

Examples

Workout



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Question 1: Write each of the following numbers in standard form.

- |               |                 |                |                |
|---------------|-----------------|----------------|----------------|
| (a) 40000     | (b) 2000000     | (c) 8000000    | (d) 7000       |
| (e) 100000000 | (f) 900         | (g) 250000     | (h) 1900       |
| (i) 54000000  | (j) 11000000    | (k) 89000      | (l) 3600000000 |
| (m) 43500     | (n) 91900000    | (o) 1230000000 | (p) 71120      |
| (q) 9804000   | (r) 471500      | (s) 55403      | (t) 2936000    |
| (u) 93508000  | (v) 333810000   | (w) 9800200000 | (x) 49300      |
| (y) 804000    | (z) 69702000000 |                |                |

Question 2: Write each of the following as ordinary numbers

- |                          |                            |                          |                         |
|--------------------------|----------------------------|--------------------------|-------------------------|
| (a) $3 \times 10^4$      | (b) $9 \times 10^3$        | (c) $6 \times 10^6$      | (d) $2 \times 10^{10}$  |
| (e) $5 \times 10^7$      | (f) $1.2 \times 10^2$      | (g) $2.9 \times 10^5$    | (h) $8.4 \times 10^8$   |
| (i) $7.7 \times 10^4$    | (j) $3.51 \times 10^5$     | (k) $9.89 \times 10^7$   | (l) $1.27 \times 10^9$  |
| (m) $4.05 \times 10^6$   | (n) $1.616 \times 10^5$    | (o) $2.0651 \times 10^3$ | (p) $8.829 \times 10^7$ |
| (q) $1.0051 \times 10^6$ | (r) $2.143578 \times 10^4$ |                          |                         |

Question 3: Write each of the following numbers in standard form.

- |                 |                       |                  |                |
|-----------------|-----------------------|------------------|----------------|
| (a) 0.002       | (b) 0.0005            | (c) 0.9          | (d) 0.00000004 |
| (e) 0.00065     | (f) 0.0022            | (g) 0.0361       | (h) 0.000558   |
| (i) 0.00000423  | (j) 0.0000000981      | (k) 0.00407      | (l) 0.02052    |
| (m) 0.0000515   | (n) 0.006015          | (o) 0.0000000082 | (p) 0.00007005 |
| (q) 0.000000024 | (r) 0.000000000000005 |                  |                |

Question 4: Write each of the following as ordinary numbers

- (a)  $2 \times 10^{-3}$       (b)  $7 \times 10^{-2}$       (c)  $3 \times 10^{-6}$       (d)  $9 \times 10^{-8}$
- (e)  $4.8 \times 10^{-4}$       (f)  $6.7 \times 10^{-3}$       (g)  $9.2 \times 10^{-6}$       (h)  $4.1 \times 10^{-2}$
- (i)  $3.16 \times 10^{-5}$       (j)  $8.62 \times 10^{-4}$       (k)  $7.09 \times 10^{-6}$       (l)  $5.71 \times 10^{-3}$
- (m)  $2.05 \times 10^{-8}$       (n)  $4.112 \times 10^{-2}$       (o)  $1.651 \times 10^{-3}$       (p)  $2.0019 \times 10^{-7}$

Question 5: Write these numbers in standard form

- (a) one million      (b) nine thousand      (c) forty thousand      (d) nine billion
- (e)  $500^2$       (f)  $200^3$       (g)  $30,000^2$       (h) two thousandths

Question 6: Write each of these numbers in standard form

- (a)  $72 \times 10^3$       (b)  $84 \times 10^6$       (c)  $500 \times 10^2$       (d)  $210 \times 10^4$
- (e)  $0.8 \times 10^7$       (f)  $0.46 \times 10^5$       (g)  $0.06 \times 10^8$       (h)  $0.007 \times 10^{12}$
- (i)  $3000 \times 10^{14}$       (j)  $24 \times 10^{-5}$       (k)  $0.8 \times 10^{-10}$       (l)  $0.0055 \times 10^{-2}$
- (m)  $0.0372 \times 10^{-9}$       (n)  $65213 \times 10^{-7}$       (n)  $2933 \times 10^{21}$       (o)  $759300 \times 10^{-1}$

Question 7: Work out the answers to the following multiplications.  
You may not use a calculator.

- (a)  $2 \times 10^3 \times 3 \times 10^4$       (b)  $(4 \times 10^8) \times (2 \times 10^5)$       (c)  $1.2 \times 10^4 \times 6 \times 10^4$
- (d)  $(3 \times 10^{-9}) \times (3 \times 10^3)$       (e)  $4 \times 10^{-7} \times 3 \times 10^{-2}$       (f)  $6 \times 10^{10} \times 4 \times 10^8$
- (g)  $7 \times 10^{12} \times 8 \times 10^{-9}$       (h)  $3.7 \times 10^5 \times 5 \times 10^6$       (i)  $(8 \times 10^3) \times (5 \times 10^5)$
- (j)  $5 \times 10^{-14} \times 4 \times 10^{-7}$       (k)  $1.8 \times 10^2 \times 2 \times 10^{-8}$       (l)  $5.8 \times 10^6 \times 4 \times 10^7$
- (m)  $4.5 \times 10^{20} \times 9 \times 10^{-14}$       (n)  $(1.1 \times 10^{-5}) \times (1.2 \times 10^{-2})$       (o)  $6.2 \times 10^4 \times 7 \times 10^9$
- (p)  $2.8 \times 10^8 \times 1.3 \times 10^7$       (q)  $1.25 \times 10^{-16} \times 3.2 \times 10^{10}$       (r)  $8.7 \times 10^2 \times 9.2 \times 10^6$
- (s)  $2 \times 10^2 \times 3 \times 10^7 \times 6 \times 10^4$       (t)  $3 \times 10^6 \times 2.1 \times 10^{-8} \times 5 \times 10^{12}$

## Standard Form

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Question 8: Work out the answers to the following divisions.  
You may not use a calculator.

- |   |  |  |
|---|--|--|
| (a) $(8 \times 10^5) \div (2 \times 10^3)$        | (b) $(9 \times 10^9) \div (3 \times 10^4)$         | (c) $(5 \times 10^6) \div (2 \times 10^2)$       |
| (d) $(9 \times 10^9) \div (4 \times 10^9)$        | (e) $(1.2 \times 10^4) \div (3 \times 10^8)$       | (f) $(3.5 \times 10^2) \div (5 \times 10^9)$     |
| (g) $(4.8 \times 10^{15}) \div (3 \times 10^4)$   | (h) $(6.4 \times 10^3) \div (8 \times 10^{16})$    | (i) $(2.7 \times 10^{-3}) \div (9 \times 10^7)$  |
| (j) $(1.44 \times 10^8) \div (12 \times 10^{-5})$ | (k) $(2 \times 10^{10}) \div (5 \times 10^{-2})$   | (l) $(1 \times 10^{-5}) \div (4 \times 10^{-2})$ |
| (m) $(5 \times 10^{-6}) \div (8 \times 10^{-14})$ | (n) $(8.1 \times 10^{-9}) \div (2.7 \times 10^3)$  | (o) $(1.6 \times 10^7) \div (8 \times 10^2)$     |
| (p) $(3 \times 10^{22}) \div (8 \times 10^9)$     | (q) $(3.92 \times 10^8) \div (1.4 \times 10^{-6})$ | (r) $(3 \times 10^{-4}) \div (1.2 \times 10^7)$  |

Question 9: Work out the answers to the following.  
You may not use a calculator.

- |                            |                            |                              |                            |
|----------------------------|----------------------------|------------------------------|----------------------------|
| (a) $(3 \times 10^3)^2$    | (b) $(2 \times 10^6)^2$    | (c) $(5 \times 10^4)^2$      | (d) $(8 \times 10^5)^2$    |
| (e) $(9 \times 10^{10})^2$ | (f) $(6 \times 10^{-3})^2$ | (g) $(2.5 \times 10^{-6})^2$ | (h) $(1.2 \times 10^8)^2$  |
| (i) $(2 \times 10^5)^3$    | (j) $(4 \times 10^9)^3$    | (k) $(3 \times 10^{15})^3$   | (l) $(5 \times 10^{-7})^3$ |
| (m) $(2 \times 10^6)^4$    | (n) $(1 \times 10^{-4})^6$ | (o) $(8.3 \times 10^{-2})^2$ | (p) $(9.7 \times 10^3)^2$  |

Question 10: Work out each of the following

- |  |   |   |
|--|---|---|
| (a) $5 \times 10^4 + 3 \times 10^4$                          | (b) $4 \times 10^3 - 2 \times 10^3$             | (c) $2.5 \times 10^5 + 3.3 \times 10^5$   |
| (d) $7 \times 10^{-2} + 2 \times 10^{-2}$                    | (e) $6 \times 10^3 + 8 \times 10^2$             | (f) $2 \times 10^6 - 8 \times 10^5$       |
| (g) $2.6 \times 10^8 + 4.5 \times 10^9$                      | (h) $5.12 \times 10^5 - 1.89 \times 10^4$       | (i) $(8 \times 10^7) + (3 \times 10^5)$   |
| (j) $5.07 \times 10^{10} + 2.77 \times 10^9$                 | (k) $6.12 \times 10^{-3} - 1.07 \times 10^{-2}$ | (l) $4 \times 10^{-7} + 9 \times 10^{-5}$ |
| (m) $3.44 \times 10^8 + 7.03 \times 10^6 + 9.89 \times 10^7$ |   |   |

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Question 11: Using a calculator, work out the following

- (a)  $3.57 \times 10^3 \times 6.7 \times 10^7$       (b)  $9.5 \times 10^4 + 3.8 \times 10^5$       (c)  $1.8 \times 10^9 \times 5.2 \times 10^9$
- (d)  $7 \times 10^{-8} \times 2 \times 10^{-6}$       (e)  $(7.71 \times 10^{15}) \div (6 \times 10^4)$       (f)  $(8 \times 10^9)^3$
- (g)  $(5 \times 10^{-7})^{-3}$       (h)  $2.55 \times 10^7 \times 8.02 \times 10^4 \times 1.1 \times 10^5$

### Apply

Question 1: The distance between London and New York is 5,567,000 metres.  
Write this number in standard form.

Question 2: The distance from the Sun to Pluto is 3.67 billion miles.  
Write this number in standard form.



Question 3: The length of a cell is 0.016 mm  
Write this number in standard form.

Question 4: The population of a country is  $6.51 \times 10^5$   
Write the population of the country as an ordinary number.

Question 5: 32,010 people attend a football match between West Ham and Southampton.  
Write this number in standard form.



Question 6: There are approximately  $5 \times 10^4$  grains of rice in a one kilogram bag of rice.  
Approximately how many grains of rice will be in 20 one kilogram bags of rice?

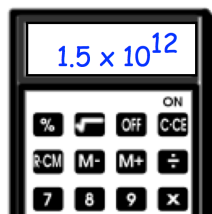
Question 7: A penny weighs 0.0036kg.  
Find the total mass of £400 worth of pennies.

Question 8:  $A = 6 \times 10^5$      $B = 30000$      $C = 5 \times 10^{-2}$   
(a) Work out AB  
(b) Work out  $C^2$

## Standard Form

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- Question 9: The population of the United Kingdom in 1950 was  $5.06 \times 10^7$   
The population of the United Kingdom in 2015 was  $6.47 \times 10^7$   
Work out how many more people live in the United Kingdom in 2015 than 1950.  
Give your answer as an ordinary number.
- Question 10: Peter has multiplied two numbers using his calculator.  
The calculator shows the answer.  
He can remember that one number was 5000.  
What was the other number used in the multiplication?



- Question 11: An asteroid travels at 25 kilometres per second.  
How far does it travel in one hour?  
Give your answer in standard form.

- Question 12: Without using a calculator, work out.

$$\sqrt{4.9 \times 10^{11}}$$

- Question 13: The mass of Earth is  $5.97 \times 10^{24}$   
The mass of Jupiter is  $1.898 \times 10^{27}$   
Using a calculator, work out how many times heavier Jupiter is than Earth.  
Give your answer to one decimal place.

- Question 14: The density of Nitrogen is  $1.25 \times 10^{-6} \text{ kg/cm}^3$   
Calculate the mass of one cubic metre of Nitrogen.

Answers



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