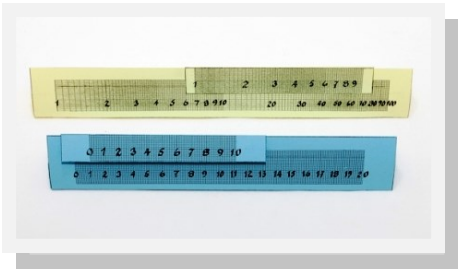

# SLIDE RULE

## For Addition & Multiplication

## TEACHER/TUTOR NOTES & WORKSHEET

**The project will take probably one session and is very useful at the end of term as a gapfiller rather than starting a new project. It can of course be used at any time in the curriculum.**

### Introduction

- Until the 1960s the slide rule was the universal calculating tool used by engineers and many scientists. It has been totally superseded by the electronic calculator.

- It has a number of advantages – it does not require batteries or an electricity supply, its accuracy – three significant figures - is comparable with that of the data and does not give the illusion of precision with the large number of significant figures. However it has the great disadvantage that one has to work out the position of the decimal point - a nuisance and source of error.

- After Napier discovered or invented logarithms in the 1620s, the slide rule was invented by William Oughtred in Cambridge some ten years later. It has remained the preferred calculator without much further development until it was overtaken in the 1960s.

- The explanation of how it works is most likely to be beyond the comprehension of most of the pupils but its use is certainly not. Several children have described it as “cool” when shown how to use it.

### Making the slide rules

Cut out the Sliding and Fixed Scales of both Slide Rules and Glue the Fixed Scale.

### Slide rule for Addition

Using the Sliding and Fixed Scales show how numbers may be added as shown in the Instructions.

### Slide rule for Multiplication and Division

#### Indices and Logarithms

The index is an easy way of writing large numbers.
For instance -it is much easier to write $10^{10}$ rather than 10,000,000,000
In this case the index specifies how many noughts there are.

$100 = 10^2 = 10 \times 10$

$1000 = 10^3 = 10 \times 10 \times 10$

$10 = 10^1$

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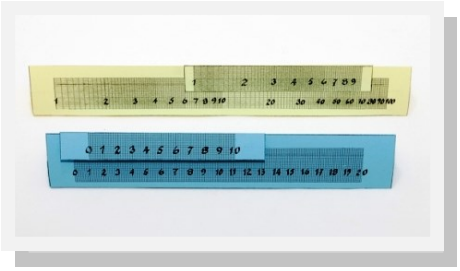

Any number can have an index.

For example:

$2^2 = 2 \times 2 = 4$

$3^3 = 3 \times 3 \times 3 = 27$

For multiplication you add the indices

$10^1 \times 10^2 = 10^3 = 1000$ Add the indices to get this number

$10^2 \times 10^3 = 10^5 = 100000$ Add the indices to get this number

$2^2 \times 2^1 = 2^3 = 8$ Add the indices to get this number

**Square roots**

The square root of a number is the value when multiplied by itself equals that number.

Thus the square root of 4 equals 2

or $4 = 2 \times 2$

or $4^1 = 4^{0.5} \times 4^{0.5}$

*0.5 is the number when added to itself equals 1*

The square root of $4 = 4^{0.5} = 2$

The square root of $100 = 100^{0.5} = 10$

The square root of $10 = 10^{0.5} = 3.1623$

*Note that you have to use a calculator or tables to get this number easily.*

**Logarithms**

You can have decimal indices. They are called Logarithms

These allow you to multiply and divide by simply adding or subtracting he logarithms. It is much simpler to subtract than to do long division.

For example :

$3 = 10^{0.4771}$

$2 = 10^{0.3010}$

These numbers are the logarithms of 3 and 2

*You have to use a calculator or table to find the Logarithm for a number.*

To multiply you add the indices or the Logarithms.

In this case

0.4711
0.3010
---
0.7781.

Thus

$3 \times 2 = 10^{0.4711} \times 10^{0.3010} = 10^{0.7781}$

The number whose Logarithm is 0.7781 is 6 *(This has been obtained from a table)*

So $3 \times 2 = 10^{0.7781} = 6$

To multiply 2 and 3 you have added the Logarithms to get 6

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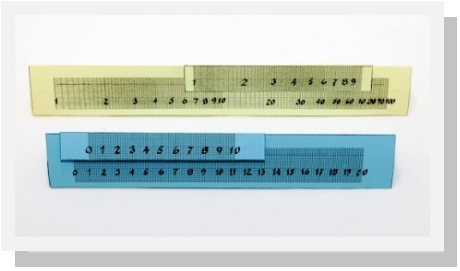


**Slide rule for multiplication**

You can make a slide rule with the scales marked in Logarithms so that instead of adding it multiplies the numbers. This is shown in the instructions.
Encourage the pupils to Investigate how it can be used for division.

**Websites**

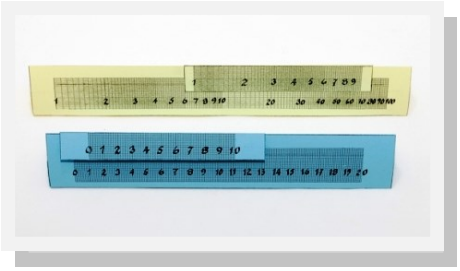
Wikipedia

https://en.wikipedia.org/wiki/Slide_rule

Slide Rules

http://sliderulemuseum.com/SR_Course.htm

# SLIDE RULE



## WORKSHEET

1. Using your slide rule for Addition do the following sums

1 + 3 = ……

4 + 5 = ……

1.1 + 5.2 = ……

5.8 + 5.9 = ……

6.4 + 5.6 = ……

2. Using the same slide rule try to do these sums

3 – 1 = …….

5 – 2 = …….

4.6 – 3.2 = …….

8.5 - 5.6 =……..

3. Using the slide rule for multiplication do these sums

3 x 2 = …….

4 x 5 = …….

4.6 x 3.9 =……..

2.5 x 6.5 =……..

4. What is the square root of

16 ……..

36 ……..

25 ……..

5. Write a story about someone who won a prize at school for getting all their sums right by using a slide rule.

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