Name _____ Date _____

From Binary to Decimal

Example

Place values from right to left: $1, 2, 4, 8, 16, \ldots$ (each one is double the one before).

$1011_2 = 1 \times 8 + 0 \times 4 + 1 \times 2 + 1 \times 1 = 8 + 2 + 1 = 11$

Remember

Add up the place values where the digit is 1. The small 2 shows that a number is written in binary: $11_2 = 3$, but $11 = 11_{10}$.

1 ON YOUR OWN Write the value in decimal.

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

2 IN PAIRS **Even or odd?** Decide without working it out and explain how you knew.

1011_2 **even / odd** 10100_2 **even / odd**

111_2 **even / odd** 1000000_2 **even / odd**

Names (pair) _____ Date _____

3 IN PAIRS **Add a zero.** Work these out and compare.

$101_2 =$ ☐ $1010_2 =$ ☐

$10100_2 =$ ☐ $101000_2 =$ ☐

What happens to a number when we write a 0 at the end of its binary form? And at the end of its decimal form?

4 ON YOUR OWN Put these in order from smallest to largest.

1001_2 111_2 1100_2 10000_2 → ☐

5 ON YOUR OWN **True or false?**

1000_2 **is greater than** 111_2**.** **true** / **false**

$11_2 = 11$ **true** / **false**

$10_2 + 10_2 = 20_2$ **true** / **false**

The Binary Numbers app · otooly.com/binary-numbers

Convert mode: switch bits on and off and watch the decimal value change.

★ ON YOUR OWN **Exit card.** $110101_2 =$ ☐