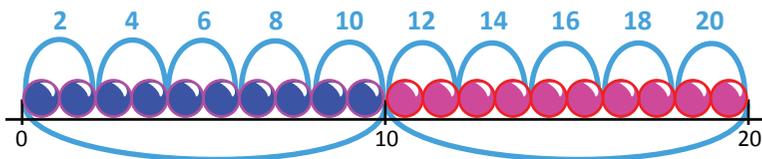


Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using \times and two using \div which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that $[\] \times 5 = 45$ and $45 \div 5 = [\]$ are seen as ways of expressing the same question.

\times Multiplication

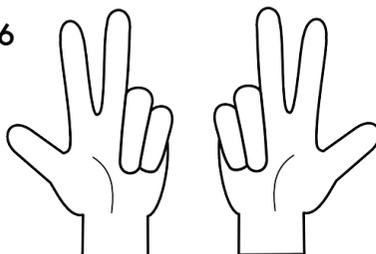
Counting in steps ('Clever' counting)

Count in 2s and 10s.



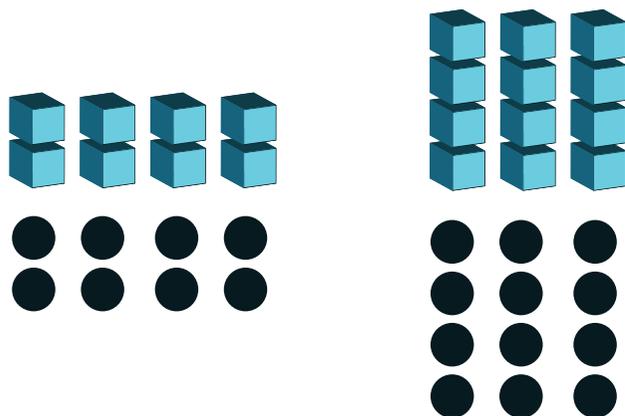
Doubling and halving

Find doubles to double 6 using fingers.



Grouping

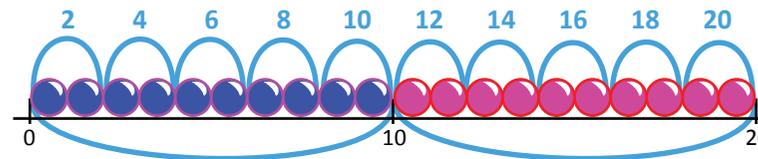
Begin to use visual and concrete arrays and 'sets of' objects to find the answers to '3 lots of 4' or '2 lots of 5', etc.



\div Division

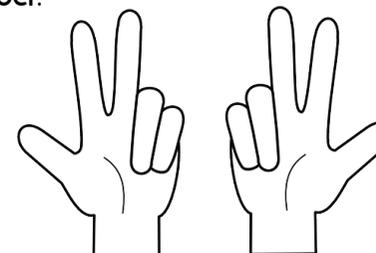
Counting in steps ('Clever' counting)

Count in 2s, and 10s.



Doubling and halving

Find half of even numbers up to 12 including realising that it is hard to halve an odd number.

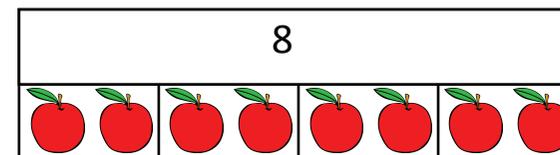


Grouping

Begin to use visual and concrete arrays and 'sets of' objects to find the answers to 'how many towers of 3 can I make with 12 cubes?'

Sharing

Begin to find half of a quantity using sharing, e.g. half of 16 cubes by giving one each repeatedly to two children.



'Clever' counting is an excellent basis for multiplication and division.

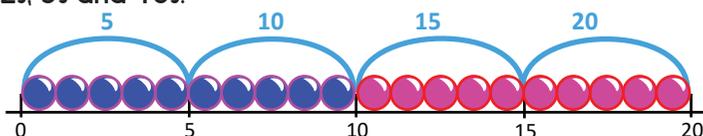
Division must be presented as the inverse of multiplication (grouping).

Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using \times and two using \div which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that $[\] \times 5 = 45$ and $45 \div 5 = [\]$ are seen as ways of expressing the same question.

\times Multiplication

Counting in steps ('Clever' counting)

Count in 2s, 5s and 10s.



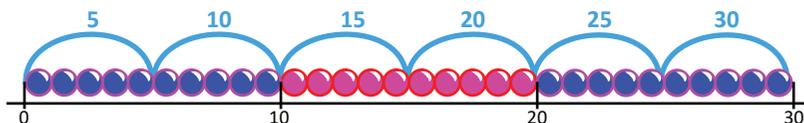
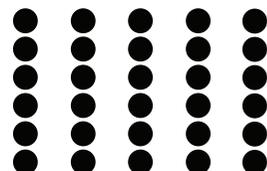
Begin to count in 3s.

Doubling and halving

Begin to know doubles of multiples of 5 to 100, e.g. *double 35 is 70.*

Grouping

Use arrays to find answers to multiplication and relate to 'clever' counting, e.g. *3 x 4 as three lots of four things and 6 x 5 as six steps in the 5s count as well as six lots of five.*



Understand that 5×3 can be worked out as three 5s or five 3s.

Use number facts

Know doubles to double 20

$$\text{Double } 7 = 14$$



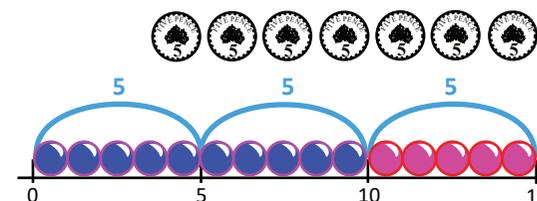
Division, grouping, is the inverse of multiplication.

Start learning 2x, 5x, 10x tables, relating these to 'Clever counting' in 2s, 5s, and 10s, e.g. $5 \times 10 = 50$, and 10, 20, 30, 40, 50 is five steps in the tens count.

\div Division

Counting in steps ('Clever' counting)

Count in 2s, 5s and 10s



'Clever' counting is an excellent basis for multiplication and division.

Doubling and halving

Find half of numbers up to 40, including realising that half of an odd number gives a remainder of 1 or an answer containing a $\frac{1}{2}$. Begin to know half of multiples of 10 to 100, e.g. *half of 70 is 35.*

Grouping

Relate division to multiplication by using arrays of towers of cubes to find answers to division, e.g. *how many towers of five cubes can I make from 20 cubes as $\square \times 5 = 20$ and also as $20 \div 5 = ?$*



Relate division to 'clever' counting and hence to multiplication, e.g. *how many 5s do I count to get to 20?*

Sharing

Begin to find half or a quarter of a quantity using sharing, e.g. $\frac{1}{4}$ of 16 cubes by sorting the cubes into four piles. Find $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ of small quantities.

Using number facts

Know halves of even numbers to 24. Know 2x, 5x and 10x division facts. Begin to know 3x division facts.

half of 20 is...

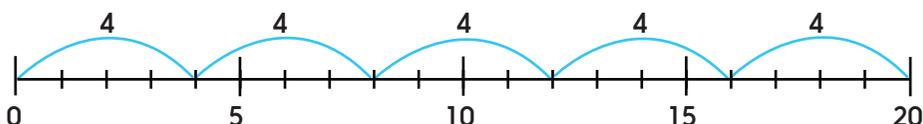
20	
?	?

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\times Multiplication

Counting in steps ('Clever' counting)

Count in 2s, 3s, 4s, 5s, 8s and 10s, e.g. colour the multiples on a 1-100 grid or use hops along a landmarked line.



Doubling and halving

Find doubles to double 50 using partitioning. Use doubling as a strategy in multiplying by 2, e.g. 18×2 is double 18 (36).

$$\begin{array}{r} 48 \\ 80 + 16 = 96 \end{array}$$

Grouping

Recognise that multiplication is commutative, e.g. $4 \times 8 = 8 \times 4$. Multiply multiples of 10 by single-digit numbers, e.g. $30 \times 8 = 240$. Multiply friendly 2-digit numbers by single-digit numbers, e.g. 13×4 .

Using number facts

Know doubles to 20 and doubles of multiples of 5 to 100, e.g. double 45 is 90. Know doubles of multiples of 5 to 100, e.g. double 85 is 170. Know 2x, 3x, 4x, 5x, 8x, 10x tables facts.

Doubling and halving form the basis of mental \times & \div strategies.

Number facts must be memorised and used on a daily basis.

\times Written Multiplication

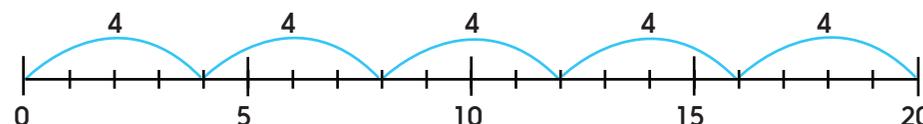
Build on partitioning to develop grid multiplication.

\times	20	3	=
4	80	12	92

\div Division

Counting in steps ('Clever' counting)

Count in 2s, 3s, 4s, 5s, 9s and 10s by colouring numbers on the 1-100 grid or using a landmarked line.



Doubling and halving

Find half of even numbers to 100 using partitioning. Use halving as a strategy in dividing by 2, e.g. $36 \div 2$ is half of 36.

$$\begin{array}{r} 36 \\ 15 + 3 = 18 \end{array}$$

Grouping

Recognise that division is not commutative, e.g. $16 \div 8$ does not equal $8 \div 16$. Relate division to multiplications 'with holes in', e.g. $\square \times 5 = 30$ is the same calculation as $30 \div 5 = ?$ thus we can count in in 5s to find the answer. Divide multiples of 10 by single-digit numbers, e.g. $240 \div 8 = 30$.

Using number facts

Know halves of even numbers to 40.

28	
?	?

Know halves of multiples of 10 to 200, e.g. half of 170 is 85. Know 2x, 3x, 4x, 5x, 8x, 10x division facts.

Use division facts to find unit and simple non-unit fractions of amounts within the times tables, e.g. $\frac{3}{4}$ of 48 is $3 \times (48 \div 4)$.

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\times Multiplication

Counting in steps (sequences)

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s.

Doubling and halving

Find doubles to double 100 and beyond using partitioning.

e.g. double 226.

$$\begin{array}{c} 226 \\ \swarrow \quad \searrow \\ 400 + 40 + 12 = 452 \end{array}$$

Facility in doubling and halving is key for mental \times and \div strategies.

Begin to double amounts of money,

e.g. £3.50 doubled is £7.

Use doubling as a strategy in multiplying by 2, 4 and 8,

e.g. $34 \times 4 =$ double 34 (68) doubled again (136).

Grouping

Use partitioning to multiply 2-digit numbers by single-digit numbers.

Multiply multiples of 100 by single-digit numbers using tables facts,

e.g. $400 \times 8 = 3200$.

Multiply using near multiples by rounding, e.g. 24×19 as $(24 \times 20) - 24$.

Using number facts

Know times tables up to 12×12 .

Stress that division is multiplication with 'holes' in.

\div Division

Counting in steps (sequences)

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s.

Doubling and halving

Find halves of even numbers to 200 and beyond using partitioning.

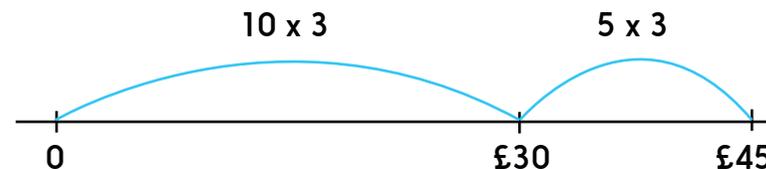
344	
172	172

Begin to half amounts of money, e.g. £9 halved is £4.50.

Use halving as a strategy in dividing by 2, 4 and 8, e.g. $164 \div 4$ is half of 164 (82) halved again (41).

Grouping

Use multiples of 10 times the divisor to divide by numbers < 9 above the tables facts, e.g. $45 \div 3$.



Divide multiples of 100 by single-digit numbers using division facts,

e.g. $3200 \div 8 = 4000$.

Using number facts

Know times tables up to 12×12 and all related division facts.

Use division facts to find unit and non-unit fractions of amounts within the times tables, e.g. $\frac{7}{8}$ of 56 is $7 \times (56 \div 8)$.

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\times Written Multiplication

Use grid multiplication to multiply 3-digit by 1-digit numbers.

$$\begin{array}{c|c|c|c} \times & 200 & 50 & 3 \\ \hline 6 & 1200 & 300 & 18 \end{array} = 1518$$

If children understand place value they can develop fluency.

Use a vertical written algorithm (ladder) to multiply 3-digit numbers by 1-digit numbers.

$$\begin{array}{r} 253 \\ \times 6 \\ \hline 1200 \\ 300 \\ 18 \\ \hline 1518 \end{array}$$

\div Written Division

Written version of a mental method:

$$\square \times 3 = 86$$

$$86 \div 3 = \underline{28} \text{ r } 2$$

$$\begin{array}{r} 20 \times 3 = 60 \\ \hline 26 \end{array}$$

$$\begin{array}{r} 8 \times 3 = 24 \\ \hline 2 \end{array}$$

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\times Multiplication

Doubling and halving

Double amounts of money using partitioning, e.g. £6.73 doubled is double £6 (£12) plus double 73p (£1.46).

Use doubling and halving as a strategy in multiplying by 2, 4, 8, 5 and 20, e.g. $58 \times 5 = \frac{1}{2}$ of 58 (29) $\times 10$ (290).

$$\begin{array}{r} \text{£}6.73 \\ \swarrow \quad \searrow \\ \text{£}12 \quad + \quad \text{£}1.46 = \underline{\text{£}13.46} \end{array}$$

Partitioning remains a key skill throughout.

Grouping

Multiply decimals by 10, 100, 1000, e.g. $3.4 \times 100 = 340$.

100s	10s	1s	.	0.1s
		3	.	4
3	4	0		

Use partitioning to multiply friendly 2-digit and 3-digit numbers by single-digit numbers, e.g. 402×6 as 400×6 (2400) and 2×6 (12).

Use partitioning to multiply decimal numbers by single-digit numbers, e.g. 4.5×3 (4×3) + (4×0.5).

Multiply using near multiples by rounding, e.g. 32×29 as $(32 \times 30) - 32$.

Learning times tables involves BOTH multiplication and division facts.

Using number facts

Use times tables facts up to 12×12 to multiply multiples of the multiplier, e.g. $4 \times 6 = 24$ so $4 \times 6 = 240$ and $400 \times 6 = 2400$.

Know square numbers and cube numbers.

\div Division

Doubling and halving

Halve amounts of money using partitioning, e.g. half of £14.84 as half of £14 and half of 84p.

$$\begin{array}{r} \text{£}14.84 \\ \swarrow \quad \searrow \\ \text{£}7 \quad + \quad 42\text{p} = \underline{\text{£}7.42} \end{array}$$

Use doubling and halving as a strategy in dividing by 2, 4, 8, 5 and 20, e.g. $115 \div 5$ as double 115 ($230 \div 10$).

Grouping

Divide numbers by 10, 100, 1000 to obtain decimal answers with up to three places, e.g. $340 \div 100 = 3.4$.

Use the 10th, 20th, 30th ... multiple of the divisor to divide friendly 2-digit and 3-digit numbers by single-digit numbers, e.g. $186 \div 6$ as 30×6 (180) and 1×6 (6).

Find unit and non-unit fractions of large amounts, e.g. $\frac{3}{5}$ of 265 is $3 \times (265 \div 5)$.

Using number facts

Use division facts from the times tables up to 12×12 to divide multiples of powers of ten of the divisor, e.g. $3600 \div 9$ using $36 \div 9$.

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\times Written Multiplication

Short multiplication of 2-digit, 3-digit and 4-digit numbers by 1-digit numbers.

$$\begin{array}{r} 387 \\ \times 6 \\ \hline 54 \\ \hline 2322 \end{array}$$

Long multiplication of 2-digit, 3-digit and 4-digit numbers by teen numbers.

$$\begin{array}{r} 387 \\ \times 14 \\ \hline 3870 \\ 1548 \\ \hline 11 \\ \hline 5418 \end{array}$$

Grid multiplication of numbers with up to 2 decimal places by single-digit numbers.

£8.65 \times 7

	£8	60p	5p	
$\times 7$	£56	£4.20	35p	£60.55

NB: Grid multiplication provides a default method for ALL children.

Multiplying fractions by single-digit numbers, e.g. $\frac{3}{4} \times 6 = \frac{18}{4}$ which is $4 \frac{3}{4} = 4 \frac{1}{2}$.

\div Written Division

Written version of a mental strategy for 3-digit \div 1-digit numbers.

$$\begin{array}{l} \square \times 6 = 326 \\ 50 \times 6 = 300 \\ \quad \quad \quad 26 \\ 4 \times 6 = 24 \\ \quad \quad \quad \quad 2 \\ \hline 54 \text{ r } 2 \end{array}$$

Short division of 3-digit and 4-digit numbers by single-digit numbers.

$$\begin{array}{r} 1264 \\ 6 \overline{) 7584} \end{array}$$

The closer division is linked to multiplication the better.

Visual images are essential to multiplying and dividing fractions.

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\times Multiplication

Doubling and halving

Double decimal numbers with up to 2-places using partitioning, e.g. 36.73 doubled is double 36 (72) plus double 0.73 (1.46).

$$\begin{array}{r} 36.73 \\ \swarrow \quad \searrow \\ 72 \quad + \quad 1.46 = \underline{73.46} \end{array}$$

Use doubling and halving as strategies in mental multiplication.

Grouping

Use partitioning as a strategy in mental multiplication, as appropriate, e.g. 3060×4 as $(3000 \times 4) + (60 \times 4)$ or 8.4×8 as 8×8 (64) and 0.4×8 (3.2)

Use factors in mental multiplication, e.g. 421×6 as 421×3 (1263) doubled (2526) or 3.42×5 as half of 3.42×10 .

Multiply decimal numbers using near multiples by rounding, e.g. 4.3×19 as 4.3×20 ($86 - 4.3$).

Using number facts

Use times tables facts up to 12×12 in mental multiplication of large numbers or numbers with up to two decimal places, e.g. $6 \times 4 = 24$ and $0.06 \times 4 = 0.24$.

\div Division

Doubling and halving

Halve decimal numbers with up to 2-places using partitioning, e.g. half of 36.86 is half of 36 (18) plus half of 0.86 (0.43).

$$\begin{array}{r} 36.86 \\ \swarrow \quad \searrow \\ 18 \quad + \quad 0.43 = \underline{18.43} \end{array}$$

Use doubling and halving as strategies in mental division, e.g. $216 \div 4$ is half of 216 (108) and half of 108 (54).

Grouping

Use 10th, 20th, 30th, ... or 100th, 200th, 300th ... multiples of the divisor to divide large numbers, e.g. $378 \div 9$ as $40 \times 9 = 360$ and $2 \times 9 = 18$ so, the answer is 42.

Use test for divisibility, e.g. 135 divides by 3 as $1 + 3 + 5 = 9$ and 9 is in the 3x table.

$$\begin{array}{r} \square \times 9 = 378 \\ \underline{40} \times 9 = 360 \\ \times 9 = 18 \\ \underline{42} \\ 0 \end{array}$$

Using number facts

Use division facts from the times tables up to 12×12 to divide decimal numbers by single-digit numbers, e.g. $1.17 \div 3$ is $\frac{1}{100}$ of $117 \div 3$ (0.39).

Understanding how to partition numbers underpins many calculation strategies.

Division as grouping, i.e. the inverse of multiplication, is a key concept.

