A-LEVEL COMPUTER SCIENCE • EXERCISE SHEET

8.3 Data Definition Language (DDL) and Data Manipulation Language (DML)

Name: _____ Class: _____ Date: _____ **Total: 25 marks**

Objective

Build the skills to answer exam questions on **SQL** 结构化查询语言—the difference between DDL and DML, and reading and writing simple SQL statements.

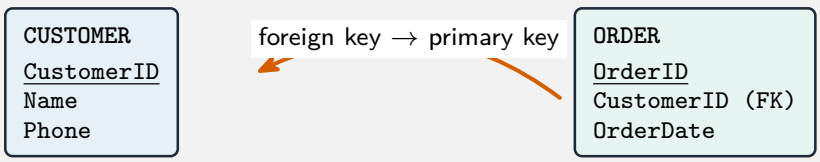
You must be able to:

- explain that the DBMS uses **DDL** to build the structure and **DML** to work with the data
- read and write simple **SQL (DDL)** statements (CREATE, ALTER, DROP)
- write **SQL (DML)** to query or change data in up to two tables

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ DDL or DML?



DDL builds the tables and keys that DML statements then query

SQL has two halves: **Data Definition Language (DDL)** changes the **structure** (tables, keys); **Data Manipulation Language (DML)** works with the **data** (query, insert, update, delete).

■

```
CREATE TABLE Student (
  StudentID INTEGER PRIMARY KEY,
  Name      VARCHAR(50) NOT NULL,
  Year      INTEGER
);

ALTER TABLE Student ADD Email VARCHAR(100);
```

A **foreign key** is declared with `FOREIGN KEY …REFERENCES`:

```
CREATE TABLE Grade (
  StudentID INTEGER,
  Mark      INTEGER,
  FOREIGN KEY (StudentID) REFERENCES Student(StudentID)
);
```

■ **DML —working with the data**

```
INSERT INTO Student (StudentID, Name, Year) VALUES (7, 'Lee', 12);

SELECT Name FROM Student WHERE Year = 12 ORDER BY Name;

UPDATE Student SET Year = 13 WHERE StudentID = 7;

DELETE FROM Student WHERE Year = 13;
```

To query **two tables**, match the foreign key to the primary key:

```
SELECT Student.Name, Grade.Mark
FROM   Student, Grade
WHERE  Student.StudentID = Grade.StudentID;
```

2 Practice

Now apply the methods above.

2.1 State the difference between **DDL** and **DML**. [2]

2.2 Write an SQL statement to list the **Name** of every student in **Year 12**. [2]

2.3 Write an SQL statement to **insert** a new student (StudentID 9, name "Sam", Year 11). [2]

2.4 Name the SQL statement used to **change a table's structure**. [1]

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3 Exam-style questions

3.1 Write SQL **DDL** to create a table `Book` with: `BookID` (integer, primary key), `Title` (text, must not be empty), `Author` (text). [3]

3.2 Write SQL to change the `Year` of the student with `StudentID` 5 to 13. [2]

3.3 Tables `Student(StudentID, Name)` and `Grade(StudentID, Mark)` are linked by

`StudentID`. Write SQL to list each student's **Name** with their **Mark**. [3]

3.4 Write SQL to **delete** every student in Year 13. [2]

3.5 Write SQL **DDL** to create a table `Grade` with `StudentID` (integer) as a **foreign key** referencing `Student(StudentID)`, and `Mark` (integer). [3]

3.6 Write SQL to list the **Name** of every Year-12 student, sorted into **alphabetical order** of name. [3]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **8.3 DDL and DML** past-paper sheet in the Library, or try these in **Practice mode**:

- 9618/12 N24 —Q6 (SQL DDL and DML)
- 9618/11 J25 —Q5 (SQL queries)
- 9618/13 N24 —Q4 (SQL script)
- 9618/12 J24 —Q4 (SQL SELECT)

Solutions

2.1 DDL defines/changes the **structure** (tables, keys); DML works with the **data** (insert, update, delete, query).

2.2 `SELECT Name FROM Student WHERE Year = 12;`.

2.3 `INSERT INTO Student (StudentID, Name, Year) VALUES (9, 'Sam', 11);`.

2.4 `ALTER` (TABLE) —a DDL statement.

3.1

```
CREATE TABLE Book (
  BookID INTEGER PRIMARY KEY,
  Title  VARCHAR(100) NOT NULL,
  Author VARCHAR(50)
);
```

3.2 `UPDATE Student SET Year = 13 WHERE StudentID = 5;`.

3.3 `SELECT Student.Name, Grade.Mark FROM Student, Grade WHERE Student.StudentID = Grade.StudentID;`.

3.4 `DELETE FROM Student WHERE Year = 13;`.

3.5

```
CREATE TABLE Grade (
  StudentID INTEGER,
  Mark      INTEGER,
  FOREIGN KEY (StudentID) REFERENCES Student(StudentID)
);
```

3.6 `SELECT Name FROM Student WHERE Year = 12 ORDER BY Name;`.