# 2.1 Algorithms: 10-minute Pack

OCR J277 · Calculators not allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** A systems analyst is designing a new algorithm to calculate a student's average test score.

**(a)** State two ways in which an algorithm can be represented, other than by using a written description in ordinary sentences. **(2)**

**(b)** Identify one advantage of using a flowchart, rather than pseudocode, to represent an algorithm. **(1)**

**(Total for Question 1 is 3 marks)**

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**2** A student is asked to write a program to help organise a school's sports day.

**(a)** State two sub-problems the student could identify by decomposing the problem 'organise a school's sports day'. **(2)**

**(b)** Explain, using this scenario, what is meant by 'abstraction' when designing an algorithm. **(2)**

**(Total for Question 2 is 4 marks)**


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**3** Two algorithms both correctly sort the same array. One algorithm sorts the array in place, while the other creates a new array during sorting.

**(a)** State which of these two algorithms is likely to use more memory, and explain your reasoning. **(2)**

**(Total for Question 3 is 2 marks)**


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# Mark scheme · 2.1 Algorithms: 10-minute Pack

## Question 1

(a) flowchart **B1**

(a) pseudocode (accept structured English) **B1**

**(a) Answer: Flowchart; pseudocode.**

(b) a valid advantage, e.g. it shows the flow/structure/logic of the algorithm visually, making it easier for people who cannot yet read code to follow (oe) **B1**

**(b) Answer: A flowchart shows the structure and flow of the algorithm visually, so it can be understood by people without programming knowledge.**

## Question 2

(a) any valid sub-problem, e.g. scheduling the order/timing of events **B1**

(a) any different valid sub-problem, e.g. assigning students to house teams, or recording race results, or allocating equipment **B1**

**(a) Answer: Example sub-problems: scheduling the events; recording and ranking race results.**

(b) abstraction means removing details that are not relevant to solving the problem (oe) **B1**

(b) a relevant example applied to the scenario, e.g. ignoring the weather forecast and focusing only on event times and participant lists (oe) **B1**

**(b) Answer: Abstraction means ignoring details that are not needed to solve the problem, such as ignoring the weather forecast for the day and focusing only on the information needed to schedule events and record results.**

## Question 3

(a) the algorithm that creates a new array (e.g. merge sort) is likely to use more memory **B1**

(a) because it needs additional storage for the new array as well as the original, whereas an in-place algorithm reuses the original array's memory (oe) **B1**

**(a) Answer: The algorithm that creates a new array uses more memory, because it needs space for both the new array and the original, whereas an in-place algorithm reuses the same memory throughout.**


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