**Worksheet 5b: Reading from a CD**

# Look at each of the pits and lands diagrams below and convert them into their binary representation. You can then convert those into denary and text using the ASCII table.

The one below has been done for you as an example.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 |
|  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *16* | *8* | *4* | *2* | *1* |  |
|  | 1 | 0 | 1 | 0 | 0 |  |
| = | 16 | + | 4 |  |  |  |
| = |  |  |  |  |  | 20 |

The pits and lands represent 10100 in binary which converts to 20 in denary.

1. What is the denary value represented here?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| = |  |  |  |  |  |  |
| = |  |  |  |  |  |  |

2. What is the denary value represented in this 8-bit example?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

3. Determine the letter or character represented by the following sequence of pits and lands. Use the ASCII table to help you.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

4. Determine the letter or character represented by the following sequence of pits and lands. Use the ASCII table to help you.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

5. Using the ASCII table to help you, draw your initials using pits and lands. Use the grid to help you.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Extension questions**

6. How do you think rewritable CDs might work? You can’t ‘un-burn’ a CD! (Hint: Think of magic ink!)

7. How can a DVD or Blu-Ray disk hold so much more than a CD if they are all the same physical size? How would the surfaces differ if you could see them all under a microscope?

8. A hard disk has a metallic surface with magnetic particles on it. How could these particles be used to represent 0s and 1s? (Hint: They use a similar principle to a CD, but with magnets rather than light.)