

Key Knowledge/Prior Learning KS2/3 and Retrieval and Suggested StartersNumber Review:

- Order positive and negative integers, decimals and fractions.
- Use the symbols =, \neq , <, >, \leq , \geq
- Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative
- Understand and use place value (eg when working with very large or very small numbers, and when calculating with decimals).
- Recognise and use relationships between operations, including inverse operations (eg cancellation to simplify calculations and expressions)
- Use order of operations, including brackets, powers, roots and reciprocals
- Use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem.
- Change between fractions, decimals, percentages.
- Calculate and work with percentages.
- Calculate parts/whole of a ratio & solve ratio problems.
- Round numbers to an appropriate degree.

Retrieval and Suggested Starters

- [Interlinking skills from the list above.](#)
- [Worded and problem-solving questions linked to the above.](#)

KS4 National Curriculum – what students will be practicing

- Evaluate a number to a power
- Evaluate the square root or cube root of a number.
- Use the laws of indices where the indices are integers.
- Change a number into and out of standard form ($A \times 10^n$, where $1 \leq A < 10$ and n is an integer).
- Add & Subtract numbers in standard form.

Specific Ambitious Knowledge

- Multiply/Divide numbers in standard form.
- Interleaving topics.
- Problem-solving questions.
- Real life context- Distances in space, microorganism sizes.

Key Vocabulary/Literacy Opportunities

- Indices

- Standard Form
- Power
- Square Root
- Cube root
- Square
- Cube

Key Formulae/Knowledge

Laws of indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{m \times n}$$

Convert to Standard Form

Move the decimal point until there is one digit to the left of the decimal point.

Exponent goes **up** ← Decimal point moves **left** • Decimal point moves **right** → Exponent goes **down**

Examples:

$$156000. = 1.56 \times 10^5$$

Move decimal point 5 places left,
exponent goes up by 5

$$0.0000053 = 5.3 \times 10^{-6}$$

Move decimal point 6 places right,
exponent goes down by 6

Cross Curricular Links

- Space/microorganisms linked to science (Standard Form)

Student' Thinking

- Why does a power of 0 always equal 1?
- Why does standard form only use a number between 1 and 10?

Projects/Enrichment/Investigations

- Powers & Roots problems- <https://rich.maths.org/8706>

- [Standard Index Form Matching](#)
- [A Question of Scale](#)
- [Power Countdown \(maths.org\)](#)
- Shared documents/Maths/Projects/Problem-solving card sorts.