Multiplication Skills

YR to Y6

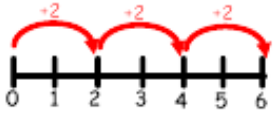
Multiplication Skills 1

Early Stages

Later Stages

Multiplication skill: Linking addition and multiplication

Children learn that 2 + 2 + 2 = 2 x 3
They will initially add then progress to counting in twos and learn that this method is more efficient.



Children can then apply their knowledge to answer questions that initially appear as addition questions more efficiently through multiplication; such as:

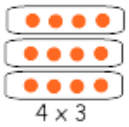
There were 48 eggs on the bottom layer of a box. On the second layer there was another 48. The third layer also had 48 eggs. The fourth had 48 as did the fifth. How many eggs in total?

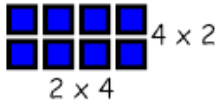
What is the total of these 5 consecutive numbers: 37,38,39,40,41?
Children will learn that the answer can be more efficiently solved by finding 39 x 5.

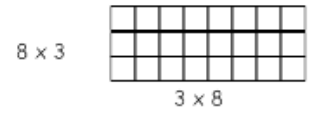
Start by using real objects and grouping to establish the concept. Cuisennaire rods and stacking cuisennaire show the link between repeated addition and multiplication.

Multiplication skill: Understanding that 3 x 4 = 4 x 3 (Commutative Law)

It is important to understand that 3 x 4 is the same as 4 x 3

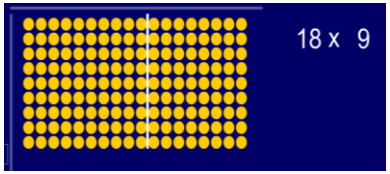






Alongside these images, pupils should explore and be shown cuisennaire rods showing images such as this:

Rather than: 15 x 48 (15 multiplied by 48 or 48 lots of 15)
Children calculate:
48 x 15
= (48 x 10) + (48 X 5)



Use the arrays ITP (Interactive Teaching Programme), bar strips and Numicon to show that 4 x 3 and 3 x 4 have equal value. Link with teaching area.

Multiplication Skills 2

Early Stages

Later Stages

Multiplication skill: Linking multiplication and Division

Use models and images to determine that:

4 x 3 = 12 3 x 4 = 12

12 ÷ 4 = 3 12 ÷ 3 = 4

Knowledge of the link between multiplication and division (inverse) is essential to solve the following calculations:

□ ÷ 12 = 38

A tin of sweets was shared between a class of 30. They each got 4 sweets and there were 2 left over. How many sweets were in the tin to start with?

Number families with bigger numbers eg. 12 x 38 = 456 etc.

Before moving on to the bar diagram use practical resources to group objects and then relate to □ x □

Multiplication skill: Multiplying by 10 and 100

Work with pupils on looking for the pattern when finding:

4 x 10 = 40

7 x 10 = 70

16 x 10 = 160

Use Tens Frames, Numicon, Diennes and Cuisenaire to show images eg 10 lots of 3.

Ensure children know the digits move, we are NOT just putting a '0' on the end or moving the decimal point. Use PV sliders.

Children apply their knowledge of x by 10 and 100 to x by 1000 and by 0.1

They use knowledge of x by 10/100 to calculate questions such as 137 x 30

= 137 x 10 x 3

OR 14.3 x 400

= 14.3 x 100 x 4

Multiplication Skills 3

Early Stages

Multiplication skill: Using what you know

- 3 x 4 = 4 x 3
- 1 x 7 —(x10)→ 10 x 7 —(÷2)→ 5 x 7
- 1 x 8 —(double)→ 2 x 8 —(double)→ 4 x 8 —(double)→ 8 x 8
- 24 x 11 = (24 x 10) + (24 x 1)

Later Stages

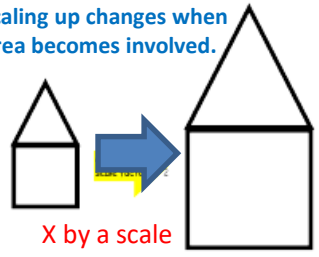
- 15 x 48 = 48 x 15
- 1 x 0.7 —(x10)→ 10 x 0.7 —(÷2)→ 5 x 0.77
- 1 x 1.6 —(double)→ 2 x 1.6 —(double)→ 4 x 1.6 —(double)→ 8 x 1.6
- 137 x 48 = (137 x 40) + (137x 8)
  = (137 x 50) – (137 x 2)
- 24 x 7 can be calculated as:
  (2 x 12) x 7= 2 x (12 x 7) Associative Law

Multiplication skill: Scaling up (YR to Y6) and Ratio (Year 5 and 6)

Children will experience scaling in practical contexts such as height (twice as high), recipes (doubling and halving ingredients) then questions such as: I earn one voucher for every 3 visits I make to the sports centre. How many visits do I need to make to get 5 vouchers?

Problem solving questions such as:
There are 25ml of juice concentrate in every 100ml of juice drink. How much concentrate is needed to make 1/2litre of juice drink?

It is worth looking at how scaling up changes when area becomes involved.



X by a scale factor of 2

Possible activity: Use a photo image on the computer to drag by the corner to enlarge – look at the difference if it is dragged horizontally/vertically. Photocopier also useful for enlarging.

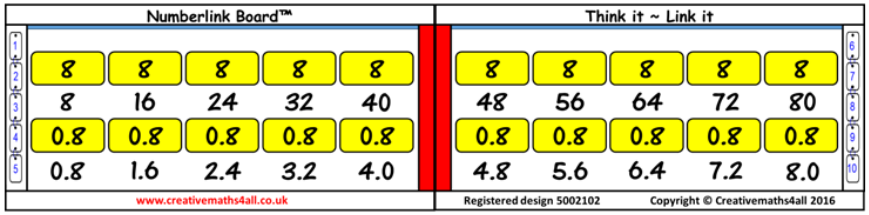
Multiplication Skills 4

Early Stages

Multiplication skill: Fluency of multiplication facts

- By the end of KS1 children should know by heart facts for 2x, 5x and 10x tables.
- By the end of Year 3: 2x, 3x, 4x, 5x, 8x, 10x.
- By the end of Year 4: All tables up to 12x.

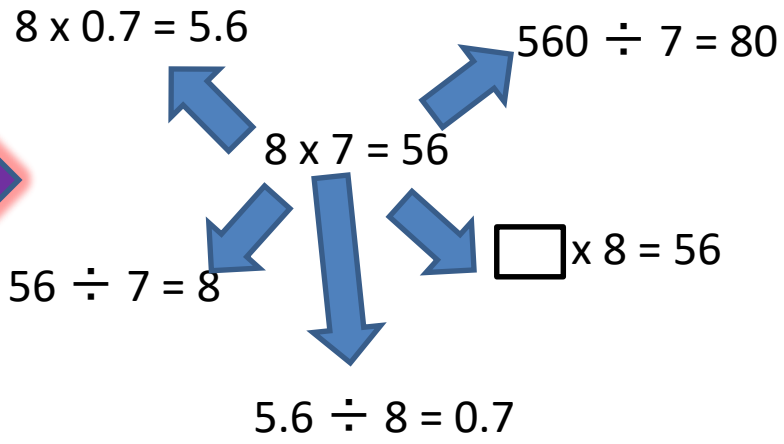
- Use Numicon and array pictures to show related facts.
- The Numberlink Board reinforces connections, begin with 1x and then 10x, use these to find 5x (half 10x).
- They then use doubling to find 2x, 4x and 8x.
- They can apply the distributive law to help them with others eg. 6 x 7 = (6 x 5) + (6 x 2) = 30 + 12 = 42



Later Stages

Fluency and application of multiplication tables.

Times tables need constant practice to become fluent and to be able to apply knowledge to related numbers.



Children need to be familiar and fluent with the language of x; vocabulary we expect them to use:
□ multiplied by □, □ times □, 3 fours, 3 by 4, □ lots of □, product of □ and □.

We encourage pupils to use key vocabulary such as multiplicand, multiplier and product in explanations.

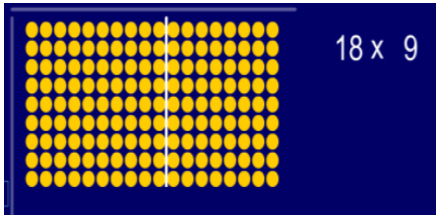
Multiplication Skills 5

Early Stages

Later Stages

Multiplication skill: Using a written method

Use ITPs (Interactive Teaching Programmes) to support with visual representations initially:



Moving from the partition method to the expanded column method

45 X 3 =

5 X 3 = 15

40 X 3 = 120

15 + 120 = 135

```
  45
x  3
 ---
  15
 120
 ---
 135
```

Put the largest number first. Align the digits.

15 means?

120 means?

Put the product in the correct position.

Children should use the expanded method to begin with, moving to the compact method once they are secure and accurate with calculations.

Expanded Method:

```
  57
 x 8
 ---
  56   (7 x 8)
+ 400  (50 x 8)
 ---
 456
```

Compact Method:

```
 237
 x 6
 ---
1422
 ---
 1 2 4
```

Long Multiplication:

```
  547
 x 83
 ----
 1641   (3 x 547)
+43760  (80 x 547)
 ----
45401
```

Multiplication Skills - Terminology

Commutative Law:
This law states that the order you multiply numbers in does not matter
eg 3 x 4 = 4 x 3
(See Multiplication skills sheet 1)

Associative Law:
This law states that the order you carry out the multiplication does not impact the answer eg
3 x (2 x 4) = (3 x 2) x 4

Distributive Law:
eg 3 x 6 = 3 x (2 + 4) = (3 x 2) + (3 x 4)

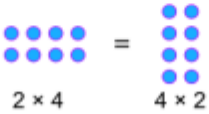
This law states that you can partition numbers and multiply them without changing the answer.
(See Multiplication skills sheets 3 and 5)

Multiplication Skills - Terminology

Commutative Law

Is the Law that says you can swap numbers around and still get the same answer when you add. Or when you multiply.

Examples:
You can swap when you add: 6 + 3 = 3 + 6
You can swap when you multiply: 2 × 4 = 4 × 2



Associative Law

The "Associative Laws" say:

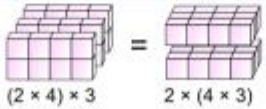
* It doesn't matter how you group the numbers when you add.

* It doesn't matter how you group the numbers when you multiply.

(In other words it doesn't matter which you calculate first.)

Example addition: (6 + 3) + 4 = 6 + (3 + 4)
Because 9 + 4 = 6 + 7 = 13

Example multiplication: (2 × 4) × 3 = 2 × (4 × 3)
8 × 3 = 2 × 12 = 24

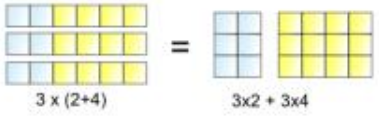


Distributive Law

The Distributive Law says that multiplying a number by a group of numbers added together is the same as doing each multiplication separately

Example: 3 × (2 + 4) = 3×2 + 3×4

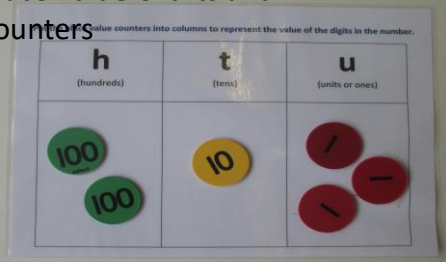
So the "3" can be "distributed" across the "2+4" into 3 times 2 and 3 times 4.



Images of practical resources we use:

Bead string

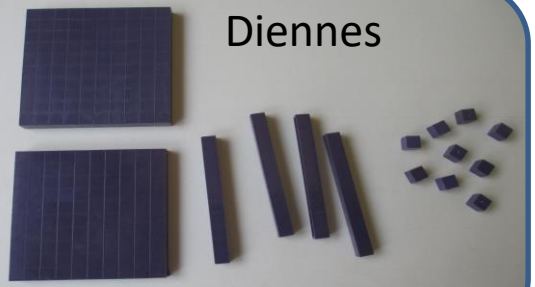
Place Value Charts and counters



Numicon

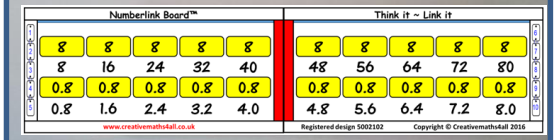
Cuisennaire

Diennes

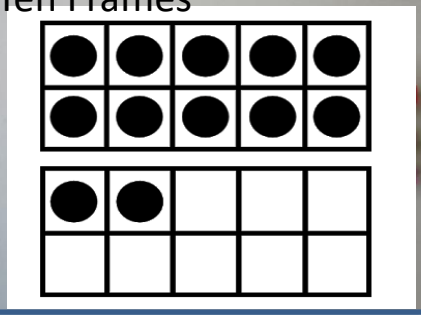


Numicon

Numberlink board



Ten Frames



Multiplicator Grid