

创造性开发

They should be able to

- 1. Explain how computing innovations are improved through collaboration. [Skill 1.C]
- 2. Explain how computing innovations are developed by groups of people. [Skill 1.C]
- 3. Demonstrate effective interpersonal skills during collaboration. [Skill 1.C]
- 4. Describe the purpose of a computing innovation. [Skill 1.A]
- 5. Explain how a program or code segment functions. [Skill 4.A]
- 6. Identify input(s) to a program. [Skill 3.A]
- 7. Identify output(s) produced by a program. [Skill 3.A]
- 8. Develop a program using a development process. [Skill 1.B]
- 9. Design a program and its user interface. [Skill 1.B]
- 10. Describe the purpose of a code segment or program by writing documentation. [Skill 4.A]
- 11. Acknowledge code segments used from other sources. [Skill 1.C]
- 12. For errors in an algorithm or program:
- 13. Identify inputs and corresponding expected outputs or behaviors that can be used to check the correctness of an algorithm or program. [Skill 4.C]

| Stage                                            | Use                                                                       | Your notes |
|--------------------------------------------------|---------------------------------------------------------------------------|------------|
| <b>Starter</b><br>10 min · retrieval<br>practice | Topic quiz 01 (10 questions, answers on sheet 2)                          |            |
| <b>Teach</b><br>the new content                  | Handout 01<br>Slide deck 01 (+ notes handout, 6-up)<br>Vocabulary list 01 |            |
| <b>Practice</b><br>guided then<br>independent    | Exercise sheets 1.1, 1.2, 1.3, 1.4<br>Past-paper sheets 1.2, 1.3, 1.4     |            |
| <b>Check</b><br>before they leave                | Unit test 1 (with mark scheme)                                            |            |
| <b>Homework</b><br>set from the Library          | Any unused exercise sheet above<br>Holiday homework pack                  |            |

数据

They should be able to

- 1. Explain how data can be represented using bits. [Skill 3.C]
- 2. Explain the consequences of using bits to represent data. [Skill 1.D]
- 3. For binary numbers:
- 4. Compare data compression algorithms to determine which is best in a particular context. [Skill 1.D]
- 5. Describe what information can be extracted from data. [Skill 5.B]
- 6. Describe what information can be extracted from metadata. [Skill 5.B]
- 7. Identify the challenges associated with processing data. [Skill 5.D]
- 8. Extract information from data using a program. [Skill 2.B]
- 9. Explain how programs can be used to gain insight and knowledge from data. [Skill 5.B]

| Stage                                            | Use                                                                       | Your notes |
|--------------------------------------------------|---------------------------------------------------------------------------|------------|
| <b>Starter</b><br>10 min · retrieval<br>practice | Topic quiz 02 (10 questions, answers on sheet 2)                          |            |
| <b>Teach</b><br>the new content                  | Handout 02<br>Slide deck 02 (+ notes handout, 6-up)<br>Vocabulary list 02 |            |
| <b>Practice</b><br>guided then<br>independent    | Exercise sheets 2.1, 2.2, 2.3, 2.4                                        |            |
| <b>Check</b><br>before they leave                | <i>nothing in the Library for this stage yet</i>                          |            |
| <b>Homework</b><br>set from the Library          | Any unused exercise sheet above<br>Holiday homework pack                  |            |

## They should be able to

1. Represent a value with a variable. [Skill 3.A]
2. Determine the value of a variable as a result of an assignment. [Skill 4.B]
3. Represent a list or string using a variable. [Skill 3.A]
4. For data abstraction:
5. Express an algorithm that uses sequencing without using a programming language. [Skill 2.A]
6. Represent a step-by-step algorithmic process using sequential code statements. [Skill 2.B]
7. Evaluate expressions that use arithmetic operators. [Skill 4.B]
8. Evaluate expressions that manipulate strings. [Skill 4.B]
9. For relationships between two variables, expressions, or values:
10. For relationships between Boolean values:
11. Express an algorithm that uses selection without using a programming language. [Skill 2.A]
12. For selection:
13. For nested selection:
14. Express an algorithm that uses iteration without using a programming language. [Skill 2.A]
15. For iteration:
16. Compare multiple algorithms to determine if they yield the same side effect or result. [Skill 1.D]
17. For algorithms:
18. For list operations:
19. For algorithms involving elements of a list:
20. For binary search algorithms:
21. For procedure calls:
22. Explain how the use of procedural abstraction manages complexity in a program. [Skill 3.C]
23. Develop procedural abstractions to manage complexity in a program by writing procedures. [Skill 3.B]
24. Select appropriate libraries or existing code segments to use in creating new programs. [Skill 2.B]
25. For generating random values:
26. For simulations:
27. For determining the efficiency of an algorithm:
28. Explain the existence of undecidable problems in computer science. [Skill 1.A]

| Stage                                            | Use                                                                                                                                                                                 | Your notes |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Starter</b><br>10 min · retrieval<br>practice | Topic quiz 03 (10 questions, answers on sheet 2)                                                                                                                                    |            |
| <b>Teach</b><br>the new content                  | Handout 03<br>Slide deck 03 (+ notes handout, 6-up)<br>Vocabulary list 03                                                                                                           |            |
| <b>Practice</b><br>guided then<br>independent    | Exercise sheets 3.1, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16,<br>3.17, 3.18, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9<br>Past-paper sheets 3.10, 3.12, 3.13, 3.2, 3.5, 3.6, 3.8, 3.9 |            |

| Stage                                   | Use                                                      | Your notes |
|-----------------------------------------|----------------------------------------------------------|------------|
| <b>Check</b><br>before they leave       | Unit test 3 (with mark scheme)                           |            |
| <b>Homework</b><br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack |            |

They should be able to

- 1. Explain how computing devices work together in a network. [Skill 5.A]
- 2. Explain how the Internet works. [Skill 5.A]
- 3. Explain how data are sent through the Internet via packets. [Skill 5.A]
- 4. Describe the differences between the Internet and the World Wide Web. [Skill 5.A]
- 5. For fault-tolerant systems, like the Internet:
- 6. For sequential, parallel, and distributed computing:
- 7. Describe benefits and challenges of parallel and distributed computing. [Skill 1.D]

| Stage                                            | Use                                                                       | Your notes |
|--------------------------------------------------|---------------------------------------------------------------------------|------------|
| <b>Starter</b><br>10 min · retrieval<br>practice | Topic quiz 04 (10 questions, answers on sheet 2)                          |            |
| <b>Teach</b><br>the new content                  | Handout 04<br>Slide deck 04 (+ notes handout, 6-up)<br>Vocabulary list 04 |            |
| <b>Practice</b><br>guided then<br>independent    | Exercise sheets 4.1, 4.2, 4.3                                             |            |
| <b>Check</b><br>before they leave                | <i>nothing in the Library for this stage yet</i>                          |            |
| <b>Homework</b><br>set from the Library          | Any unused exercise sheet above<br>Holiday homework pack                  |            |

They should be able to

- 1. Explain how an effect of a computing innovation can be both beneficial and harmful. [Skill 5.C]
- 2. Explain how a computing innovation can have an impact beyond its intended purpose. [Skill 5.C]
- 3. Describe issues that contribute to the digital divide. [Skill 5.C]
- 4. Explain how bias exists in computing innovations. [Skill 5.E]
- 5. Explain how people participate in problem-solving processes at scale. [Skill 1.C]
- 6. Explain how the use of computing can raise legal and ethical concerns. [Skill 5.E]
- 7. Describe the risks to privacy from collecting and storing personal data on a computer system. [Skill 5.D]
- 8. Explain how computing resources can be protected and can be misused. [Skill 5.E]
- 9. Explain how unauthorized access to computing resources is gained. [Skill 5.E]

| Stage                                            | Use                                                                       | Your notes |
|--------------------------------------------------|---------------------------------------------------------------------------|------------|
| <b>Starter</b><br>10 min · retrieval<br>practice | Topic quiz 05 (10 questions, answers on sheet 2)                          |            |
| <b>Teach</b><br>the new content                  | Handout 05<br>Slide deck 05 (+ notes handout, 6-up)<br>Vocabulary list 05 |            |
| <b>Practice</b><br>guided then<br>independent    | Exercise sheets 5.1, 5.2, 5.3, 5.4, 5.5, 5.6                              |            |
| <b>Check</b><br>before they leave                | <i>nothing in the Library for this stage yet</i>                          |            |
| <b>Homework</b><br>set from the Library          | Any unused exercise sheet above<br>Holiday homework pack                  |            |