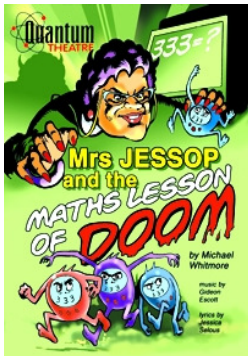


Mrs Jessop And the Maths Lesson Of Doom

This play has been developed to support the teaching of numeracy in schools at Key Stage Two and to reinforce much of the number work tested in the SATS.

The main focus of the play is on number patterns, mental arithmetic and approaches to the four functions, including work with the number line, number patterns, decimals and fractions, and multiplication table patterns.

Each mathematical idea is built upon throughout the play involving the audience directly in both the calculations and the methodology employed in problem solving and encouraging them to use a variety of approaches to achieve a single answer. Throughout the play the work is put into a number of everyday contexts through which the problems are explored.

The following pages provide a summary of the work covered and examples of how it is put into practice in the play.

PLACE VALUE

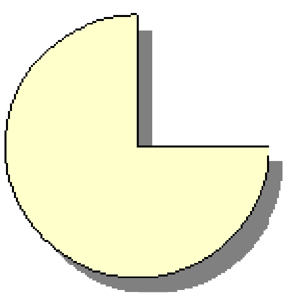
The position of a digit in a number gives its value and each position is worth ten times more than the position on its right.

Using this idea we set up a human calculator using three volunteers from the audience to be 9, 8 and 1. Starting with the number 981 we multiply by 10. The children all move one place to the left, giving us 9, 810 and a zero is added to the number to keep the numbers in their new position. We then divide 9810 by 10, and the digits move one place to the right giving us 981 once more.

Now a decimal point is introduced between the 8 and the 1 giving us 98.1and this time we multiply by 100. The children move two places to the left this time, making sure that the decimal point doesn't move, and make the number 9810. Finally 9810 is divided by 100 taking us back down to 98.1. We see the decimal point stays in its position as the digits *move to the left and right. If there are any empty spaces then they must be filled by zeros as place holders to keep the correct values for each number.*

Th	H	T	U	•	Ths	Hths	
	9	8	1				
9	8	1	0				x 10
	9	8	1				÷ 10
		9	8	•	1		
9	8	1	0				x 100
		9	8		1		÷ 100

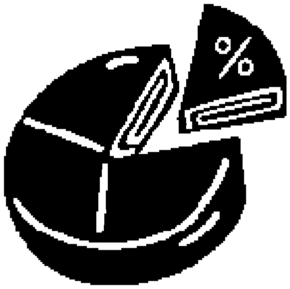
FRACTIONS



A fraction is part of a whole number and has two parts. The top number is the **numerator** and the bottom is the **denominator.**

We start by finding ¼ of 100 and see it to be 25 by splitting 100 into 4 equal parts. We see that to simplify a fraction the numerator and denominator must be divided by the same number thus the fraction 2/4 can be simplified to ½ by dividing top and bottom by 2. Using this knowledge the audience are asked to simplify 2/6: divide top and bottom by 2 to get 1/3, 6/10 is simplified to 3/5 and 6/9 to 2/3.

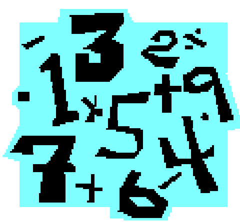
PERCENTAGES



A percentage can be described as 'out of 100' and can be written as a fraction with a denominator of 100. In order to represent a fraction as a percentage it is necessary to find the equivalent fraction.

The children see that to change 7/10 into a percentage you must first find the equivalent fraction with a denominator of 100. Thus top and bottom must be multiplied by 10, giving us 70%. They help find the equivalent percentages for 7/25 and 2/5. We show that the reverse is true, changing 50% into 50/100 and simplify it down to 1/2.

THE FOUR OPERATIONS



With addition, subtraction, multiplication and division we look at the method employed to solve the problem and how to choose the most appropriate way of tackling the question. The audience learn this song:

When you see a problem
It's easy to overcome
Read the instructions carefully
Then organise the sum
Answer the calculation
Then answer the problem too
Then the world of mathamtics
Will be easy for you.

Estimate, Count on, count back,
Round and then adjust
Learn your tables, know your bonds
Break your numbers up

With every problem we see the children must *read the instructions carefully, organise the sum, answer the calculation, then answer the problem.*

ADDITION

Addition is approached using two methods: breaking numbers up and rounding and adjusting.

The problem is set up: how much does Johnnie spend if he buys Millions for 45p and a Mars Bar for 49p and is tackled in two ways. Firstly the numbers are broken up into tens and units:

$$45 + 49 = 40 + 40 + 5 + 9$$
$$= 80 + 14$$
$$= 94$$

Next we approach the same problem using rounding to reach the answer:

45 + 49 = ?

(round the 49 to 50) 45 + 50 = 95

(adjust by taking away the 1 we added) 45 + 50 –1 = 94

The audience are then given two more problems.

Problem 1: Johnnie went into a sweet shop and spent 32p on a Twix and 25p on a bag of peanuts. How much did he spend in all?

Organise the sum: 32p + 25p = ?

Using 'breaking numbers up' 32 + 25 = 30 + 20 + 2 + 5

= 50 + 7

= 57

So Johnnie spends 57p

Problem 2: Johnnie goes into a sweet shop and spends 28p on a lollypop, 30p on Refreshers Bars and 66p on a Slush puppy. What does Johnnie spend now?

Organise the sum: 28p + 30p + 66p = ?

Using 'rounding' 30 + 30 + 66 = 126

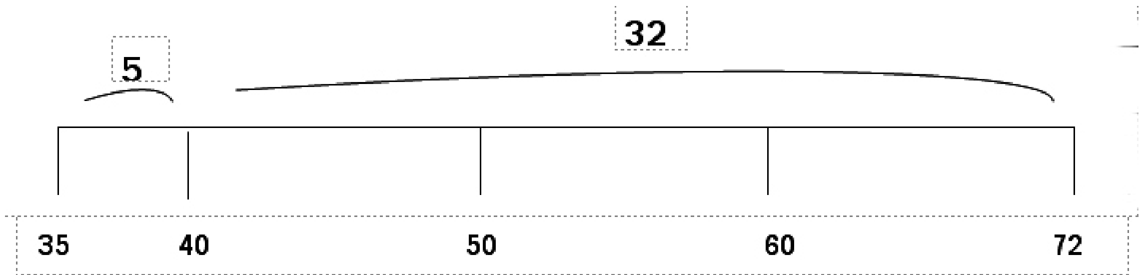
Adjust by taking away the 2 we added = 124

Answer the problem: Johnnie spends £1.24p

SUBTRACTION

We introduce the method of ‘counting on’ to find the difference to solve subtraction problems. A number line is used to illustrate the method.

We are given the problem: Johnnie has 72p. How much change does he get if he spends 35p? We start with a number line and put 35 on one end with 72 on the other. We count on 5 to 40, hold the 5 in our heads and count on from 40 to 72, giving us 32. We add the 5, giving us the answer 37p.



Three more problems are presented and we use each of the methods we’ve encountered so far to solve them: either counting on, breaking numbers up or rounding.

Problem 1: Johnnie went into a sweet shop and bought 58p of penny sweets. How much change did he have from £1.24?

This time we use ‘rounding’ and round the 58 up to 60, thus 124 – 60 = 64

Adjust by adding back the extra 2 we’d taken away 124 – 58 = 66

So Johnnie had 66p change

Problem 2: Johnnie had 66p. If he bought a Refresher Bar for 15p how much would he have then?

This time we use ‘breaking numbers up’: 66 – 15 = 60 – 10 + 6 – 5

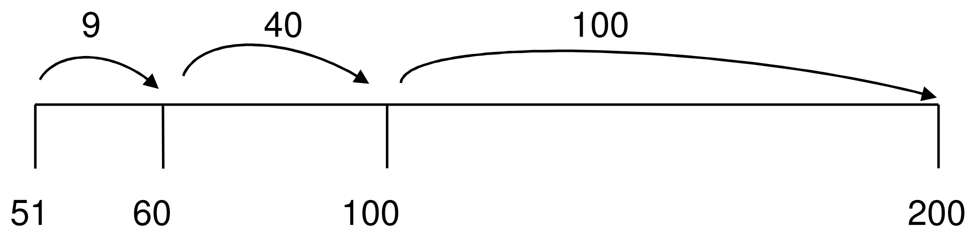
= 50 + 1

= 51

So Johnnie has 51p left

Problem 3: After Johnnie had finished in the sweet shop he had only 51p left of his £2s pocket money. How much had he spent?

Finally we use 'counting on' (although 'rounding' would be an excellent option too for this calculation)



We count on 9 to 60, then another 40 to 100 and finally 100 to 200

9 + 40 + 100 = 149

So Johnnie spent £1.49

MULTIPLICATION

Throughout the play the audience joins in Mrs Jessop's mental warm ups by chanting multiples of 3, 4, 7 and 8, and by doubling and halving numbers given. Multiplying a two digit number by a single digit is approached in a similar way to addition and subtraction; by breaking numbers up or by rounding. To this we add doubling and halving as a useful tool.

BREAKING NUMBERS UP. We set up the problem 23 x 7 and see that we can break it up into two sections: 20 x 7 + 3 x 7.

20 x7 = 2 x 7 x 10 　　3 x 7 = 21

= 14 x 10

= 140

So 23 x 7 = 140 + 21 = 161

If we know our tables well we can follow these steps to answer the calculation

ROUNDING. The next problem is 49 x5. Here we see that the simplest method is to round; 49 x 5 = 50 x 5—1 x 5 thus we round the 49 up to 50 and then adjust by taking away the one lot of 5.

$$49 \times 5 = (50 \times 5) - (1 \times 5)$$
$$= 250 - 5$$
$$= 245$$

DOUBLING AND HALVING. The final problem is 50 x 15. Here we see that the simplest method is to double and halve; double 50 to 100 and multiply the 15 by 100 then halve the answer to solve the problem.

$$100 \times 15 = 1500$$
$$1500 \div 2 = 750$$

DIVISION

As division is the inverse operation of multiplication a good working knowledge of the multiplication tables is a necessary. It is also very useful to know the rules of divisibility and we show the audience the following:

To divide by 2 – even the number must be.
To divide by 3 – sum of the digits divides by 3
To divide by 4- the last two digits must divide by 4
To divide by 5- ending in 5 or 0 is the law.
To divide by 9 – the sum of its digits divides by 9
To divide by 10- the last digit being a nought is the sign.

The audience are then given a series of different numbers and by using the rules of divisibility they work out whether a given digit will divide into it or not.

Does 15 divide by 5? Yes, because the last digit is a 5

Does 102 divide by 3? Yes, because if you add the digits 1 + 0 + 2 = 3 and that is divisible by 3

Does 11 divide by 2? No, because it's an odd number

Does 148 divide by 4? Yes, because the last two digits divide by 4

Does 205 divide by 10? No, because the number doesn't end in a 0

Does 117 divide by 9? Yes, because 1 + 1 + 7 = 9 and of course 9 is divisible by 9

WHAT'S MY NUMBER?

The play concludes with a number quiz: 'What's my number?'. A series of problems are posed and the audience, with the main protagonist, are encouraged to solve them using one of the above methods.