



# Two's complement: binary to denary 1

Convert the binary number 11101001 to denary. The binary value is encoded as an 8-bit **two's complement** number.

- ☐ -105
- ☐ +233
- ☐ -23
- ☐ +105

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# Two's complement: binary to denary 3

Convert the binary number 10001010 to denary. The binary value is encoded as an 8-bit **two's complement** number.

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# Two's complement: denary to binary 1

Convert the value  $+28_{10}$  to an 8-bit two's complement binary number.

- ☐ 11100000
- ☐ 00011100
- ☐ 011100
- ☐ 11100100

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# Two's complement: denary to binary 2

Convert the value  $-49_{10}$  to an 8-bit two's complement binary number.

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# Two's complement: range 1

Signed integers can be stored in two's complement form. What is the range of values that can be stored using 8 bits in two's complement?

- ☐ +255 to -256
- ☐ +127 to -128
- ☐ +256 to -256
- ☐ +128 to -128

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# Signed fixed: binary to denary 1

Select the denary number that is the same value as the binary number 010110.1010

The number is represented using **two's complement fixed point form**, with 6 places before the binary point and 4 places after the binary point.

- ☐  $-9.375$  (or  $-9\frac{3}{8}$ )
- ☐  $22.625$  (or  $22\frac{5}{8}$ )
- ☐  $5.65625$  (or  $5\frac{21}{32}$ )
- ☐  $11.3125$  (or  $11\frac{5}{16}$ )
- ☐  $362$

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# Signed fixed: binary to denary 4

Convert the binary number 100110.1110 to denary. It is represented in **two's complement fixed point form** with 6 places before the binary point and 4 places after the binary point.

Type your answer as a **signed decimal number** (e.g. +3.75). Do not leave any spaces in your answer.

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# Signed fixed: denary to binary 1

Each binary number below is encoded as a **fixed point two's complement number** with 4 places before the binary point and 4 places after the binary point.

Select the binary number that is the same value as the denary number  $5\frac{5}{8}$  (or  $\frac{45}{8}$  or 5.625 as a decimal).

☐ 01011010

☐ 00101101

☐ 10100110

☐ 10111010

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# Signed fixed: denary to binary 3

Convert the denary number  $-11\frac{3}{8}$  (or  $-\frac{91}{8}$  or  $-11.375$  as a decimal) to binary. It must be encoded as a **fixed point two's complement number** with 5 places before the binary point and 4 places after the binary point.

Type your answer as a 9-bit binary number **without a binary point** (e.g. 111110000). Do not leave any spaces in your answer.

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# Absolute and relative error 1

Calculate the absolute and relative error that is caused due to the **truncated** representation of  $0.2_{10}$  in binary using 8 bits.

Original value in denary	Truncated representation in binary using 8 bits	Absolute error	Relative error
$0.2_{10}$	$0.0011010_2$	?	?

## Part A

Calculate the value of the **absolute error** in denary.

## Part B

Using your answer for the absolute error in Part A, calculate the value of the **relative error** as a percentage (but do not include the percentage sign).

