Multiplication and Division

Year 4

The Distributive Property of Multiplication

$0 \times 6 = 0$
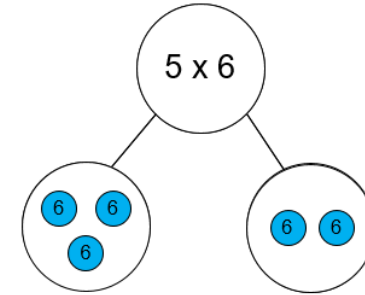$1 \times 6 = 6$ $\quad + 6$
$2 \times 6 = 12$ $\quad + 6$
$3 \times 6 = 18$ $\quad + 6$
$4 \times 6 = 24$ $\quad + 6$
$5 \times 6 = 30$ $\quad + 6$
$6 \times 6 = 36$
$7 \times 6 = 42$
$8 \times 6 = 48$
$9 \times 6 = 54$
$10 \times 6 = 60$
$11 \times 6 = 66$
$12 \times 6 = 72$

$6 \times 0 = 0$
$6 \times 1 = 6$ $\quad + 6$
$6 \times 2 = 12$ $\quad + 6$
$6 \times 3 = 18$ $\quad + 6$
$6 \times 4 = 24$ $\quad + 6$
$6 \times 5 = 30$ $\quad + 6$
$6 \times 6 = 36$
$6 \times 7 = 42$
$6 \times 8 = 48$
$6 \times 9 = 54$
$6 \times 10 = 60$
$6 \times 11 = 66$
$6 \times 12 = 72$

Adjacent multiples of ___ have a difference of ___.
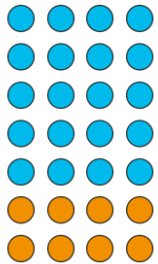
$4 \times 6 + 6$

Five sixes is one more six than four sixes.

5×6

$3 \times 6 + 2 \times 6 = 5 \times 6$

5 is equal to 3 plus 2, so 5 sixes is equal to 3 sixes plus 2 sixes.

We can partition one of the factors to make calculations easier.

$7 = 5 + 2$
$7 \times 4 = 5 \times 4 + 2 \times 4$
$\quad = 20 + 8$
$\quad = 28$

$13 \times 7 = 91$
10   3

7
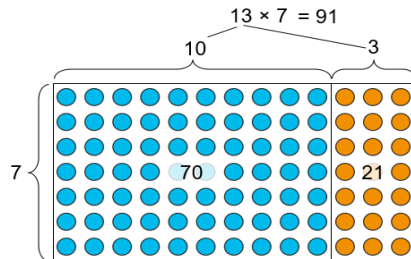
70   21

$13 \times 7 = 10 \times 7 + 3 \times 7$
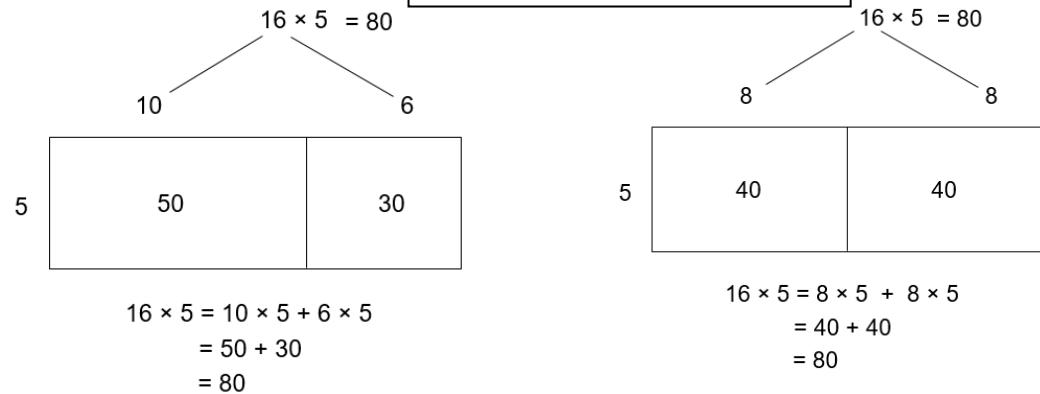$\quad = \quad 70 \quad + \quad 21$
$\quad = \quad 91$
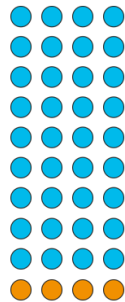
$9 = 10 - 1$
$9 \times 4 = 10 \times 4 - 1 \times 4$
$\quad = 40 - 4$
$\quad = 36$

We can partition the factors in different ways to make calculations easier.

$16 \times 5 = 80$
10   6

5   50   30

$16 \times 5 = 10 \times 5 + 6 \times 5$
$\quad = 50 + 30$
$\quad = 80$

$16 \times 5 = 80$
8   8

5   40   40

$16 \times 5 = 8 \times 5 + 8 \times 5$
$\quad = 40 + 40$
$\quad = 80$

Vocabulary:

Ones   Tens   Hundreds   Thousands   Represents Partition   Recombine
Multiply   Unitising   Partial Product   Aligned   Calculation   Expanded layout
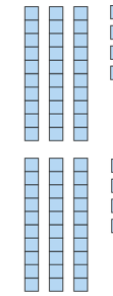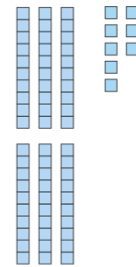Compact layout   Equation   Regroup   Algorithm

Factor x Factor = Product

34 chairs

2 rows

Move between representations of dienes and expanded written multiplication.
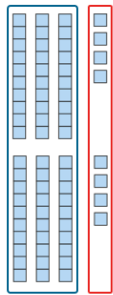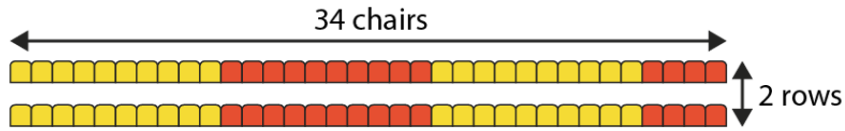
10s	1s
3	4
×	2

Use dienes to represent context as repeated addition and move to multiplication.

34 = 30 + 4
34 × 2 = 30 × 2 + 4 × 2

10s	1s
3	4
×	2
	8

2 × 4 ones = 8 ones
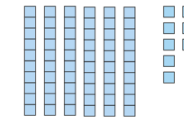
10s	1s
3	4
×	2
	8
6	0

2 × 4 ones = 8 ones
2 × 3 tens = 6 tens

321 × 3 =   963

100s	10s	1s
3	2	1
		× 3
		3
	6	0
9	0	0
9	6	3

3 × 1 ones = 3 ones
3 × 2 tens = 6 tens
3 × 3 hundreds = 9 hundreds

3 2 1
× 3
9 6 3

Represent 3 digit by 1 digit multiplication without exchanges using dienes, moving from expanded layout to compact layout.

10s	1s
3	4
×	2
6	8

Move between representations of expanded layout and compact layout.
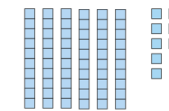
10s	1s
3	4
×	2
	8
6	0
6	8

2 × 4 ones = 8 ones
2 × 3 tens = 6 tens

Multiplication and Division

Year 5

Multiply using a Formal Written Method (2)

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4

Represent 3 digit by 1 digit multiplication with exchanges using place value counters, moving from expanded layout to compact layout.

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4
		2	8

4 × 7 ones = 28 ones
= 2 tens + 8 ones
4 × 6 tens = 24 tens
= 2 hundreds + 4 tens

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4
		2	8
	2	4	0

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4
		2	8
	2	4	0
1	2	0	0

4 × 7 ones = 28 ones
= 2 tens + 8 ones
4 × 6 tens = 24 tens
= 2 hundreds + 4 tens
4 × 3 hundreds = 12 hundreds
= 1 thousand + 2 hundreds

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4
		2	8

367 × 4 = ☐

1,000s	100s	10s	1s
	3	6	7
×			4
		2	8

4 × 7 ones = 28 ones
= 2 tens + 8 ones

367 × 4 = 1,468

Move from expanded layout to compact layout.

$$
\begin{array}{ccc}
& 3 \quad 6 \quad 7 \\
\times & \quad\quad 4 \\
\hline
1 \quad 4 \quad 6 \quad 8 \\
2 \quad\quad 2
\end{array}
$$

If there are 10 or more ones, we must regroup ones into tens and ones.

If there are 10 or more tens, we must regroup into hundreds and tens.

If there are 10 or more hundreds, we must regroup into thousands and hundreds.