Decimal / denary numbers recap

How many <u>digits</u> are in our number system?

To develop knowledge by exploring the denary and binary number system

To secure understanding by converting between both number systems

How does our number system work?

What is the following number?

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14

Exactly…Its **fourteen**

Without really thinking you did the following…

Hundreds   Tens   Ones

0   1   4

Number placements go up in tens

1
10
100

0 x 100
= 0

1 x 10
= 10

4 x 1
= 1

= 14

Binary numbers

Computers can only recognise 2 numbers:

1 and 0

These are called Binary numbers

To develop knowledge by exploring the denary and binary number system

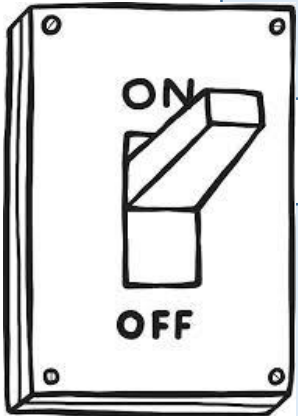*To secure understanding* by converting between both number systems

Computers have switches not fingers!

There are millions of tiny switches inside a computer.
Switches can only ever be ON or OFF

1 = switch turned on

0 = switch being off
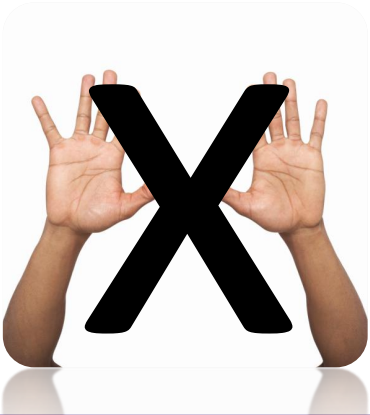
1

0

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So the binar

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1 1 1 0

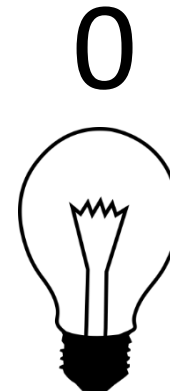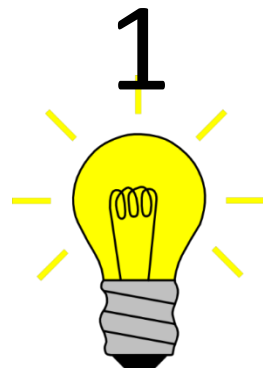In base ten (denary) we wrote the place numbers 1, 10 and 100 above the number.

In **base 2 (binary)** we have to write…

8   4   2   1

1 1 1 0

What do you notice about the numbers above the binary?

Do they go up in tens this time?

They **double each time**

8 4 2 1

1 1 1 0
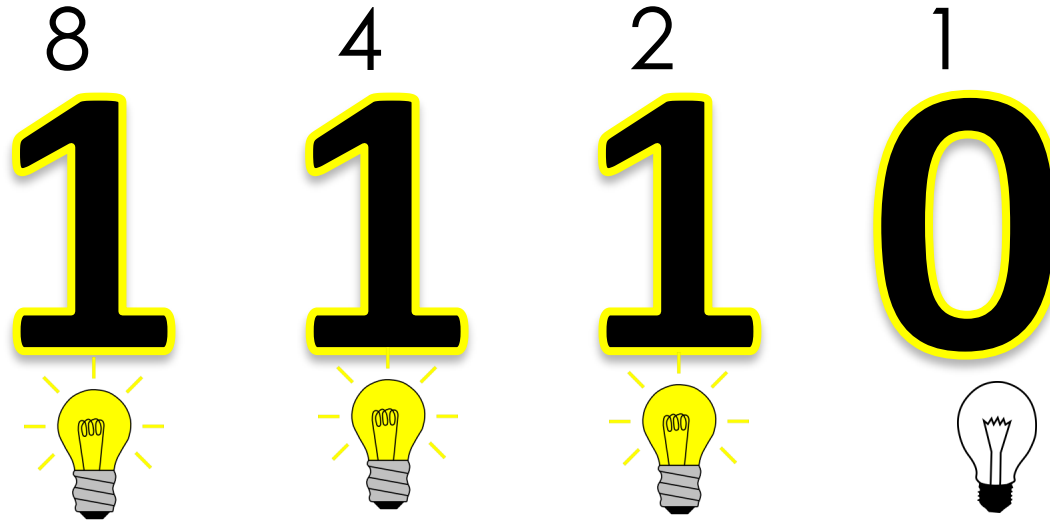
In binary, we only count the places with a 1 underneath them (switched on)

Like with denary we then do the calculation...

1 x 8	=	8
1 x 4	=	4
1 x 2	=	2
		14

Let's do some together☺

8	4	2	1
0	1	0	1

$$1 + 4 = 5$$

Let's do another one ☺

8	4	2	1
1	1	0	1

1 + 4 + 8 = 13

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One more ☺
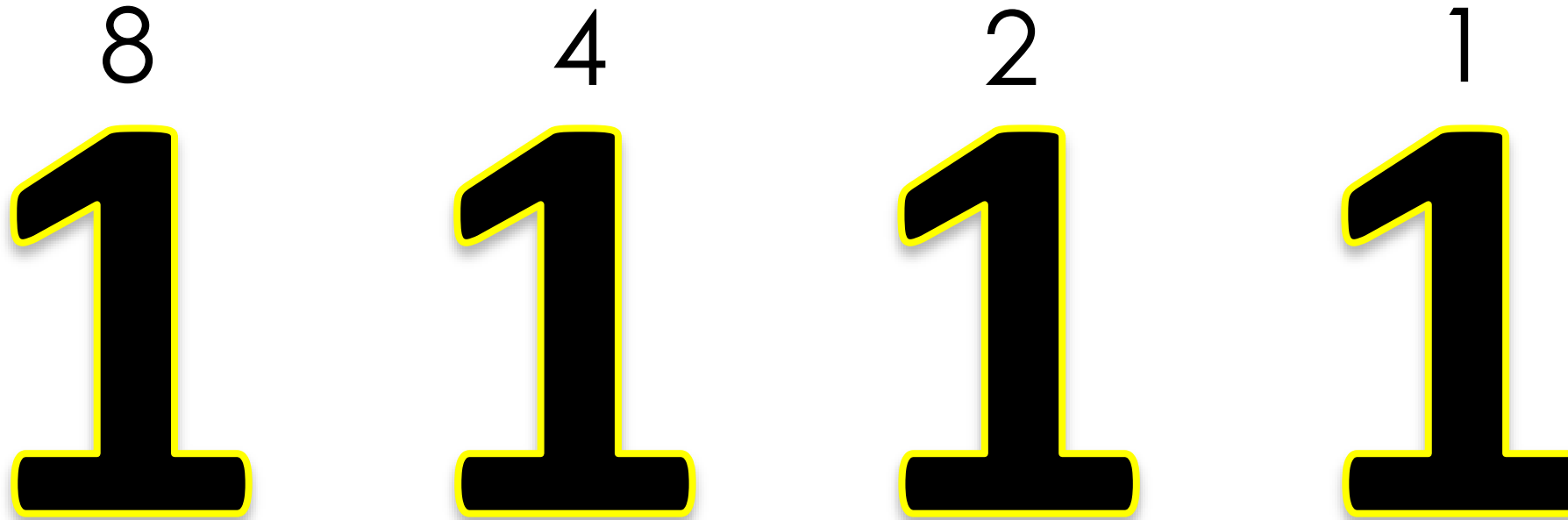
8	4	2	1
1	**1**	**1**	**1**

$$1 + 2 + 4 + 8 = 15$$

Convert these numbers to decimal numbers

(REMEMBER TO USE YOUR BINARY PLACE NUMBERS AT THE TOP)

0	0	0	1	=
0	0	1	0	=
0	0	0	0	=
1	0	0	0	=
0	1	0	0	=
1	0	1	0	=
0	1	1	1	=
0	0	1	1	=

Extra conversions:

0	1	0	1	=
1	1	1	1	=
0	1	1	0	=
1	0	0	1	=
1	1	1	0	=
1	1	0	0	=
1	0	1	1	=
1	1	0	1	=

THINK IT:

What do you think you should do if you wanted to make a number which was greater than 16?

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YOU HAVE 5 MINUTES TO COMPLETE AS MANY CONVERSIONS AS YOU CAN

Convert these numbers to denary - ANSWERS

8	4	2	1		
0	0	0	1	=	**1**
0	0	1	0	=	**2**
0	0	0	0	=	**0**
1	0	0	0	=	**8**
0	1	0	0	=	**4**
1	0	1	0	=	**10**
0	1	1	1	=	**7**
0	0	1	1	=	**3**

8 MARKS

Extra conversions:

| 8	4	2	1		
0	1	0	1	=	**5**
1	1	1	1	=	**15**
0	1	1	0	=	**6**
1	0	0	1	=	**9**
1	1	1	0	=	**14**
1	1	0	0	=	**12**
1	0	1	1	=	**11**
1	1	0	1	=	**13**

8 MARKS

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Mark your answers with a different colour pen and write the total marks at the bottom.

Convert these numbers to binary

Choose your level and do EITHER KNOW IT or GRASP IT

		8	4	2	1
1	=				
4	=				
2	=				
6	=				
8	=				
5	=				

		8	4	2	1
7	=				
11	=				
10	=				
14	=				
13	=				
15	=				
	=				
	=				
	=				

KNOW IT:

GRASP IT:

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THINK IT:

Add any missing numbers to the list

Convert these numbers to binary

KNOW IT: *6 MARKS*

1	=	0	0	**0**	1
4	=	0	1	0	0
2	=	0	0	**1**	**0**
6	=	0	1	**1**	**0**
8	=	1	0	**0**	**0**
5	=	0	1	**0**	1

GRASP IT: *6 MARKS*

7	=	0	1	**1**	**1**
11	=	1	0	1	1
10	=	1	0	**1**	**0**
14	=	1	1	**1**	**0**
13	=	1	1	**0**	1
15	=	1	1	**1**	**1**
	=				
	=				
	=				

THINK IT:

Add any missing numbers to the list

Making larger numbers

We have to keep doubling the place numbers

128	64	32	16	8	4	2	1
0	0	1	0	0	0	0	1
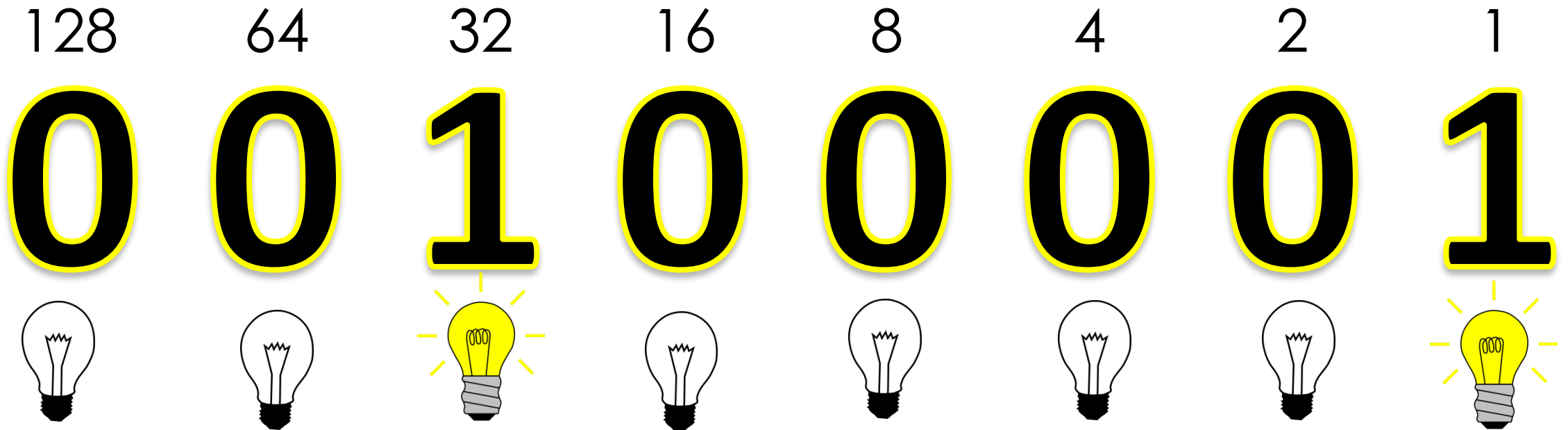
What is this binary number?

Convert these numbers to decimal numbers

(REMEMBER TO USE YOUR BINARY PLACE NUMBERS AT THE TOP)

0	0	0	1	0	0	0	1	=
0	0	1	0	0	0	1	0	=
0	0	1	0	0	0	1	1	=
0	0	0	1	1	1	0	0	=
1	0	0	0	0	0	0	1	=
0	1	0	0	1	0	1	0	=

THINK IT:

1	1	0	1	0	0	0	1	=
1	1	1	1	1	1	1	1	=
1	0	1	1	0	1	1	1	=
0	1	1	1	1	1	0	0	=
1	1	0	0	0	1	0	1	=
0	1	1	0	1	1	1	0	=

YOU HAVE 5 MINUTES TO COMPLETE AS MANY CONVERSIONS AS YOU CAN

To achieve excellence by converting between 8 bit binary numbers

Convert these numbers to decimal numbers

(REMEMBER TO USE YOUR BINARY PLACE NUMBERS AT THE TOP)

128	64	32	16	8	4	2	1		
0	0	0	1	0	0	0	1	=	17
0	0	1	0	0	0	1	0	=	34
0	0	1	0	0	0	1	1	=	35
0	0	0	1	1	1	0	0	=	28
1	0	0	0	0	0	0	1	=	129
0	1	0	0	1	0	1	0	=	74

THINK IT:

128	64	32	16	8	4	2	1		
1	1	0	1	0	0	0	1	=	209
1	1	1	1	1	1	1	1	=	255
1	0	1	1	0	1	1	1	=	183
0	1	1	1	1	1	0	0	=	124
1	1	0	0	0	1	0	1	=	197
0	1	1	0	1	1	1	0	=	110

YOU HAVE 5 MINUTES TO COMPLETE AS MANY CONVERSIONS AS YOU CAN

To achieve excellence by converting between 8 bit binary numbers

QUIZ

1. Who or what can use and understand the decimal number system?

2. How many digits are in the binary number system?

3. What are the digits in the decimal number system?

4. Who/what uses binary numbers

5. Which binary number is the biggest?

   0 0 1 1 0 1 0 1   or   0 0 1 1 0 1 0 0

6. What do the numbers 1 and 0 represent inside a computer?

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To achieve excellence by converting between 8 bit binary numbers