Floating-Point Conversions

To convert a decimal number into **IEEE 754** Floating Point format:

1. Calculate the significand as though it were a fixed-point binary value.
For example, the value 10.5 can be written as 1010.1

2. Normalise the significand.

Shift the Binary Point to the left or right, until the significand is in the form:

`1.bbbbb`

This means that **all** significands will begin with **`1.???`**
The 1 and the binary point are therefore **implied and are not stored**.

3. Calculate the exponent, based on the number of shifts made in the last step.

Shifts to the left indicate positive exponents, while right-shifts indicate negative exponents.

As the IEEE standard states that the exponent should be displayed in 8 bit bias form, work out what the normal two's complement code would be for the exponent, and then add the two's complement code for the bias constant to it.

This will give you the exponent expressed in bias form.

Example:

We will convert the value 10.5

10.5 = 1010.1 in binary.

We must shift the binary point **three** places to the **left**. This gives us **1.0101**

Remembering that the most significant bit of the significand is not stored, we can write the significand as

```
0101
```

We left-shifted **3 places** which gives us a value of + 3 for the exponent.

```
00000011        3 in two's comp
01111111        127 in two's comp
========
10000010        3 in bias form
```

So the number would be written:

`0 10000010 01010000000000000000000`