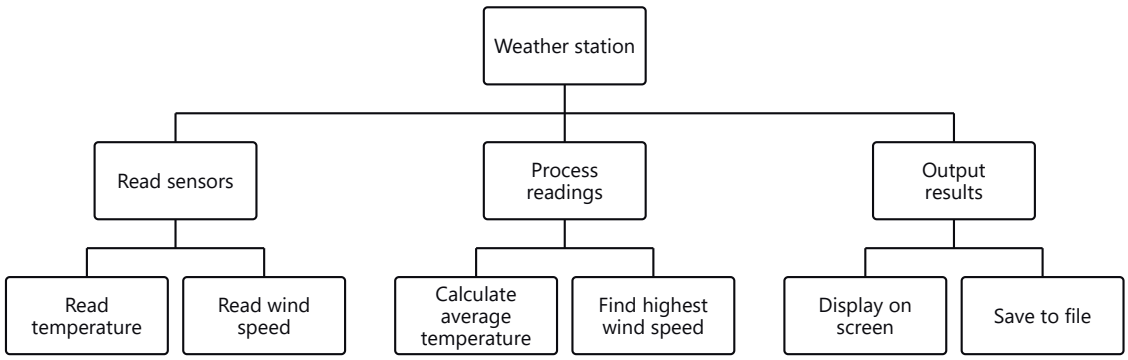
MODULE K ALGORITHM DESIGN · K3

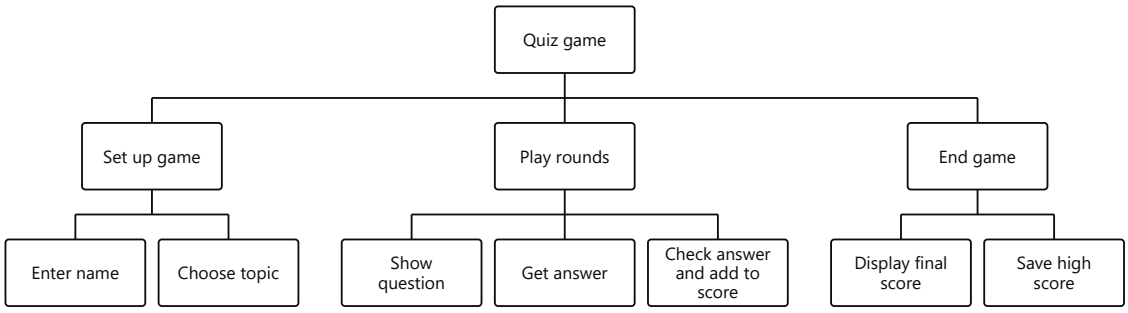
Structure diagrams: mark scheme

21 marks · OCR J277 spec 2.1.2: structure diagrams (produce simple diagrams to show the structure of a problem, subsections and their links to other subsections); identify the inputs, processes and outputs for a problem · 2.1.1: decomposition

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 2.1.2	Top box represents the whole problem: True Each box broken down into sub-problems on the level below: True Diamond-shaped box for each decision: False Records the value of each variable: False	**4**	1 mark per correct row. A row with both boxes ticked scores 0. (Decisions in diamonds belong to flowcharts; variable values are recorded in a trace table.)
2(a) J277 2.1.2	How the problem is broken down / decomposed into smaller sub-problems / subsections / parts The whole problem at the top, with each level below splitting a part into smaller parts // the parts arranged in levels / a hierarchy The links between subsections // which smaller parts belong to which subsection	**2**	1 mark per bullet, max 2. Credit any other valid answer. Do not accept "the order the steps are carried out" / "the decisions" / "the flow of the program" (these describe a flowchart).
3(a) J277 2.1.2	Collect parcel	**1**	Do not accept "Parcel locker".
3(b) J277 2.1.2	The (collection) code (entered by the customer) The parcel label / barcode on the label (scanned by the courier)	**1**	Any one. Do not accept "the parcel" alone, "the locker", or a box name that is not an input (e.g. Open locker door, Send code to customer).
3(c) J277 2.1.2, 2.2.3	Write the code (to open a locker door) as one sub program / procedure / function ... and call / use it from both subsections // from both Deposit parcel and Collect parcel	**2**	1 mark per bullet. The second mark depends on the first. Accept "subroutine" / "module". Do not accept "copy and paste the code".

QUESTION	ANSWER	MARKS	GUIDANCE
3(d) J277 2.1.1	1 mark for a way, 1 mark for the matching explanation: Each programmer can be given a different subsection / box to write … so they can work at the same time / the program is finished sooner Each part is a smaller / simpler problem … so it is easier to write / solve Each part can be tested separately / on its own … so errors are easier to find / fix The diagram shows how the parts link … so the programmers know which parts must work together A part such as Open locker door can be written once … and reused	**2**	Max 2. Only one way is credited: the second mark must explain the way given. Credit any other valid way with an explanation. Do not accept "faster" / "easier" alone with no reason.
4(a) J277 2.1.2	Second-level boxes: Process readings **and** Output results Read wind speed (below Read sensors) Calculate average temperature **and** Find highest wind speed (below Process readings) Display (results) on screen **and** Save (results) to file (below Output results)	**4**	1 mark per bullet. Accept any wording with the same meaning (e.g. "Work out average temperature", "Find maximum wind speed"). The two boxes in a pair may be in either order. Follow through: if the two second-level boxes are swapped, credit each pair placed below the matching box.
4(a) Completed diagram			
5(a) J277 2.1.2	Hierarchical structure: subsections joined by lines below Quiz game, with a further level below them Three subsections for setting up, playing and ending the game (any suitable names) Enter name **and** Choose topic, below the set-up subsection At least two of: show question / get (input) answer / check answer / add 1 to score, below the playing subsection Display (final) score **and** Save high score, below the end-of-game subsection	**5**	1 mark per bullet. Accept Input / Process / Output as the subsection names if the boxes below match the description. Accept a further level (e.g. Check answer split into Compare answer and Add 1 to score). Boxes may be in any order within a level. A flowchart (steps in sequence, decision diamonds) is not a structure diagram: 0 marks.

QUESTION	ANSWER	MARKS	GUIDANCE
5(a) Example answer			

Total: 21 marks