Chapter 15 Indices – Scientific Notation – Surds

Laws of Indices

1. I know that **Power** is another word for **index.**
2. I know to **multiply** powers of the same number, **add** the indices
   $(X^2)(X^2) = X^{2+2} = X^4$
3. I know to **divide** powers of the same number, subtract the indices
   $3^5 / 3^2 = 3^3$
4. I know to **raise** a power to a further power, multiply the indices
   $(x^2)^3 = X^2 \times X^2 \times X^2 = X^{2x3} = X^6$
5. I know that any number to the power of zero is 1 i.e. $2^0 = 1$
   $2^3 / 2^3 = 8 / 8 = 1$
   $2^3 / 23 = 2^{3-3} = 2^0 = 1$
6. I know that negative indices can be written as
   $a^{-n} = 1/a^n$

   i.e. $4^{-3} = 1/4^3$

7. I know that

   $(ab)n = a^n b^n$

   $(a/b)^n = a^n/b^n$

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8. I know that for Fractional Indices

   $X^{m/n} = (\sqrt[n]{X})^m$

   See Example 1 Page Page 291
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9. I know that for equations involving indices that I have to rewrite the base numbers/letters so that they are the same before I can proceed to solve the equation.
   i.e. If $a^x = a^y$ then x=y

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Irrational numbers - Surds

10. I know that Rational numbers are any numbers which can be expressed as a ratio in the form **a/b (in the form of a fraction) where a and b are integers**
    And that the **decimal equivalent of the rational number** either **TERMINATES** or **RECURS**
    Q denotes Rational Numbers

11. I know that dot notation (1 dot or 2) can be used in recurring decimals
    Use your **calculator to familiarise** yourself with Dot Notation

    Try 7/8= 1/3= 3/11= 7/12=
    Try 4/1= 2/3= - 7/8= 0.45=

    I know that I can type a number into my calculator, press = and if it displays a fraction then that number is a rational number and that I can use the SD button to switch the display from rational to decimal.

12. I know that **Irrational numbers cannot** be expressed in the form a/b (i.e. in rational or fraction form), are **never ending** and **non-repeating**
13. I know that the **square root of any number that does not have an exact square root** is an irrational number i.e. √2 √3 √5 √11 √15 are examples of irrational numbers

    NB the above irrational numbers are said to be expressed in **Surd** Form

14. I know that **∏** = 3.14159265 ... is an **irrational number (never ending non recurring)**
15. I know that combining rational and irrational numbers gives us the set of **Real Numbers R and that the set of irrational numbers is denoted as R\Q (set of real numbers less the set of rational numbers)**
16. I know that a **number which has an exact square root** is known as **a perfect square.** i.e 4, 9, 16
17. **I know that for Surds**

    √ab = √a√b and √a/b = √a/√b

18. I know that for surds **2√2** is said to be the **simplest form** of **√8**

19. I can add and subtract surds knowing that they can only be added or subtracted when they have the same irrational parts. If they are not the same we reduce each surd to its simplest form.
    Example 1 Page 296

20. I know that when multiplying surds that I must multiply separately the rational factors and the irrational factors.
    Example 2 Page 297
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Standard From – Scientific Notation

21. I know that a number in the form a x 10^n where 1 < a < 10, with n as an integer is said to be expressed in **scientific notation or standard form**
    i.e 6.8 x 10^4

    5000 = 5 x 10^3 **0.037 = 3.7 x 10^{-2}**

22. I know how to use the **x10^x** key on my calculator to perfume calculations involving standard form numbers.

23. I know how to add, subtract, multiply and divide numbers in standard form using my calculator.
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24. I know how to give answers correct to a set number of **decimal places**. Correct ot a number of decimal places means giving an answer up the number of places after the decimal point.

25. I know who to re write numbers correct to a given number of **significant figures** (rounding numbers to nearest to 10's, 100's, 1000's or 1/10ths, 1/100ths, 1/1000ths for deciamls) by looking at the next number to the right of the sig figure ... if it i2 0,1,2,3 or 4 then leave sig number as is and put in trailing zeros. If number to right of sig fig is 5,6,7,8 or 9 then add 1 to the sig fig and put in trailing zeros.

26. I know not to count 0's immediately after a decimal place if the number is less than 1 when rewriting to sig figures.

27. I know how to **make an estimate** by rounding numbers greater than 1 to one sig fig and numbers less than 1 to one decimal place before performing a calculation.

28. I know what the reciprocal of a number is and how to use my calculator to find the reciprocal of a number.

29. I know that a number multiplied by its reciprocal gives 1.

30. I can use my calculator to perform calculations with powers and root.

31. I have watched the 'How to use my calculator' on xequals.weebly.com

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