

9 Databases

Name: _____ Class: _____ Date: _____ **Total: 27 marks**

KEY WORDS record • field • primary key • database • query

Objective

Build the skills to answer exam questions on a **single-table database** : records, fields, data types, a primary key, validation, and SQL queries using SELECT, FROM, WHERE, ORDER BY, AND, OR, SUM and COUNT.

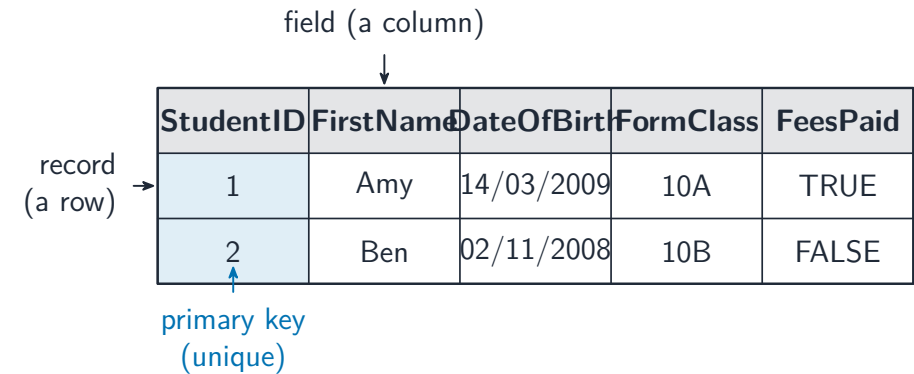
You must be able to:

- choose a field, a data type and a primary key for a table
- write and read a single-table SQL query
- list the rows a query returns

1 Key knowledge and worked examples

■ The table

A **database** is an organised store of data. At IGCSE the data is in one table.



One row is one record; one column is one field

- A **record** is one row: all the data about one thing.
- A **field** is one column: one fact that every record has.

text	a name
number	an age
date/time	a birthday
boolean	yes / no

Choose the type that matches the data

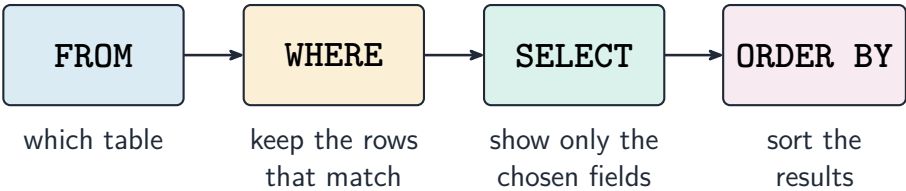
Data type	Used for	Example
text / alphanumeric	letters, digits and symbols	10A
character	one character	M
Boolean	one of two values	TRUE or FALSE
integer	a whole number	42
real	a number with a decimal point	12.50
date/time	a date or a time	14/03/2009

A **primary key** is a field whose value is **unique** in every record. No two rows share it. **BookID** can be a primary key. **Author** cannot, because one author can have many books.

Validation checks that a value is sensible before it is stored, for example a range check on a price.

■ SQL

SQL (Structured Query Language) picks rows out of the table. Read a query in this order: FROM, WHERE, SELECT, ORDER BY.



FROM chooses the table, WHERE keeps rows, SELECT chooses fields, ORDER BY sorts

Keyword	Job
SELECT	which fields to show; * means every field
FROM	which table
WHERE	which rows; join tests with AND or OR
ORDER BY ... ASC	sort smallest or A to Z first
ORDER BY ... DESC	sort largest or Z to A first
COUNT	how many rows match
SUM	add a numeric field

Worked example. Show the title and price of every Orwell book that is in stock, cheapest first.

```
SELECT Title, Price
FROM Book
WHERE Author = 'Orwell' AND InStock = TRUE
ORDER BY Price ASC
```

FROM names the table. WHERE keeps only rows that pass both tests. SELECT shows two fields. ORDER BY Price ASC puts the lowest price first.

2 Practice

Use this Book table.

BookID	Title	Author	Price	InStock
B1	Dune	Herbert	12.50	TRUE
B2	1984	Orwell	8.00	TRUE
B3	Emma	Austen	9.50	FALSE
B4	Animal Farm	Orwell	7.00	TRUE

2.1 State the difference between a record and a field. Use the table. [2]

2.2 Give a suitable data type for Title, Price, InStock and the number of copies of a book. [4]

2.3 Explain why BookID is a suitable primary key and Author is not. [2]

2.4 Complete the query so it shows the title of every book by Austen. [3]

```
SELECT .....
FROM .....
WHERE .....
```

2.5 State the difference between ORDER BY Price ASC and ORDER BY Price DESC. [2]

2.6 State the difference between COUNT(BookID) and SUM(Price). [2]

3 Exam-style questions

3.1 The best primary key for the Book table is: [1]

- ☐ A Author
- ☐ B InStock
- ☐ C BookID
- ☐ D Price

3.2 Write an SQL query that shows the title and price of every book by Orwell that is in stock, with the cheapest book first. [4]

3.3 State the titles returned by this query, in the order shown. [3]

```
SELECT Title
FROM Book
WHERE Price < 10 AND InStock = TRUE
ORDER BY Title ASC
```

3.4 A shop wants the number of books that are not in stock.

(a) Write the SQL query. [3]

(b) State the number it returns for the table above. [1]

Solutions

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

2.1

- a record is one row, such as all the data about Dune
- a field is one column, such as **Author**

2.2

- Title: **text**
- Price: **real**
- InStock: **Boolean**
- number of copies: **integer**

2.3

- every BookID is different, so it identifies one record
- **Author** repeats, so it cannot identify one book

2.4

- SELECT Title
- FROM Book
- WHERE Author = 'Austen'

2.5

- ASC puts the lowest price first
- DESC puts the highest price first

2.6

- COUNT counts the matching rows
- SUM adds the values in Price

3.1 C

- BookID is unique for every book
- Author, InStock and Price can repeat

3.2

- SELECT Title, Price
- FROM Book
- WHERE Author = 'Orwell' AND InStock = TRUE
- ORDER BY Price ASC

```
SELECT Title, Price
FROM Book
WHERE Author = 'Orwell' AND InStock = TRUE
ORDER BY Price ASC
```

3.3

- WHERE keeps 1984 (price 8.00, in stock) and Animal Farm (price 7.00, in stock)
- Emma is under 10 but InStock is FALSE, so it is rejected; Dune is 12.50, so it is rejected
- ORDER BY Title ASC gives **1984**, then **Animal Farm**

3.4

(a)

- SELECT COUNT(BookID)
- FROM Book
- WHERE InStock = FALSE

```
SELECT COUNT(BookID)
FROM Book
WHERE InStock = FALSE
```

(b)

- only Emma is not in stock, so the result is **1**