Scaled Binary

$5/9 = .555\ldots = .\underline{5}$

↖ meaning repeats to infinity

How to represent in integers using scaled binary

Convert to Base 16

$5/9 \times 16 = 80/9 = 8\ 8/9$

$8/9 \times 16 = 128/9 = E\ 2/9$

$2/9 \times 16 = 32/9 = 3\ 5/9$

$5/9 \times 16 = 80/9 = 8\ 8/9$

$8/9 \times 16 = 128/9 = E\ 2/9$

$2/9 \times 16 = 32/9 = 3\ 5/9$

$5/9 = .8E38E3 \times 16^{0} = .\underline{8E3} \times 16^{0}$

Scaled to 1 Byte $= 8E \times 16^{-2}$

2 Bytes $= 8E38 \times 16^{-4}$

3 Bytes $= 8E38E3 \times 16^{-6}$

or $8E \times 2^{-8}$ 1 Byte

$8E39 \times 2^{-16}$ 2 Byte rounded up

$8E38E4 \times 2^{-24}$ 3 Byte rounded up

Now let's write computer code and see what this achieves when multiplying

$$254 \times 5/9 = 141.1$$

But just using integer math

$$255 \times 5/9 = 141 \quad \text{truncated}$$

Using scaled Binary

$$25 \times 8E \times 2^{-8} = 140$$
$$25 \times 8F \times 2^{-8} = 141$$
$$25 \times 8E38 \times 2^{-16} = 141$$
$$25 \times 8E39 \times 2^{-16} = 141$$
$$25 \times 8E38E3\ 2^{-24} = 141$$
$$25 \times 8E38E4 \times 2^{-24} = 141$$

See computer program for example called scaled binary