Standard Form 2

In standard form a number is written as a number between 1 and 10 multiplied by a power of 10

Examples

$3650 = 3.65 \times 10^3$

$51{,}000 = 5.1 \times 10^4$

$0.0086 = 8.6 \times 10^{-3}$

$0.0000862 = 8.62 \times 10^{-5}$

Exercise

$894{,}000 = 8.94 \times 10^5$

$16{,}300 = 1.63 \times 10^4$

$0.048 = 4.8 \times 10^{-2}$

$0.0032 = 3.2 \times 10^{-3}$

$126 = 1.26 \times 10^2$

$0.345 = 3.45 \times 10^{-1}$

Write as ordinary numbers

Examples 1) $4.3 \times 10^3 = 4300$

2) $6.81 \times 10^5 = 681000$

3) $3.4 \times 10^{-3} = 0.0034$

4) $5.85 \times 10^{-6} = 0.00000585$

Exercise Write as ordinary numbers

1) $2.6 \times 10^{3} = 2600$

2) $4.1 \times 10^{-3} = 0.0041$

3) $5.88 \times 10^{5} = 588000$

4) $1.23 \times 10^{-4} = 0.000123$

5) $6.6 \times 10^{6} = 6{,}600{,}000$

6) $5.8 \times 10^{-1} = 0.58$

Adjustments to put numbers in standard form

1) $32 \times 10^{7} = 3.2 \times 10^{8}$

2) $0.53 \times 10^{4} = 5.3 \times 10^{3}$

3) $163 \times 10^{9} = 1.63 \times 10^{11}$

4) $48 \times 10^{-7} = 4.8 \times 10^{-6}$

Exercise Write in standard form

1) $48 \times 10^4 = 4.8 \times 10^5$

2) $650 \times 10^5 = 6.5 \times 10^7$

3) $0.12 \times 10^4 = 1.2 \times 10^3$

4) $0.073 \times 10^{-4} = 7.3 \times 10^{-6}$

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1 These numbers are not in standard form. Write them in standard form.

a 56.7×10^2	**b** 0.06×10^4	**c** 34.6×10^{-2}
d 0.07×10^{-2}	**e** 56×10	**f** $2 \times 3 \times 10^5$
g $2 \times 10^2 \times 35$	**h** 160×10^{-2}	**i** 23 million
j 0.0003×10^{-2}	**k** 25.6×10^5	**l** $16 \times 10^2 \times 3 \times 10^{-1}$
m $2 \times 10^4 \times 56 \times 10^{-4}$	**n** $18 \times 10^2 \div 3 \times 10^3$	**o** $56 \times 10^3 \div 2 \times 10^{-2}$

a) $56.7 \times 10^2 = 5.67 \times 10^3$

b) $0.06 \times 10^4 = 6 \times 10^2$

c) $34.6 \times 10^{-2} = 3.46 \times 10^{-1}$

d) $0.07 \times 10^{-2} = 7 \times 10^{-4}$

e) $56 \times 10 = 5.6 \times 10^2$

f) $2 \times 3 \times 10^5 = 6 \times 10^5$

g) $2 \times 10^2 \times 35 = 70 \times 10^2 = 7 \times 10^3$

h) $160 \times 10^{-2} = 1.6 \times 10^0$

i) $23{,}000{,}000 = 2.3 \times 10^7$

j) $0.00003 = 3 \times 10^{-5}$

k) $25.6 \times 10^5 = 2.56 \times 10^6$

l) $16 \times 10^2 \times 3 \times 10^{-1} = 48 \times 10^1 = 4.8 \times 10^2$

m) $2 \times 10^4 \times 56 \times 10^{-4} = 112 \times 10^0 = 1.12 \times 10^2$

n) $\dfrac{18 \times 10^2}{3 \times 10^3} = 6 \times 10^{-1}$

o) $\dfrac{56 \times 10^3}{2 \times 10^{-2}} = 28 \times 10^5 = 2.8 \times 10^6$

Using a Calculator

Examples

1) $(5 \times 10^9) \times (7 \times 10^8) = 3.5 \times 10^{18}$

$\boxed{5}$ $\boxed{\times 10^x}$ $\boxed{9}$ $\boxed{\times}$ $\boxed{7}$ $\boxed{\times 10^x}$ $\boxed{8}$ $\boxed{=}$

$\boxed{\text{exp}}$ $\boxed{\text{exp}}$

2) $(2.4 \times 10^{37}) \div (4 \times 10^{23}) = 6 \times 10^{13}$

3) $(3.2 \times 10^{87}) \div (8 \times 10^{82}) = 40000$

$= 4 \times 10^{5}$

4) $(6.2 \times 10^{21}) + (5.83 \times 10^{20}) = 6.783 \times 10^{21}$

Homework

3 Work out the following. Give your answers in standard form, rounding off to an appropriate degree of accuracy where necessary.

a $2.1 \times 10^4 \times 5.4 \times 10^3$

b $1.6 \times 10^3 \times 3.8 \times 10^3$

c $2.4 \times 10^4 \times 6.6 \times 10^4$

d $7.3 \times 10^{-6} \times 5.4 \times 10^3$

e $(3.1 \times 10^4)^2$

f $(6.8 \times 10^{-4})^2$

g $5.7 \times 10 \times 3.7 \times 10$

h $1.9 \times 10^{-2} \times 1.9 \times 10^9$

i $5.9 \times 10^3 \times 2.5 \times 10^{-2}$

j $5.2 \times 10^3 \times 2.2 \times 10^2 \times 3.1 \times 10^3$

k $1.8 \times 10^2 \times 3.6 \times 10^3 \times 2.4 \times 10^{-2}$