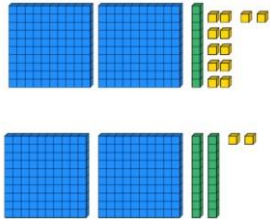




Year 6: Addition

Vocabulary: add, make, altogether, sum, and, plus, total, more than, greater than, combined, increased



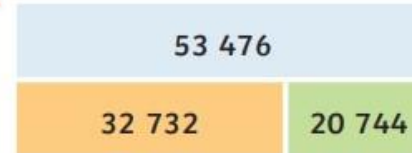
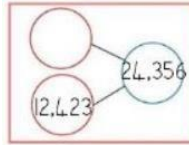
Strategy	Concrete	Pictorial	Abstract																														
Column addition (compact) <u>with and without</u> regrouping/exchanging (addition up to and including five digit numbers).	<p>Without regrouping: Use dienes apparatus to physically add thousands, hundreds, tens and ones.</p> <p>With regrouping: $119 + 103 = 222$</p> <p>Physically exchange ten ones for a ten, ten tens for a hundred and ten hundreds for a thousand.</p> 	<p>Without regrouping: Draw dienes apparatus and add ones first, then add tens, then add hundreds and finally add thousands.</p> <p>With regrouping: Draw dienes apparatus and to add from the right to the left, beginning with the ones as with compact column addition. When exchanging, cross out and regroup e.g. Cross out ten ones and add the extra ten into the tens column.</p>	<p>Without regrouping, one regroup/exchange and multiple regrouping/exchanges:</p> <table border="1" data-bbox="1547 448 2096 743"> <tr><td></td><td>1</td><td>2</td><td>8</td><td>4</td><td>7</td></tr> <tr><td>+</td><td>1</td><td>1</td><td>6</td><td>2</td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>2</td><td>4</td><td>4</td><td>7</td><td>1</td></tr> <tr><td></td><td></td><td>1</td><td></td><td>1</td><td></td></tr> </table> <p>Work from the right to the left, beginning with the ones. When exchanges take place, they should be recorded beneath the calculation.</p>		1	2	8	4	7	+	1	1	6	2	4	<hr/>							2	4	4	7	1			1		1	
	1	2	8	4	7																												
+	1	1	6	2	4																												
<hr/>																																	
	2	4	4	7	1																												
		1		1																													

Using the inverse to check calculations and identify missing numbers.

Use practical apparatus such as counters, dienes apparatus, cubes etc. to form addition number sentences and then the related addition sentence using the commutative law and the related subtraction number sentences.

Use pictorial models including bar models and part, whole models to show the inverse operation and the related number sentences. E.g.

$$53,476 - ? = 20,744$$
$$24,356 = ? + 12,423$$



Use formal methods for column addition and subtraction to demonstrate understanding of the inverse operation.

$$35,718 + ? = 48,675$$

	3	5	7	1	8
+	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	4	8	6	7	5

$$75,351 - 40,428 =$$

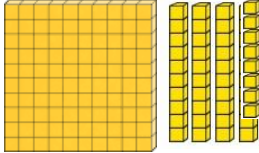
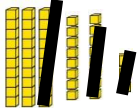
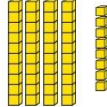
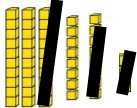
The difference between 34,623 and 75,351 is 40,728. Use the inverse to check this statement.



Year 6: Subtraction

Vocabulary: minus, take away, difference, less than, less, leave, left, left over, fewer, subtract, minus, difference between, distance between, subtraction **reduced**, decreased



Strategy	Concrete	Pictorial	Abstract																																				
Compact column subtraction <u>with and without</u> exchanging.	<p>Without exchanging: 148 $\begin{array}{r} 148 \\ - 17 \\ \hline \end{array}$</p> <p>Physically take away the ones, then the tens and then the hundreds. </p> <p>With exchanging: 32 - 7 =</p> <p>Make the largest number using dienes apparatus. Physically take away the ones, then the tens and finally the hundreds. If there are not enough ones, exchange one ten for ten units. If there are not enough tens, exchange one hundred for ten tens. </p>	<p>Without exchanging: Draw the largest numbers. Cross out the ones being taken away, followed by the tens and then the hundreds.</p> <p>With exchanging: 47 - 19 =</p> <p>Draw the largest numbers. </p> <p>If there are not enough ones, exchange one ten for ten units. If there are not enough tens, exchange one hundred for ten tens. Cross out the ones being taken away followed by the tens and the units. </p>	<p>With and without exchanging:</p> <table border="1" data-bbox="1608 373 2136 639"> <tr> <td></td> <td>3</td> <td>5</td> <td>6</td> <td>13</td> <td>1</td> </tr> <tr> <td>-</td> <td></td> <td>3</td> <td>4</td> <td>7</td> <td>6</td> </tr> <tr> <td></td> <td>3</td> <td>2</td> <td>2</td> <td>6</td> <td>6</td> </tr> </table> <table border="1" data-bbox="1608 724 2136 995"> <tr> <td></td> <td>1</td> <td>1</td> <td>4</td> <td>6</td> <td>1</td> </tr> <tr> <td>-</td> <td></td> <td>2</td> <td>2</td> <td>4</td> <td>4</td> </tr> <tr> <td></td> <td>1</td> <td>9</td> <td>2</td> <td>2</td> <td>8</td> </tr> </table>		3	5	6	13	1	-		3	4	7	6		3	2	2	6	6		1	1	4	6	1	-		2	2	4	4		1	9	2	2	8
	3	5	6	13	1																																		
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	3	2	2	6	6																																		
	1	1	4	6	1																																		
-		2	2	4	4																																		
	1	9	2	2	8																																		

Finding the difference.

Use practical apparatus to show the difference between two numbers. Equipment such as multilink, which is equal in size and can be lined up exactly, demonstrates this concept.

Use bar models to show finding the difference between two numbers.

What is the difference between 25,567 and 1,875?



Number Sentence:

What is the difference between 102,616 and 14,504?

$$102,616 - 14,504 =$$

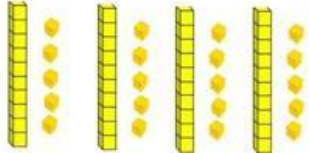
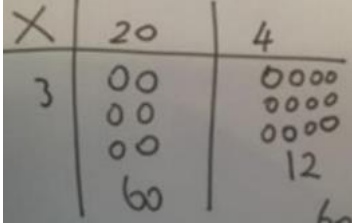


Year 6: Multiplication

Vocabulary: double, groups, lot, grouping, array, twos, tens, fives, times, multiply, multiplied by, two times table, ten times table, five times table, multiple of, once, twice, three times, five times, ten times, time as, repeated addition, row, column, sets, product, six times table, seven times tables, nine times table, eleven times table, twelve times table, short multiplication, **long multiplication**



Timetables Progression: 2s to 12s

Strategy	Concrete	Pictorial	Abstract																																
Short Multiplication	<p>Use dienes apparatus to make groups. Combine units and tens. Add together to find the total.</p>  <p> $4 \times 15 =$ $4 \times 10 = 40$ $4 \times 5 = 20$ $40 + 20 = 60$ </p> <p>Use counters to represent value of digits to multiply in a place value grid. Recombine tens and ones.</p> <table border="1" data-bbox="309 917 616 1149"> <thead> <tr> <th>10s</th> <th>1s</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> <p> $23 \times 3 =$ $20 \times 3 = 60$ $3 \times 3 = 9$ $60 + 9 = 69$ </p>	10s	1s			<p>Draw dienes apparatus or counters to represent place value of digits in columns.</p> <p>$24 \times 3 =$</p> <p>$60 + 12 = 72$</p> 	<p>Short Multiplication:</p> <table border="1" data-bbox="1400 462 1724 829"> <thead> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>5</td> <td>4</td> <td>3</td> </tr> <tr> <td>x</td> <td></td> <td></td> <td>4</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>2</td> <td>1</td> <td>7</td> <td>2</td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td></td> <td>1</td> <td>1</td> <td></td> </tr> </tbody> </table> <p>Multiply from the right to the left (ones, tens and then hundreds). When exchanges take place, they should be recorded beneath the calculation.</p>	Th	H	T	O		5	4	3	x			4	<hr/>				2	1	7	2	<hr/>					1	1	
10s	1s																																		
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x			4																																
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2	1	7	2																																
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	1	1																																	

Long
Multiplication

NB: CPA understanding must be in place for short multiplication in order to progress to long multiplication.

Long Multiplication

			1	1	
				3	6
x				3	2
<hr/>					
				7	2
	1	0		8	0
<hr/>					
	1	1		5	2
			1		

Begin long multiplication with the ones. Multiply 2×6 . Write the answer down correctly, recording any exchanges above the calculation in the correct column. $6 \times 2 = 12$ so place the 2 in the ones column and carry the ten above the calculation.

Multiply 2×3 (tens). Write the answer down correctly, recording any exchanges above the correct column. $3 \times 2 = 6 + 1 \text{ ten} = 7 \text{ tens}$.

Place a zero in the row below in the ones column as the next step requires multiplying by 10.

Multiply 3 (tens) $\times 6$. Write the answer down correctly recording any exchanges above the calculation in the correct column. 3 (tens) $\times 6 = 18$. Place the 8 in the tens column and carry the 1 (hundred) into the hundreds column.

Multiply 3 (tens) by 3 (tens). Write the answer down correctly recording any exchanges above the calculation in the correct column. 3 (tens) $\times 3$ (tens) $= 9$. Add 9 to the 1 in the hundreds column and record in the thousands column.

Add $1082 + 72$. Record any exchanges beneath the calculation.



Year 6: Division

Vocabulary: half, halve, pair, share equally, equal groups, grouping, sharing, repeated subtraction, arrays, column, row, one each, two each, three each, group in pairs, group in tens, group in fives, equal groups of, divide, divided, divided by, divided into, remainder, divide by 10, **long division**



Timetables Progression: 2s – 12s

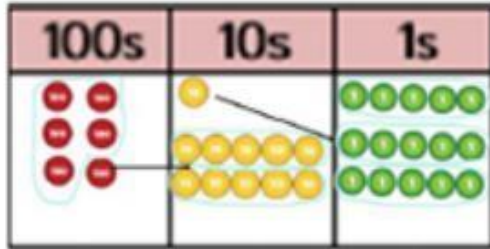
Strategy

Concrete

Pictorial

Abstract

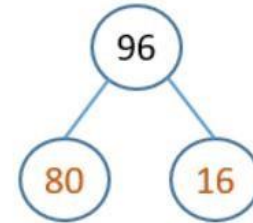
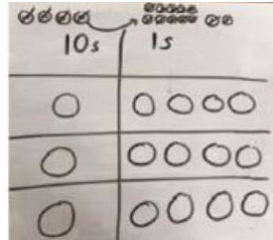
615 ÷ 5 = 123



Make 615 with place value counters.
 How many groups of 5 hundreds can you make with 6 hundred counters?
 Exchange 1 hundred for 10 tens.
 How many groups of 5 tens can you make with 11 counters?
 Exchange 1 ten for 10 ones.
 How many groups of 5 ones can you make with 15 ones?

Place Value Grid/Part-Whole Model

42 ÷ 3 = 14 96 ÷ 4 = 24



$$(80 \div 4) + (16 \div 4)$$

$$20 + 4 = 24$$

Number Sentence:

Without carrying:

		4	8
6	2	8	8

With carrying:

	1	1	7
5	5	8	5

How many 5's in 5 (hundreds)?
 How many 5's in 8 (tens)?
 Exchange the remaining 3 tens.
 How many 5's in 35?

Children will be required to express remainders as fractions or decimals.

Long
Division

NB: CPA understanding must be in place for short division in order to progress to long division.

$$399 \div 15 = ?$$

divide

$$15 \overline{) 399} \quad \begin{array}{c} 2 \\ \hline \end{array}$$

multiply

$$15 \overline{) 399} \quad \begin{array}{c} 2 \\ \hline 30 \\ \hline \end{array}$$

subtract

$$15 \overline{) 399} \quad \begin{array}{c} 2 \\ \hline 30 \\ - 30 \\ \hline 9 \\ \hline \end{array}$$

bring down

$$15 \overline{) 399} \quad \begin{array}{c} 2 \\ \hline 30 \\ \downarrow \\ 99 \\ \hline \end{array}$$

repeat!

$$15 \overline{) 399} \quad \begin{array}{c} 26 \\ \hline 30 \\ \hline 99 \\ \hline \end{array}$$

$$15 \overline{) 399} \quad \begin{array}{c} 26 \\ \hline 30 \\ \hline 99 \\ - 90 \\ \hline 9 \\ \hline \end{array}$$

$$15 \overline{) 399} \quad \begin{array}{c} 26 \\ \hline 30 \\ \hline 99 \\ - 90 \\ \hline r9 \\ \hline \end{array}$$

$$399 \div 15 = 26 \text{ r}9$$

or

$$399 \div 15 = 26 \frac{9}{15}$$