1. Key terms

Word/phrase	Meaning
data	A collection of text, numbers or symbols in raw or unorganised form
explicit knowledge	Knowledge, such as facts, that can be easily passed on to others
information	Data that has been processed, e.g. grouped, normally by a computer, to give it meaning and make it interpretable
knowledge	The acquisition by a person of information such as facts, or the understanding of information such as how to solve problems
raw data	Similar to data, the raw input of text, numbers and symbols that needs to be processed to give it meaning
tacit knowledge	Knowledge that is difficult to pass on to someone else, such as knowing how to do something

2. Theory

2.1 Introduction

We live in the information age. In the same way that the development of industry created the industrial age, the development of information technology systems, and especially the internet, has created the information age. It has been a long-held belief by many philosophers that **knowledge** is power and that knowledge stems from understanding of **information**; information, in turn, is the assigning of meaning to **data**. To develop learners' understanding of information technology, we start by defining these three related concepts. The topics are hierarchical in that:

Data

becomes

Information

becomes

Knowledge

2.2 Data

2.2.1 What is data?

The concept of data as it is used in the syllabus is commonly referred to as 'raw' data – a collection of text, numbers and symbols with no meaning. Data therefore has to be processed, or provided with a context, before it can have meaning.

Example

- 3, 6, 9, 12
- cat, dog, gerbil, rabbit, cockatoo
- 161.2, 175.3, 166.4, 164.7, 169.3

These are meaningless sets of data. They could be the first four answers in the 3 x table, a list of household pets and the heights of 15-year-old students but without a context we don't know.

2.3 Information

2.3.1 What is information?

It is important that students learn the concept of what 'information' is as used in information technology. Information is the result of processing data, usually by computer. This results in facts, which enables the processed data to be used in context and have meaning. Information is data that has meaning.

2.3.2 When does data become information?

Data on its own has no meaning. It only takes on meaning and becomes information when it is interpreted. Data consists of raw facts and figures. When that data is processed into sets according to context, it provides information.

Data refers to raw input that when processed or arranged makes meaningful output. Information is usually the processed outcome of data. When data is processed into information, it becomes interpretable and gains significance.

In IT, symbols, characters, images, or numbers are data. These are the inputs an IT system needs to process in order to produce a meaningful interpretation. In other words, data in a meaningful form becomes information. Information can be about facts, things, concepts, or anything relevant to the topic concerned. It may provide answers to questions like who, which, when, why, what, and how.

If we put Information into an equation it would look like this:

Data + Meaning = Information

Example

Looking at the examples given for data:

- 3, 6, 9, 12
- cat, dog, gerbil, rabbit, cockatoo
- 161.2, 175.3, 166.4, 164.7, 169.3

Only when we assign a context or meaning does the data become **information**. It all becomes meaningful when we are told:

- 3, 6, 9 and 12 are the first four answers in the 3 x table
- cat, dog, gerbil, rabbit, cockatoo is a list of household pets
- 161.2, 175.3, 166.4, 164.7, 169.3 are the heights of 15-year-old students.

2.4 Knowledge

2.4.1 What is knowledge?

When someone memorises information this is often referred to as 'rote-learning' or 'learning by heart'. We can then say that they have acquired some knowledge. Another form of knowledge is produced as a result of understanding information that has been given to us, and using that information to gain knowledge of how to solve problems.

Knowledge can therefore be:
- acquiring and remembering a set of facts, or
- the use of information to solve problems.

The first type is often called explicit knowledge. This is knowledge that can be easily passed on to others. Most forms of explicit knowledge can be stored in certain media. The information contained in encyclopedias and textbooks are good examples of explicit knowledge.

The second type is called tacit knowledge. It is the kind of knowledge that is difficult to pass on to another person just by writing it down. For example, saying that Paris is the capital of France is explicit knowledge that can be written down, passed on, and understood by someone else. However, the ability to speak a foreign language, bake bread, program a computer or use complicated machinery requires additional pieces of knowledge (such as that gained through experience) that are not always known explicitly and are difficult to pass on to other users.

2.4.2 How are data, information and knowledge linked?

If we put Knowledge into an equation it would look like this:

Information + application or use = Knowledge

Example

Looking at the examples given for **data**:

- 3, 6, 9, 12
- cat, dog, gerbil, rabbit, cockatoo
- 161.2, 175.3, 166.4, 164.7, 169.3

Only when we assign a context or meaning does the data become **information**. It all becomes meaningful when we are told:

- 3, 6, 9 and 12 are the first four answers in the 3 x table
- cat, dog, gerbil, rabbit, cockatoo is a list of household pets
- 161.2, 175.3, 166.4, 164.7, 169.3 are the heights of the five tallest 15-year-old students in a class.

If we now apply this information to gain further **knowledge** we could say that:

- 4, 8, 12 and 16 are the first four answers in the 4 x table (because the 3 x table starts at three and goes up in threes the 4 x table must start at four and go up in fours)
- The tallest student is 175.3cm.
- A lion is not a household pet as it is not in the list and it lives in the wild.