Level 4: Standard form (also known as scientific notation)

1) Write large numbers in standard form, for example: -

6̲24 000 000 000 000 000 000 = 6.24×10^{20}

↗ *Twenty digits after the point*

Point goes in here (always after one digit).

7 4̲44 000 000 000 000 000 000 000 = 7.444×10^{24}

↗ *Twenty four digits after the point*

Point goes in here (always after one digit).

2) Write small numbers in standard form, for example

0.000 000 000 742 = 7.42×10^{-10}

↑

Point goes in here – it has moved back ten places

0.000 000 000 000 000 023 = 2.3×10^{-17}

↑

Point goes in here – it has moved back seventeen places

3) Convert standard form to "normal" numbers, for example: -

2.98×10^{18} = 2 980 000 000 000 000 000

Altogether there are 18 digits after the place where the point was.

3.8×10^{-22} = 0.000 000 000 000 000 000 000 38

Negative "power" so it will be a small number.
Twenty two digits from the point to the place where the point was

4) Use a calculator to carry out calculations in standard form.

Know how to enter numbers into your own calculator for example: -

3.2×10^{45} may be entered as 3.2 EXP 45 on some calculators.

On others it may be entered as 3.2 ×10□ 45.

5) Solve problems involving standard form.

a) Arrange these numbers in order, largest to smallest: -

$$3 \times 10^8 \quad 8 \times 10^3 \quad 3.8 \times 10^3 \quad 8.3 \times 10^3 \quad 3.8 \times 10^8$$

b) How far will a rocket travelling at 8.8×10^3 metres per second travel in 3.2×10^7 seconds (approximately one year).

c) An iron atom has a diameter of 1.26×10^{-10} metres.
How many iron atoms would be needed to make a line of iron atoms 1 metre long?

**REMEMBER TO SHOW ALL YOUR WORKING
AND EXPLAIN YOUR ANSWER FULLY!**