

Solutions

Each answer shows the steps, then the **result**.

2.1

- the purpose is “when does my bus come?”, so keep only what answers that question
- route number, arrival time and stop name are **essential**; the driver’s name and the colour of the bus are **not essential**

2.2 any **three** sensible items, for example:

- the guest’s name (or a guest ID)
- the room number
- the date of arrival
- the number of nights, or the date of leaving

2.3 any **two**, for example:

- add a new booking
- delete (cancel) a booking
- search for a free room on a date
- update the dates of a booking

2.4

- new member → **add a new member’s record**
- a changed phone number → **update a member’s phone number**
- how much the fine is → **calculate the fine for a late book**

2.5

- “Record the results of the races” is the only sub-problem with two smaller jobs inside it, so it is the box with two boxes below it: **A**
- its two parts are “Record the time of each runner” and “Work out the winner of each race”: **C** and **D**, in either order
- “Print the certificates” is the last main job: **B**

2.6

- a **function**
- it gives one value, the winner’s name, back to the program that called it; a procedure does not return a value in this way

3.1

(a) one mark for each item with a justification linked to the purpose:

- the **email address**: needed to send the reminder
- the **date the membership ends**: needed to select the members whose membership ends this month
- the **name**: needed to address the email to the member

(b) any **two**, each with a justification:

- the home address: the reminder is sent by email, not by post
- the date of birth: a member’s age has no effect on the reminder
- the favourite exercise class: it is not used to decide who gets a reminder, or what it says

(c) **abstraction**

3.2

(a) one mark for each sensible module with its use, for example:

- **ReadTicket**: reads the time of arrival from the ticket
- **CalculateCharge**: works out the charge from the time parked
- **TakePayment**: takes the payment from the driver’s card
- **ReturnTicket**: marks the ticket as paid and gives it back

(b) a **function**

(c) any **two** of:

- each programmer can write a different module at the same time, so the program is finished sooner
- each module is small, so it is easier to understand and to write
- each module can be tested and corrected on its own

3.3

(a) the details that are not needed for the problem are filtered out

- so that only the essential details are kept, which gives a simpler model of the system

(b) one mark for **two** sensible items, two marks for **four**, for example: the customer’s name; the delivery address; the phone number; the items ordered; the cost of the order; the time of the order

(c) any **two**, for example:

- add a new order
- calculate the total cost of an order
- update the state of an order, for example to “delivered”
- produce a list of the orders that are waiting

3.4

(a) to remove the details that the module does not need, so that the problem is simpler and the module contains only essential data

(b) the list shows the time, the animal and how to contact the owner, so:

- **essential**: the animal’s name, the owner’s phone number, the date and time of the appointment
- **not essential**: the favourite toy, the colour, the dates of past visits

- one mark for each **two** correct rows

(c) **tomorrow's date** (or today's date): it comes from the computer's clock, and it is used to select the appointments

(d) one mark for each sensible sub-problem with a description, for example:

- make an appointment: store the animal, the date and the time
- cancel or change an appointment
- produce the list of tomorrow's appointments
- search for a free time on a given day

(e) any **two** of:

- a small module is easier to write, to test and to correct than one long program
- a module can be changed later without changing the rest of the program
- a module can be reused, for example "search for a free time" is used when an appointment is made and when it is changed