Symbols and Vocabulary

+	**-**	**X**	**÷**	**=**
add plus sum total more altogether	take-away subtract minus less	multiply times lots of	divide share	Equals

This policy shares the core strategies used in our schools to teach calculation from Reception through to Year Six. Representations in **bold** identify the first time the children would have been exposed to it. Other representations can also be used to further support the teaching of key concepts, these are found in the **White Rose Scheme of Learning** at the start of each block as well as the **White Rose Slides**.

The core strategies are progressive, starting with concrete methods, moving through pictorial and then abstract. Each time a new skill is taught, concrete methods will help the children to embed the skill. As children progress at different rates, some children may need to use strategies from previous year groups. It is good practise to continue to visit prior representations. Use the small steps outlined in the **White Rose** planning to build up these skills.

Eventually, we want our children to be able to select an efficient method of their choice (concrete, pictorial or abstract) that is appropriate for a given task.

Helpful Hooks

There are ten **chewits** in a packet. This is a useful way of introducing place value, and the relationship between ten ones and one ten. When more ones are needed to solve a problem, you can **open a packet** of tens to use the ten ones.
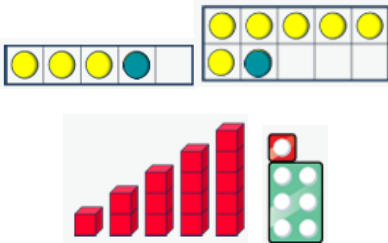
To help understand the role of equals, an **equals mountain** can be used to help show that both sides of the mountain need to equal the same amount, otherwise the calculation will 'tip over'.
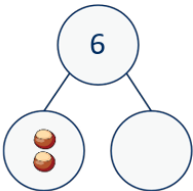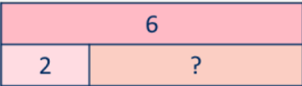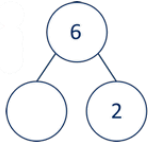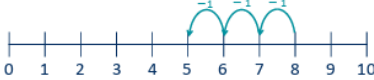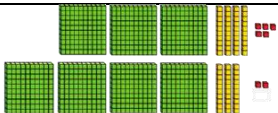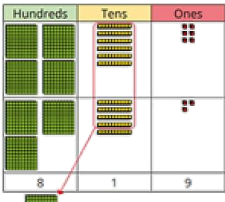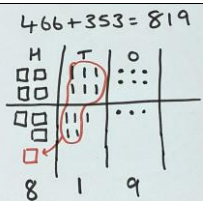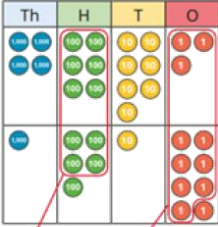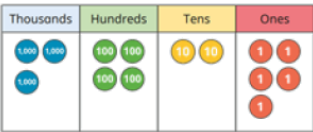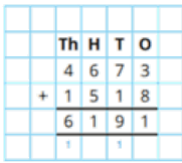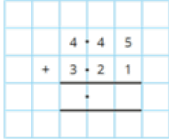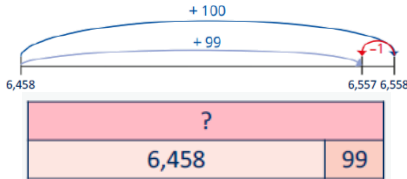
To help children understand the role of X, it can be introduced as 'lazy multiply', when you add the same number over and over, it 'gets tired' and falls on its side, turning into a multiply.

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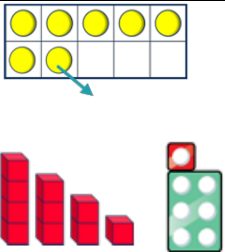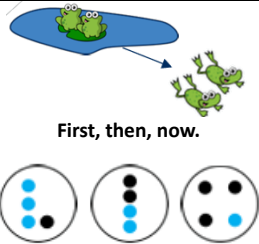
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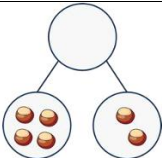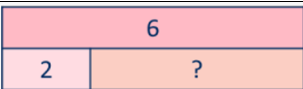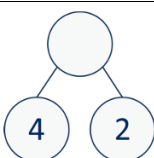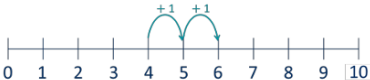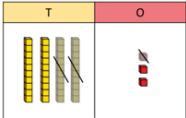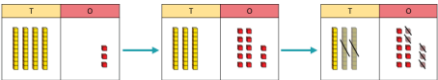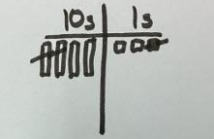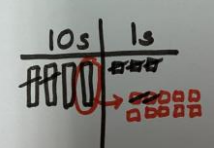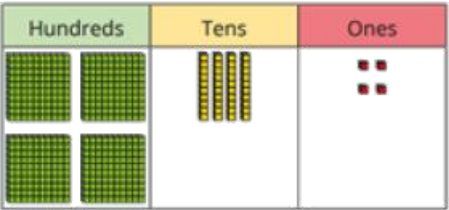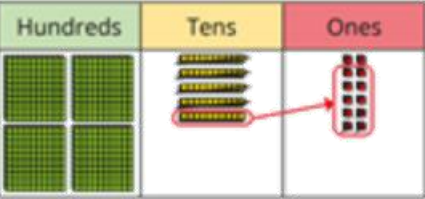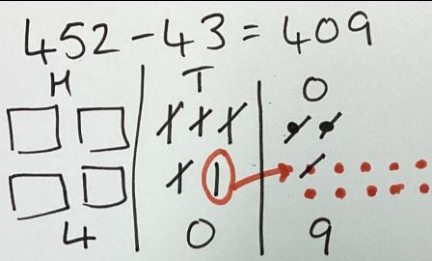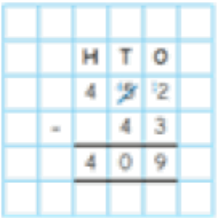
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception		 **First, then, now.** **Subitise** to notice parts that make a whole	*Introduce* *+ and =* 1 2 3 4 5 6 7 8 9 10 **Number tracks**	___ and ___ make ___. I have ___. I add ___ more. Now I have ___. First ____ then ___ now ____.

	Concrete	Pictorial	Abstract	Stem sentences
	Use of **five frame**, **ten frame**, Numicon and other manipulatives.	Plus pictorial versions of concrete representations.		
Year One	Continue with the manipulatives used in Reception, plus: 6 **Part-whole model**	Pictorial versions of a five frame and ten frame. 	6	
2	?	 **Bar model** to introduce missing number problems.	*Introduce number sentences e.g. 6-2=4* 6 / 2 Part-whole model 0 1 2 3 4 5 6 7 8 9 10 **Number line**	This is a part. This is a part. This is the whole. One part is ____. One part is ____. The whole is _____.
Year Two	Tens / Ones **Base 10** when not bridging T / O → T / O **Base 10** when bridging	10s / 1s **Drawing** tens and ones when not bridging. 10s / 1s **Drawing** tens and ones when bridging (make ten).	**Partition** tens and ones. 43 + 21= 40 + 20 = 60 3 + 1 = 4 60 + 4 = 64 **Partition** tens and ones. 45 + 37= 5 + 7 = 12 12 = 10 + 2 40 + 30 + *10* = 80 80 + 2 = 82	First I partition the ____ into ____ and ____. ___ plus ___ is equal to ___.
Year Group	**Concrete**	**Pictorial**	**Abstract**	**Stem sentences**
Year Three	Base 10 when not bridging Hundreds / Tens / Ones 8 1 9 Base 10 when bridging	466+353= 819 H T O 8 1 9 Drawing hundreds, tens and ones when not bridging. Drawing hundreds, tens and ones when bridging (bonds to 100)	H T O / H T O / H T O 3 4 5 + 4 3 2 4 6 6 + 3 5 3 8 1 9 3 6 7 + 1 6 4 5 3 1 no exchange one exchange two exchanges **Column method**	There are __ hundreds, __ tens and __ ones. __ tens plus ___ tens is equal to ___ tens. The tens column will increase by ___.

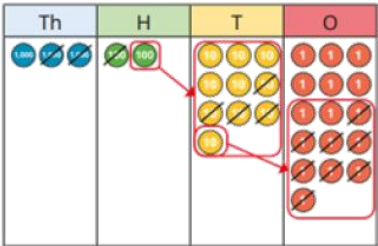| Year Four	**Place Value Counters**	Understanding pictorial representation of counters.	Continue column method with four-digit numbers.	__ ones added to __ ones is equal to __ ones. __ added to ___ is equal to __. I have __ hundreds, so I do/do not need to make an exchange.
Year Five	No new concrete methods introduced.	Continue with pictorial representation of place value counters.	Continue column method with decimal numbers. **Drawn methods** to help understand mental strategies.	In column addition, we start from the place value column that has the __ value. There are not enough __, so I need to exchange 1 __ for 10 ___.
Year Six	No new concrete methods introduced. **Consolidate Previous Strategies**	No new pictorial methods introduced. **Consolidate Previous Strategies**	Continue with drawn methods to help understand mental strategies.	In column addition, we start with the __ place value column. The is in the ___ column. It represents ___.

Subtraction				
Year Group	**Concrete**	**Pictorial**	**Abstract**	**Stem sentences**
Reception	Use of **five frame**, **ten frame**, Numicon and other manipulatives.	**First, then, now.** **Subitise** to notice parts that make a whole Plus pictorial versions of concrete representations.	*Introduce* *- and =* **Number tracks**	I have ___. I take ___ away. Now I have ___. First ____ then ___ now ____.
Year One	Continue with the manipulatives used in Reception, plus:	Pictorial versions of a five frame and ten frame.	*Introduce **number sentences** e.g. 5+2=7*	___ is the whole. ___ is a part. ___ is a part. __ minus __ is equal to __

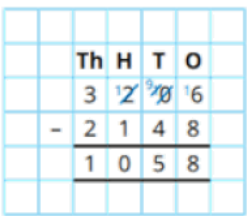| Year Group	Concrete	Pictorial	Abstract	Stem sentences
	Part-whole model	6 / 2 / ? **Bar model** to introduce missing number problems.	Part-whole model +1 +1 0 1 2 3 4 5 6 7 8 9 10 **Number line**	___ less than ___ is ___.
Year Two	T / O **Base 10** when not bridging T O → T O → T O **Base 10** when **bridging**	10s / 1s **Drawing** tens and ones when not bridging. 10s / 1s **Drawing** tens and ones when **bridging** (make ten).	**Partition** tens and ones. 43 – 21 = 40 - 20 = 20 3 - 1 = 2 20 and 2 = 22 **Partition** tens and ones. 43 – 25 = 3 – 5 (I need to **exchange** 1 ten for 10 ones) *so* 13 – 5 = 8 ones 4 tens 3 tens – 2 tens = 1 ten 1 ten and 8 ones = 18	I need to exchange 1 ten for 10 ones. The whole is ____. I subtract one part that is ____. The other part is ____.
Year Group	**Concrete**	**Pictorial**	**Abstract**	**Stem sentences**
Year Three	Hundreds / Tens / Ones Base 10 when not bridging Hundreds / Tens / Ones Base 10 when bridging	452 – 43 = 409 H T O 4	0	9	H T O 4 5 2 - 4 3 4 0 9 **Column Method** with hundreds, tens and ones.	There are __ hundreds, __tens and __ones. __ tens minus ___ tens is equal to ___ tens. The tens column will decrease by ___.

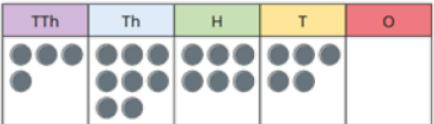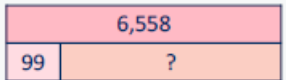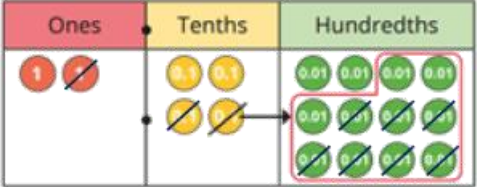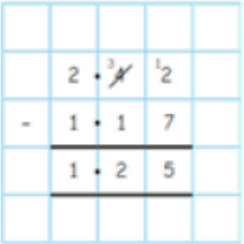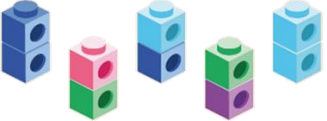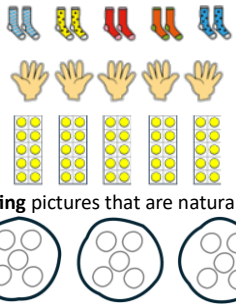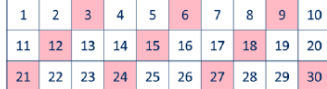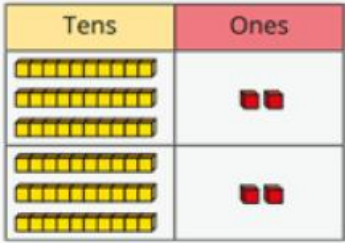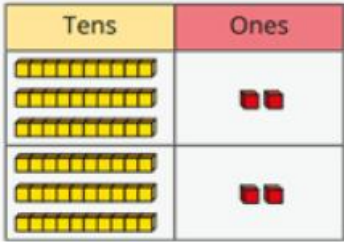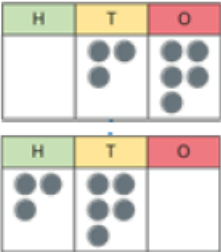| Year Four	Place Value Counters for exchanging practically.	Place Value Counters for exchanging.	Column Method with hundreds, tens and ones. Flexible Partitioning	___ ones added to ___ ones is equal to ___ ones. ___ added to ___ is equal to ___. I have ___ hundreds, so I do/do not need to make an exchange.
Year Five		Place Value Counters without units written. Bar Model for exposure Place Value Counters to exchange with decimals.	Column Method with decimal places. Supporting mental methods.	In column subtraction, we start from the place value column that has the ___ value. There are not enough ___, so I need to exchange 1 ___ for 10 ___.
Year Six	No new concrete methods introduced. **Consolidate Previous Strategies**	No new pictorial methods introduced. **Consolidate Previous Strategies**	Continue with drawn methods to help understand mental strategies.	In column subtraction, we start with the ___ place value column. The is in the ___ column. It represents ___.
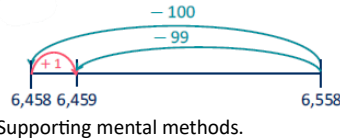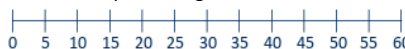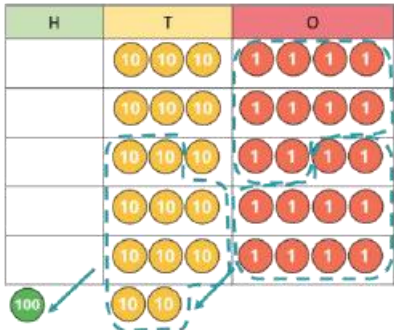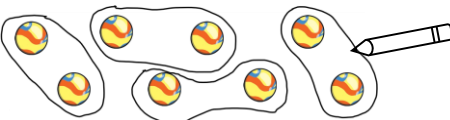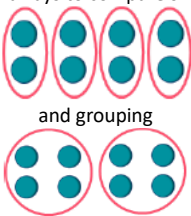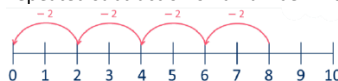
Multiplication

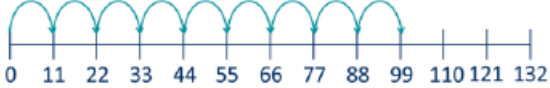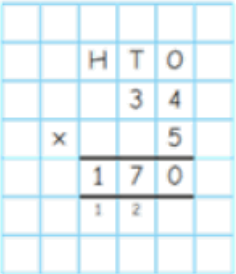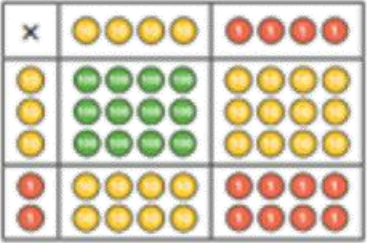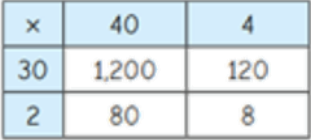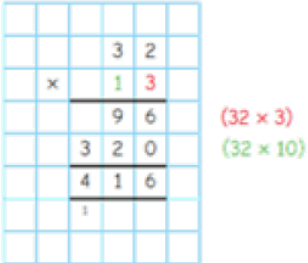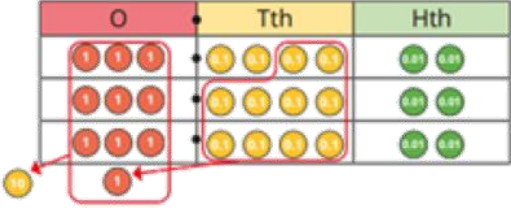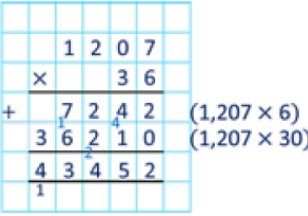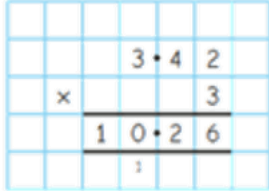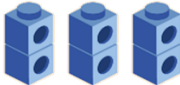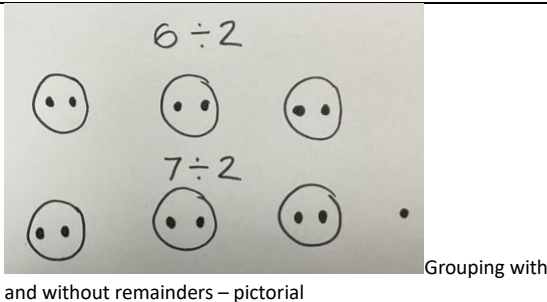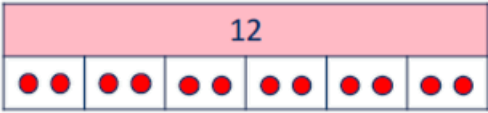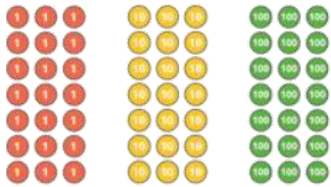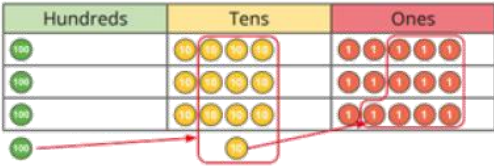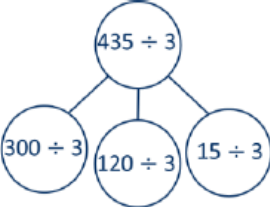| Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception	Make **equal groups** of 'real life' problems in class. Using hands to show **doubles** to five	*Not necessary for exposure at this stage.*	*Not necessary for exposure at this stage.*	Double ___ is ___.
Year One	**Equal groups of objects** Physically making equal groups of objects using any manipulative.	**Step counting** pictures that are naturally grouped. Draw **groups** of objects	Introduce **arrays, rows and columns** $2 + 2 + 2 =$ $5 + 5 + 5 =$ $10 + 10 + 10 =$ Introduce **repeated addition**	There are __ groups of __ There are __ altogether. There are __ rows. There are __ columns. There are __ altogether.
Year Two	Arranging equal groups of objects as arrays.	Draw arrays	Introduce patterns on a **number square**. Step counting number tracks Step counting on a number line $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ Write repeated addition and multiplication $1 \times 5 = 5 \qquad 5 = 1 \times 5$ $2 \times 5 = 10 \quad 10 = 2 \times 5$ $3 \times 5 = 15 \quad 15 = 3 \times 5$ **Times tables**	There are __ equal groups with __ in each group. There are __ altogether. __ lots of __ is equal to. __ times __ is equal to.
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three	**Unifix** to show 3s, 4s, 8s	Pictorial representations for 3s, 4s, 8s	$4 \times 3 = 12 \qquad 12 = 4 \times 3$ Hundred Square, and number line to show 3s, 4s, 8s	There are ___ lots of ___. __x__ = __x__
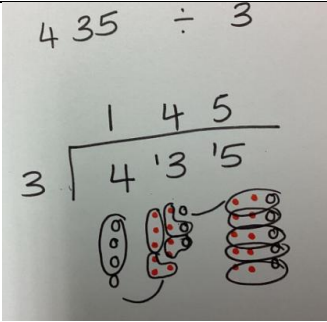
	 32 X 2 = **Base 10** Grid for multiplication.	 Place Value Counters to show related facts. Pictorial Version 32 X 2 =	$30 \times 2 = 60$ $2 \times 2 = 4$ $32 \times 2 = 64$ Partitioning tens and ones	
Year Four	As above but extending 12 X 12	 Place Value Counters for multiplying by 10 or 100 Pictorial representation of column method.	 Extending to 12 X 12 $3 \times 7 = 21$ $3 \times 70 = 210$ $3 \times 700 = 2,100$ Related facts Column Method to multiply 2-digit by 1-digit	6 lots of __ is ___. ___ shared into 6 equal groups is ___. Multiplying by 6 is the same as multiplying by ___ twice. __ x 6 = double __ x 3
Year Five			 **Numerical Grid Method**	A multiple is the result of multiplying a number by __. The first multiple of a number is always ___. ___ is a multiple of ___ because _ x _ =

			Grid Method exposure. Column Method to multiply 2-digit by 2-digit	
Year Six		Grid Method when multiplying decimals.	Column Method to multiply 4-digit by 2-digit. Column Method for decimal places.	The first multiple of a number is always __. __ is a multiple of __ because __ x ___ = ___. __ is a common multiple of __ and __.

Division				
Year Group	**Concrete**	**Pictorial**	**Abstract**	**Stem sentences**
Reception	Fair **sharing** of 'real life' problems in class.	*Not necessary for exposure at this stage.*	*Not necessary for exposure at this stage.*	There are __ altogether. They are shared equally between __ groups.
Year One	Make equal groups **Sharing** Divide equally between the groups to see how many are in a group. **Grouping** Divide into equal groups to see how many groups are made.	Share groups of objects by drawing them one at a time. Circle groups of objects.	*Not necessary for exposure at this stage.*	There are __ altogether. How many groups of __ can you make? __ has been shared equally between __. There are __ on/in each __.
Year Two	**Beadstring** to show repeated subtraction. Compare sharing and grouping	Draw arrays to compare sharing and grouping	Repeated subtraction on a number line. Times tables facts $4 \times 2 = 8$ $8 \div 2 = 4$	__ divided into equal groups of ___ is equal to ___. __ shared between ___ groups is equal to ___.

Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three		Grouping with and without remainders – pictorial	14÷2=7 10÷2=5 4÷2=2 Partitioning 34÷2=17 20÷2=10 14÷2=7 Flexible Partitioning	__ has been shared equally into __ equal groups. There are __ groups of __ in __. This question is sharing/ grouping because __.
Year Four	No new concrete…	Bar model Pictorial Representation of related facts. Pictorial Representation of carrying.	$2 \times 6 = 12$ $12 \div 6 = 2$ Fact family $21 \div 7 = 3$ $21 \div 3 = 7$ $210 \div 7 = 30$ $210 \div 3 = 70$ $2,100 \div 7 = 300$ $2,100 \div 3 = 700$ Related facts $435 \div 3$ $300 \div 3$ $120 \div 3$ $15 \div 3$ $300 \div 3 = 100$ $120 \div 3 = 40$ $15 \div 3 = 5$ $435 \div 3 = 145$ Flexible partitioning into factors.	__ tens divided by __ =__ tens each. __ ones divided by __= __ ones each. I cannot share all of the tens equally, so I need to…

Year Five	No new concrete...	 Pictorial Examples of Bus Stop method	**Bus stop method** Mental Strategies...	__ divided by 10/100/1000 is equal to __. __ is one-tenth/ one-hundredth/ one-thousandth the size of __. There were __ tens/hundreds. Now there are __ ones/tens.
Year Six	No new concrete...	No new pictorial	Long division strategies	__ thousands divided by __ is equal to __. thousands with a remainder of __. The remainder is exchanged into __ hundreds. __ hundreds divided by __ is equal to __ hundreds with a remainder of __. The remainder is exchanged into __ tens.