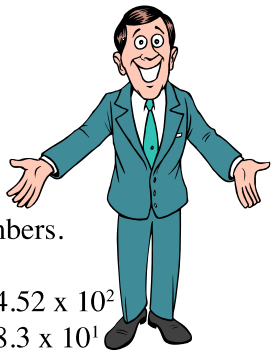
Standard Index Form.



Positive Powers of 10.

A. These numbers are given as standard index form. Write them as ordinary numbers.

1). 1.4×10^{2}	2). 2×10^{3}	3). 6.3×10^{1}	4). 4.52×10^{2}
5). 7×10^{4}	6). 5.6×10^{4}	7). 4.56×10^{4}	8). 8.3×10^{1}
9). 3.5×10^{0}	10). 4.76×10^{6}	11). 2×10^{5}	12). 7.02×10^{3}
13). 6×10^{1}	14). 2.1×10^{2}	15). 4.63×10^{1}	16). 6.1×10^{5}
17). 9×10^{0}	18). 7.8×10^{4}	19). 1.3×10^{2}	20). 9.7×10^{0}
21). 4.571×10^{4}	22). 6.78×10^{2}	23). 1.8×10^{5}	24). 3.67×10^{8}
25). 6.82×10^{1}	26). 4.01×10^{3}	27). 3.55×10^{1}	28). 3.91×10^{5}
29). 6.3721×10^{4}	30). 7.242×10^{2}	31). 9.37×10^{6}	32). 8.931×10^{0}
33). 7.35×10^{7}	34). 8.32×10^{1}	35). 1.4×10^{8}	36). 7.93×10^{5}
37). 8×10^{8}	38). 5.25×10^{2}	39). 2.04×10^{1}	40). 6.7×10^{3}
41). 2.8×10^{2}	42). 2×10^{4}	43). 8.302×10^{6}	44). 8.2×10^{2}
45). 7.34×10^{0}	46). 9.8×10^{1}	47). 6.32×10^{5}	48). 6.143×10^{7}
49). 3.56×10^{1}	50). 9.18×10^{3}	51). 7.2×10^{2}	52). 8.95×10^{8}
53). 6×10^{3}	54). 7.892×10^{7}	55). 3.602×10^{0}	56). 8.1×10^{4}
57). 7.842×10^{2}	58). 6.7232×10^{10}	59). 3.537×10^{5}	60). 9×10^{15}

B. Write these numbers in standard index form.

1). 470	2). 5000	3). 60	4). 3600
5). 972	6). 15	7). 6.8	8). 890000
9). 365	10). 620000	11). 23	12). 620
13). 5100	14). 8000000	15). 560000	16). 8
17). 6300	18). 93	19). 4.93	20). 12400
21). 320000	22). 900000	23). 4562	24). 572
25). 23.5	26). 93400	27). 207	28). 7210000
29). 1.32	30). 930000000	31). 46000	32). 9700000000
33). 66	34). 500000	35). 170200	36). 4.32
37). 754000	38). 5649000	39). 2009000	40). 783
41). 67000000000	42). 2600	43). 898500	44). 908000000
45). 860000	46). 340	47). 7000000000	48). 6500000
49). 79200	50). 5	51). 72	52). 895
53). 66600000000	54). 1950000000	55). 345	56). 41000000000
57). 85000000	58). 602300000	59). 3810000000000	60). 9.14324

Negative Powers of 10.

A. These numbers are given as standard index form. Write them as ordinary numbers.

1). 9.6×10^{-2}	2). 2.4×10^{-1}	3). 7×10^{-2}	4). 4.52×10^{-3}
5). 7.1×10^{0}	6). 9.2×10^{-2}	7). 7.32×10^{-4}	8). 9.2×10^{-1}
9). 2.5×10^{-3}	10). 5.76×10^{-4}	11). 8×10^{-2}	12). 3.02×10^{-3}
13). 2×10^{-1}	14). 4.1×10^{-5}	15). 5.63×10^{0}	16). 3.1×10^{-4}
17). 6×10^{-2}	18). 1.8×10^{-3}	19). 4.3×10^{-6}	20). 6.7×10^{-1}
21). 4.071×10^{-5}	22). 8.78×10^{-3}	23). 3.8×10^{-1}	24). 1.67×10^{0}
25). 2.82×10^{-7}	26). 6.02×10^{-3}	27). 2.55×10^{-6}	28). 9.91×10^{-2}

29). 2×10^{-8}	30). 3.242×10^{-4}	31). 6.37×10^{-2}	32). 4.931×10^{-9}
33). 6.35×10^{-4}	34). 8.32×10^{-6}	35). 1.4×10^{-1}	36). 7.93×10^{-7}
37). 7×10^{-2}	38). 2.25×10^{-1}	39). 2.04×10^{-4}	40). 6.7×10^{-9}
41). 2.8×10^{-3}	42). 9×10^{0}	43). 1.302×10^{-4}	44). 8.2×10^{-1}
45). 7.34×10^{-7}	46). 6.8×10^{-4}	47). 6.32×10^{-2}	48). 4.143×10^{-10}
49). 2.56×10^{-3}	50). 2.18×10^{-7}	51). 5.2×10^{-4}	52). 1.95×10^{-5}
53). 3×10^{-3}	54). 7.892×10^{-8}	55). 3.602×10^{-2}	56). 3.1×10^{-12}
57). 9.842×10^{-2}	58). 8.7232×10^{-15}	59). 1.537×10^{-7}	60). 2×10^{-24}

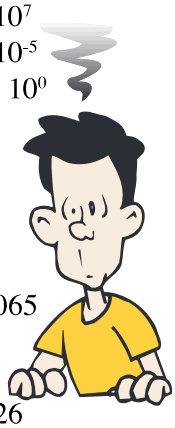
B. Write these numbers in standard index form.

1). 0.4	2). 0.0023	3). 0.045	4). 0.9
5). 0.83	6). 0.006	7). 0.0056	8). 0.0312
9). 0.204	10). 0.00081	11). 0.3	12). 0.00004
13). 0.00608	14). 0.036	15). 1.3	16). 0.0052
17). 0.041	18). 0.00021	19). 0.647	20). 0.0682
21). 4.63	22). 0.00009	23). 0.000362	24). 0.00000002
25). 0.0034	26). 0.52	27). 0.98	28). 0.00361
29). 0.004005	30). 0.00524	31). 0.0682	32). 0.0007
33). 2.8	34). 0.0000712	35). 0.00003	36). 0.00253
37). 0.0352	38). 0.799	39). 0.00000053	40). 0.0000000006
41). 0.0000645	42). 0.00245	43). 6.8342	44). 0.000004
45). 0.000326	46). 0.0257	47). 0.00003213	48). 0.00000074
49). 0.00045673	50). 5	51). 0.00045	52). 0.00836
53). 0.00000005671	54). 0.00000000002	55). 0.00004562	56). 0.000349
57). 0.0002355	58). 0.000000000003	59). 0.0002456	60). 0.000142

Mixed Powers of 10.

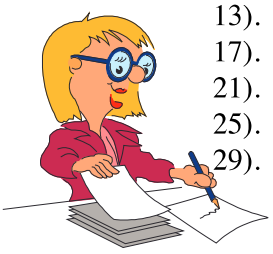
A. These numbers are given as standard index form. Write them as ordinary numbers.

1). 4.4×10^{3}	2). 7×10^{-1}	3). 2.3×10^{0}	4). 1.52×10^{4}
5). 6×10^{1}	6). 2.6×10^{-2}	7). 7.56×10^{-1}	8). 2.3×10^{3}
9). 8.5×10^{5}	10). 9.76×10^{-4}	11). 5×10^{-7}	12). 8.02×10^{5}
13). 4.3×10^{-1}	14). 1.1×10^{2}	15). 7.63×10^{1}	16). 6.1×10^{-3}
17). 4×10^{0}	18). 7.8×10^{-5}	19). 2.3×10^{7}	20). 9.7×10^{4}
21). 2.571×10^{-4}	22). 8.78×10^{0}	23). 8.8×10^{-2}	24). 7.67×10^{7}
25). 2.82×10^{6}	26). 4.02×10^{-8}	27). 7.55×10^{8}	28). 3.91×10^{-5}
29). 9×10^{9}	30). 5.242×10^{-10}	31). 9.37×10^{7}	32). 8.931×10^{0}



B. Write these numbers in standard index form.

1). 560	2). 0.7	3). 23	4). 6720
5). 0.0034	6). 19	7). 0.0045	8). 730000
9). 0.00527	10). 7120000	11). 0.00505	12). 0.0000065
13). 9100	14). 8000000	15). 560000	16). 8
17). 6300	18). 3	19). 49300	20). 0.124
21). 1200	22). 1900000	23). 0.00000782	24). 0.000426
25). 0.00067	26). 0.0054	27). 2.07	28). 0.00000076
29). 132	30). 930000000	31). 0.00000000065	32). 96200000000



Standard Index Form (No Calculator).

A. Express these numbers in standard index form.

1).	450	2).	3500	3).	48000	4).	45	5).	7850
6).	76500	7).	6.5	8).	43	9).	6700000	10).	249
11).	0.00056	12).	0.01	13).	0.003	14).	0.00072	15).	0.0057
16).	0.9004	17).	0.001056	18).	0.0000006	19).	0.07809	20).	0.0000000002

B. These numbers are given in standard form. Write them as ordinary numbers.

1).	6×10^{2}	2).	7.4×10^{4}	3).	6.2×10^{3}	4).	8.3×10^{1}	5).	3.54×10^{6}
6).	7.8×10^{4}	7).	9.03×10^{5}	8).	5.7×10^{0}	9).	6.1×10^{3}	10).	9.04×10^{5}
11).	4.7×10^{-2}	12).	9.1×10^{-7}	13).	8.7×10^{-4}	14).	9.3×10^{-2}	15).	2.59×10^{-4}
16).	7.8×10^{-1}	17).	9.03×10^{-4}	18).	5.7×10^{-5}	19).	6.1×10^{-1}	20).	9.04×10^{-3}

C. Put these numbers in order of size, largest first.

1).	6×10^{3}	0.076	9.2×10^{4}	4×10^{-3}	67000
2).	2×10^{-1}	203	47.6	3.1×10^{1}	0.09
3).	45000	4×10^{5}	5.7×10^{-6}	9×10^{-8}	2×10^{7}
4).	0.004	3×10^{-2}	0.9	8×10^{-4}	6.4×10^{-3}
5).	0.09	5×10^{-3}	0.5	8×10^{-4}	5.4×10^{-2}
6).	4.6×10^{-1}	420	58.9	5.6×10^{1}	1.2×10^{2}
7).	3.21×10^{5}	8.9×10^{-3}	9.65×10^{4}	6.3×10^{9}	3.5×10^{4}
	7.62×10^{-1}	1.4×10^{7}	9.96×10^{-10}.		

D. These numbers are **not** written in standard form. Put them into standard form.

1).	80×10^{2}	2).	14×10^{3}	3).	220×10^{6}	4).	783×10^{2}	5).	6354×10^{6}
6).	1278×10^{4}	7).	803×10^{2}	8).	257×10^{0}	9).	810×10^{3}	10).	34×10^{5}
11).	567×10^{1}	12).	9400×10^{0}	13).	8700×10^{7}	14).	43×10^{4}	15).	20009×10^{2}
16).	5600×10^{7}	17).	94×10^{1}	18).	5600×10^{0}	19).	6700×10^{8}	20).	900000×10^{12}
21).	0.6×10^{3}	22).	0.07×10^{2}	23).	0.004×10^{6}	24).	0.56×10^{5}	25).	0.00009×10^{7}
26).	0.003×10^{1}	27).	0.03×10^{2}	28).	0.008×10^{2}	29).	0.04×10^{0}	30).	0.00006×10^{3}
31).	0.89×10^{6}	32).	0.056×10^{1}	33).	0.037×10^{6}	34).	0.78×10^{2}	35).	0.00096×10^{2}

E. These numbers also are **not** written in standard form. Put them into standard form.

1).	50×10^{-2}	2).	24×10^{-4}	3).	42×10^{-1}	4).	840×10^{-7}	5).	35400×10^{-6}
6).	800×10^{-6}	7).	9303×10^{-4}	8).	70×10^{-1}	9).	600×10^{-1}	10).	9000×10^{-2}
11).	740×10^{-2}	12).	6500×10^{-3}	13).	23×10^{-4}	14).	6700×10^{-5}	15).	460000×10^{-4}
16).	0.04×10^{-1}	17).	0.06×10^{-2}	18).	0.007×10^{-4}	19).	0.56×10^{-4}	20).	0.00004×10^{-2}
21).	0.7×10^{-2}	22).	0.1×10^{-7}	23).	0.7×10^{-4}	24).	0.03×10^{-2}	25).	0.00009×10^{-4}
26).	0.08×10^{-5}	27).	0.02×10^{-3}	28).	0.008×10^{-1}	29).	0.06×10^{-9}	30).	0.0007×10^{-15}

F. Work out the following, leave your answer in standard form.

1).	$(3 \times 10^{4}) \times (4 \times 10^{5})$	2).	$(2 \times 10^{2}) \times (6 \times 10^{4})$	3).	$(9 \times 10^{2}) \times (6 \times 10^{2})$
4).	$(6 \times 10^{1}) \times (7 \times 10^{3})$	5).	$(2 \times 10^{2}) \times (3 \times 10^{1})$	6).	$(7 \times 10^{6}) \times (4 \times 10^{0})$

7). $(2 \times 10^{4}) \times (6 \times 10^{-3})$ 8). $(5 \times 10^{6}) \times (4 \times 10^{-4})$ 9). $(6 \times 10^{2}) \times (7 \times 10^{-5})$
10). $(7 \times 10^{1}) \times (4 \times 10^{-4})$ 11). $(3 \times 10^{6}) \times (9 \times 10^{-2})$ 12). $(6 \times 10^{3}) \times (8 \times 10^{-7})$
13). $(4 \times 10^{-2}) \times (9 \times 10^{4})$ 14). $(3 \times 10^{-4}) \times (7 \times 10^{2})$ 15). $(9 \times 10^{-4}) \times (6 \times 10^{0})$
16). $(7 \times 10^{-4}) \times (5 \times 10^{3})$ 17). $(9 \times 10^{-1}) \times (4 \times 10^{6})$ 18). $(3 \times 10^{-2}) \times (5 \times 10^{3})$
19). $(6 \times 10^{-2}) \times (7 \times 10^{-7})$ 20). $(4 \times 10^{-2}) \times (5 \times 10^{-4})$ 21). $(3 \times 10^{-1}) \times (7 \times 10^{-3})$
22). $(8 \times 10^{-4}) \times (2 \times 10^{-5})$ 23). $(3 \times 10^{-1}) \times (9 \times 10^{-9})$ 24). $(8 \times 10^{-3}) \times (4 \times 10^{-5})$

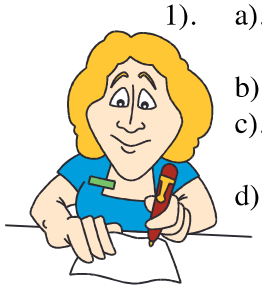
G. Work out the following, leave your answer in standard form.

1). $(8 \times 10^{3}) \div (2 \times 10^{1})$ 2). $(9 \times 10^{7}) \div (3 \times 10^{2})$ 3). $(6 \times 10^{7}) \div (6 \times 10^{2})$
4). $(8 \times 10^{6}) \div (4 \times 10^{3})$ 5). $(6 \times 10^{5}) \div (3 \times 10^{6})$ 6). $(7 \times 10^{2}) \div (1 \times 10^{5})$
7). $(4 \times 10^{5}) \div (2 \times 10^{2})$ 8). $(8 \times 10^{4}) \div (4 \times 10^{9})$ 9). $(4 \times 10^{0}) \div (2 \times 10^{6})$
10). $(7 \times 10^{-1}) \div (1 \times 10^{4})$ 11). $(9 \times 10^{-4}) \div (3 \times 10^{1})$ 12). $(6 \times 10^{-1}) \div (6 \times 10^{5})$
13). $(7 \times 10^{-4}) \div (7 \times 10^{7})$ 14). $(4 \times 10^{5}) \div (2 \times 10^{-3})$ 15). $(9 \times 10^{4}) \div (3 \times 10^{-2})$
16). $(5 \times 10^{1}) \div (5 \times 10^{-2})$ 17). $(6 \times 10^{7}) \div (2 \times 10^{-3})$ 18). $(4 \times 10^{-3}) \div (4 \times 10^{0})$
19). $(6 \times 10^{-2}) \div (3 \times 10^{-3})$ 20). $(7 \times 10^{-5}) \div (7 \times 10^{-9})$ 21). $(9 \times 10^{-4}) \div (3 \times 10^{-1})$
22). $(8 \times 10^{-7}) \div (4 \times 10^{-5})$ 23). $(2 \times 10^{-3}) \div (2 \times 10^{-6})$ 24). $(6 \times 10^{-2}) \div (3 \times 10^{-2})$

H. Work out the following, leave your answer in standard form.

1). $(3.2 \times 10^{4}) + (4.6 \times 10^{3})$ 2). $(2.4 \times 10^{2}) + (6.56 \times 10^{3})$ 3). $(7 \times 10^{2}) - (6 \times 10^{1})$
4). $(6.45 \times 10^{4}) - (8.9 \times 10^{3})$ 5). $(2.35 \times 10^{3}) + (3 \times 10^{1})$ 6). $(2 \times 10^{1}) - (4.6 \times 10^{0})$
7). $(2.87 \times 10^{4}) + (7.98 \times 10^{2})$ 8). $(5.76 \times 10^{6}) - (9.7 \times 10^{4})$ 9). $(6.6 \times 10^{0}) + (7.8 \times 10^{2})$
10). $(7.64 \times 10^{7}) - (4.6 \times 10^{6})$ 11). $(3.6 \times 10^{6}) - (6.05 \times 10^{4})$ 12). $(9.1 \times 10^{5}) + (6 \times 10^{4})$
13). $(3.4 \times 10^{-1}) + (4 \times 10^{-2})$ 14). $(2.7 \times 10^{-2}) + (6.8 \times 10^{-1})$ 15). $(9 \times 10^{-3}) + (2.1 \times 10^{-2})$
16). $(6 \times 10^{-3}) - (7 \times 10^{-4})$ 17). $(2.143 \times 10^{-2}) + (9 \times 10^{-4})$ 18). $(7.6 \times 10^{-6}) - (9 \times 10^{-7})$
19). $(1.76 \times 10^{-2}) + (5.7 \times 10^{-4})$ 20). $(5.72 \times 10^{-1}) - (4.2 \times 10^{-3})$ 21). $(6.56 \times 10^{0}) + (7 \times 10^{-2})$
22). $(7.05 \times 10^{-4}) - (9.6 \times 10^{-6})$ 23). $(3.5 \times 10^{-2}) + (9.473 \times 10^{-1})$ 24). $(6.508 \times 10^{-3}) - (8 \times 10^{-5})$

I.



1). a). There are about 59 million people in the United Kingdom.
Write this number in standard form.
b). On inch is 0.000015 miles (2 s.f.). Write this number in standard form.
c). The density of a metal is quoted as 5.4×10^{6} grams/m^3. Rewrite this as a normal denary number.
d). It takes light approximately 3.05×10^{-7} seconds to travel 100 metres. Write this as a normal decimal.

2). a). A crowd is estimated at a football match to be 46300 people. Write this number in standard form.
b). The largest acceptable gap between two particular moving parts in a car engine is 8.89×10^{-3} centimetres. Write this gap as a number of centimetres in decimal form.

3). Annette is trying to explain to her little brother how standard form actually works. She shows him the number 2.4×10^{3}. Her explanation is

" 10^{3} means 10 x 10 x 10 which equals 1000
To multiply by 1000 you have to move the decimal point 3 places to the right.
So $2.4 \times 10^{3} = 2400$."

In a similar way, write how Annette might explain how to handle 2.4×10^{-2}.

Standard Index Form (With Calculator).

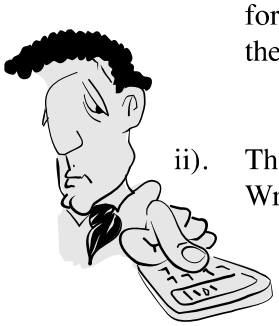
1). Put the following into standard index form.

a). 52 b). 147 c). 0.1×10^3 d). 1530
e). 142×10^2 f). 0.045 g). 0.54 h). 0.042×10^4

2). Change the following from standard index form into the normal number system.

a). 7×10^3 b). 5.4×10^2 c). 9.3×10^1 d). 7.34×10^0
e). 4×10^{-1} f). 5.2×10^{-3} g). 7.6×10^{-4} h). 4.3×10^{-2}

3). i). Thomas' calculator has an EXP button that allows him to put a number into it in standard form. Write down clearly the sequence of buttons he would have to press to put each of these numbers into his calculator.



a). 3.42×10^7 b). 6.7×10^4 c). 6.93×10^{-5}
d). 1.92×10^{-3} e). -2.9×10^{-2} f). -1.56×10^{-7}

ii). Thomas does some more calculations. The display on his calculator is shown below. Write down each of these answers in standard form.

a). 8.6^{06} b). 4^{09} c). -2.3^{08}
d). 4.73^{-04} e). 5.39^{-12} f). -4.1^{-07}

4). Work out the following, leave your answer in standard form.

a). $(1.3 \times 10^4) \times (4.6 \times 10^5)$ b). $(2.5 \times 10^2) \times (6.4 \times 10^4)$ c). $(9.7 \times 10^2) \times (6.5 \times 10^2)$
d). $(6.5 \times 10^1) \times (7.2 \times 10^{-3})$ e). $(7.8 \times 10^4) \times (7.3 \times 10^{-4})$ f). $(7.1 \times 10^6) \times (4.8 \times 10^{-2})$
g). $(4.8 \times 10^{-5}) \times (2.6 \times 10^7)$ h). $(5.4 \times 10^{-1}) \times (3.6 \times 10^3)$ i). $(3.1 \times 10^{-4}) \times (7.2 \times 10^6)$
j). $(6.72 \times 10^{-3}) \times (1.56 \times 10^{-6})$ k). $(3.71 \times 10^{-2}) \times (8.7 \times 10^{-3})$ l). $(9.1 \times 10^{-4}) \times (7.89 \times 10^{-6})$

5). Work out the following, leave your answer in standard form and correct to 3 sig. figs. if necessary.

a). $(8.2 \times 10^3) \div (2.4 \times 10^1)$ b). $(9.2 \times 10^7) \div (3.7 \times 10^2)$ c). $(3.2 \times 10^7) \div (6.9 \times 10^2)$
d). $(6.2 \times 10^6) \div (4.3 \times 10^{-1})$ e). $(6.8 \times 10^5) \div (3.9 \times 10^{-4})$ f). $(7.1 \times 10^2) \div (1.6 \times 10^{-4})$
g). $(4.2 \times 10^{-1}) \div (2.7 \times 10^2)$ h). $(9.1 \times 10^{-3}) \div (4.2 \times 10^2)$ i). $(4.4 \times 10^{-5}) \div (2.7 \times 10^4)$
j). $(7.9 \times 10^{-1}) \div (1.3 \times 10^{-3})$ k). $(3.4 \times 10^{-4}) \div (2.7 \times 10^{-2})$ l). $(6.3 \times 10^{-1}) \div (7.2 \times 10^{-5})$

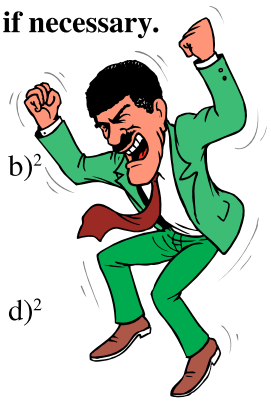
6). Work out the following, leave your answer in standard form.

a). $(3.24 \times 10^4) + (2.56 \times 10^5)$ b). $(1.46 \times 10^8) + (9.56 \times 10^7)$ c). $(1.3 \times 10^{12}) - (6.8 \times 10^{10})$
d). $(2.45 \times 10^1) - (8.9 \times 10^{-1})$ e). $(2.35 \times 10^{-3}) + (3.97 \times 10^{-4})$ f). $(4.69 \times 10^{-2}) - (2.69 \times 10^{-2})$
g). $(9.87 \times 10^4) + (7.98 \times 10^5)$ h). $(2.76 \times 10^6) - (9.7 \times 10^5)$ i). $(6.698 \times 10^0) + (7.8 \times 10^{-2})$
j). $(7.641 \times 10^{11}) - (4.656 \times 10^{10})$ k). $(1.68 \times 10^{-8}) - (6.05 \times 10^{-9})$ l). $(8.12 \times 10^{-9}) + (6.97 \times 10^{-8})$

7). Using your calculator find the answer to each of these calculations. Give your answer in standard form, correct to 3 significant figures if necessary.

a). $(3.274 \times 10^4) \div (1.69 \times 10^3)$ b). $(6.7 \times 10^{-5}) + (3.8 \times 10^{-4})$
c). $(2.35 \times 10^7) \times (6.941 \times 10^{-7})$. d). $(3.65 \times 10^3) \times (1.6 \times 10^2)$
e). $(2.37 \times 10^{-3}) - (8.2 \times 10^{-4})$ f). $(5.1 \times 10^8) \div (3 \times 10^{-6})$
g). $(4.6 \times 10^4) \times (3.2 \times 10^7)$ h). $(3.1 \times 10^{-4}) \div (2.1 \times 10^{-3})$
i). $(3.21 \times 10^3) + (2.47 \times 10^2)$ j). $(6.71 \times 10^{-2}) - (6.31 \times 10^{-3})$
k). $(2.86 \times 10^4) + (4.4 \times 10^2)$ l). $(4.1 \times 10^3) \times (3.2 \times 10^5)$
m). $(7.3 \times 10^4) \div (2.6 \times 10^2)$ n). $(3.2 \times 10^5) \div (6.2 \times 10^{-3})$

For all the following questions leave your answer correct to 3 significant figures if necessary.



8). If $a = 3.6 \times 10^2$, $b = 6.2 \times 10^4$, express in standard form

a). ab b). $a \div b$ c). $a + b$ d). a^2 e). $(a + b)^2$

9). If $c = 4.7 \times 10^{-3}$, $d = 9.6 \times 10^{-4}$, express in standard form

a). cd b). $c \div d$ c). $c + d$ d). c^2 e). $(c + d)^2$

10). If $e = 8.3 \times 10^{-4}$, $f = 1.2 \times 10^3$, express in standard form

a). ef b). $e \div f$ c). $f \div e$ d). $3e^2$ e). $4f^2 \div 2e^2$

11). If $a = 2.3 \times 10^3$, $b = 4.8 \times 10^{-1}$, $c = 8.2 \times 10^4$, express in standard form

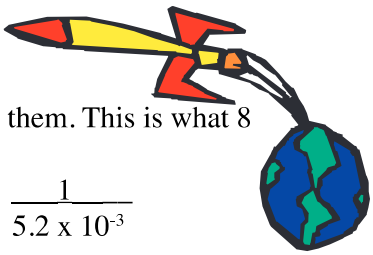
a). $a + c$ b). $c - a$ c). $c \div a$ d). ac e). abc
f). $a \div b$ g). $c \div b$ h). $(a + c) \times b$ i). $(c - a) \div b$ j). a^2b

12). Calculate the following and give your answer in standard index form.

a) $(3.7 \times 10^2) \times (3.5 \times 10^9)$ b) $\dfrac{7.52 \times 10^{-6}}{7.5 \times 10^{-9}}$ c) $(9.13 \times 10^6) \times (5.9 \times 10^{-4})$

13). For the following questions leave the answer in standard form.

a). Find the difference between i) 8.37×10^4 and 3.1×10^5 ii) 3.2×10^{-1} and 7.1×10^{-2}
b). Find the sum of i) 6.93×10^4 and 6.82×10^5 ii) 4.9×10^{-2} and 7.98×10^{-3}
c). Find the product of i) 7×10^5 and 9×10^4 ii) 9×10^{-3} and 7×10^4



14). If $c \times 10^c = 500000$, what is c ?

15). In a game where you have to choose cards with equal numbers on them. This is what 8 cards had on them:

4.27×10^3 0.0219×10^{-5} 0.00219×10^{-10} $\dfrac{1}{5.2 \times 10^{-3}}$

0.427×10^4 21.9×10^{-6} 5.2×10^3 2.19×10^{-7}

Find the **2 pairs** that have equal values on them.

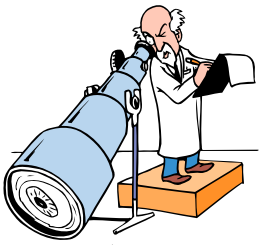
16). The mass of the planet Mercury is 2.30×10^{23} Kg and the mass of our moon is 7.35×10^{22} Kg. How many times bigger is the mass Mercury compared with that of the moon ?

17). A neutron has a mass of 1.68×10^{-27} Kg and an electron 9.11×10^{-31} Kg.

a). Which is heavier, the neutron or the electron ?
b). By how many times heavier is one to the other ?

18). The distance of the Sun from the earth is 1.5×10^8 Km. The speed of light is approximately 3.0×10^5 Km/s.
How long does it take for light to travel from the Sun to the earth in
a). seconds, b). minutes?

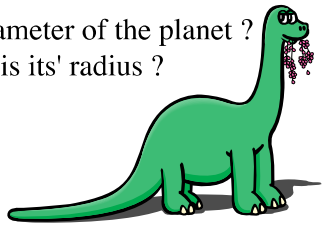
Standard Index Form (Problems).



Unless stated, leave your answer in standard index form.
Leave answers to an appropriate degree of accuracy.

1). The mass of Jupiter is approximately 1.90×10^{27} Kg. Write this mass as an ordinary number.

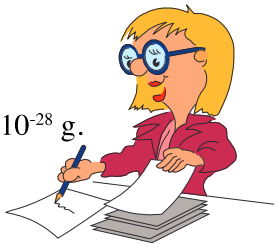
2). a). The radius of Saturn is approximately 6.04×10^{7} metres. What is the diameter of the planet ?
b). The diameter of a red blood cell is approximately 7×10^{-6} metres. What is its' radius ?



3). Dinosaurs died out about 64 million years ago. They first appeared on Earth 220 million years ago. For roughly how many years did they exist?

4). A magazine has 75 sheets of glossy paper is 0.6 cm thick. Work out the thickness of one sheet of paper.

5). The area of the Atlantic Ocean is 8.17×10^{7} sq. Km, the area of the Pacific Ocean is 1.66×10^{8} sq. Km.
a). Which ocean is the bigger ?
b). What is the difference in size between the two oceans ?

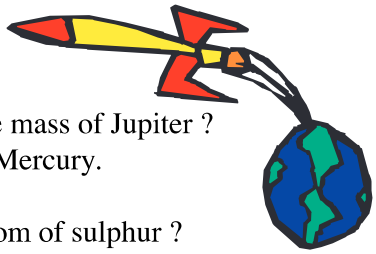


6). The mass of a neutron is 1.6725×10^{-24} g, the mass of an electron is 9.109×10^{-28} g.
a). What is the difference in mass between the two ?
b). What is the mass of 3 neutrons and 2 electrons ?

7). The area of the Asian continent is approximately 4.44×10^{7} sq. Km and the area of the North American continent is approximately 2.42×10^{7} sq. Km. Calculate, in standard index form,
a). the total area of the two continents,
b). the difference in area of the two continents.

8). The speed of light is approximately 2.998×10^{8} metres per second. How far can light travel in
a). 40 seconds, b). 5 minutes, c). 7 hours, d). 1 day ?

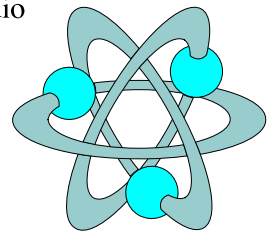
9). One atom of hydrogen weighs 1.67×10^{-24} g, one atom of oxygen weighs 2.66×10^{-23} g.
a). Which is the heavier atom ?
b). What is the difference in mass of the two atoms ?
c). One molecule of water is made up of 2 atoms of hydrogen and 1 atom of oxygen.
What is the weight of one molecule of water ?



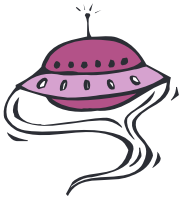
10). The mass of Earth is 5.976×10^{24} Kg.
a). The mass of Jupiter is 318 times the mass of Earth. What is the mass of Jupiter ?
b). Mercury's mass is 0.038 of the Earth's mass. Find the mass of Mercury.

11). 32 g of sulphur contains 6.02×10^{23} atoms. What is the mass of 1 atom of sulphur ?

12). The speed of radio waves is 3×10^{8} m/s. How long will it take for a radio wave to travel 100 **Km**? (Speed = distance ÷ time).



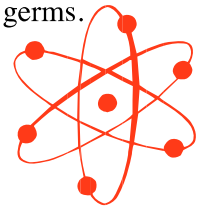
13). The mass of an atom of hydrogen weighs 1.66×10^{-24} g.
The mass of an atom of carbon is 1.99×10^{-23} g.
a). Which is the heavier atom ?
b). Find the difference in weight between the two atoms.
c). A molecule of methane is made up of 1 atoms of carbon and 4 atoms of hydrogen.
What is the weight of one molecule of methane?
d). How many molecules of methane are there in 1 g ?



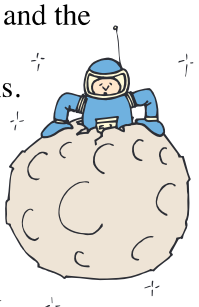
14). To measure distances in space we use units that are huge.
One Astronomical Unit = 149596000 Km. One Parsec = 206265 Astronomical Units.
a). How many Kilometres are there in one Parsec ?
b). The radius of the galaxy is 15000 Parsecs. What is this distance in Kilometres ?
c). The star Sirius A is 2.7 Parsecs away. What is this distance in Astronomical Units ?

15). The distance light travels in one year is called a "light year".
One light year equals 9.46×10^{12} Km.
a). Alpha Centuri A is 4.3 light years away. How far away is this in Kilometres ?
b). The star Castor is 4.634×10^{14} Km away. How many light years is this ?

16). An advertiser does an experiment to show how effective a disinfectant is against germs.
In the experiment there are 1.001×10^{9} germs in a petra dish.
The disinfectant kills 9.999×10^{8} germs.
The advertiser claim this "kills nearly all germs".
Is this a reasonable claim ? Show all your working out.

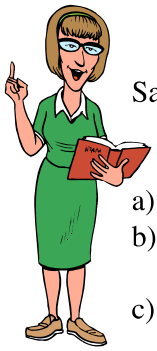


17). The mass of a neutron is 1.6725×10^{-24} g, the mass of an electron is 9.109×10^{-28} g, and the mass of a proton is 1.6748×10^{-24} g.
a). An atom of Helium is made up of two protons, two neutrons and two electrons.
What is the mass of one atom of helium ?
b). i). An atom of carbon is made up of 6 neutrons, 6 protons and 6 electrons.
What is the mass of one atom of carbon ?
ii). How many atoms of carbon are there in 1 gram of carbon ?



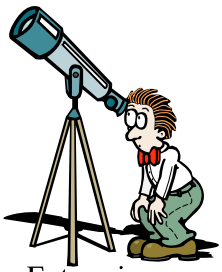
18). The space probes Viking 1 and Voyager 1 travelled to Mars and Jupiter respectively.
a). The space probe Viking 1 took approximately 800 hours to get to Mars and travelled 3.5×10^{7} miles. What was the speed of Viking 1 ?
b). The space probe Voyager 1 travelled from Earth to Jupiter. This journey took about 13000 hours and travelled 3.9×10^{8} miles. Which space probe travelled the faster ?

19). The distance, in Kilometres, of the planets from the sun are as follows:



Pluto	5.90×10^{9}	Venus	1.08×10^{8}	Neptune	4.50×10^{9}
Saturn	1.43×10^{9}	Mercury	5.79×10^{7}	Jupiter	7.78×10^{8}
Uranus	2.87×10^{9}	Earth	1.50×10^{8}	Mars	2.28×10^{8}

a). Put them in order of distance from the sun, nearest to furthest.
b). Find the ratio of the distance of Uranus from the sun to the distance of Mercury from the sun. Give your answer in the form of n : 1.
c). Light travels at a speed of 3.00×10^{5} Km/s. Calculate the time, correct to the nearest minute, that light takes to travel from the sun to:
i). Venus, ii). Earth, iii). Saturn, iv). Pluto.



20). A seed merchant wishes to estimate the number of carrot seeds in a 50g packet.
He finds the total mass of 6 seeds is 8×10^{-2} g.
Estimate the number of seeds in a 50 g pack.

21). In Star Trek, The Enterprise flies at warp speeds. The warp speed is the speed of the Enterprise divided by the speed of light. The speed of light is 2.998×10^{5} Km/s.
What is the speed of the Enterprise in Km/s flying at warp speed:
a). 10, b). 7, c). 2, d). 15 ?