Name: _____ Class: _____

Lesson 4: Introduction to Binary — Teacher answers

Date: _____ **Learning objective:** I am learning to explain how computers store numbers in binary and convert between binary and denary.

Starter — What can you remember? (5 min)

1. What is primary storage? **RAM — holds data being used now**	**2.** AND gate: A = 1, B = 0. What is the output? **0**
3. Name one solid-state storage device. **e.g. USB stick, SD card, SSD**	**4.** Why is RAM called volatile? **It loses its data when the power is off**

Section 1: Developing — Know how data is stored in binary (8 min)

Task 1 — Units of data

1. What is a bit?

Answer: A single binary digit — a 1 or a 0.

2. Complete the table.

Unit	Equal to
1 nibble	**4 bits**
1 byte	**8 bits**
1 kilobyte	**1,000 bytes**
1 megabyte	**1,000 KB**
1 gigabyte	**1,000 MB**

3. Put these in order, smallest first: terabyte, kilobyte, nibble, gigabyte.

Answer: nibble, kilobyte, gigabyte, terabyte

Section 2: Securing — Convert binary to denary (12 min)

Task 2 — Binary to denary

4. Convert 00010101 to denary.

128	64	32	16	8	4	2	1
0	0	0	1	0	1	0	1

Denary answer: 21

5. Convert 01001101 to denary.

128	64	32	16	8	4	2	1
0	1	0	0	1	1	0	1

Denary answer: 77

6. Convert 10000011 to denary.

128	64	32	16	8	4	2	1
1	0	0	0	0	0	1	1

Denary answer: 131

Section 3: Mastering — Convert denary to binary (12 min)

Task 3 — Denary to binary

7. Convert 36 into 8-bit binary.

128	64	32	16	8	4	2	1
0	0	1	0	0	1	0	0

8. Convert 100 into 8-bit binary.

128	64	32	16	8	4	2	1
0	1	1	0	0	1	0	0

9. Convert 200 into 8-bit binary.

128	64	32	16	8	4	2	1
1	1	0	0	1	0	0	0

10. What is the largest number that can be stored in 8 bits? Explain.

Answer: 255 — all eight bits are 1: 128+64+32+16+8+4+2+1.

Exit ticket (3 min)

1. How many bits in a byte? **8**	**2.** Convert 00001010 to denary. **10**	**3.** Convert 17 to 8-bit binary. **00010001**
Finished early? Computers also store letters as binary (ASCII). 'A' is 65. Write 'A' in 8-bit binary, then work out 'C'.		

How confident do I feel? Colour one box for each skill.

Level	Skill	Red	Amber	Green
Developing	Know how data is stored in binary			
Securing	Convert binary to denary			
Mastering	Convert denary to binary			