## Information revolution: how ultra-short bursts of light can help us improve data storage

## Introducing binary numbers

Writing numbers using the binary system can seem tricky, but can end up being lots of fun. The binary system works based on exponential multiples of two, for example, $2^{0}, 2^{1}$, and $2^{2}$. By adding combinations of these exponential multiples of two, you can create any number.

Try writing these binary numbers yourselves:

| Decimal number | Conversion to binary |  |  |  |  |  |  | Binary number |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $2^{6}=64$ | $2^{5}=32$ | $2^{4}=16$ | $2^{3}=8$ | $2^{2}=4$ | $2^{1}=2$ | $2^{0}=1$ |  |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 |
| 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 11 |
| 10 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1010 |
| 33 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 100001 |
| Try the following ones yourself |  |  |  |  |  |  |  |  |
| 15 |  |  |  |  |  |  |  |  |
| 19 |  |  |  |  |  |  |  |  |
| 75 |  |  |  |  |  |  |  |  |

