



## Scenario 1

### Questions 1, 2, 3, 4, 5, 6 and 7

A2Z is a company which specialises in developing new drugs for treating human illnesses. They use a supercomputer in their research.

Daniel works as a publisher for the company and produces a monthly magazine.

The magazine contains articles about the research being carried out both in the laboratories and at research sites around the world.

Daniel employs a number of reporters to write the articles for the magazine. The reporters are expected to gather information from the scientists.

The reporters are provided with a laptop.

Articles may be produced in the offices or while travelling but have to be sent to Daniel in time for publication in both hardcopy and electronic formats.

1 Give reasons why a reporter would use each of these input devices when preparing their articles.

(i) A4 scanner

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(ii) microphone

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2 Describe the limitations of using a laptop for creating an article and sending it to Daniel.

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- Describe how Daniel would do this.

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- 5 The company decides to produce an electronic version of the magazine.  
Discuss the benefits and drawbacks of producing the magazine in electronic format.

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7 (a) Describe what is meant by the term 'supercomputer'.

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(b) Describe how supercomputers are used in drug research.

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## Scenario 2

### Questions 8 and 9

SRCo is a scientific research company that employs a number of skilled technicians to support the scientists in its laboratories. The technicians may work in more than one laboratory depending on the needs of the scientists.

The company has a human resources department that keeps a database. The database stores details of the technicians. The human resources department issues each technician with an identity badge.

Jasmine works in the human resources department where her job is to create a new record in the database and issue a badge to a technician when they join the company.

- 8 (a)** Explain why Jasmine would need to use each of the input devices below when she creates a new record in the database.

**(i)** digital camera

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**(ii)** keyboard

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- (b) (i)** When a database is created, the fields in the database are usually assigned a data type. Explain why it is necessary to assign a data type to a field.

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- (ii) The details of each technician are stored in fields in the database. For each of the fields shown, complete the table to give the **most appropriate** data type and a reason for using that type.

| Details stored in the field in the database | Most appropriate data type used for that field | Reason for using the chosen type |
|---------------------------------------------|------------------------------------------------|----------------------------------|
| Technician's last name                      |                                                |                                  |
| Technician's gender                         |                                                |                                  |

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- (iii) Explain why it is **not** appropriate to use a 'numeric' data type for the field in the database that stores the telephone number of the technician.

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erDiagram
    Technician ||--o{ JobRole : "has"
    JobRole ||--o{ JobTitle : "has"
    JobRole ||--o{ Laboratory : "has"

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The diagram illustrates the following tables and their attributes:

- Technician**
  - technician\_ID (Primary Key)
  - first\_name
  - last\_name
  - gender
  - address
  - city
  - post\_code
  - telephone\_number
- JobRole**
  - technician\_ID (Foreign Key to Technician)
  - date\_start
  - title\_ID (Foreign Key to JobTitle)
  - Lab\_ID (Foreign Key to Laboratory)
- JobTitle**
  - title\_ID (Primary Key)
  - title\_name
  - job\_description
- Laboratory**
  - Lab\_ID (Primary Key)
  - Lab\_name
  - Scientist\_ID

Relationships:

- Technician to JobRole:** One-to-Many relationship. One technician can have multiple job roles.
- JobRole to JobTitle:** One-to-Many relationship. One job title can be held by multiple job roles.
- JobRole to Laboratory:** One-to-Many relationship. One laboratory can have multiple job roles.

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- [6]



**Scenario 3****Questions 10, 11 and 12**

KemCo is a chemical company that develops, manufactures and markets fertilizers for growing crops.

Colin, the marketing manager, uses computer-based financial models to assess whether or not the company should develop, manufacture and market a new fertilizer.

The manufacturing process of the fertilizer is monitored and controlled by microprocessors.

Once the fertilizer is ready to sell, Colin uses primary and secondary marketing techniques to help him market the fertilizer.



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- The diagram illustrates a microprocessor-controlled chemical reactor system. A rectangular box on the left is labeled "Microprocessor". It is connected by lines to three components: a circular "Valve to let in more alkali" located below a funnel-shaped "Hopper with alkali" (which contains black dots representing alkali); a "Temperature sensor" and a "pH sensor" (represented by vertical bars with circular tips) submerged in a "Vessel with fertilizer"; and a "Heater" (a rectangular box) also submerged in the vessel. The vessel contains several black dots representing fertilizer. The entire setup is shown in a cross-sectional view.

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**Question 12 is on the next page.**

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