

Writing large and small numbers in standard form

- 1 The place value table shows the number 72 500. Write 72 500 in standard form.

10^4	10^3	10^2	10^1	10^0
7	2	5	0	0

- 2 Write in standard form.
 (a) 6000 (b) 3 080 000
 (c) 0.009 (d) 0.000 304
- 3 Write as ordinary numbers.
 (a) 3×10^6 (b) 2.07×10^4
 (c) 5×10^{-2} (d) 6.1×10^{-5}
- 4 Two of these numbers are not written in standard form. Find them, and write them correctly.
 34×10^5 7×10^{-2} 0.7×10^3 1.5×10^9
- 5 The planet Mercury is about 58 000 000 km from the Sun. Write this distance in standard form.
- 6 The table shows the widths of some small things. Write them in order, smallest first.

Grain of sand	5×10^{-4} m
Human hair	7×10^{-5} m
Red blood cell	8×10^{-6} m
Ant	4×10^{-3} m

Multiplying and dividing in standard form

- 7 Work out, giving your answers in standard form.
 (a) $(2 \times 10^3) \times (4 \times 10^5)$
 (b) $(5 \times 10^6) \times (3 \times 10^{-2})$
 (c) $(9 \times 10^8) \div (3 \times 10^2)$
 (d) $(2 \times 10^{-3}) \div (8 \times 10^4)$
- 8 A sheet of paper is 1×10^{-4} m thick. How tall is a pile of 5×10^3 sheets? Give your answer in standard form.
- 9 Light travels 3×10^5 km in one second. How far does light travel in 2×10^3 seconds?

Adding and subtracting in standard form

- 10 Work out, giving your answers in standard form.
 (a) $6 \times 10^4 + 3 \times 10^3$
 (b) $8.5 \times 10^6 - 4 \times 10^5$
 (c) $2 \times 10^{-3} + 6 \times 10^{-4}$
 (d) $7 \times 10^{-2} - 5 \times 10^{-3}$
- 11 Ben says, " $3 \times 10^4 + 2 \times 10^3 = 5 \times 10^7$." Explain Ben's mistake, and find the correct answer.
- 12 The diameter of Jupiter is 1.43×10^5 km. The diameter of the Earth is 1.27×10^4 km. How much bigger is the diameter of Jupiter? Give your answer in standard form.

Standard form with a calculator

- 13** Use a calculator. Give your answers in standard form.

(a) $(6.3 \times 10^7) \times (4.8 \times 10^{-3})$

(b) $(7.5 \times 10^4)^2$

(c) $(9.6 \times 10^5) \div (1.2 \times 10^{-3})$

(d) $\sqrt{4.9 \times 10^7}$

On most calculators, standard form is entered with the $\boxed{\times 10^x}$ key.

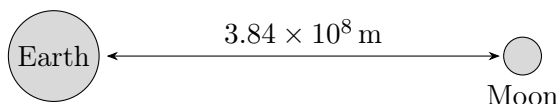
- 14** Ava wants to work out $(4 \times 10^3) \div (2 \times 10^2)$. She types

$\boxed{4} \boxed{\times} \boxed{1} \boxed{0} \boxed{\times 10^x} \boxed{3} \boxed{\div} \boxed{2} \boxed{\times} \boxed{1} \boxed{0} \boxed{\times 10^x} \boxed{2} \boxed{=}$

and gets 200 000. The correct answer is 20. Explain what has gone wrong.

Problems with standard form

- 15** The Moon is 3.84×10^8 m from the Earth. Light travels at 3×10^8 m per second. How many seconds does light from the Moon take to reach the Earth?



- 16** A spacecraft travels at 1.1×10^4 m per second for one hour, which is 3.6×10^3 seconds. How far does it travel? Give your answer in standard form.
- 17** A red blood cell is 8×10^{-6} m wide. How many red blood cells would fit side by side across a fingernail 2×10^{-2} m wide?
- 18** The population of the UK is about 6.8×10^7 . The area of the UK is about 2.4×10^5 km². On average, how many people are there for each km²? Give your answer to 2 significant figures.
- 19** The mass of the Earth is 5.97×10^{24} kg. The mass of the Moon is 7.35×10^{22} kg. How many times heavier is the Earth than the Moon? Give your answer to the nearest whole number.

Problem solving

- 20** A computer does 3×10^9 calculations each second. How many hours does it take to do 1.2×10^{14} calculations? Give your answer to 1 decimal place.
- 21** Two numbers in standard form are multiplied, and the answer is 6×10^5 . Write down three different pairs of numbers that could have been multiplied.
- 22** Which is bigger, $(2 \times 10^3)^3$ or 10^{10} ? Show how you know.