

## 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  $1 \leq A < 10$  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)  $3.4 \times 10^5$ .
- (b)  $2.91 \times 10^{-5}$ .
- (c)  $3.01 \times 10^{-4}$ .

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

- (a)  $(3 \times 10^5) \times (2 \times 10^7)$ .
- (b)  $(2 \times 10^8) \times (8 \times 10^4)$ .
- (c)  $(4 \times 10^{10}) \times (4 \times 10^9)$ .
- (d)  $(8 \times 10^{50}) \times (9 \times 10^{12})$ .
- (e)  $(1 \times 10^{-5}) \times (2 \times 10^{-6})$ .
- (f)  $(4 \times 10^{-12}) \times (3 \times 10^5)$ .
- (g)  $(5 \times 10^{-5}) \times (6 \times 10^{17})$ .
- (h)  $\frac{4 \times 10^{12}}{2 \times 10^5}$ .
- (i)  $\frac{8 \times 10^6}{2 \times 10^{13}}$ .
- (j)  $\frac{2 \times 10^{14}}{4 \times 10^6}$ .
- (k)  $\frac{2 \times 10^{-6}}{8 \times 10^5}$ .
- (l)  $\frac{1 \times 10^{-10}}{8 \times 10^{-16}}$ .
- (m)  $\frac{2 \times 10^{12}}{5 \times 10^{-5}}$ .

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

- (a)  $(3 \times 10^8) + (2 \times 10^7)$ .
- (b)  $(2.6 \times 10^7) + (4.1 \times 10^8)$ .
- (c)  $(4 \times 10^{-5}) + (3 \times 10^{-4})$ .
- (d)  $(5 \times 10^{800}) + (3 \times 10^{801})$ .
- (e)  $(9 \times 10^{356}) - (3 \times 10^{355})$ .
- (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  $(a \times 10^m) \times (b \times 10^n)$ .
- (b) If  $\sqrt{10} < a < 10$  and  $\sqrt{10} < b < 10$ , find  $(a \times 10^m) \times (b \times 10^n)$ .