Stem Sentences

Supporting Maths Talk

Contents

DRAFT

EXAMPLES UNDER DEVELOPMENT

Introduction

Mathematics has specialised and technical language which needs to be taught explicitly.
If our children are to '**talk like mathematicians**', we need to be intentional and precise in the modelling of mathematical language. The use of **stem sentences** scaffolds this development.

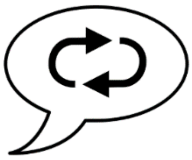
So, what is a stem sentence?

- A stem sentence is a structured sentence that often expresses a key conceptual idea or generalisation.
- Stem sentences provide opportunities to communicate ideas with mathematical precision and clarity.
- A stem sentence can be a whole sentence or have missing parts to fill in.

What impact can a stem sentence have?

- They improve the learners oracy skills and challenge them to widen their mathematical vocabulary.
- A stem sentence provides a framework to aid the embedding of knowledge and build a deeper understanding.
- They enhance, through the precise use of language, the ability to reason, explain thinking and to effectively question.

How can stem sentences be used within our Maths lessons?



1. **I say You say We all say**

   Example: This is a whole *apple* **because I have all of it.**
   Example: A coordinate is a fixed point.

   The stem sentence is modelled. Learners are then chosen to repeat the stem sentence, before everyone says the sentence together. The repetition of a key concept helps to embed mathematical knowledge. The use of gestures alongside a stem sentence supports spatial thinking, visualisation and has been found to reduce the load on working memory.

2. **Complete the sentence**

   Example: Which is the largest decimal number? 0.001 0.01 0.1
   The largest decimal number is ___. I know this because ___.

3. Variation

Example: There are 12 stars. <u>One third</u> of the stars is equal to <u>4 stars</u>.
There are 12 stars. ______ of the stars is equal to ______

Learners vary key parts within the modelled stem sentence to create a new stem sentence of their own.

4. Create a Generalisation/Rule

Through exploration and modelled examples, learners are guided towards generalisations.
When adding 10 to a number, the ones digit stays the same.
Numbers that have exactly two factors are prime numbers.

The stem sentence is modelled. Learners repeat the sentence, as the repetition of a generalisation/rule helps to embed mathematical concepts.

5. Reasoning

Learners complete the stem sentences to explain their thoughts and reasons behind their answer. (More stems are on reasoning mats)

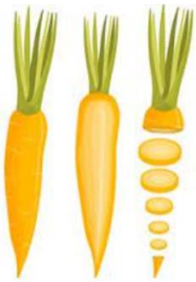
I noticed that ___ so ____.
The answer can't be ___ because ____. Therefore, the answer must be ___.
I already know that ____ so ____.

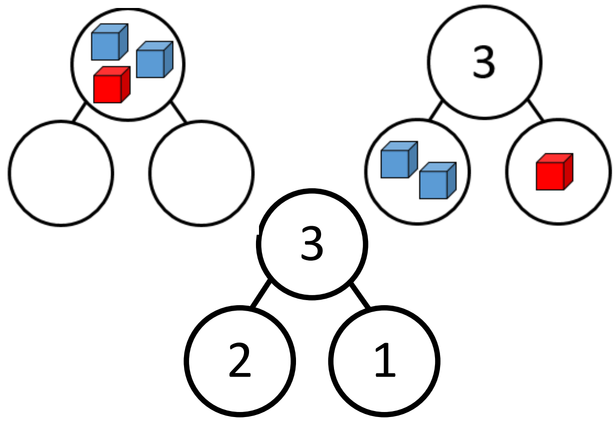
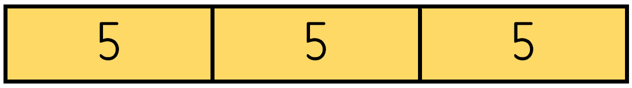
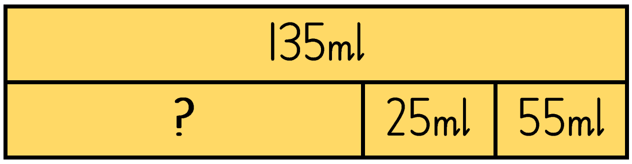
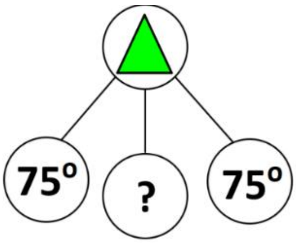
6. Problem Solving

Stems to support talking about maths problems include

The information needed to solve this problem is _______
The first thing I did was ….
First ____ Then _____ Next ____ Last _____
I agree with you because …. I disagree with you because ….
The strategy … I used was / is similar because / is different because

The expectation within every maths lessons is that our children are to speak in full sentences, explaining their thoughts, methods, connections seen or found, avoiding vague responses.
The use of stem sentences aim to support fundamental maths structures, which can be drawn upon as children speak and express their own ideas.

Wholes and parts		
This is a whole ___ because I have all of it.	Language/ Structure	This is a whole apple because I have all of it  
This is not a whole ___ because I don't have all of it.	Language/ Structure	This is not a whole apple because I don't have all of it. This is not a whole apple because I only have part of it.  
This is not a whole ___ because I only have part of it.	Language/ Structure	
A whole can be split into two parts in lots of different ways.	Generalisation	 
A whole is always bigger than a part of the whole.	Generalisation	 
A part is always smaller than its whole.	Generalisation	
A whole can be split into more than two parts in lots of different ways.	Generalisation	
This is a whole group of ___ because none are missing; I have all of them.	Structure	 This is a whole group of cakes because none are missing; I have all of them.
This is not a whole group of ____ because only part of the ____ has ___ in.	Structure	 This is not a whole group of cakes because we don't have all of them; some of them are missing. This is not a whole group of cakes because only part of the tray has cakes
This is the whole group of ___. I have all of them.	Language/ Structure	 Lottie's group of 4 balls This is the whole group of Lottie's balls. I have all of them
There are ___ ___ in the whole group. There are ___ ___ in this part of the group.	Structure	 There are six pencils in the whole group. There are four pencils in this part of the group.

Whole and parts		
___ is the whole; ___ is a part and ___ is a part. The whole is _____. One part is _____ the other part is _____.	Structure	3 is the whole; 1 is a part and 2 is a part. 
A whole split into equal parts can be seen as both an **additive** and a **multiplicative structure.**	Generalisation	
A whole split into unequal parts can be seen as an **additive structure.**	Generalisation	
The whole minus the known part(s) is equal to the missing part. The sum of the known part(s) plus the missing part is equal to the whole	Generalisation	 
Add your own		

Composition of numbers inc. place value		
The ___ represents all the counters. The ___ represents the ___ counters.	Structure	
The ___ represents the ___ counters.		The five represents all the counters. The three represents the blue counters. The two represents the red counters.
The whole is ___ and one part is ___ so the other part must be ___.	Structure	The whole is five and one part is two so the other part must be three.
The number before a given number is one less. The number after a given number is one more.	Generalisation	
Adding one gives one more.	Generalisation	
Subtracting one gives one less.	Generalisation	
___ is five and ___ more.	Structure	Six is five and one more.
___ is equal to ten plus ___.	Structure	Twelve is equal to ten plus two.
This is ten ones. It is also one ten	Structure	
___ ones are equal to ___ ten. We have ___ group(s) of ten. We have ___ ten(s).	Structure	Ten ones ae equal to one ten. We have one group of ten. We have one ten.
This is the number ___. The ___ represents ___ tens.	Structure	This is the number ten. The 1 represents one ten
There are ___ tens which is ___ and ___ ones which is ___. This makes ___ altogether. The ___ represents ___ tens. It has a value of ___. The ___ represents ___ ones. It has a value of ___.	Structure	There are two tens which is twenty and three ones which is three. This makes twenty-three altogether: 23. The '2' represents two tens. It has a value of twenty. The '3' represents three ones. It has a value of three.
All multiples of ten end with a zero.	Generalisation	
We have ___ tens. We call this ___.	Language/ structure	
This is the number ___. We write the ___ then the ___.	Structure	This is the number forty-two. We write the four then the two.
This is ___. Ten more than ___ is ___. ___ is ten more than ___. This is ___. Ten less than ___ is ___. ___ is ten less than ___.	Structure	This is thirty. Ten more than thirty is forty. Forty is ten more than thirty. This is forty. Ten less than forty is thirty. Thirty is ten less than forty.
I know that ___ plus ___ is equal to ___. So, ___ tens plus ___ tens is equal to ___ tens.	Structure	I know that 2 plus 5 is equal to 7. So, 2 tens plus 5 tens is equal to 7 tens.
I know that ___ minus ___ is equal to ___. So, ___ tens minus ___ tens is equal to ___ tens.	Structure	I know that 5 minus 2 is equal to 3. So, 5 tens minus 2 tens is equal to 3 tens.

I know that ___ plus ___ is equal to ten so ___ plus ___ is equal to ___.	Structure	I know that 6 plus 4 is equal to 10 so 16 plus 4 is equal to 20.
I know that ___ minus ___ is equal to ten so ___ minus ___ is equal to ___.	Structure	I know that 10 minus 3 is equal to 7 so 20 minus 3 is equal to 17.
To compare two digit numbers, we need to compare the tens digits; if the tens digits are the same, we need to compare the ones digits.	Generalisation structure	
To compare three digit numbers, we need to compare the hundreds digit; if the hundreds digits are the same, we need to compare the tens digits; if the	Generalisation structure	
So ___ tens plus ___ tens is equal to ___ tens. (multiple-of-ten addends) ___ plus ___ is equal to one hundred and ___. (number names)		
I know that ___ minus ___ is equal to ___. (bridging ten) So ___ tens minus ___ tens is equal to ___ tens. (bridging ten tens) One hundred and ___ minus ___ is equal to ___. (number names)	Structure	I know that twelve minus five is equal to seven. So twelve tens minus five tens is equal to seven tens. 120 minus 50 is equal to 70.
There is ___ group of 100 and ___ more. There are ___ ___.	Structure	There is 1 group of 100 and 24 more. There are one hundred and twenty-four.
___ is ___ ones. ___ is ___ hundreds and ___ ones. ___ is ___ tens and ___ ones. ___ is ___ hundreds, ___ tens and ___ ones.	Structure	243 is 243 ones. 243 is 2 hundreds and 43 ones. 243 is 24 tens and 3 ones. 243 is 2 hundreds, 4 tens and 3 ones.
There are ten hundreds in one thousand. There are one hundred tens in one thousand. There are one thousand ones in one thousand.	Structure	
___ hundred plus ___ hundred is equal to ___ hundred. We know there are ten hundreds in one thousand, so ___ hundred plus ___ hundred is equal to ___ thousand ___ hundred.	Structure	Six hundred plus five hundred is equal to eleven hundred. We know there are ten hundreds in one thousand, so six hundred plus five hundred is equal to one thousand one hundred.
We know there are ten hundreds in one thousand, so ___ thousand ___ hundred is equal to ___ hundred. ___ hundred minus ___ hundred is equal to ___ hundred.		We know there are ten hundreds in one thousand, so one thousand one hundred is equal to eleven hundred. eleven hundred minus six hundred is equal to five hundred.

There are ten one thousands in ten-thousand. There are one hundred one hundreds in ten-thousand. There are one thousand tens in ten-thousand. There are ten thousand ones in ten-thousand.		

Additive structures: aggregation and partitioning		
There are ___ and ___. We can write this as ___ plus ___. The ___ represents the ___. The ___ represents the ___.	Structure	There are four open umbrellas and five closed umbrellas. We can write this as four plus five. The four represents the four open umbrellas. The five represents the five closed umbrellas.
___ is equal to ___ plus ___. ___ plus ___ is equal to ___. ___ and ___ are the addends. ___ is the sum.	Structure	Five is equal to four plus one. Four plus one is equal to five. Four and one are the addends. Five is the sum.
Addend plus addend equals sum. Sum equals addend plus addend.	Language	
Additive structures: augmentation and reduction		
First… then… now… See: ncetm_mm_spl_yl_se06_teach.pdf for lots more examples of how to use 'first… then… now' in the context of augmentation and reduction.	Language	First, four children were sitting on the bus. Then three more children got on the bus. Now seven children are sitting on the bus. First, there were four children in the car. Then one child got out. Now there are three children in the car.
Odd and even numbers		
___ is made of pairs; it is an even number. ___ is not made of pairs; it is an odd number.	Structure/ Language	6 is made of pairs; it is an even number. 7 is not made
Even numbers can be partitioned into two odd parts or two even parts.	Generalisation	
Odd numbers can be partitioned into one odd part and one even part.	Generalisation	
If the whole is odd and one part is even, the other part must be odd. If the whole is odd and one part is odd, the other part must be even. If the whole is even and one part is even, the other part must be even. If the whole is even and one part is odd, the other part must be odd.	Generalisation	
Adding two to an odd number gives the next odd number. Adding two to an even number gives the next even number. Subtracting two from an odd number gives the previous odd number. Subtracting two from an even number gives the previous even number.	Generalisation	
Consecutive odd numbers have a difference of two.	Generalisation	

Consecutive even numbers have a difference of two.		
Doubling a whole number always gives an even number	Generalisation	
We know the number ___ is odd because the ones digit is odd. We know the number ___ is even because the ones digit is even.	Generalisation	
A number is odd if the ones digit is odd. It can't be made from groups of two. A number is even if the ones digit is even. It can be made from groups of two.	Generalisation	
Rounding		
___ is between ___ and ___. ___ is the previous multiple of ten/ hundred/ thousand. ___ is the next multiple of ten/ hundred/ thousand.	Structure/ language	43 is between 40 and 50. 40 is the previous multiple of ten. 50 is the next multiple of ten.
'a' is between ___ and ___. The previous multiple of one ten/ hundred/ thousand is ___. The next multiple of one ten/ hundred/ thousand is ___. 'a' is nearest to ___ ten/ hundred/ thousand. 'a' is ___ when rounded to the nearest ten/ hundred/ thousand.	Structure	1321 is between 1000 and 2000. The previous multiple of one thousand is 1000. The next multiple of one thousand is 2000. 1321 is nearest to 1000. 1321 is 1000 when rounded to the nearest thousand.
___ is between ___ and ___. ___ is the previous whole number. ___ is the next whole number. ___ is nearest to ___. ___ rounded to the nearest whole number is ___.	Structure	3.4 is between 3 and 4. 3 is the previous whole number. 4 is the next whole number. 3.4 is nearest to 3. 3.4 rounded to the nearest whole number is 3.
When rounding to the nearest ___, if the ___ digit is 4 or less we round down. If the ___ digit is 5 or more, we round up.	Generalisation	When rounding to the nearest thousand, if the hundreds digit is 4 or less we round down. If the hundreds digit is 5 or more, we round up.
The midpoint between/ of ___ and ___ is ___, so the midpoint between/ of ___ thousand and ___ thousand is ___.	Structure	The midpoint between ten and twenty is fifteen, so the midpoint between ten-thousand and twenty-thousand is fifteen thousand.
___ is greater/ less than ___ so ___ thousand is greater/ less than ___ thousand.	Structure	$54 < 58$ $54000 < 58000$ 58 is greater than 54, so 58 thousand is greater than 54 thousand.

Negative numbers		
Negative numbers are below/ less than zero. Positive numbers are above/ greater than zero.	Generalisation	
Negative numbers are to the left of zero. Positive numbers are to the right of zero.	Generalisation	
Zero is neither negative nor positive	Generalisation	
For both positive and negative numbers, the larger the value of the number, the further away it is from zero.	Generalisation	
For negative temperatures, the further away from zero it is, the colder the temperature. For positive temperatures, the further away from zero it is, the warmer the temperature. (Can be adapted to other contexts)	Generalisation	
The difference between two numbers is always a positive number, regardless of whether the numbers are negative or positive.	Generalisation	
If we add a positive number, the number gets higher/ greater. If we subtract a positive number, the number gets lower/ smaller. If we add a negative number, the number gets smaller/ lower. If we subtract a negative number, the number gets higher/ greater.	Generalisation	
Addition and subtraction strategies		
If we change the order of the addends, the sum remains the same. We can change the order of the addends and the sum remains the same.	Structure	
Adding one gives one more.	Generalisation	
Subtracting one gives one less.	Generalisation	
Consecutive numbers have a difference of one.	Generalisation	
When zero is added to a number, the number remains unchanged.	Generalisation	
When zero is subtracted from a number, the number remains unchanged.	Generalisation	
Subtracting a number from itself gives a difference of zero.	Generalisation	

There are ___, ___ and ___. Altogether there are ___.	Language	There are two red marbles, three blue marbles and five yellow marbles. Altogether, there are ten marbles.
When we add three numbers, the total will be the same whichever pair we add first.	Generalisation	
We can look for pairs of addends which sum to ten.	Generalisation	
___ plus ___ is equal to ten, then ten plus ___ is equal to ___.	Structure	7+ 3 + 4. Seven plus three is equal to ten, then ten plus four is equal to fourteen.
First I partition the ___: ___ plus ___ is equal to ___. Then ___ plus ___ is equal to ten… …and ten plus ___ is equal to ___.	Structure	First I partition the five: three plus 2 is equal to five. Then seven plus three is equal to ten… …and ten plus two is equal to twelve.
There are ___ more ___ than ___. There are ___ fewer ___ than ___.	Structure	There are two more red cars than blue cars. There are two fewer blue cars than red cars.
The difference between the number of ___ and the number of ___ is ___.	Structure	The difference between the number of blue cars and the number of red cars is two.
The more we subtract, the less we are left with. The less we subtract, the more we are left with.	Generalisation	
The ___ represents the number of ___. The ___ represents the number of ___. The ___ represents the difference between the number of ___ and the number of ___.	Structure	The 8 represents the number of children. The 3 represents the number of pencils. The 5 represents the difference between the number of children and the number of pencils.
Subtraction is not commutative	Generalisation	6 − 3 is not equal to 3 − 6.
To subtract ___, we can subtract the ___ then subtract the ___.	Structure	To subtract 23. We can subtract the 20 then subtract the 3.
For a subtraction calculation where both numbers have the same ones digit, the difference is a multiple of ten.	Generalisation	
First we add: ___ plus ___ is equal to ___ … then we adjust: ___ minus ___ is equal to ___.		First we add: 52 plus 30 is equal to 82 … then we adjust: 82 minus 1 is 81.
For calculations that involve both additions and subtraction steps, we can add then subtract, or subtract then add; the final answer is the same.	Generalisation	
The value of the expressions on each side of the equals sign must be equal.	Generalisation	=

If one addend is increased by an amount and the other addend is decreased by the same amount, the sum remains the same.	Generalisation	
(connected with above) I have added ___ to this addend so I must subtract ___ from the other addend to keep the sum the same.	Structure	I have added ten to 520 so I must subtract ten from 290 to keep the sum the same.
If one addend is increased/ decreased by an amount and the other addend remains unchanged, the sum is also increased/ decreased by the same amount.	Generalisation	
(connected with above) I've added/ subtracted ___ to/ from this addend and kept the other addend the same so I must add/ subtract ___ to/ from the sum.	Structure	I have added ten to 4 and kept the other addend the same so I must add ten to 7 also.
If the sum increases/ decreases by an amount and one addend has stayed the same, the other addend must increase/ decrease by the same amount.	Generalisation	
(connected with above) The sum has increased/ decreased by ___; one addend has stayed the same, so the other addend must increase/ decrease by ___.	Structure	The sum has increased by 2; one addend has stayed the same, so the other addend must also increase by 2.
If the minuend and the subtrahend are changed by the same amount, the difference remains the same.	Generalisation	
I've added/ subtracted ___ to/ from the minuend and the subtrahend so the difference remains the same.	Structure	I've subtracted 1 from the minuend and the subtrahend so the difference remains the same.
In a balanced equation, If I add an amount to the minuend or subtrahend, I need to add the same amount to the subtrahend or minuend to keep the difference the same. In a balanced equation, if I subtract an amount from the minuend or subtrahend, I need to subtract the same amount from the subtrahend or minuend to keep the difference the same.	Generalisation	
I've added ___ to the minuend/ subtrahend, so I need to add ___ to the subtrahend/ minuend to keep the difference the same. I've subtracted ___ from the minuend/ subtrahend so I need to subtract ___ from	Structure	I've added 35 to the minuend so I need to add 35 to the subtrahend to keep the difference the same.

the subtrahend/ minuend to keep the difference the same.		
If a certain amount is added to the minuend and the subtrahend is kept the same, the difference must be increased by the same amount.	Generalisation	
I've added ___ to the minuend and kept the subtrahend the same, so I have to add ___ to the difference.	Structure	I've added ten to the minuend and kept the subtrahend the same, so I have to add ten to the difference.
If the minuend is changed by an amount and the subtrahend is kept the same, the difference changes by the same amount.	Generalisation	
I've subtracted ___ from the minuend and kept the subtrahend the same, so I must subtract ___ from the difference.	Structure	I've subtracted ten from the minuend and kept the subtrahend the same, so I must subtract ten from the difference.
If the minuend is kept the same and the subtrahend is increased/ decreased by an amount, the difference must decrease/ increase by the same amount.	Generalisation	
I've kept the minuend the same and *added/ subtracted* ___ to/ from the subtrahend so I must *subtract/ add* ___ to/ from the difference.	Structure	I've kept the minuend the same and *added* ten to the subtrahend so I must *subtract* ten from the difference.
Written algorithms for addition and subtraction		
For Dienes: We line up the ones; ___ one(s) plus ___ one(s). We line up the tens; ___ ten(s) plus ___ ten(s). For the column addition calculation: The ___ is in the ones column- it represents ___ one(s); the ___ is in the ones column- it represents ___ one(s). The ___ is in the tens column- it represents ___ ten(s); the ___ is in the tens column- it represents ___ ten(s).	Structure	We line up the ones; three ones plus five ones. We line up the tens; four tens plus two tens. The '3' is in the ones column- it represents three ones. The '5' is in the ones column- it represents five ones. The '4' is in the tens column- it represents four tens. The '2' is in the tens column- it represents two tens.
In column addition, we start at the right hand side.	Generalisation	
If the column sum is equal to ten or more, we must regroup.	Generalisation	
Decimals		
The whole is divided into ten/ a hundred equal parts and ___ of them is/ are shaded; this is ___ tenth(s)/ hundred(s) of the whole.	Structure	The whole is divided into ten equal parts and one of them is shaded; this is one tenth of the whole.

If a digit is moved one/ two column(s) to the left, the number represented becomes ten/ one hundred times bigger/ ten/ one hundred times the size. If a digit is moved one/ two column to the right, the number represented becomes ten/ one hundred times smaller; we can also say it becomes one tenth/ one hundredth the size.	Structure/ language	
One tenth/ hundredth can be written as 0.1/ 0.01 so ___ tenths/ hundredths can be written as 0.___/ 0.0___.	Structure	One tenth can be written as 0.1 so three tenths can be written as 0.3.
I say ___ point ___ but I think ___ and ___ tenth(s). I say ___ point ___ ___ but I think ___ and ___ hundredths.	Language	I say forty-three point six but I think 43 and six tenths. I say five point zero six but I think 5 and six hundredths
___ tenths plus ___ tenths is equal to ten tenths, which is equal to one. One is equal to ten tenths; ten tenths minus ___ tenths is equal to ___ tenths.	Structure	Four tenths plus six tenths is equal to ten tenths, which is equal to one. One is equal to ten tenths; ten tenths minus four tenths is equal to six tenths.
___ hundredths plus ___ hundredths is equal to ten hundredths, which is equal to one tenth. One tenth is equal to ten hundredth; ten hundredths minus ___ hundredths is equal to ___ hundredths.	Structure	Four hundredths plus six hundredths is equal to ten hundredths, which is equal to one tenth. One tenth is equal to ten hundredth; ten hundredth minus four hundredths is equal to six hundredths.
___ tenths plus ___ tenths is equal to ten tenths, which is equal to one. One is equal to ten tenths; ten tenths minus ___ tenths is equal to ___ tenths.	Structure	Four tenths plus six tenths is equal to ten tenths, which is equal to one. One is equal to ten tenths; ten tenths minus four tenths is equal to six tenths.
___ hundredths plus ___ hundredths is equal to ten hundredths, which is equal to one tenth. One tenth is equal to ten hundredth; ten hundredths minus ___ hundredths is equal to ___ hundredths.	Structure	Four hundredths plus six hundredths is equal to ten hundredths, which is equal to one tenth. One tenth is equal to ten hundredth; ten hundredth minus four hundredths is equal to six hundredths.
When one tenth is divided into ten equal parts, each part is one hundredths of the whole; ten hundredths is equal to one tenth.	Generalisation	
Ten hundredths is equal to one tenth. Ten tenths is equal to one. One tenth is equal to ten hundredth. One is equal to ten tenths.	Structure	

One centimetre is one hundredth of a metre, so we can write one centimetre as zero-point-zero-one. Ten centimetres is one tenth of a metre, so we can write ten centimetres as zero-point-one.	Structure	
Ten groups of ten pence is equal to one pound, so ten pence is one tenth of a pound. One hundred groups of one penny is equal to one pound, so one penny is equal to one hundredth of a pound. Ten groups of one penny is one tenth of ten pence.	Structure	
The number to the left of the decimal point represents the number of whole pounds. The number to the right of the decimal point represents the number of additional pennies.	Structure	