

# Standard Index Form

The PowerPoint contains the slides shown below and these give an animated presentation explaining how to change between ordinary and SIF numbers. There are questions with answers.

Standard Index Form

Objectives: Change between ordinary and SIF numbers

☆ 1

What is Standard Index Form?

In technical, medical and scientific work, sometimes it is necessary to deal with numbers that have lots of noughts.

A number with lots of noughts is clumsy and it's easy to make a mistake with the noughts so we can use a method called standard index form like this:

$3\ 000\ 000 = 3 \times 10^6$

Three million written in the normal way

Three million written in standard index form

☆ 2

How to write a number in S.I.F.

To write, for example, 300 000 in SIF, we would use powers of 10 like this...

$300\ 000 = 3 \times 100\ 000$   
 $= 3 \times 10^5$

$10^2 = 100$   
 $10^3 = 1\ 000$   
 $10^4 = 10\ 000$   
 $10^5 = 100\ 000$   
 $10^6 = 1\ 000\ 000$   
 etc

This number must be bigger than 1 and smaller than 10

The power of 10 that gives an equal value

☆ 3

How to write a number in S.I.F.

Here is another example of how to write 1 250 000 in SIF

$1\ 250\ 000 = 1.25 \times 100\ 000$   
 $= 1.25 \times 10^5$

$10^2 = 100$   
 $10^3 = 1\ 000$   
 $10^4 = 10\ 000$   
 $10^5 = 100\ 000$   
 $10^6 = 1\ 000\ 000$   
 etc

This number must be bigger than 1 and smaller than 10

The power of 10 that gives an equal value

☆ 4

Write these numbers in standard index form

- $3\ 000\ 000 \rightarrow 3 \times 100\ 000 \rightarrow 3 \times 10^6$
- $240\ 000 \rightarrow 2.4 \times 100\ 000 \rightarrow 2.4 \times 10^5$
- $3\ 400 \rightarrow 3.4 \times 1\ 000 \rightarrow 3.4 \times 10^3$
- $12\ 500 \rightarrow 1.25 \times 10\ 000 \rightarrow 1.25 \times 10^4$
- $375\ 000 \rightarrow 3.75 \times 100\ 000 \rightarrow 3.75 \times 10^5$
- $120\ 000 \rightarrow 1.2 \times 100\ 000 \rightarrow 1.2 \times 10^5$
- $17\ 500\ 000 \rightarrow 1.75 \times 10\ 000\ 000 \rightarrow 1.75 \times 10^7$
- $456\ 000 \rightarrow 4.56 \times 100\ 000 \rightarrow 4.56 \times 10^5$
- $7\ 500\ 000 \rightarrow 7.5 \times 100\ 000 \rightarrow 7.5 \times 10^6$
- $125\ 000 \rightarrow 1.25 \times 100\ 000 \rightarrow 1.25 \times 10^5$

☆ 5

Change SIF numbers into ordinary numbers

☆ 6

To change  $8.75 \times 10^5$  into an ordinary number, we would...

$8.75 \times 10^5 \rightarrow 8.75 \times 100\ 000 \rightarrow 875\ 000$

Write out what the numbers mean

Do the multiplication

☆ 7

Write these SIF numbers as ordinary numbers

- $4 \times 10^4 \rightarrow 4 \times 10\ 000 \rightarrow 40\ 000$
- $2 \times 10^4 \rightarrow 2 \times 100\ 000 \rightarrow 200\ 000$
- $1.5 \times 10^4 \rightarrow 1.5 \times 10\ 000 \rightarrow 15\ 000$
- $3.75 \times 10^4 \rightarrow 3.75 \times 10\ 000 \rightarrow 37\ 500$
- $2.5 \times 10^5 \rightarrow 2.5 \times 100\ 000 \rightarrow 250\ 000$
- $4.7 \times 10^2 \rightarrow 4.7 \times 100 \rightarrow 470$
- $1.25 \times 10^5 \rightarrow 1.25 \times 100\ 000 \rightarrow 125\ 000$
- $3.1 \times 10^7 \rightarrow 3.1 \times 10\ 000\ 000 \rightarrow 31\ 000\ 000$
- $6.25 \times 10^4 \rightarrow 6.25 \times 10\ 000 \rightarrow 62\ 500$
- $7.5 \times 10^6 \rightarrow 7.5 \times 100\ 000 \rightarrow 750\ 000$

☆ 8

Use SIF to represent small numbers

Small numbers also contain lots of noughts. It is easy to add or miss out a nought in a number like 0.000012 so SIF can be used to represent these like this...

☆ 9

To write 0.000012 in SIF, we would

Decimal point needs to move 5 times  $\rightarrow -5$

$0.000012 = 1.2 \times 10^{-5}$

$10^2 = 100$   
 $10^3 = 1\ 000$   
 $10^4 = 10\ 000$   
 $10^{-1} = 0.1$   
 $10^{-2} = 0.01$   
 $10^{-3} = 0.001$   
 $10^{-4} = 0.0001$   
 $10^{-5} = 0.00001$   
 etc

Write this as a number bigger than 1 and smaller than 10

Use the appropriate power of 10 to make the two numbers equal

☆ 10

Write these numbers in standard index form

- $0.000007 = 7 \times 10^{-6}$
- $0.000000005 = 5 \times 10^{-9}$
- $0.000125 = 1.25 \times 10^{-4}$
- $0.000075 = 7.5 \times 10^{-5}$
- $0.000625 = 6.25 \times 10^{-4}$
- $0.000067 = 6.7 \times 10^{-5}$
- $0.00043 = 4.3 \times 10^{-4}$
- $0.056 = 5.6 \times 10^{-2}$
- $0.000000875 = 8.75 \times 10^{-7}$
- $0.0000045 = 4.5 \times 10^{-6}$

☆ 11

Write these SIF numbers as ordinary numbers

- $8 \times 10^{-3} = 0.00008$
- $7 \times 10^{-6} = 0.000007$
- $9 \times 10^{-9} = 0.0000009$
- $3.5 \times 10^{-7} = 0.00000035$
- $2.5 \times 10^{-8} = 0.000000025$
- $4.7 \times 10^{-9} = 0.000000047$
- $1.25 \times 10^{-8} = 0.000000125$
- $1.375 \times 10^{-7} = 0.000001375$
- $8.75 \times 10^{-6} = 0.00000875$
- $1.125 \times 10^{-10} = 0.0000000001125$

☆ 12