

# KNOWLEDGE ORGANISER

## KS3 COMPUTING: Year 7 Spring Term: Unit 5 Database Development

**Introduction:** During this unit, you will learn what a database is and why they are so useful. You will gain knowledge of key concepts such as: flat file databases, tables, primary keys, fields, entities, records, forms, queries and operators. You will also learn how to create queries, forms and reports.

### Overview

<b>Data</b>	When we store data in a database, it is in a format that the computer can understand and might not make much sense to us. When we collect and use the data in a database so that it is meaningful to us, we say that the data becomes information.
<b>Database</b>	A structured collection of data, on a computer, that allows people to perform complex sorting and searching of the data to find the information they need. The Police Criminals Database is a good example.
<b>Flat file</b>	A flat file database is a database that comprise a single table. These are often created from a single spreadsheet. If a single spreadsheet was sufficient to contain all the information needed, a flat file database may also suffice.
<b>Table</b>	A structured collection of data in a table format (a bit like a spreadsheet) that normally stores data about a particular entity – like patients in a hospital or students in a school or customers of a business.
<b>Record</b>	A record is a row in a database table that describes a single entity – such as one customer or one student or one patient. All the relevant data about a single customer or patient in a table will be contained in a single record.
<b>Field</b>	A field is the same as a column in a databases table. Each field describes one characteristic of a record – such as a student’s name or a customer’s phone number. Fields have different field types: text, currency, Yes/No, numbers.
<b>Primary Key</b>	A primary key is a unique identifier in tables that enables a database to find related information across more than one table. Examples are a bank customer’s unique account number and a workers unique National Insurance Number.
<b>Form</b>	An object in the database that allows you to add, edit and delete the data in one or more databases tables. Forms make it easier to work with data in a database because they hide the data you don’t need to see.
<b>Query</b>	When we request data from the database, we do so by creating and running a query. A query can also sort and order data when it is presented to us.
<b>Query Operators</b>	Query operators determine the range or conditions applicable to a query. For example: : >=, BETWEEN, AND, OR, NOT and the wildcard * in queries.
<b>Parameterised Query</b>	A parameterised query is a query where we ask the user to provide one of more of search criteria. For example, we may ask the user which gender to search for: male or female, or to provide a ranges of dates within which to search.
<b>Validation</b>	We can provide rules for the database to check that information being entered by a user is correct. The database can provide a message to say why the data entered cannot be accepted.
<b>Report</b>	A document that presents the results of a query formatted so that people can understand and make use of the data. We can print database reports or save them electronically.

### Key Learning that will take place in this unit

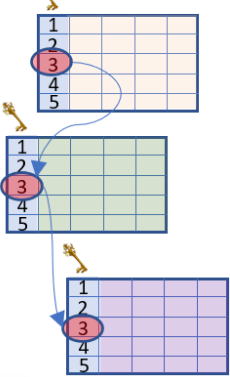
- To understand what a databases is and why databases are so useful.
- To know some key definitions: table, field, field types ,record, form, query and report.
- To understand the term ‘flat file’ database.
- To be able to add records to a table.
- To be able to create queries including a complex query and parametrised query.
- To be able to sort data in a table.
- To be able to add a calculated field.
- To be able to enter data into forms, modify data and to use forms to navigate records.
- To understand the different operators: >=, BETWEEN, AND, OR, NOT and the wildcard \* in queries.
- To appreciate the significance of a primary key in a table.
- To know how to validate data in a table.
- To create a report based on a query, and to be able to apply consistent formatting.

### Databases we take for granted

When we go ‘shopping online’, we expect to be able to *search* for items, to *compare* prices, to *sort* items, to *collate* a wish-list, to *add items* to a shopping cart and to make a purchase. Databases help to do all of these things for use – behind the scenes!



### Keys and relationships

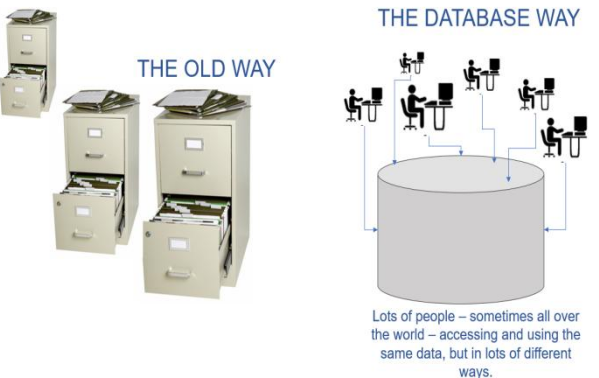


Primary keys are unique items of data that establish the relationship between tables in a database. Without a primary key, a databases can’t reliably locate related data in other tables. For example, a customer’s unique account number must be the same in every table with related information about a customer.

### Databases for the world we live in

In the not-so-distant-past, people were content with all their information-needs stored as paper in filing cabinets!

The world has radically changed. Today, people, organisations and businesses are connected and interact globally. Data also needs to be available and shared globally for people and businesses to connect with each other 24/7. Can you imagine a world trying to do all of this only using paper stored in filing cabinets?



TEST YOURSELF

- 1 Explain why a primary keys in tables are so important for databases to work properly.
- 2 What is the difference between a record and a field?
- 3 What is a flat-file database?
- 4 Why do databases store data in different tables rather than in one larger table?
- 5 What is a parameterised query?
- 6 Give 3 examples of data that might be validated before being entered into a database.
- 7 Give 3 example of types of data (field types) that you need to consider when you design a table.
- 8 Would you store a phone number as a number data type or as a text data type? Explain your choice.

AT HOME. (Parents/carers may be able to help with this.)

How many customers does Amazon have across the world? This will be the number of customers that Amazon would have to store in its database systems!

Find out if members of your family use a database at work. If so, what type of information does each database need to store as data?

Why do you think that large companies use databases rather than lots of spreadsheets to store their data?

**Creating Tables and Queries:** In this unit you will learn how to design a table that caters for different types of data. You will become familiar with the concept of data validation, the significance of a primary key, and how to create queries using more than one table. You will also learn how to create parameterised queries that ask a user for input.

All about tables, entities, fields, rows and keys

A primary key identifies each car uniquely

The Primary Key

A record describes each car in the table – such as a Peugeot

A record

Car ID*	Make	Model	Class	Seats	Price	Date
356	Kia	Picanto	Mini	4	£29.80	18/01/2013
357	Vauxhall	Corsa	Economy	4	£31.50	24/04/2013
358	Peugeot	308 Estate	Compact	5	£94.79	20/11/2013
359	BMW	E-Class	Luxury	5	£150.56	22/11/2013

A field describes a shared characteristic of every car – such as the date.

Cars are a distinct **entity**. Every car is stored in the same table because all cars share common characteristics such as a model and make, and number of seats.

Choosing field types

Common data types

- Number
- Text (short or long)
- Yes/No (Boolean)

Primary key

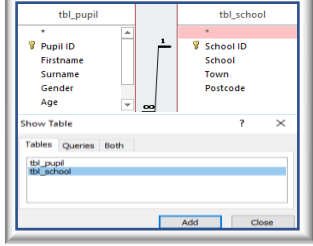
AutoNumber is used to create a primary key of numbers in order 1, 2, 3, 4, 5 etc

Field Name	Data Type
School ID	AutoNumber
School	Short Text
Town	Short Text
Postcode	Short Text

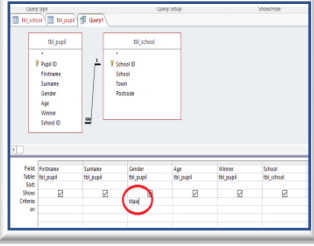
Short text is text that is limited – usually to 255 characters

Creating Queries the process..

1 Select the tables and relationships



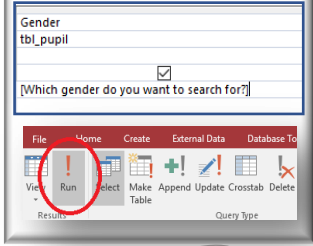
2 Select the fields and define the criteria



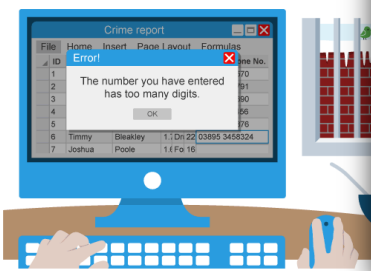
3 Use the relevant operators if needed

Operator	Meaning	Example
<	Less than	<1.65
<=	Less than or equal to	<=40
>	Greater than	>1.9
>=	Greater than or equal to	>=30
=	Equal to	"M"
BETWEEN	Tests for a range of values	BETWEEN 18 AND 25
OR	At least one of the criteria must be satisfied	"medium" OR "overweight"
NOT	All criteria are satisfied except for the ones specified	NOT "bald"

4 Add additional parameters and Run



Database users should receive messages so that they know how to correct a mistake entering data.



How we verify and validate data entry

Validation rules

Data is validated or checked to see if it meets certain rules when entered into a field. It cannot be checked for accuracy. For example, a validation rule may only allow mobile phone numbers that are 11 digits long, but the mobile number itself could be wrong.

- Field length check – only allows a specific number of characters to be entered.
- Range check – number entered must be within a certain range, eg between 1-100.
- List check – only specific data can be entered, eg male or female.
- Present check – the field cannot be left empty.
- Input mask – data must be entered in a specific way, eg including a space between the first and last part of a postcode.

In addition, an **input mask** – which you can see below - is great for validating data of a specific format. For example, entering post codes.

General Lookup	
Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	Is Not Null
Validation Text	You MUST enter a surname
Required	No
Allow Zero Length	Yes