INTEGERS, INDICES AND SCIENTIFIC NOTATION - SUMMARY

For Year Level 9

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This material relates to the following Australian Curriculum (Mathematics) Outcome/s:

- Apply index laws to numerical expressions with integer indices (ACMNA209); and
- Express numbers in scientific notation (ACMNA210)

Rationale for Use

It is expected that students will have access to an array of practice material in the form of text books or school prepared exercises. The purpose of the AMSI materials is to support the development of **understanding** and **reasoning** about the concepts involved. They complement and enhance the teacher instruction elements of normal classroom instruction.

Explanation (What this includes):

In this unit, students apply index laws to numerical expressions with integer[1] indices. They write given numbers in their index form (using integer indices only) and indices in their number form.

Students then evaluate numerical expressions involving a *negative* index by rewriting it with a positive index and expressing its reciprocal.

The topic also includes expressing large and small numbers in scientific notation, entering and read scientific notation on a calculator and using index laws to make 'order of magnitude checks' for numbers in scientific notation.

Resources:

1. **Watch some useful online videos:**

   *If you've forgotten what **indices** are, watch this first!*

   - FuseSchool - What are Indices? https://www.youtube.com/watch?v=mfMAbap5Rms

   Then, move on to these ones:

   - FuseSchool - Part 1 - Operating with indices: https://www.youtube.com/watch?v=BUJKEDqGp1U; and
   - FuseSchool - Part 2 – Negative Indices and Fractional Indices: https://www.youtube.com/watch?v=Z4Lzi1gFndM

[1] Remember, an **integer** is a whole number, that is, a number that's *not* a fraction. Integers can be positive or negative.

Finally, watch the following video on 'Scientific Notation':

- Math Antics – Scientific Notation: https://www.youtube.com/watch?v=bXkewQ7WEdI

2. **Review the attached 'Year 9 Indices Content Summaries', 1 to 4.** These have been provided with this unit and can be used to summarise the main concepts and skills in this topic. Along with this, we have provided a GeoGebra interactive tool that is referred to in the Content Summaries.

3. **Review the modules from the AMSI Supporting Australian Mathematics (SAM) Project**:

   - http://www.amsi.org.au/ESA_middle_years/Year9/Year9_md/Year9_1b.html, and
   - http://www.amsi.org.au/ESA_middle_years/Year9/Year9_md/Year9_1e.html.

   Read through the introduction for each module and then work through each of the 'Student Resources' tabs in these topics. Short self-quizzes are included throughout these units – have a go!

4. **Play some games and have fun with some activities!**

   Here are a few ideas to have fun with on the 'NRich' and 'Calculate' mathematics websites:

   - NRich Mathematics – 'Standard Index Form (Scientific Notation) Matching' - https://nrich.maths.org/14530
   - NRich Mathematics – Big and Small Numbers in the Physical World' - https://nrich.maths.org/7278
   - NRich Mathematics – 'Power mad!' - https://nrich.maths.org/6401
   - NRich Mathematics – 'Power Countdown'' - https://nrich.maths.org/6448
   - AMSI Schools 'Calculate' Unit – *'Mission to Mars'*, Background activity and Activity 1 only - https://calculate.org.au/2016/04/27/mission-mars-amsi-schools-rich-task-number-place-value/

5. **Use your maths textbook to practice some examples.**

   Look up 'Indices' in your textbook and look for the chapter or section that deals with looking at operating with indices, using negative and fractional indices, and with expressing numbers using Scientific Notation.

   (If you're using the 'IEC-EM' mathematics textbooks, you'll need to refer to Year 9 Book 1, Chapter 8. Section 8D deals specifically with Scientific Notation).

   Then, use the review exercises and problems in your book to practice some of these questions and concepts.