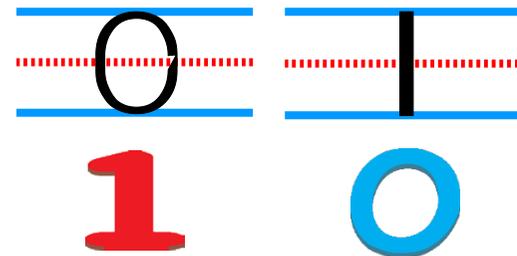


Binary Numbers



1

Did you know that computers count using only zero and one?

0

All information in a computer (words, pictures, movies, sound) is stored and transmitted as sequences of bits, or binary digits.

1

A bit is a single piece of data that can be thought of as either zero or one.

0

1

0

0

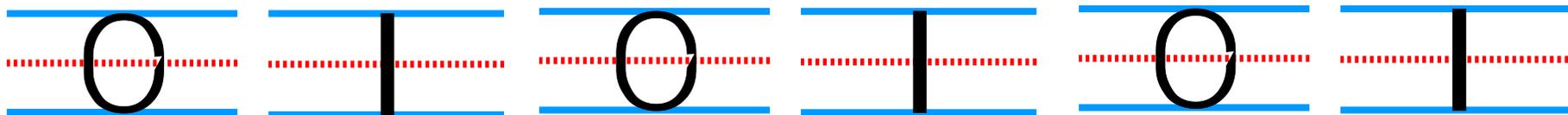
1

0

1

0

1



Decimal vs Binary

Decimal - Base 10

The number system that we normally use is the decimal number system. It has 10 numbers: 0 to 9

10^5	10^4	10^3	10^2	10^1	10^0
100 000	10 000	1 000	100	10	1
		10x10x10	10x10	10x1	1

What would the number 45 look like?

100 000	10 000	1 000	100	10	1
				4	5

= 4 tens + 5 ones

Binary - Base 2

The binary number system is a base-2 number system. This means it only has two numbers: 0 and 1.

2^5	2^4	2^3	2^2	2^1	2^0
32	16	8	4	2	1
		2x2x2	2x2	2x1	1

32	16	8	4	2	1
1	0	1	1	0	1

= 32 + 8 + 4 + 1

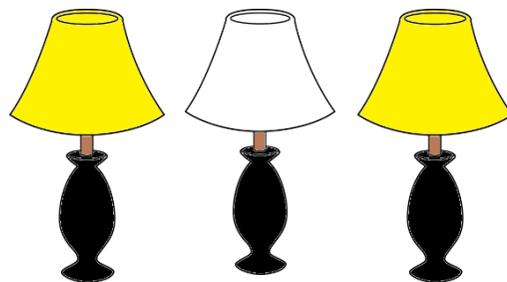
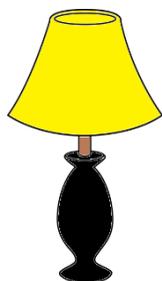
On and off

0 = off =

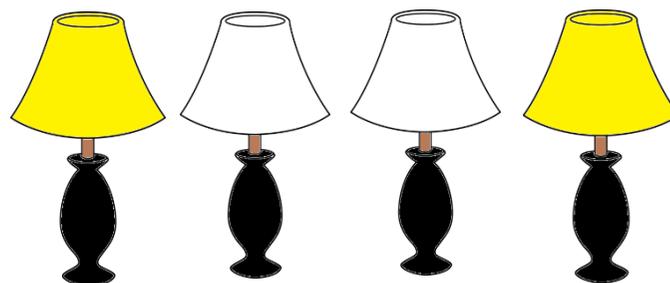


= 10

1 = on =



= 101



= 1001

STAGE 1

Creating a decimal number
from a binary number

Challenge 1

Creating decimal
from binary

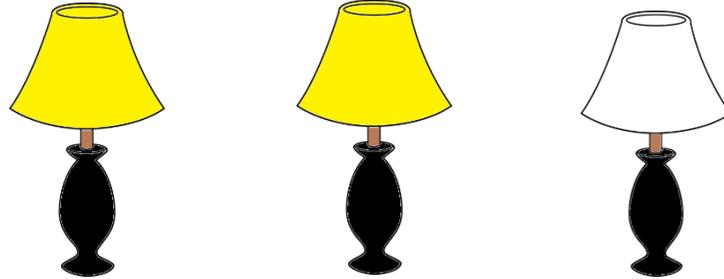


4	2	1

The decimal number is _____

Challenge 2

Creating decimal
from binary

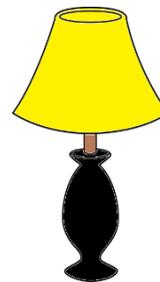
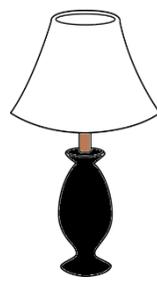
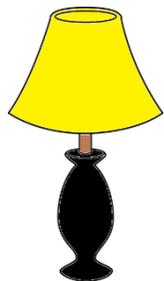
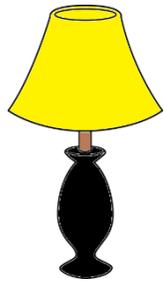


4	2	1

The decimal number is _____

Challenge 3

Creating decimal
from binary

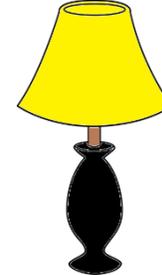
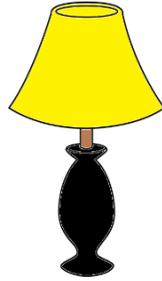
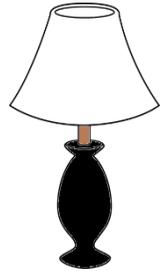
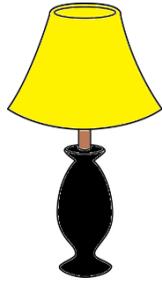


8	4	2	1

The decimal number is _____

Challenge 4

Creating decimal
from binary

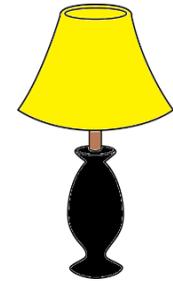
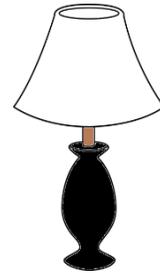
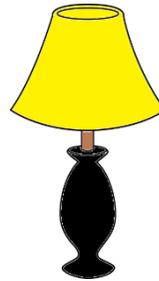
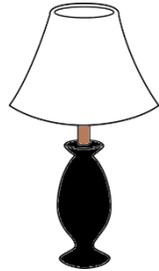
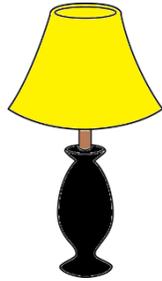
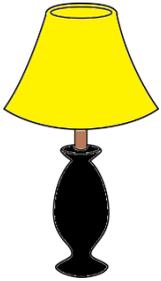


16	8	4	2	1

The decimal number is _____

Challenge 5

Creating decimal
from binary



32	16	8	4	2	1

The decimal number is _____

STAGE 2

Creating a binary number
from a decimal number

Challenge 6

Creating binary
from decimal

7

4	2	1



The binary number is _____

Challenge 7

Creating binary
from decimal

13

8	4	2	1



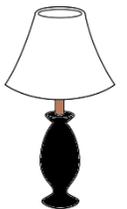
The binary number is _____

Challenge 8

Creating binary
from decimal

19

16	8	4	2	1



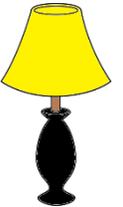
The binary number is _____

Challenge 9

Creating binary
from decimal

27

16	8	4	2	1



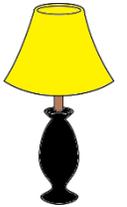
The binary number is _____

Challenge 10

Creating binary
from decimal

45

32	16	8	4	2	1



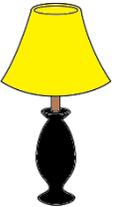
The binary number is _____

Challenge 11

Creating binary
from decimal

58

32	16	8	4	2	1



The binary number is _____