

# Digital Technologies - Above satisfactory - Years 5 and 6

## Portfolio summary

This portfolio of student work shows that the student can explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks (WS3). The student can explain how digital systems use whole numbers as a basis for representing a variety of data types (WS4).

The student can define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems (WS1, WS2). The student can incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions (WS1, WS2), including a visual program (WS2). They explain how information systems and their solutions meet needs and consider sustainability (WS1). Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols (WS1, WS2).

## Digital project: Learning tool

### Sample summary

Students collaboratively designed a learning tool featuring branching and repetition. The learning tool aimed to give opportunities for players (Year 3 and Year 4 students) to explore, practise and apply mathematical concepts and skills (multiplication and division). The learning tool provided opportunities for the player to work through levels. Students also collected and validated data about what the students already knew about multiplication using three simple tests before and after using the learning tool. They collated the data from six students, represented it in a graph and commented on their findings. Students evaluated the solution.

## Achievement standard

### Subject

### Learning Area

By the end of Year 6, students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. They explain how digital systems use whole numbers as a basis for representing a variety of data types.

Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. They explain how information systems and their solutions meet needs and consider sustainability. Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.

Learning tool

AC Digital 56 WS1 AB

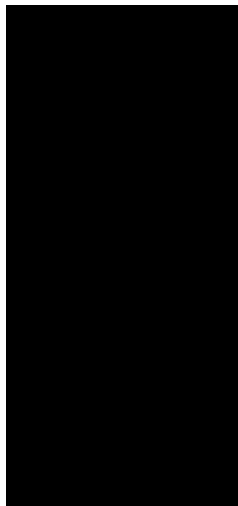
Watch later Share

**SORRY THAT'S WRONG**

-1 point

Try Again

Data collection

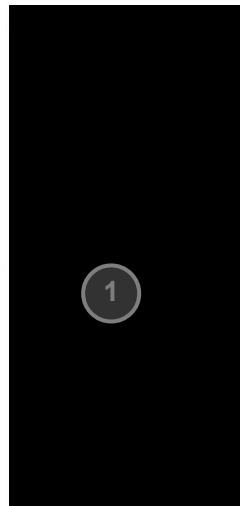


Pre-test: Multiplication  
Pre-test 1 recording sheet

Instructions: Read these questions to the Year 4 student who is taking the test: I am going to ask you ten questions about times tables. You have to work them out without a calculator or a pencil and paper. I will check your answer and at the end I will tell you your score out of ten.

Are you ready? Let's go. **✗**

Question	Answer	A	B	C	D	E	F
1. $2 \times 6$	12	✓	✓	✓	✓	✓	✓
2. $5 \times 6$	30	✓	✓	✓	✓	✓	✓
3. $10 \times 0$	0	✓	✓	✓	✓	✓	✓
4. $5 \times 1$	5	✓	✓	✓	✓	✓	✓
5. $3 \times 7$	21	✓	✓	✓	✓	✓	✓
6. $3 \times 12$	36	✓	✓	✓	✓	✓	✓
7. $7 \times 2$	14	✓	✓	✓	✓	✓	✓
8. $4 \times 3$	12	✓	✓	✓	✓	✓	✓
9. $6 \times 5$	30	✓	✓	✓	✓	✓	✓
10. $4 \times 10$	40	✓	✓	✓	✓	✓	✓
		8 / 10	7 / 10	10 / 10	9 / 10	10 / 10	7 / 10



Annotations

- 1 **Annotation 1**  
Collects data accurately from students using pre-tests and post-tests

Pre-test 2 recording sheet

Use your calculator to solve these ten questions.

You will have 1 minute.

1.  $4 \times 3 =$     2.  $2 \times 9 =$     3.  $5 \times 5 =$     4.  $80 \times 8 =$     5.  $1 \times 7 =$   
 6.  $3 \times 4 =$     7.  $7 \times 6 =$     8.  $6 \times 2 =$     9.  $10 \times 9 =$     10.  $5 \times 0 =$

Question	Answer	A	B	C	D	E	F
1	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	640	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	42	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	90	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Pre-test 3 recording sheet

How good are you at multiplication?

For each question shade in the box which has the right answer. Here is an example:

$3 \times 5 =$

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	20	15	30

1. $2 \times 8 =$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	16	26	14	10
2. $3 \times 3 =$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	12	18	6	9
3. $5 \times 10 =$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	50	55	15	45
4. $3 \times 6 =$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	18	36	9	24
5. $6 \times 7 =$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	42	42	47	34

Answer	A	B	C	D	E	F
1	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	42	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	45	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	40	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	33	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Post-test: Multiplication

Post-test 1 recording sheet

Instructions: Read these to your friend who is taking the test.

I am going to ask you ten questions about times tables. You have to work them out without a calculator or a pencil and paper. I will check your answer and at the end I will tell you score out of ten. I am going to compare your score to the score you got before you played my game.

Question	Answer	A	B	C	D	E	F
1	27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	36	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	24	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	45	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	90	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Post-test 2 recording sheet**  
Use your calculator to solve these ten questions.  
You will have 1 minute.

1.  $5 \times 6 =$     2.  $9 \times 2 =$     3.  $5 \times 5 =$     4.  $8 \times 10 =$     5.  $7 \times 1 =$   
6.  $4 \times 6 =$     7.  $11 \times 1 =$     8.  $2 \times 6 =$     9.  $9 \times 10 =$     10.  $7 \times 0 =$

Question	Answer	A	B	C	D	E	F
1	30	/	/	/	/	/	/
2	18	/	/	/	/	/	/
3	25	/	/	/	/	/	/
4	80	/	/	/	/	/	/
5	7	/	/	/	/	/	/
6	24	/	/	/	/	/	/
7	11	/	/	/	/	/	/
8	12	/	/	/	/	/	/
9	90	/	/	/	/	/	/
10	0	/	/	/	/	/	/
		10/10	10/10	10/10	10/10	10/10	10/10

**Post-test 3 recording sheet**  
Which is correct? In these questions some are right and some are wrong. Tick or cross them.

1.  $5 \times 3 = 15$     2.  $10 \times 9 = 99$     3.  $3 \times 1 = -3$     4.  $6 \times 3 = 21$     5.  $6 \times 7 = 76$   
6.  $10 \times 0 = 100$     7.  $2 \times 1 = 9$     8.  $4 \times 6 = 16$     9.  $11 \times 2 = 22$     10.  $0 \times 8 = 80$

Answer	A	B	C	D	E	F
1	Y	/	/	/	/	/
2	N	/	/	/	/	/
3	Y	/	/	/	/	/
4	N	/	/	/	/	/
5	N	/	/	/	/	/
6	N	/	/	/	/	/
7	Y	/	/	/	/	/
8	Y	/	/	/	/	/
9	Y	/	/	/	/	/
10	N	/	/	/	/	/
		10/10	10/10	10/10	10/10	10/10

**Multiplication pre and post-test results**  
Collecting data  
Collate the data from the pre-test and post-test in an Excel spreadsheet and paste below.

Student	A	B	C	D	E	F
Pre-test 1	8	7	10	9	5	7
Post-test 1	9	7	10	10	6	9
Pre-test 2	6	8	10	10	6	9
Post-test 2	10	8	10	10	7	9
Pre-test 3	8	8	10	8	5	6
Post-test 3	10	9	10	10	6	9

Representing data  
Represent the data you have collected using an Excel chart and paste below.

Interpreting and validating the data (add a comment here)  
Student A, E and F improved their results in all tests. Student C scored 10 for all tests. Our data was validated by testing students if they can do it in their heads or using a calculator or choosing partners. Everyone did better after using the learning tool.

Evaluating (How does the solution meet needs and consider sustainability?)  
Year 3 students said they liked the learning tool and they were happy they did better in the tests. The learning tool is sustainable because it is cheap to make, lots of students can use it, you don't have to print it and you can keep using it until you get better.

## Annotations

**1 Annotation 1**  
Collates data accurately from pre-tests and post-tests in a table

**2 Annotation 2**  
Represents data using a side-by-side column graph including appropriate labelling

**3 Annotation 3**  
Draws conclusions from the graphs

**4 Annotation 4**  
Describes how the data were validated

**5 Annotation 5**  
Evaluates the impact

of the learning tool and explains why it is a sustainable solution

## Digital project: Scratch game

### Sample summary

Students designed a game for a buddy using Scratch visual programming language. They selected a challenge from three options and defined the problem. They designed and implemented the digital solution and recorded their development process.

### Achievement standard

#### Subject

#### Learning Area

By the end of Year 6, students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. They explain how digital systems use whole numbers as a basis for representing a variety of data types.

Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. They explain how information systems and their solutions meet needs and consider sustainability. Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.

### Game development

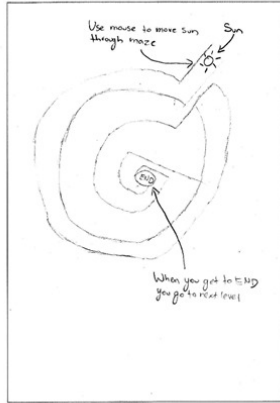
The image shows a 'Game development Scaffold' form with handwritten student responses. Three numbered callouts (1, 2, 3) point to specific parts of the form:

- 1** points to the 'State the aim of your game' section, which contains the handwritten text: 'You have to get the sun through the maze without touching the sides'.
- 2** points to the 'Give your game a name' section, which contains the handwritten text: 'Maze Runner'.
- 3** points to the 'Algorithm' section, which contains the handwritten text: 'START Use the mouse to drag the sun around maze IF touches sides THEN end game ELSE move to next level END'.

### Annotations

- 1 Annotation 1**  
Defines the problem to be solved in the game
- 2 Annotation 2**  
Identifies a comprehensive list of functional requirements
- 3 Annotation 3**  
Writes an algorithm (step-by-step instructions), including input and output, and 'if-then-else' statements

Create a storyboard for your game.



Divide and assign the tasks to each member of the group

Group member name	Task to be carried out
	Design ideas
	Programme Scratch
	Sprite Creation

Evaluation - Is your game interesting and appealing? Is it intuitive and easy to use? Does it address the functional requirements you identified?

The game is very simple and fun. The different levels keep it interesting and challenging. It is very easy to use because the maze is simple.

The game addresses all functional requirements except sound. We thought it was better to add more levels rather than add sound. But the game features the sun character, different mazes and the sprite that moves the sun.

1

## Annotations

- 1 Annotation 1**  
Communicates ideas for designing a digital solution by drawing and labelling features of one of the graphical user interfaces presented in the game

1

## Annotations

- 1 Annotation 1**  
Plans the collaborative creation of a digital solution

2

- 2 Annotation 2**  
Provides a clear and accurate description of the game

3

- 3 Annotation 3**  
Evaluates how the game addresses the identified functional requirements

## Scratch game



## Presentation: School system

### Sample summary

Throughout the year, students have been using and considering the purpose of a range of digital system components and how these components can be connected. Students were asked to verbally explain and justify the classroom network.

### Achievement standard

#### Subject

#### Learning Area

By the end of Year 6, students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. They explain how digital systems use whole numbers as a basis for representing a variety of data types.

Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. They explain how information systems and their solutions meet needs and consider sustainability. Students

manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.

### Recorded explanation



## Worksheet: Whole numbers

### Sample summary

Students were introduced to whole numbers using a CS Unplugged video and unplugged group activities. Students completed a worksheet to assess their understanding of binary numbers.

### Achievement standard

#### Subject

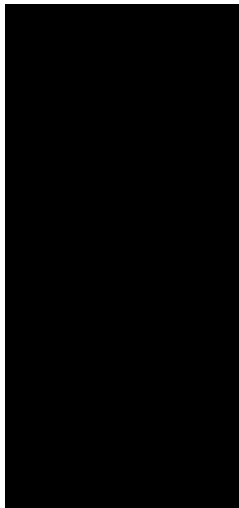
#### Learning Area

By the end of Year 6, students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. They explain how digital systems use whole numbers as a basis for representing a variety of data types.



Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. They explain how information systems and their solutions meet needs and consider sustainability. Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.

### Binary numbers



**Binary Numbers**

What do you notice about the number of dots on the cards?  
 The number of dots doubles from right to left.

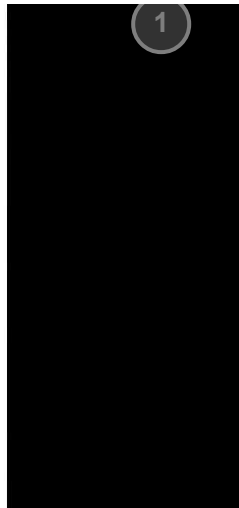
How many dots would the next card have if we carried on to the left? Explain your answer.  
 32 - 16 x 2 = 32 - The next card would have 32 dots.

How many cards do I need in order to reach a card with 328 dots?  
 8

We can use these cards to make numbers by turning some of them face down and adding up the dots that are showing. Be sure to draw all 5 cards, turn over (draw black boxes) for those not needed (See example on the next page).

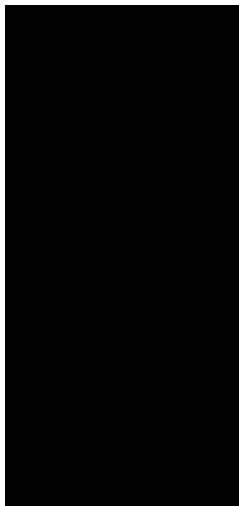
Make 6:

Make 15:



### Annotations

- 1 **Annotation 1**  
 Demonstrates understanding of the binary number system of 0s and 1s



When a binary number card is not showing, it is represented by a zero. When it is showing, it is represented by a one. This is the binary number system.

0 1 0 0 1 = 9

Make 1001:

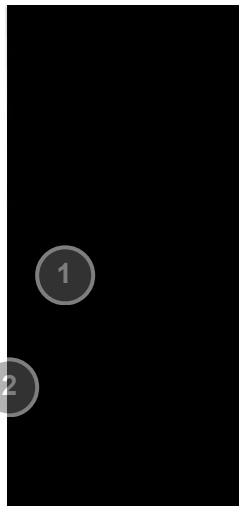
What number is this in decimal?  
 17

What would 17 be in binary?  
 10001

Can you work out what 10101 is?  
 21

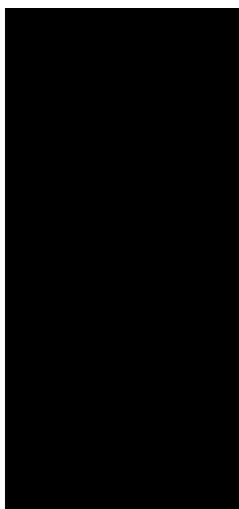
What about 11111?  
 31

What day of the month were you born? Write it in binary.  
 10110 = 22



### Annotations

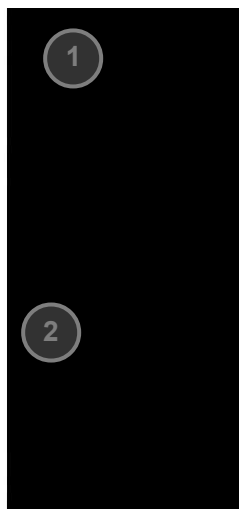
- 1 **Annotation 1**  
 Converts binary to decimal
- 2 **Annotation 2**  
 Converts accurately decimal numbers to binary



Try to work out these coded numbers:

= 01001 (@=1, @=0) 9	= 1010 (k=1, q=0) 10
= 101 (@=1, @=0) 5	= 1101 (+)=1, X=0) 13
= 0 (@=1, @=0)	= 10101 (@=1, @=0) 21
= 10 (@=1, @=0)	= 101010 (@=1, @=0) 26
= 0 (@=1, @=0)	= 11111 (@=1, @=0) 31

Why do you think the computer uses binary?  
 Computers can store something in memory. Computers only understand two digits - 0 and 1. Pictures use binary numbers. Black is 0 and white is 1. Photos are made up of bits (tiny digital bits).



### Annotations

- 1 **Annotation 1**  
 Recognises patterns and converts binary to decimal numbers
- 2 **Annotation 2**  
 Explains why binary is used in computing and provides an example of a data type