Subject	Year	Month	
Mathematics	9	September	Balcarras From strength to strength

Topic:

INDICES, ROOTS, STANDARD FORM, ERROR INTERVALS — 10 LESSONS

Content (Intent)

Prior Learning

Y7
- Powers & Roots
- Round to decimal places or significant figures
- Know the meaning of the symbols <, >, ≤, ≥ **(more of this coming in January)**

Y8
- Intro to standard form
- laws of indices

Future Learning

Solving indices problems involving different bases
Using bounds in relation to SDT and density/pressure problems

Objectives

- Calculate with positive indices (the index laws)
- Calculate with roots and fractional powers
- HIGHER Calculate with negative indices ~~in the context of standard form~~
- Use a calculator to evaluate numerical expressions involving powers and roots

- Apply **the four operations** in calculations using standard form
- Use standard form on a scientific calculator including interpreting the standard form display of a scientific calculator

- Understand the difference between truncating and rounding
- Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.) (**lower bound and upper bound**)
- Use inequalities to describe the range of values for a rounded value (=**error interval**)
- HIGHER Solve problems involving the maximum and minimum values of an amount that has been rounded

For teaching purposes

Possible questions

- Kenny thinks this number is written in standard form: 23×10^7. Do you agree with Kenny? Explain your answer.
- When a number 'x' is rounded to 2 significant figures the result is 70. Jenny writes '$65 < x < 75$'. What is wrong with Jenny's statement? How would you correct it?

Misconceptions

- may think that any number multiplied by a power of ten qualifies as a number written in standard form
- may think, for example, that 6729 rounded to one significant figure is 7
- may struggle to understand why the maximum value of a rounded number is actually a value which would not round to that number; i.e. if given the fact that a number 'x' is rounded to 1 sf the result is 70, they might write '$65 < x < 74.99$'

Pedagogical notes (implementation)

Liaise with the science department to establish when students first meet the use of standard form, and in what contexts they will be expected to interpret it.
NCETM: Departmental workshops: Index Numbers
NCETM: Glossary

Use *'standard form', be aware it's the same as 'scientific notation' or 'standard index form'.*

The language 'negative number' is used instead of 'minus number'.

How will understanding be assessed & recorded (Impact)

End of term Assessment in **December**
End of Year Assessment in **May**
9BAM1 Roots and indices

How can parents help at home?

MathsWatch clips (Qualification KS3)
N25, N45a, N45b

Further reading/discussion

Reading / Enrichment

KM: Maths to Infinity: Standard form

KM: Maths to Infinity: Indices

Investigate 'Narcissistic Numbers'.

NRICH: Power mad!

NRICH: A question of scale

The scale of the universe animation (external site)

Literacy

Power
Root
Index, Indices
Standard form
Inequality
Truncate
Round
Minimum, Maximum, lower and upper bound
Error Interval
Decimal place
Significant figure

Numeracy Links

Careers Links:

Scientist
Engineer