

Scientific notation is a system developed to deal with **very large** and **very small** numbers. Only the **significant digits** are included in the first part of scientific notation. All **leading and trailing zeroes** are removed and replaced with an **exponent of base 10** to indicate the **position of the decimal place**.

$$567000 = 5.67 \times 10^5$$

To convert **to** scientific notation:

1. Show the decimal (if necessary).
2. Shift the decimal to the right or left, so the coefficient is a number between 1 and 10 (but not 10).
3. Remove any leading or trailing zeroes.
4. Add an exponent with base 10
5. Set the exponent to the number of steps left (positive) or number of steps right (negative).

567000	0.000234
567000.	
5.67000	00002.34
5.67	2.34
$5.67 \times 10^2$	$2.34 \times 10^2$
$5.67 \times 10^5$	$2.34 \times 10^{-4}$

To convert **from** scientific notation:

1. Shift the decimal **right** for a positive exponent, and **left** for a negative exponent, inserting zeroes where necessary.
2. For decimal values less than 1, good form includes a zero in front of the decimal place.

$5.67 \times 10^5$	$2.34 \times 10^{-4}$
567000	.000234
	0.000234

Ex.1 Write each number in scientific notation.

(a) 0.000006	(b) 70
(c) 6700500	(d) 200000000
(e) 48900	(f) 0.00002160
(g) 355.0085	(h) 0.004410

Ex.2 Convert each number into standard notation.

(a) $2.30 \times 10^4$	(b) $1.76 \times 10^{-3}$
(c) $1.901 \times 10^{-7}$	(d) $8.65 \times 10^{-1}$
(e) $9.11 \times 10^3$	(f) $1.76 \times 10^0$
(g) $7.405012 \times 10^5$	(h) $6.320 \times 10^{-5}$

Answers:

1. (a)  $6 \times 10^{-6}$  (b)  $7 \times 10^1$  (c)  $6.7005 \times 10^6$  (d)  $2 \times 10^8$  (e)  $4.89 \times 10^4$  (f)  $2.160 \times 10^{-5}$  (g)  $3.550085 \times 10^2$  (h)  $4.410 \times 10^{-3}$
2. (a) 23000 (b) 0.00176 (c) 0.0000001901 (d) 0.865 (e) 9110 (f) 1.76 (g) 74050.12 (h) 0.00006320