



		Year 6	
	Concrete	Pictorial	Abstract
Year 6 Addition			
Comparing and selecting efficient methods	Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.	Discuss similarities and differences between methods, and choose efficient methods based on the specific calculation. Compare written and mental methods alongside place value representations. The harmonic place in the specific calculation. Compare written and mental methods alongside place value representations. The harmonic place in the specific calculation. The specific calculation. Compare written and mental methods alongside place value representations. The harmonic place is a specific calculation. The specific calculation is specific calculation. The specific calculation is specific calculation is specific calculation. The specific calculation is specific calculation is specific calculation. The specific calculation is specific calculation is specific calculation. The specific calc	Use column addition where mental methods are not efficient. Recognise common errors with column addition. $32,145+4,302=?$ $\frac{TTh}{3} \frac{Th}{2} \frac{Th}{4} \frac{Th}{5} \frac{Th}{3} \frac{Th}{2} \frac{Th}{4} \frac{Th}{5} \frac{H}{4} \frac{T}{5} \frac{T}{5} \frac{1}{1} \frac{6}{5} \frac{5}{5}$ Which method has been completed accurately? What mistake has been made? Column methods are also used for decimal additions where mental methods are not efficient. $\frac{H}{1} \frac{T}{4} \frac{O}{0} \frac{Tth}{4} \frac{Hth}{1} \frac{H}{4} \frac{1}{4} $





Selecting mental methods for larger numbers where appropriate

Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.

М	HTh	TTh	Th	Н	Т	0
••	0000	•	•	•••		•

$$2,411,301 + 500,000 = ?$$

This would be 5 more counters in the HTh place.

So, the total is 2,911,301.

$$2,411,301 + 500,000 = 2,911,301$$

Use a bar model to support thinking in addition problems.

I added 100 thousands then subtracted 1 thousand.

257 thousands + 100 thousands = 357 thousands

So,
$$257,000 + 99,000 = 356,000$$

Use place value and unitising to support mental calculations with larger numbers.

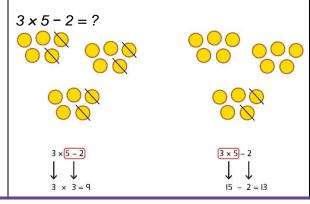
$$195,000 + 6,000 = ?$$

$$195 + 5 + 1 = 201$$

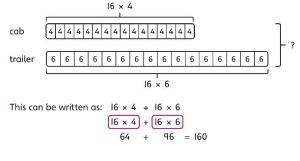
195 thousands + 6 thousands = 201 thousands

Understanding order of operations in calculations

Use equipment to model different interpretations of a calculation with more than one operation. Explore different results.



Model calculations using a bar model to demonstrate the correct order of operations in multi-step calculations.



Understand the correct order of operations in calculations without brackets.

Understand how brackets affect the order of operations in a calculation.

$$4 + 6 \times 16$$

 $4 + 96 = 100$

$$(4+6) \times 16$$

10 × 16 = 160





Year 6 Subtraction	Concrete	Pictorial	Abstract
Comparing and selecting efficient methods	Use counters on a place value grid to represent subtractions of larger numbers. The Head Counter of the counte	Compare subtraction methods alongside place value representations. The Horizontal To Description of the compare subtraction methods alongside place value representations. The Horizontal To Description of the compare subtraction methods alongside place value representations. The Horizontal To Description of the compare subtraction methods alongside place value representations.	Compare and select methods. Use column subtraction when mental methods are not efficient. Use two different methods for one calculation as a checking strategy. The H T O
Subtracting mentally with larger numbers		Use a bar model to show how unitising can support mental calculations. 950,000 - 150,000 That is 950 thousands - 150 thousands 950,000 - 150,000 = 800 thousands. 950,000 - 150,000 = 800,000	Subtract efficiently from powers of 10. $10,000 - 500 = ?$





Year 6 Multiplication	Concrete	Pictorial	Abstract
Multiplying up to a 4-digit number by a single digit	Use equipment to explore multiplications. Th	Use place value equipment to compare methods. Method I 3 2 2 5	Understand area model and short multiplication. Compare and select appropriate methods
number		3 2 2 5 3 2 2 5 3 2 2 5 1 2 9 0 0	for specific multiplications. Method 3 3,000 200 20 5
	4 groups of 2,345	Method 2	4 12,000 800 80 20 12,000 + 800 + 80 + 20 = 12,900
	This is a multiplication: 4 × 2,345 2,345 × 4	4 × 3,000 4 × 200 4 × 20 4 × 5 12,000 + 800 + 80 + 20 = 12,900	Method 4 3 2 2 5 × 4 1 2 9 0 0
Multiplying up to a 4-digit number by a		Use an area model alongside written multiplication.	Use compact column multiplication with understanding of place value at all stages.
2-digit number		Method I 1,000 200 30 5 20 20,000 4,000 600 100 1 1,000 200 30 5	





Using knowledge of factors and partitions to compare methods for multiplications

Use equipment to understand square numbers and cube numbers.

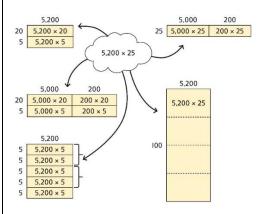




$$5 \times 5 = 5^2 = 25$$

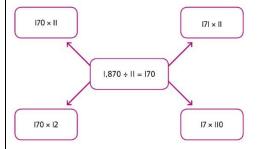
 $5 \times 5 \times 5 = 5^3 = 25 \times 5 = 125$

Compare methods visually using an area model. Understand that multiple approaches will produce the same answer if completed accurately.



Represent and compare methods using a bar model.

Use a known fact to generate families of related facts.

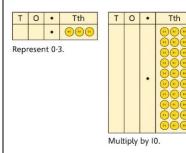


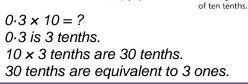
Use factors to calculate efficiently.

$$15 \times 16 \\
= 3 \times 5 \times 2 \times 8 \\
= 3 \times 8 \times 2 \times 5 \\
= 24 \times 10 \\
= 240$$

Multiplying by 10, 100 and 1.000

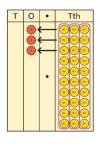
Use place value equipment to explore exchange in decimal multiplication.

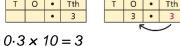




Exchange each group

Understand how the exchange affects decimal numbers on a place value grid.





Use knowledge of multiplying by 10, 100 and 1,000 to multiply by multiples of 10, 100 and 1.000.

$$8 \times 100 = 800$$

 $8 \times 300 = 800 \times 3$
 $= 2.400$

$$2.5 \times 10 = 25$$

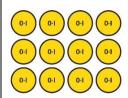
 $2.5 \times 20 = 2.5 \times 10 \times 2$
= 50



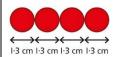


Multiplying decimals

Explore decimal multiplications using place value equipment and in the context of measures.



3 groups of 4 tenths is 12 tenths. 4 groups of 3 tenths is 12 tenths.



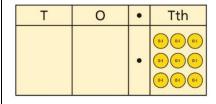
$$4 \times 1 \text{ cm} = 4 \text{ cm}$$

 $4 \times 0.3 \text{ cm} = 1.2 \text{ cm}$
 $4 \times 1.3 = 4 + 1.2 = 5.2 \text{ cm}$

Represent calculations on a place value grid.

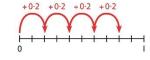
$$3 \times 3 = 9$$

$$3 \times 0.3 = 0.9$$



Understand the link between multiplying decimals and repeated addition.





Use known facts to multiply decimals.

$$4 \times 3 = 12$$

 $4 \times 0.3 = 1.2$
 $4 \times 0.03 = 0.12$

$$20 \times 5 = 100$$

 $20 \times 0.5 = 10$
 $20 \times 0.05 = 1$

Find families of facts from a known multiplication.

I know that $18 \times 4 = 72$.

This can help me work out:

$$1.8 \times 4 = ?$$

 $18 \times 0.4 = ?$
 $180 \times 0.4 = ?$
 $18 \times 0.04 = ?$

Use a place value grid to understand the effects of multiplying decimals.

	Н	Т	0	•	Tth	Hth
2 × 3			6	•		
0·2 × 3			0	•	6	
0·02 × 3				•		





Year 6 Division	Concrete	Pictorial	Abstract
Understanding factors	Use equipment to explore different factors of a number.	Recognise prime numbers as numbers having exactly two factors. Understand the link with division and remainders.	Recognise and know primes up to 100. Understand that 2 is the only even prime, and that 1 is not a prime number.
	$24 \div 4 = 6$ $30 \div 4 = 7 \text{ remainder } 2$	0000000 0000 0000 000 000000 0000 0000	I 2 3 4 5 6 7 8 9 10 II 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4 is a factor of 24 but is not a factor of 30.	17 ÷ 2 = 8 r l 17 ÷ 3 = 5 r 2 17 ÷ 4 = 4 r l 17 ÷ 5 = 3 r 2	31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
Dividing by a single digit	Use equipment to make groups from a total. There are 78 in total. There are 6 groups of 13. There are 13 groups of 6.	H T O groups of 6 are in 100? H T O How many groups of 6 are in 13 tens? H T O How many groups of 6 are in 13 tens? H T O Groups of 6 are in 12 ones? H T O How many groups of 6 are in 12 ones?	Use short division to divide by a single digit. $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$





Dividing by a
2-digit number
using factors

Understand that division by factors can be used when dividing by a number that is not prime.

Use factors and repeated division.

$$1,260 \div 14 = ?$$



$$1,260 \div 2 = 630$$

$$630 \div 7 = 90$$

 $1.260 \div 14 = 90$

Use factors and repeated division where appropriate.

$$2,100 \div 12 = ?$$

$$2,100 \longrightarrow \begin{bmatrix} \div 2 \\ \end{bmatrix} \longrightarrow \begin{bmatrix} \div 6 \\ \end{bmatrix} \longrightarrow$$

$$2,100 \longrightarrow \begin{bmatrix} \div 6 \\ \end{bmatrix} \longrightarrow \begin{bmatrix} \div 2 \\ \end{bmatrix} \longrightarrow$$

$$2,100 \longrightarrow \begin{bmatrix} \div 3 \\ \end{bmatrix} \longrightarrow \begin{bmatrix} \div 4 \\ \end{bmatrix} \longrightarrow$$

$$2,100 \longrightarrow \begin{bmatrix} \div 4 \\ \end{bmatrix} \longrightarrow \begin{bmatrix} \div 3 \\ \end{bmatrix} \longrightarrow$$

$$2,100 \longrightarrow [\div 3] \longrightarrow [\div 2] \longrightarrow [\div 2] \longrightarrow$$

Dividing by a 2-digit number using long division

Use equipment to build numbers from groups.



182 divided into groups of 13. There are 14 groups.

Use an area model alongside written division to model the process.

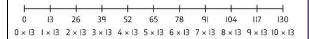


$$377 \div 13 = 29$$

Use long division where factors are not useful (for example, when dividing by a 2-digit prime number).

Write the required multiples to support the division process.

$$377 \div 13 = ?$$



$$377 \div 13 = 29$$

A slightly different layout may be used, with the division completed above rather than at the side.



Catholic Primary School and Nulsery			3 21 7 9 8 - 6 3 0 1 6 8 21 7 9 8 - 6 3 0 1 6 8
Dividing by 10	Lies place value equipment to evalue	Papragent division to show the relationship	Divisions with a remainder explored in problem-solving contexts.
Dividing by 10, 100 and 1,000	Use place value equipment to explore division as exchange. O Th Hth Thth O Th Hth Thth Exchange each 0-I for ten 0-0Is. Divide 20 counters by I0.	Represent division to show the relationship with multiplication. Understand the effect of dividing by 10, 100 and 1,000 on the digits on a place value grid.	Use knowledge of factors to divide by multiples of 10, 100 and 1,000. $40 \div 50 = \boxed{}$ $40 \longrightarrow \div 10 \longrightarrow \div 5 \longrightarrow ?$ $40 \longrightarrow \div 5 \longrightarrow \div 10 \longrightarrow ?$ $40 \div 5 = 8$ $8 \div 10 \longrightarrow 9$
	0·2 is 2 tenths. 2 tenths is equivalent to 20 hundredths. 20 hundredths divided by 10 is 2 hundredths.	$12 \div 20 = ?$ $12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 +$	$8 \div 10 = 0.8$ So, $40 \div 50 = 0.8$





Dividing decimals

Use place value equipment to explore division of decimals.



8 tenths divided into 4 groups. 2 tenths in each group.

Use a bar model to represent divisions.

0.8				
?	?	?	?	

 $4 \times 2 = 8$

 $8 \div 4 = 2$

So, $4 \times 0.2 = 0.8$ $0.8 \div 4 = 0.2$

Use short division to divide decimals with up to 2 decimal places.

0 · 42 4

 $0 \cdot 5$ $4 \cdot {}^{4}2^{2}4$