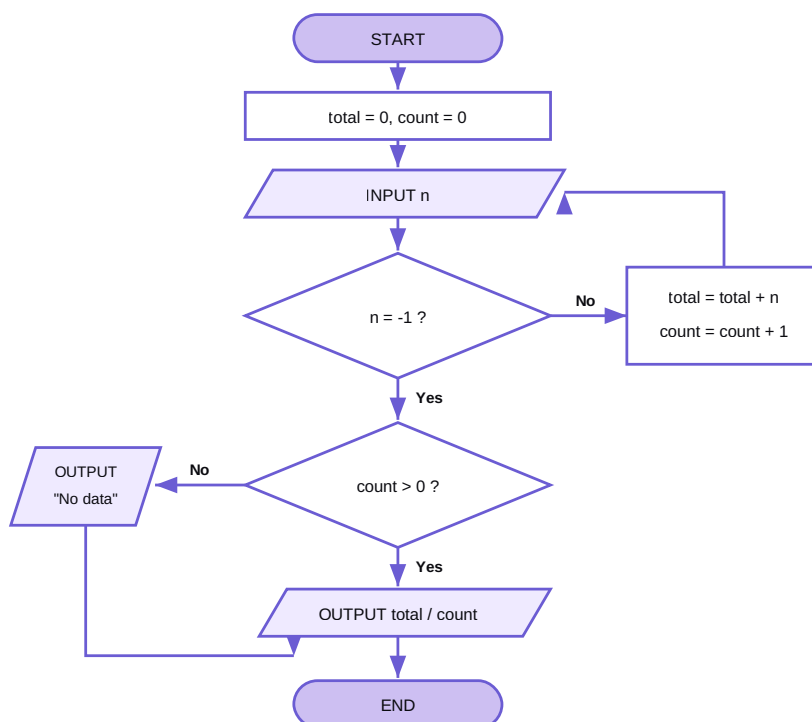
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Figure 1 shows a flowchart for a different algorithm. The user enters a series of whole numbers, ending with  $-1$  to stop.

Figure 1: flowchart for the algorithm



(a) Identify the flowchart symbol used to represent a decision. [1]

(b) Copy and complete the trace table for the inputs 8, 5, 2,  $-1$ . The first row is done for you. [4]

| n | total | count | output |
|---|-------|-------|--------|
|   | 0     | 0     |        |
|   |       |       |        |
|   |       |       |        |
|   |       |       |        |
|   |       |       |        |

(c) State the value that the algorithm outputs. [1]

(d) State what the algorithm outputs if the very first value entered is  $-1$ , and explain why. [2]

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5

Total: 4 marks

Flowcharts use a set of standard symbols.

(a) State the purpose of the connector symbol. [2]

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(b) Outline **one** reason for drawing a flowchart before writing the code. [2]

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6

Total: 4 marks

It is often said that computational thinking does not necessarily involve programming.

Explain this statement, referring to **one** real-world example. [4]

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END OF QUESTIONS