1. Information representation

Weeks 1–3

信息表示

They should be able to

1. Show understanding of binary magnitudes and the difference between binary prefixes and decimal prefixes
2. Show understanding of different number systems
3. Perform binary addition and subtraction
4. Describe practical applications where **Binary Coded Decimal** (**BCD**) and **Hexadecimal** are used
5. Show understanding of and be able to represent character data in its internal binary form, depending on the character set used
6. Show understanding of how data for a **bitmapped image** are encoded
7. Perform calculations to estimate the file size for a **bitmap image**
8. Show understanding of the effects of changing elements of a **bitmap image** on the image quality and file size
9. Show understanding of how data for a **vector graphic** are encoded
10. Justify the use of a **bitmap image** or a **vector graphic** for a given task
11. Show understanding of how sound is represented and encoded
12. Show understanding of the impact of changing the **sampling rate** and **resolution**
13. Show understanding of the need for and examples of the use of **compression**
14. Show understanding of **lossy** and **lossless** compression and justify the use of a method in a given situation
15. Show understanding of how a text file, **bitmap image**, **vector graphic** and sound file can be compressed

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 01 (10 questions, answers on sheet 2)	
Teach the new content	Handout 01 Slide deck 01 Vocabulary list 01	
Practice guided then independent	Exercise sheets 1.1, 1.1.2, 1.2, 1.2.1, 1.3 Past-paper sheets 1.1, 1.1.1, 1.1.2, 1.2, 1.2.1, 1.3, 1.3.1	
Check before they leave	Unit test 1 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

2. Communication

Weeks 4–6

通信

They should be able to

1. Show understanding of the purpose and benefits of networking devices
2. Show understanding of the characteristics of a **LAN** (local area network) and a **WAN** (wide area network)
3. Explain the **client-server** and **peer-to-peer** models of networked computers
4. Show understanding of **thin-client** and **thick-client** and the differences between them
5. Show understanding of the **bus**, **star**, **mesh** and **hybrid** topologies
6. Show understanding of **cloud computing**
7. Show understanding of the differences between and implications of the use of wireless and wired networks
8. Describe the hardware that is used to support a **LAN**
9. Describe the role and function of a **router** in a network
10. Show understanding of **Ethernet** and how collisions are detected and avoided
11. Show understanding of **bit streaming**
12. Show understanding of the differences between the World Wide Web (WWW) and the internet
13. Describe the hardware that is used to support the internet
14. Explain the use of **IP addresses** in the transmission of data over the internet
15. Explain how a **Uniform Resource Locator** (**URL**) is used to locate a resource on the **World Wide Web** (**WWW**) and the role of the **Domain Name Service** (**DNS**)

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 02 (10 questions, answers on sheet 2)	
Teach the new content	Handout 02 Slide deck 02 Vocabulary list 02	
Practice guided then independent	Exercise sheets 2.1, 2.1.1, 2.1.2, 2.1.3 Past-paper sheets 2.1, 2.1.1, 2.1.3	
Check before they leave	Unit test 2 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

3. Hardware

Weeks 7–9

硬件

They should be able to

1. Show understanding of the need for **input**, **output**, **primary memory** and **secondary** (including removable) **storage**
2. Show understanding of **embedded systems**
3. Describe the principal operations of hardware devices
4. Show understanding of the use of **buffers**
5. Explain the differences between **Random Access Memory** (**RAM**) and **Read Only Memory** (**ROM**)
6. Explain the differences between **Static RAM** (**SRAM**) and **Dynamic RAM** (**DRAM**)
7. Explain the difference between **Programmable ROM** (**PROM**), **Erasable Programmable ROM** (**EPROM**) and **Electrically Erasable Programmable ROM** (**EEPROM**)
8. Show an understanding of **monitoring** and **control systems**
9. Use the following logic gate symbols: [NOT, AND, OR, NAND, NOR, XOR]
10. Understand and define the functions of: **NOT**, **AND**, **OR**, **NAND**, **NOR** and **XOR** (**EOR**) gates
11. Construct the **truth table** for each of the logic gates above
12. Construct a **logic circuit**
13. Construct a **truth table**
14. Construct a **logic expression**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 03 (10 questions, answers on sheet 2) Starter quiz 3 – past-paper questions	
Teach the new content	Handout 03 Slide deck 03 Vocabulary list 03	
Practice guided then independent	Exercise sheets 3.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.2, 3.2.1, 3.2.2 Past-paper sheets 3.1, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.2, 3.2.1, 3.2.2	
Check before they leave	Unit test 3 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

4. Processor Fundamentals

Weeks 10–12

处理器基础

They should be able to

1. Show understanding of the basic **Von Neumann** model for a computer system and the **stored program concept**
2. Show understanding of the purpose and role of **registers**, including the difference between **general purpose** and **special purpose registers**
3. Show understanding of the purpose and roles of the **Arithmetic and Logic Unit** (ALU), **Control Unit** (CU) and **system clock**, **Immediate Access Store** (IAS)
4. Show understanding of how data are transferred between various components of the computer system using the **address bus**, **data bus** and **control bus**
5. Show understanding of how factors contribute to the performance of the computer system
6. Understand how different **ports** provide connection to peripheral devices
7. Describe the stages of the **Fetch-Execute** (F-E) cycle
8. Show understanding of the purpose of **interrupts**
9. Show understanding of the relationship between **assembly language** and **machine code**
10. Describe the different stages of the assembly process for a **two-pass assembler**
11. Trace a given simple assembly language program
12. Show understanding that a set of instructions are grouped
13. Show understanding of and be able to use different **modes of addressing**
14. Show understanding of and perform **binary shifts**
15. Show understanding of how **bit manipulation** can be used to monitor/control a device
16. Instruction Label \
17. AND #n / Bn / &n
18. AND <address>
19. XOR #n / Bn / &n
20. XOR <address>
21. OR #n / Bn / &n
22. OR <address>
23. LSL #n
24. LSR #n
25. <label>: <opcode> <operand>
26. <label>: <data>
27. All questions will assume there is only one general purpose register available (Accumulator) ACC denotes Accumulator IX denotes Index Register <address> can be an absolute or symbolic address # denotes a denary number, e.g. #123 B denotes a binary number, e.g. B01001010 & denotes a hexadecimal number, e.g. &4A

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 04 (10 questions, answers on sheet 2)	
Teach the new content	Handout 04 Slide deck 04 Vocabulary list 04	

Stage	Use	Your notes
Practice guided then independent	Exercise sheets 4.1, 4.1.1, 4.2, 4.3, 4.3.1 Past-paper sheets 4.1, 4.1.1, 4.2, 4.3	
Check before they leave	Unit test 4 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

5. System Software

Weeks 13–14

系统软件

They should be able to

1. Explain why a computer system requires an **Operating System** (OS)
2. Explain the key management tasks carried out by the Operating System
3. Show understanding of the need for typical **utility software** provided with an Operating System
4. Show understanding of **program libraries**
5. Show understanding of the need for: • **assembler** software for the translation of an **assembly language** program • a **compiler** for the translation of a high-level language program • an **interpreter** for translation and execution of a high-level language program
6. Explain the benefits and drawbacks of using either a compiler or interpreter and justify the use of each
7. Show awareness that high-level language programs may be partially compiled and partially interpreted, such as Java (console mode)
8. Describe features found in a typical **Integrated Development Environment** (IDE)

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 05 (10 questions, answers on sheet 2)	
Teach the new content	Handout 05 Slide deck 05 Vocabulary list 05	
Practice guided then independent	Exercise sheets 5.1, 5.1.1, 5.1.2, 5.2, 5.2.1 Past-paper sheets 5.1, 5.1.1, 5.1.2, 5.2, 5.2.1	
Check before they leave	Unit test 5 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

6. Security, privacy and data integrity

Weeks 15–16

安全、隐私与数据完整性

They should be able to

1. Explain the difference between the terms **security**, **privacy** and **integrity** of data
2. Show appreciation of the need for both the **security of data** and the **security of the computer system**
3. Describe **security measures** designed to protect computer systems, ranging from the stand-alone PC to a network of computers
4. Show understanding of the **threats** to computer and data security posed by networks and the internet
5. Describe methods that can be used to restrict the risks posed by threats
6. Describe security methods designed to protect the security of data
7. Describe how **data validation** and **data verification** help protect the **integrity** of data
8. Describe and use methods of **data validation**
9. Describe and use methods of **data verification** during data entry and data transfer

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 06 (10 questions, answers on sheet 2)	
Teach the new content	Handout 06 Slide deck 06 Vocabulary list 06	
Practice guided then independent	Exercise sheets 6.1, 6.2 Past-paper sheets 6.1, 6.2	
Check before they leave	Unit test 6 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

7. Ethics and Ownership

Weeks 17–18

伦理与所有权

They should be able to

1. Show understanding of the need for and purpose of **ethics** as a computing professional
2. Show understanding of the need to act ethically and the impact of acting ethically or unethically for a given situation
3. Show understanding of the need for **copyright** legislation
4. Show understanding of the different types of **software licencing** and justify the use of a licence for a given situation
5. Show understanding of **Artificial Intelligence** (AI)

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 07 (10 questions, answers on sheet 2)	
Teach the new content	Handout 07 Slide deck 07 Vocabulary list 07	
Practice guided then independent	Exercise sheets 7.1, 7.1.1 Past-paper sheets 7.1, 7.1.1	
Check before they leave	Unit test 7 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

8. Databases

Weeks 19–21

数据库

They should be able to

1. Show understanding of the limitations of using a **file-based approach** for the storage and retrieval of data
2. Describe the features of a **relational database** that address the limitations of a file-based approach
3. Show understanding of and use the terminology associated with a relational database model
4. Use an **entity-relationship** (E-R) diagram to document a database design
5. Show understanding of the **normalisation** process
6. Explain why a given set of database tables are, or are not, in 3NF
7. Produce a normalised database design for a description of a database, a given set of data, or a given set of tables
8. Show understanding of the features provided by a **Database Management System** (**DBMS**) that address the issues of a file based approach
9. Show understanding of how software tools found within a **DBMS** are used in practice
10. Show understanding that the **DBMS** carries out all creation/modification of the database structure using its **Data Definition Language** (**DDL**)
11. Show understanding that the **DBMS** carries out all queries and maintenance of data using its **DML**
12. Show understanding that the industry standard for both **DDL** and **DML** is **Structured Query Language** (**SQL**)
13. Understand given **SQL** (**DDL**) statements and be able to write simple **SQL** (**DDL**) statements using a sub-set of statements
14. Write an **SQL** script to query or modify data (**DML**) which are stored in (at most two) database tables

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 08 (10 questions, answers on sheet 2)	
Teach the new content	Handout 08 Slide deck 08 Vocabulary list 08	
Practice guided then independent	Exercise sheets 8.1, 8.1.1, 8.1.2, 8.2, 8.3, 8.3.1 Past-paper sheets 8.1, 8.1.1, 8.1.2, 8.2, 8.3, 8.3.1	
Check before they leave	Unit test 8 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

9. Algorithm Design and Problem-solving

Weeks 22–25

算法设计与问题求解

They should be able to

1. Show an understanding of **abstraction**
2. Describe and use **decomposition**
3. Show understanding that an **algorithm** is a solution to a problem expressed as a sequence of defined steps
4. Use suitable identifier names for the representation of data used by a problem and represent these using an **identifier table**
5. Write **pseudocode** that contains input, process and output
6. Write **pseudocode** using the three basic constructs of **sequence**, **selection** and **iteration** (repetition)
7. Document a simple **algorithm** using a structured English description, a **flowchart** or **pseudocode**
8. Write **pseudocode** from: • a structured English description • a **flowchart**
9. Draw a **flowchart** from: • a structured English description • **pseudocode**
10. Describe and use the process of **stepwise refinement** to express an algorithm to a level of detail from which the task may be programmed
11. Use logic statements to define parts of an algorithm solution

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 09 (10 questions, answers on sheet 2)	
Teach the new content	Handout 09 Slide deck 09 Vocabulary list 09	
Practice guided then independent	Exercise sheets 9.1, 9.1.1, 9.2, 9.2.1, 9.2.2, 9.2.3 Past-paper sheets 9.1, 9.1.1, 9.2, 9.2.1, 9.2.2, 9.2.3	
Check before they leave	Unit test 9 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

10. Data Types and Structures

Weeks 26–29

数据类型与数据结构

They should be able to

1. Select and use appropriate **data types** for a problem solution
2. Show understanding of the purpose of a **record structure** to hold a set of data of different data types under one identifier
3. Use the technical terms associated with **arrays**
4. Select a suitable data structure (**1D** or **2D array**) to use for a given task
5. Write pseudocode for 1D and 2D arrays
6. Write pseudocode to process array data
7. Show understanding of why **files** are needed
8. Write pseudocode to handle **text files** that consist of one or more lines
9. Show understanding that an **ADT** is a collection of data and a set of operations on those data
10. Show understanding that a **stack**, **queue** and **linked list** are examples of **ADTs**
11. Use a **stack**, **queue** and **linked list** to store data
12. Describe how a **queue**, **stack** and **linked list** can be implemented using **arrays**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 10 (10 questions, answers on sheet 2)	
Teach the new content	Handout 10 Slide deck 10 Vocabulary list 10	
Practice guided then independent	Exercise sheets 10.1, 10.2, 10.2.1, 10.2.2, 10.3, 10.4, 10.4.1 Past-paper sheets 10.1, 10.2, 10.2.1, 10.3, 10.4, 10.4.1	
Check before they leave	Unit test 10 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

11. Programming

Weeks 30–35

程序设计

They should be able to

1. Implement and write **pseudocode** from a given design presented as either a **program flowchart** or **structured English**
2. Write **pseudocode** statements for: • the declaration and initialisation of **constants** • the declaration of **variables** • the assignment of values to **variables** • expressions involving any of the arithmetic or logical operators input from the keyboard and output to the console
3. Use built-in functions and library routines
4. Use **pseudocode** to write: • an 'IF' statement including the 'ELSE' clause and nested IF statements • a 'CASE' structure • a 'count-controlled' loop: • a 'post-condition' loop • a 'pre-condition' loop
5. Justify why one loop structure may be better suited to solve a problem than the others
6. Define and use a **procedure**
7. Explain where in the construction of an algorithm it would be appropriate to use a **procedure**
8. Use **parameters**
9. Define and use a **function**
10. Explain where in the construction of an algorithm it is appropriate to use a **function**
11. Use the terminology associated with **procedures** and **functions**
12. Write efficient **pseudocode**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 11 (10 questions, answers on sheet 2)	
Teach the new content	Handout 11 Slide deck 11 Vocabulary list 11	
Practice guided then independent	Exercise sheets 11.1, 11.1.1, 11.1.2, 11.2, 11.2.1, 11.2.2, 11.2.3, 11.2.4, 11.3, 11.3.1, 11.3.2, 11.3.3 Past-paper sheets 11.1, 11.1.2, 11.2, 11.2.1, 11.2.3, 11.2.4, 11.3, 11.3.1, 11.3.2, 11.3.3	
Check before they leave	Unit test 11 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

12. Software Development

Weeks 36–38

软件开发

They should be able to

1. Show understanding of the purpose of a **development life cycle**
2. Show understanding of the need for different **development life cycles** depending on the program being developed
3. Describe the principles, benefits and drawbacks of each type of **life cycle**
4. Show understanding of the **analysis**, **design**, **coding**, **testing** and **maintenance** stages in the **program development life cycle**
5. Use a **structure chart** to decompose a problem into sub-tasks and express the **parameters** passed between the various modules/procedures/functions which are part of the algorithm design
6. Show understanding of the purpose of **state-transition diagrams** to document an algorithm
7. Show understanding of ways of exposing and avoiding faults in programs
8. Locate and identify the different types of errors
9. Correct identified errors
10. Show understanding of the methods of testing available and select appropriate data for a given method
11. Show understanding of the need for a test strategy and test plan and their likely contents
12. Choose appropriate test data for a test plan
13. Show understanding of the need for continuing maintenance of a system and the differences between each type of maintenance
14. Analyse an existing program and make amendments to enhance functionality

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 12 (10 questions, answers on sheet 2)	
Teach the new content	Handout 12 Slide deck 12 Vocabulary list 12	
Practice guided then independent	Exercise sheets 12.1, 12.2, 12.2.1, 12.3, 12.3.1 Past-paper sheets 12.1, 12.2, 12.2.1, 12.3, 12.3.1	
Check before they leave	Unit test 12 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

13. Data Representation

Weeks 39–41

数据表示

They should be able to

1. Show understanding of why **user-defined types** are necessary
2. Define and use **non-composite types**
3. Define and use **composite data types**
4. Choose and design an appropriate **user-defined data type** for a given problem
5. Show understanding of the methods of **file organisation** and select an appropriate method of file organisation and **file access** for a given problem
6. Show understanding of methods of **file access**
7. Show understanding of **hashing algorithms**
8. Describe the format of **binary floating-point** real numbers
9. Convert **binary floating-point** real numbers into **denary** and vice versa
10. Normalise **floating-point** numbers
11. Show understanding of the consequences of a **binary** representation only being an approximation to the real number it represents (in certain cases)
12. Show understanding that **binary** representations can give rise to **rounding errors**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 13 (10 questions, answers on sheet 2)	
Teach the new content	Handout 13 Slide deck 13 Vocabulary list 13	
Practice guided then independent	Exercise sheets 13.1, 13.1.1, 13.2, 13.3, 13.3.1 Past-paper sheets 13.1, 13.2, 13.3	
Check before they leave	Unit test 13 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

14. Communication and internet technologies

Weeks 42–43

通信与互联网技术

They should be able to

1. Show understanding of why a **protocol** is essential for communication between computers
2. Show understanding of how **protocol** implementation can be viewed as a **stack**, where each layer has its own functionality
3. Show understanding of the **TCP/IP protocol** suite
4. Show understanding of **protocols** (**HTTP**, **FTP**, **POP3**, **IMAP**, **SMTP**, **BitTorrent**) and their purposes
5. Show understanding of **circuit switching**
6. Show understanding of **packet switching**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 14 (10 questions, answers on sheet 2)	
Teach the new content	Handout 14 Slide deck 14 Vocabulary list 14	
Practice guided then independent	Exercise sheets 14.1, 14.2 Past-paper sheets 14.1, 14.2	
Check before they leave	Unit test 14 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

15. Hardware and Virtual Machines

Weeks 44–46

硬件与虚拟机

They should be able to

1. Show understanding of **Reduced Instruction Set Computers** (**RISC**) and **Complex Instruction Set Computers** (**CISC**) processors
2. Show understanding of the importance/use of **pipelining** and registers in **RISC** processors
3. Show understanding of the four basic computer architectures
4. Show understanding of the characteristics of **massively parallel computers**
5. Show understanding of the concept of a **virtual machine**
6. Produce **truth tables** for logic circuits including **half adders** and **full adders**
7. Show understanding of a **flip-flop** (**SR**, **JK**)
8. Show understanding of **Boolean algebra**
9. Show understanding of **Karnaugh maps** (**K-map**)

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 15 (10 questions, answers on sheet 2)	
Teach the new content	Handout 15 Slide deck 15 Vocabulary list 15	
Practice guided then independent	Exercise sheets 15.1, 15.2, 15.2.1 Past-paper sheets 15.1, 15.2	
Check before they leave	Unit test 15 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

16. System Software

Weeks 47–49

系统软件

They should be able to

1. Show understanding of how an **OS** can maximise the use of resources
2. Describe the ways in which the **user interface** hides the complexities of the hardware from the user
3. Show understanding of **process management**
4. Show understanding of **virtual memory**, **paging** and **segmentation** for memory management
5. Show understanding of how an **interpreter** can execute programs without producing a translated version
6. Show understanding of the various stages in the **compilation** of a program
7. Show understanding of how the grammar of a language can be expressed using **syntax diagrams** or **Backus-Naur Form (BNF)** notation
8. Show understanding of how **Reverse Polish Notation (RPN)** can be used to carry out the evaluation of expressions

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 16 (10 questions, answers on sheet 2)	
Teach the new content	Handout 16 Slide deck 16 Vocabulary list 16	
Practice guided then independent	Exercise sheets 16.1, 16.2, 16.2.1 Past-paper sheets 16.1, 16.2	
Check before they leave	Unit test 16 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

17. Security

Weeks 50

安全

They should be able to

1. Show understanding of how **encryption** works
2. Show awareness of the **Secure Socket Layer (SSL) / Transport Layer Security (TLS)**
3. Show understanding of **digital certification**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 17 (10 questions, answers on sheet 2)	
Teach the new content	Handout 17 Slide deck 17 Vocabulary list 17	
Practice guided then independent	Exercise sheets 17.1 Past-paper sheets 17.1	
Check before they leave	Unit test 17 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

18. Artificial Intelligence (AI)

Weeks 51–52

人工智能（AI）

They should be able to

1. Show understanding of how **graphs** can be used to aid **Artificial Intelligence (AI)**
2. Show understanding of how **artificial neural networks** have helped with **machine learning**
3. Show understanding of **Deep Learning**, **Machine Learning** and **Reinforcement Learning** and the reasons for using these methods.
4. Show understanding of **back propagation of errors** and **regression methods** in machine learning

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 18 (10 questions, answers on sheet 2)	
Teach the new content	Handout 18 Slide deck 18 Vocabulary list 18	
Practice guided then independent	Exercise sheets 18.1 Past-paper sheets 18.1	
Check before they leave	Unit test 18 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

19. Computational thinking and Problem-solving

Weeks 53–54

计算思维与问题求解

They should be able to

1. Show understanding of **linear search** and **binary search** methods
2. Show understanding of **insertion sort** and **bubble sort** methods
3. Show understanding of and use **Abstract Data Types** (**ADT**)
4. Show how it is possible for **ADTs** to be implemented from another **ADT**
5. Show understanding that different algorithms which perform the same task can be compared by using criteria (e.g. time taken to complete the task and memory used)
6. Show understanding of **recursion**
7. Show awareness of what a compiler has to do to translate **recursive** programming code

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 19 (10 questions, answers on sheet 2)	
Teach the new content	Handout 19 Slide deck 19 Vocabulary list 19	
Practice guided then independent	Exercise sheets 19.1, 19.1.1, 19.2 Past-paper sheets 19.1, 19.2	
Check before they leave	Unit test 19 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	

20. Further Programming

Weeks 55–56

进阶程序设计

They should be able to

1. Understanding what is meant by a **programming paradigm**
2. Show understanding of the characteristics of a number of **programming paradigms**:
3. • **Low-level**
4. • **Imperative** (**Procedural**)
5. • **Object Oriented**
6. • **Declarative**
7. Write code to perform **file-processing** operations
8. Show understanding of an **exception** and the importance of **exception handling**

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 20 (10 questions, answers on sheet 2)	
Teach the new content	Handout 20 Slide deck 20 Vocabulary list 20	
Practice guided then independent	Exercise sheets 20.1, 20.1.1, 20.2 Past-paper sheets 20.1, 20.2	
Check before they leave	Unit test 20 (with mark scheme)	
Homework set from the Library	Any unused exercise sheet above Holiday homework pack	