Standard Form

Standard form is an efficient method of writing numbers that are very large and very small. It is *always* written as $A \times 10^n$ where $1 \leqslant A < 10$ and n is an integer. You must be able to carry out all four operations with numbers in standard form $(+, -, \times, \div)$

1. Convert the following to standard form.

    (a) 4600000000. □

    (b) 322000000000. □

    (c) 0.0000000433. □

2. Convert the following to ordinary form.

    (a) 3.4×10^5. □

    (b) 2.91×10^{-5}. □

    (c) 3.01×10^{-4}. □

3. Evaluate the following, giving your answer in standard form.

    (a) $(3 \times 10^5) \times (2 \times 10^7)$. $\boxed{6 \times 10^{12}}$

    (b) $(2 \times 10^8) \times (8 \times 10^4)$. $\boxed{\times 10}$

    (c) $(4 \times 10^{10}) \times (4 \times 10^9)$. $\boxed{1.6 \times 10^{20}}$

    (d) $(8 \times 10^{50}) \times (9 \times 10^{12})$. $\boxed{\times 10}$

    (e) $(1 \times 10^{-5}) \times (2 \times 10^{-6})$. $\boxed{2 \times 10^{-11}}$

    (f) $(4 \times 10^{-12}) \times (3 \times 10^5)$. $\boxed{\times 10}$

    (g) $(5 \times 10^{-5}) \times (6 \times 10^{17})$. $\boxed{\times 10}$

    (h) $\dfrac{4 \times 10^{12}}{2 \times 10^5}$. $\boxed{\times 10}$

    (i) $\dfrac{8 \times 10^6}{2 \times 10^{13}}$. $\boxed{\times 10}$

    (j) $\dfrac{2 \times 10^{14}}{4 \times 10^6}$. $\boxed{\times 10}$

    (k) $\dfrac{2 \times 10^{-6}}{8 \times 10^5}$. $\boxed{\times 10}$

    (l) $\dfrac{1 \times 10^{-10}}{8 \times 10^{-16}}$. $\boxed{\times 10}$

    (m) $\dfrac{2 \times 10^{12}}{5 \times 10^{-5}}$. $\boxed{\times 10}$

4. Evaluate the following, giving your answer in standard form.

    (a) $(3 \times 10^8) + (2 \times 10^7)$. $\boxed{3.2 \times 10^8}$

    (b) $(2.6 \times 10^7) + (4.1 \times 10^8)$. □

    (c) $(4 \times 10^{-5}) + (3 \times 10^{-4})$. $\boxed{3.4 \times 10^{-4}}$

    (d) $(5 \times 10^{800}) + (3 \times 10^{801})$. □

    (e) $(9 \times 10^{356}) - (3 \times 10^{355})$. $\boxed{8.7 \times 10^{356}}$

    (f) $(2 \times 10^a) + (7 \times 10^{a+2})$. □

5. Evaluate the following (with the given conditions), giving your answer in standard form.

    (a) If $1 < a < \sqrt{10}$ and $1 < b < \sqrt{10}$, find $(a \times 10^m) \times (b \times 10^n)$. $\boxed{ab \times 10^{m+n}}$

    (b) If $\sqrt{10} < a < 10$ and $\sqrt{10} < b < 10$, find $(a \times 10^m) \times (b \times 10^n)$. $\boxed{\frac{ab}{10} \times 10^{m+n+1}}$