Standard form: fact sheet

Planner week 4 · Learn these facts

What standard form looks like

4.38×10^5

1 ≤ number < 10 — power of 10

A number from 1 up to (not including) 10, times a power of 10

Not standard form: 24×10^3

Big numbers

438 000

4.38×10^5

point moves 5 places

Count how far the point moves

32 460 000 = 3.246×10^7

Small numbers

0.00562

5.62×10^{-3}

small number: negative power

Numbers less than 1 have a **negative** power

0.007 = 7×10^{-3}

Back to ordinary numbers

3.42×10^4

34 200

power 4: point moves 4 right

Positive power: bigger.
Negative power: smaller

7.4×10^{-5} = 0.000074

Multiplying

$(4 \times 10^3) \times (6 \times 10^{-5})$

24×10^{-2}

$= 2.4 \times 10^{-1}$

Multiply the numbers, **add** the powers

Then fix the front number

Dividing

$(2.645 \times 10^9) \div (1.15 \times 10^3)$

$2.645 \div 1.15 = 2.3$

$9 - 3 = 6 \rightarrow 2.3 \times 10^6$

Divide the numbers, **subtract** the powers

Or use the ×10ˣ button

Ordering

Order: look at the power first

$6.2 \times 10^8 < 4.7 \times 10^9$

bigger power → bigger number

Compare the powers, then the front numbers

Or write them all out in full

Calculator

×10ˣ	type 4.38 ×10ˣ 5
Adding	type both in, then convert the answer
Check	front number between 1 and 10?

Which sheet do I need?

Writing numbers in standard form ▸
change to or from standard form

Calculating with standard form ▸
× ÷ + − with standard form

Key words

- **Standard form** $a \times 10^n$ with $1 \le a < 10$
- **Ordinary number** written out in full
- **Power** how many places the point moves
- **Negative power** a number less than 1

Exam tips

- The front number must be **at least 1** and **less than 10**.
- Big number → positive power. Small number → negative power.
- Multiply: add the powers. Divide: subtract the powers.
- Adding: write both as ordinary numbers first (or use a calculator).
- 24×10^{-2} is not standard form: it becomes 2.4×10^{-1}.
- Ordering mixed numbers: write them all out in full.

Writing numbers in standard form: fact sheet

Standard form · Planner week 4 · Learn the method

Worked example

QUESTION

Write 32 460 000 in standard form.

ANSWER



The point moves 7 places to make 3.246

$$= 3.246 \times 10^{7}$$

Move the point until the number is between 1 and 10.

How to do it

1. Put the point after the **first non-zero digit**.
2. Count how many places the point has moved: this is the power.
3. Big numbers: positive power. Numbers less than 1: negative power.
4. Back to ordinary: move the point the other way and fill with zeros.
5. Ordering: write every number out in full, then compare.

Model answer:

32 460 000 = **3.246×10^{7}**

Watch out

- 32.46×10^{6} (the front number must be less than 10).
- Getting the sign of the power wrong for small numbers.
- Saying 6.2×10^{8} is bigger than 4.7×10^{9} because 6.2 > 4.7.

Calculating with standard form: fact sheet

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Worked example

QUESTION

Work out $(2.4 \times 10^3) \times (9.5 \times 10^5)$.

Give your answer in standard form.

ANSWER

1. Multiply the numbers: $2.4 \times 9.5 = 22.8$
2. Add the powers: $10^3 \times 10^5 = 10^8$
3. So the answer is 22.8×10^8
4. 22.8 is not between 1 and 10: $22.8 = 2.28 \times 10$, so add 1 to the power

2.28×10^9

Work out the numbers and the powers separately, then fix the answer.

How to do it

1. Multiplying: multiply the front numbers, **add** the powers.
2. Dividing: divide the front numbers, **subtract** the powers.
3. Adding or subtracting: change to ordinary numbers first.
4. If the front number is not between 1 and 10, adjust it and the power.
5. With a calculator, use the $\times 10^x$ button and convert the answer.

Model answer:

2.28×10^9

Watch out

- Multiplying the powers ($10^3 \times 10^5$ is 10^8, not 10^{15}).
- Leaving the answer as 22.8×10^8.
- Adding the powers when adding two numbers.