Learning Multiplication Facts

The best way to learn multiplication facts is through learning strategies that build number sense (rather than rote learning a list of facts aka times tables). By practicing the strategies regularly, you build your automatic recall of multiplication facts. Focus on accurate use of strategies not speed. A great way to practice these strategies is through games as this will not only help build automatic recall but also a positive mathematical mindset. Plus, it's fun!

We suggest learning facts in the following order as the strategies build on each other. The 1s and 10s facts tend to be learnt through place value work in grades 1 and 2.

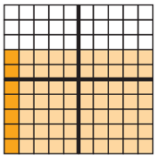
10s Facts

Tens Facts ×10

To multiply any number by 10, think of the number that is equal to that many tens.

$10 \times 4 = 40$

10 times 4 is the same as 4 tens. We call that number 40.



$7 \times 10 = 70$

7 times 10 is the same as 7 tens. We call that number 70.

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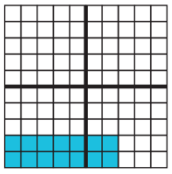
2s Facts

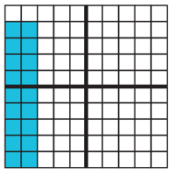
Doubles Facts ×2

To multiply any number by 2, double it.



$7 + 7 = 14$

$2 \times 7 = 14$



$9 + 9 = 18$

$9 \times 2 = 18$

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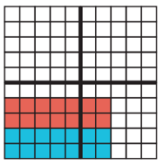
4s Facts

Double-Doubles Facts ×4

To multiply any number by 4, double the number and then double that product.

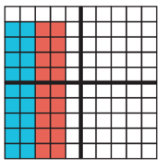


4×7

$2 \times 7 = 14$

$2 \times 14 = 28$

$4 \times 7 = 28$



9×4

$9 \times 2 = 18$

$18 \times 2 = 36$

$9 \times 4 = 36$

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8s Facts

Double-Double Doubles Facts ×8

To multiply any number by 8, double the number. Then double the product and finally, double that product.

8×6

$2 \times 6 = 12$

$2 \times 12 = 24$

$2 \times 24 = 48$

$8 \times 6 = 48$

9×8

$9 \times 2 = 18$

$18 \times 2 = 36$

$36 \times 2 = 72$

$9 \times 8 = 72$

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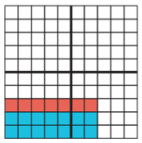
3s Facts

Doubles Plus One Set Facts ×3

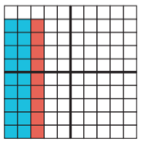
To multiply any number by 3, double it and then add one more set of that number.



$3 \times 7 = (2 \times 7) + 7$

$= 14 + 7$

$= 21$



$9 \times 3 = (9 \times 2) + 9$

$= 18 + 9$

$= 27$

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5s Facts

Half-Tens Facts ×5

To multiply any number by 5, multiply it by 10 and then divide the result in half.

$10 \times 6 = 60$

$60 \div 2 = 30$

$5 \times 6 = 30$

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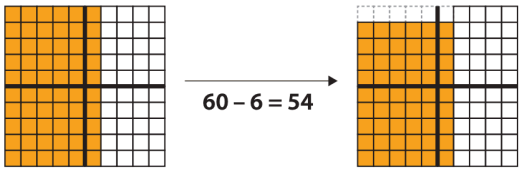
9s Facts

Tens Minus One Set Facts ×9

To multiply any number by 9, multiply it by 10 and then subtract one set of that number.



$10 \times 6 = 60$ $9 \times 6 = 54$

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6s Facts

Note: most of the six facts have been learnt through learning the other strategies. If you know 4 x 6 you also know 6 x 4.

Half-Tens Plus One Set Facts ×6

To multiply any number by 6, multiply it by 5 and then add one more set of that number.

$6 \times 4 = (5 \times 4) + 4 = 20 + 4 = 24$

$8 \times 6 = (8 \times 5) + 8 = 40 + 8 = 48$

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Once these facts have been learnt you have also learnt all the 7s facts except for 7 x 7 = 49. That is one fact that you just have to memorise.

Games For Practising Multiplication Facts

Game	Facts that are practised	Equipment Required
Double Up	2s facts	• One dice • A handful of counters for each player (a different colour for each player).
Double-Double Up	2s and 4s facts	• One dice • A handful of counters for each player (a different colour for each player).
Double-Double-Double Up (aka Double x2, x2 Up)	2s, 4s and 8s facts	• One dice • A handful of counters for each player (a different colour for each player).
Arrays Game	All facts (can be tailored to focus on 2 or more facts)	• Gameboard • Pen or whiteboard marker • Pencil • Paperclip
3 In a Row	All facts – you choose two facts to focus on when playing.	• A handful of counters for each player (a different colour for each player). • A zero to nine 10-sided dice. • Pen and paper to create the gameboard.

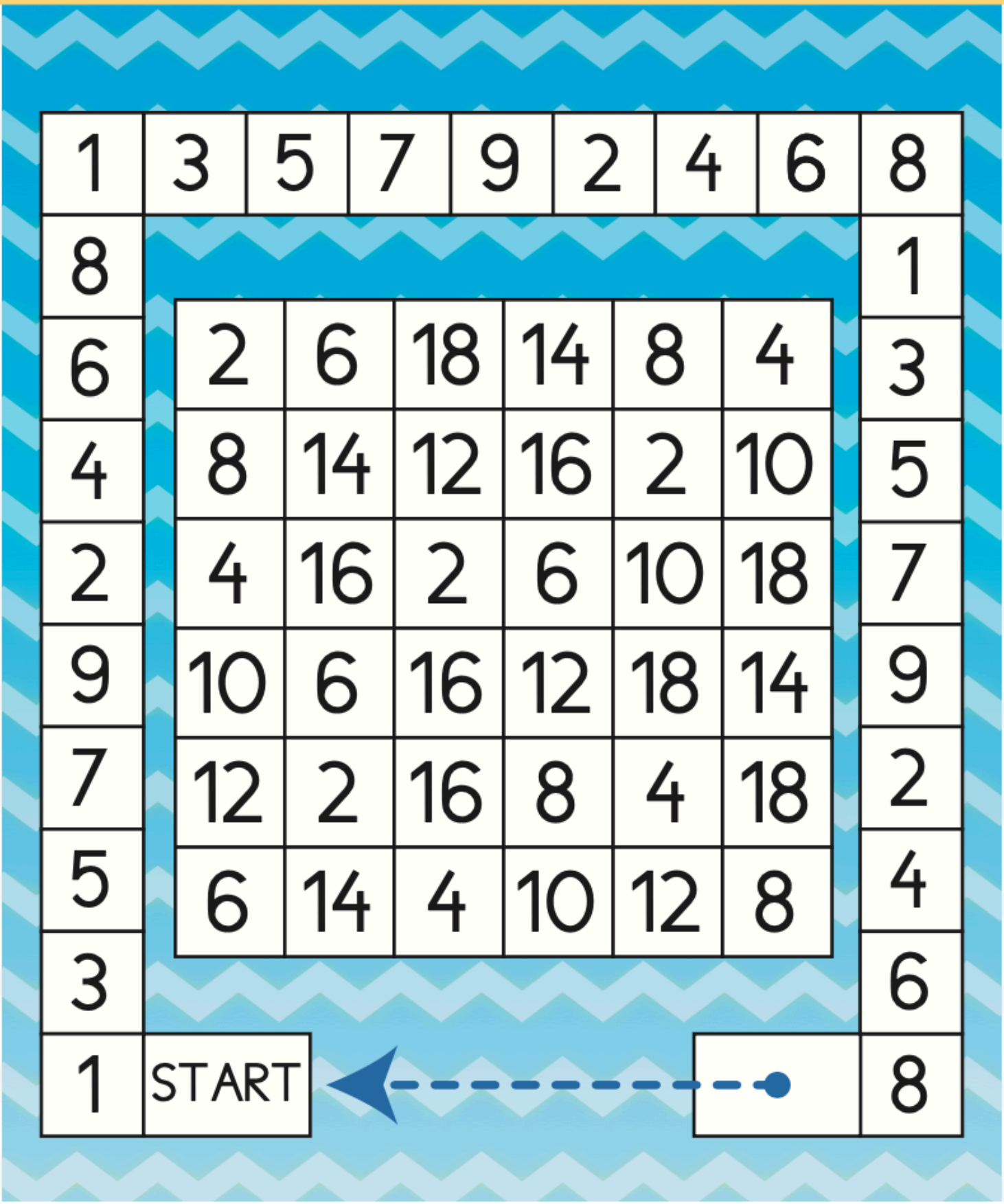
Instructions for each game plus game boards are on the following pages. They can also be found on the following EPS Maths website as well as videos explaining and modelling each strategy:

bit.ly/42mKB0p

DOUBLE UP

Materials: A dice, counters in two colours. A game for two players.
Aim: To place four counters in a row, column or diagonal.

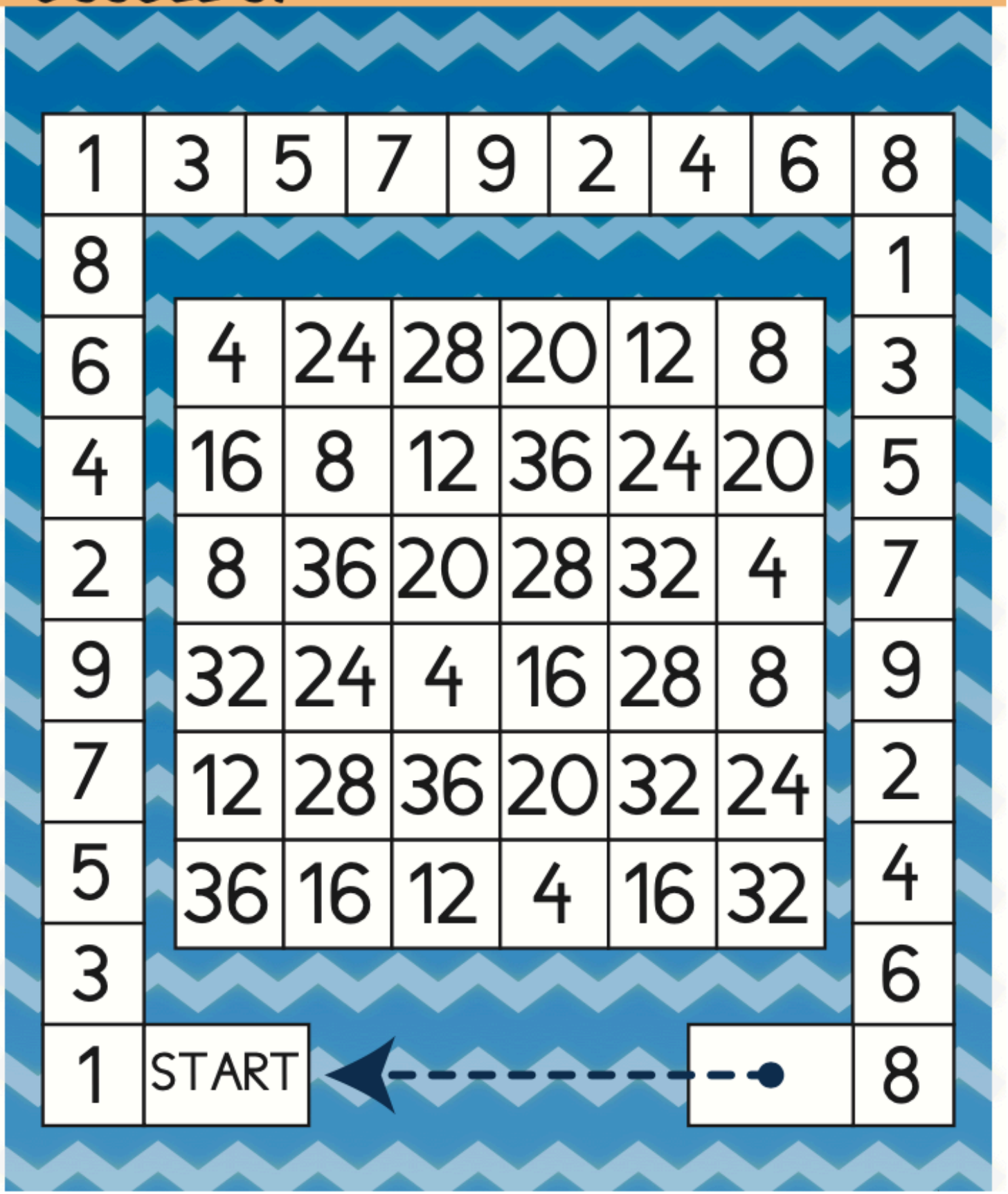
Rules: Roll the dice and move along the track. Double the number you land on and place a counter on that number in the centre square. The first player with four in a row wins.



DOUBLE DOUBLE UP

Materials: A dice, counters in two colours. A game for two players.
Aim: To place four counters in a row, column or diagonal.

Rules: Roll the dice and move along the track. Double double the number you land on and place a counter on that number in the centre square. The first player with four in a row wins.



DOUBLE (X2, X2) UP

Materials: A dice, counters in two colours. A game for two players.
Aim: To place four counters in a row, column or diagonal.

Rules: Roll the dice and move along the track. Double three times (x2, x2, x2) the number you land on and place a counter on that number in the centre square. The first player with four in a row wins.

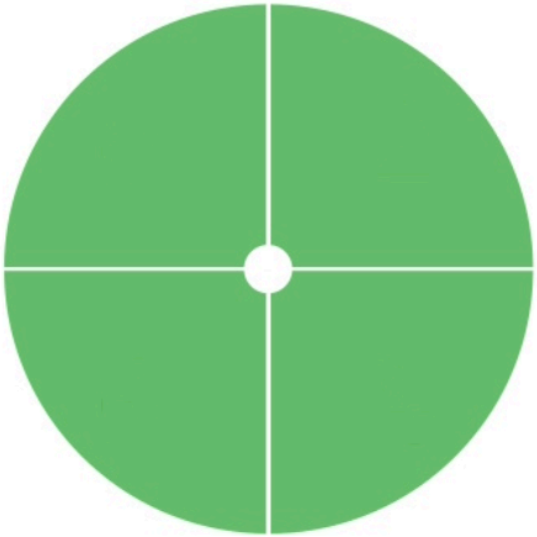
1	3	5	7	9	2	4	6	8
8								1
6								3
4								5
2								7
9								9
7								2
5								4
3								6
1	START							8

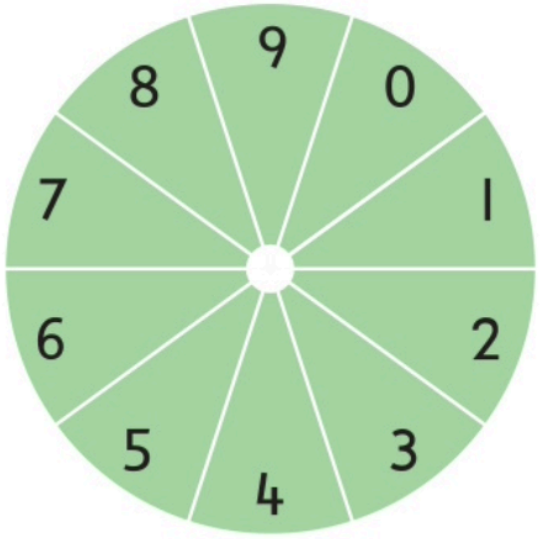
8	48	56	40	24	16
32	16	24	72	48	40
16	72	40	56	64	8
64	48	8	32	56	16
24	56	72	40	64	48
72	32	24	8	32	64

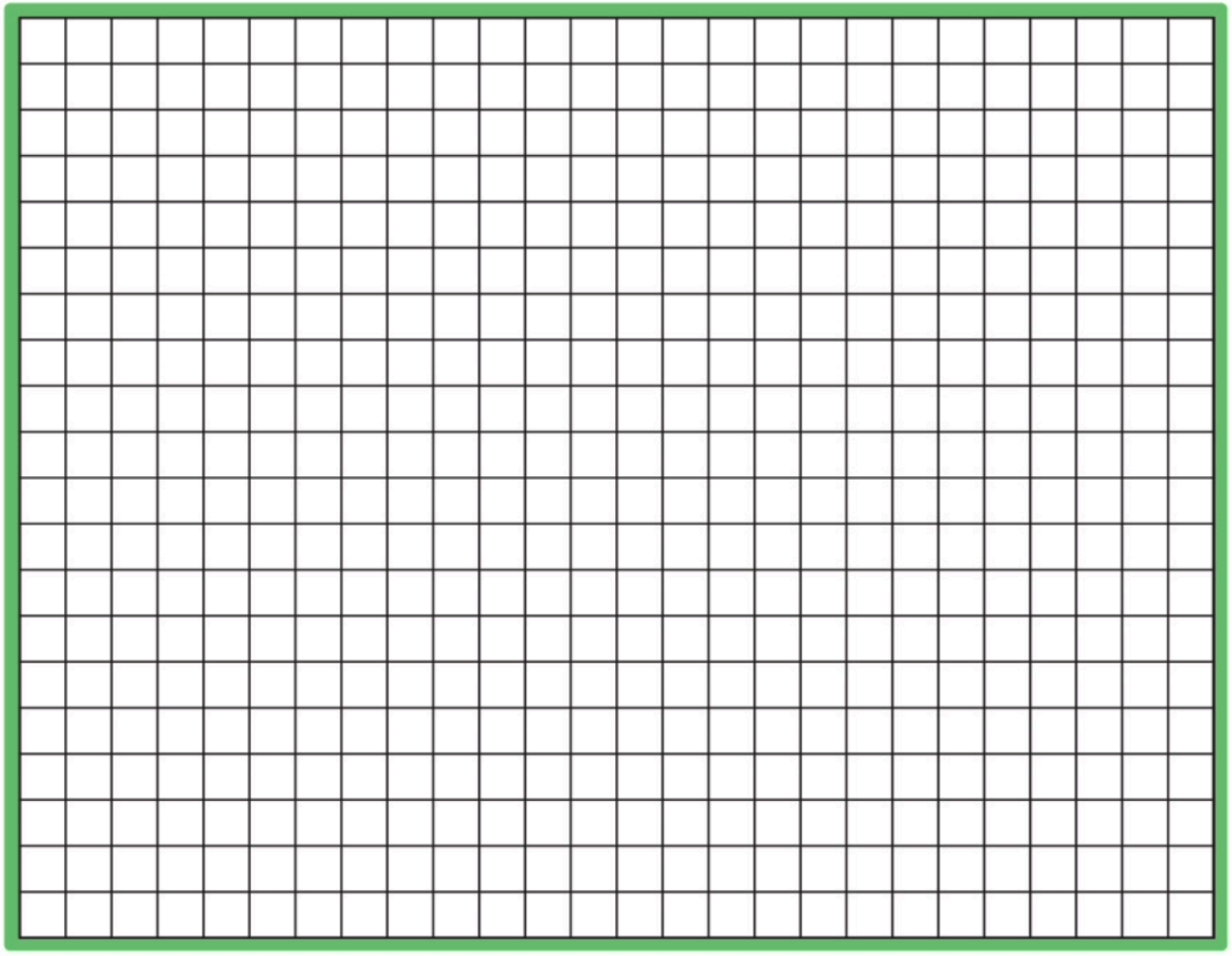
ARRAYS GAME

Aim: To colour (capture the most area).
Materials: Two different coloured pens or erasable markers.
A game for two players.

Rules:
Each player flicks the spinners and draws a rectangle (array) according to what is indicated on the spinners. The player should lightly shade the inside of the rectangle and write the calculation.
A time limit can be set and the winner is the player who captures the most area in this time period.





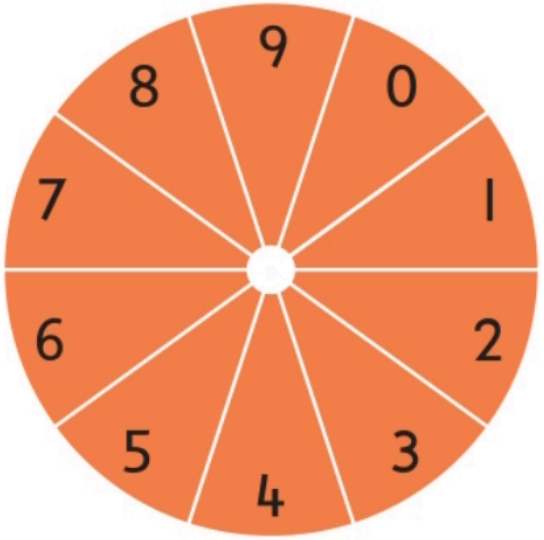


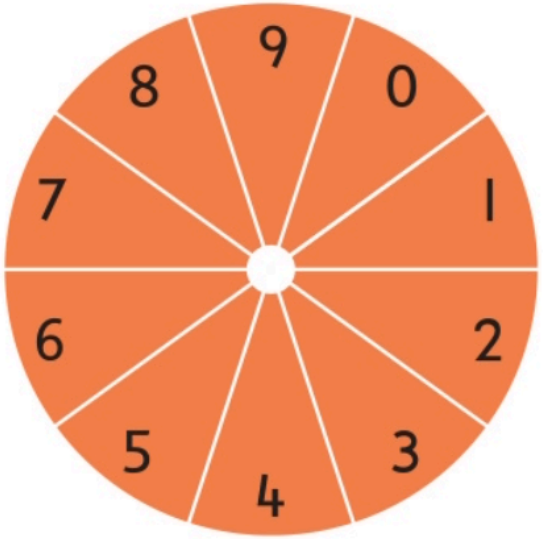
ARRAYS GAME

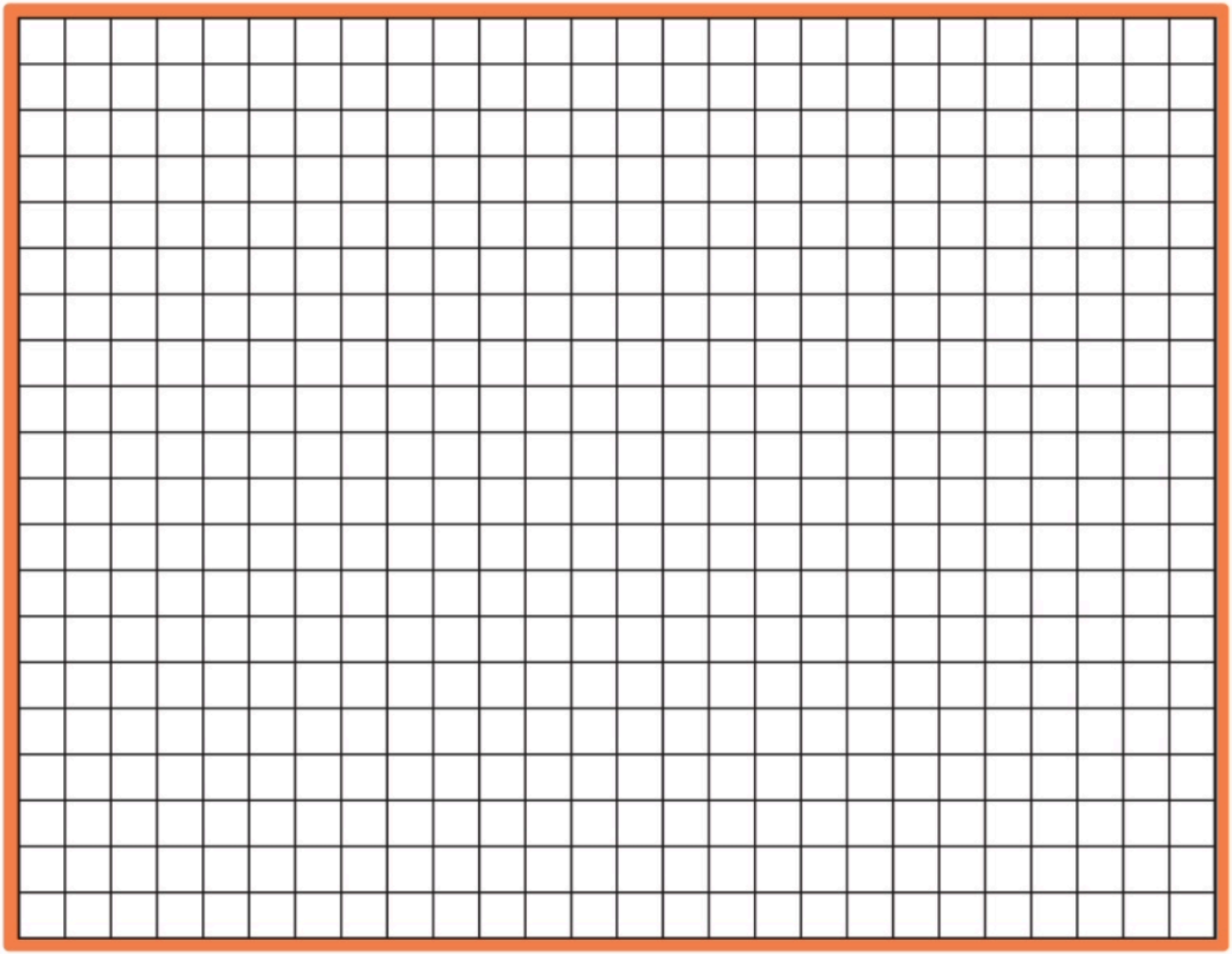
Up to 9 x 9

Aim: To colour (capture the most area).
Materials: Two different coloured pens or erasable markers.
A game for two players.

Rules:
Each player flicks the spinners and draws a rectangle (array) according to what is indicated on the spinners. The player should lightly shade the inside of the rectangle and write the calculation.
A time limit can be set and the winner is the player who captures the most area in this time period.







3 in a Row

Equipment

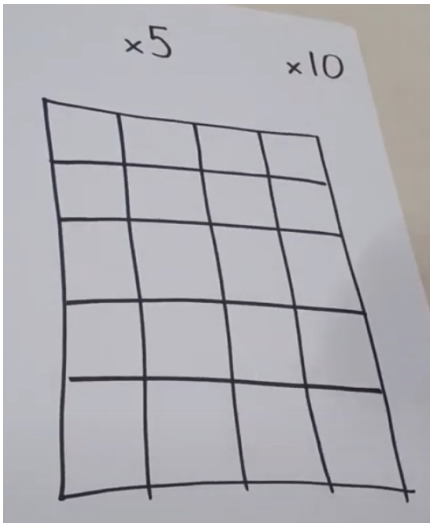
- A handful of counters for each player (a different colour for each player).
- A zero to nine 10-sided dice
- A game board (created by the players):
    - Choose which multiplication facts you are practising (choose the facts group that is your current goal and the facts group directly before it on the pathway. If you're at the end of the pathway you can choose any two facts groups). Write these facts at the top of the game board leaving a space between each one (see the example)
    - Draw a 4 x 5 grid (you'll end up with 20 empty boxes)
    - Fill in the boxes with the multiples of the numbers you've chosen up to multiplied by 9. Place them randomly on the board (for example, if you've chosen x5 and x10 you would randomly place 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 (5x9=45) and 10, 20, 30, 40 50, 60, 70, 80, 90 (10x9=90))

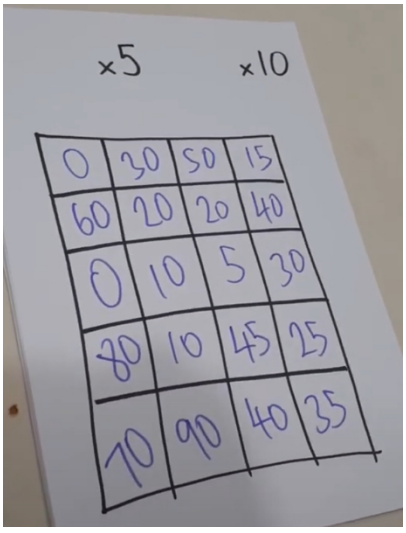
How to Play

- Players decide who will go first.
- The first player rolls the dice and decides which of the two numbers at the top of the board they want to multiply it by.
- The player then puts one of their counters onto the number that is the answer.
- Player 2 then does the same thing for their turn.
- Play continues until someone has three counters in a row (vertically, horizontally or diagonally).

Example

This board is for the 5s and 10s facts

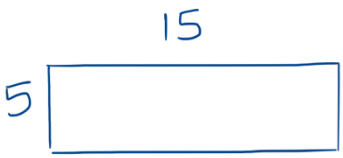




Multiplication and Division

Arrays

An array is an arrangement of objects in columns and rows. Each row has the same number of objects as the other rows and each column has the same number of as all the other columns.



Once you're familiar with arrays, drawing all the dots becomes tedious. That's where we can use open/blank arrays instead.

An open array is essentially a rectangle with the side lengths written in. It's particularly useful for visualising multiplication and division strategies with larger numbers. An open array is sometimes called an area model.

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Arrays are essential models that form the basis of developing a solid understanding of multiplication and division.

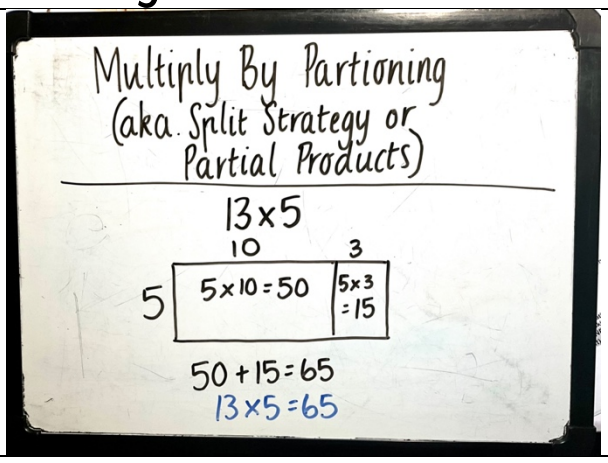
When using arrays in multiplication, we know how many rows and columns (the side lengths) and we are trying to calculate altogether how much is in the array (the area). In division, we can think of it as knowing how much is inside the array and one of the side lengths and we are trying to figure out the other side length (we know how many rows and we are trying to work out how much is in each row).

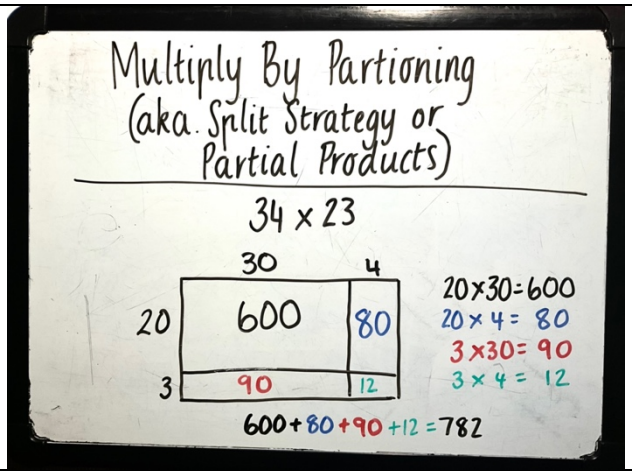
The following strategies help students understand the fundamental principles of multiplication and division which are essential for flexible and fluent thinking. They are developed over time through a range of rich classroom experiences utilising real life contexts to ensure a solid understanding. New strategies are built onto the understanding of previous strategies and number sense.

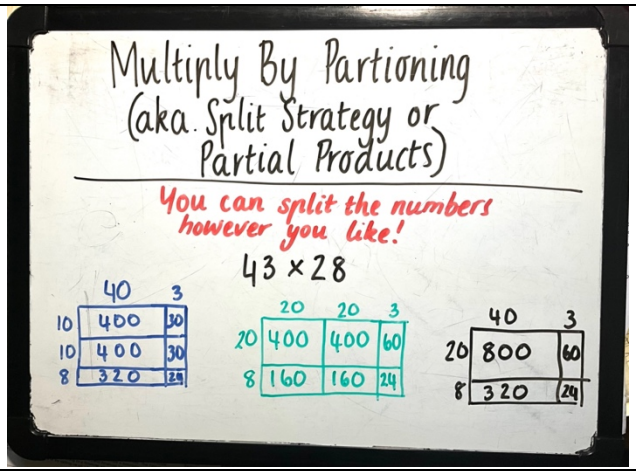
Multiplication Strategies

Multiply By Using Partitioning (aka. Split Strategy/Partial Products/Area Method)

This is one of the most essential strategies to learn. It involves partitioning (splitting) the numbers either into their place value parts or any way that makes the calculation easier. Drawing an open array links this strategy to area and can help ensure you've multiplied all of the parts.

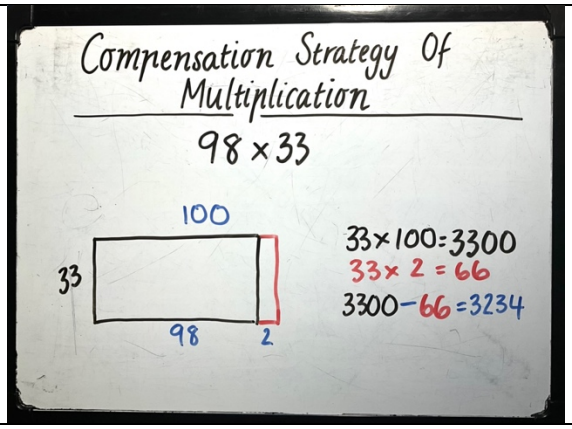


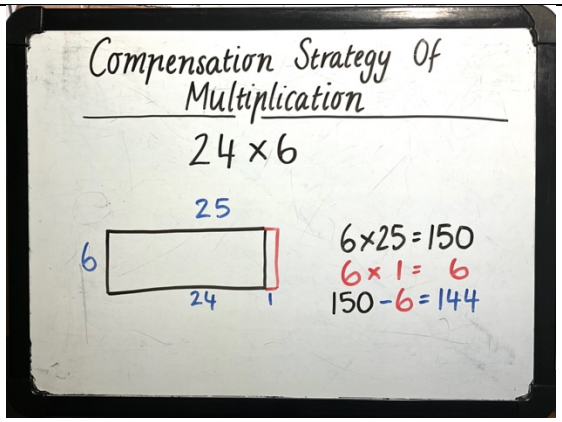




Compensation

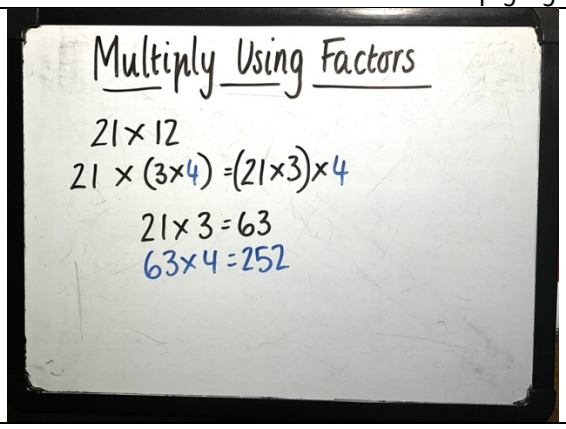
In this strategy you manipulate the numbers to make 'friendlier' to make the calculation easier and then subtract what you added on.

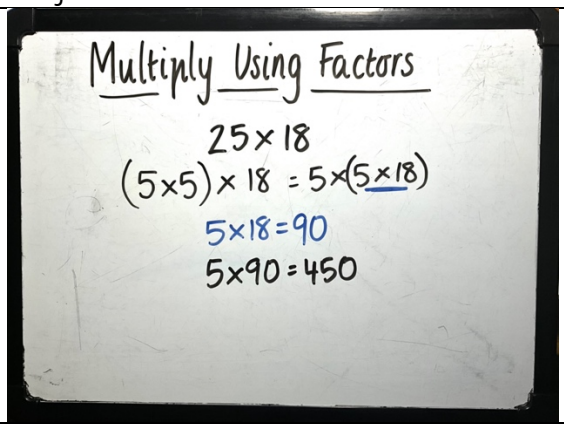




Multiplying Using Factors

Sometimes you can make a calculation easier by expressing one of the numbers as it's factors and multiplying in turn by the factors.

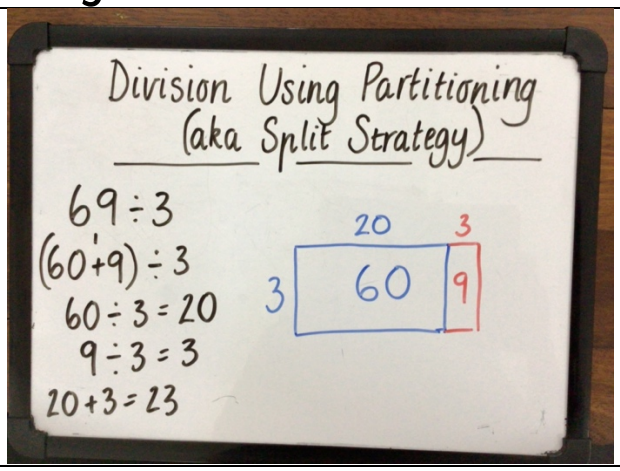


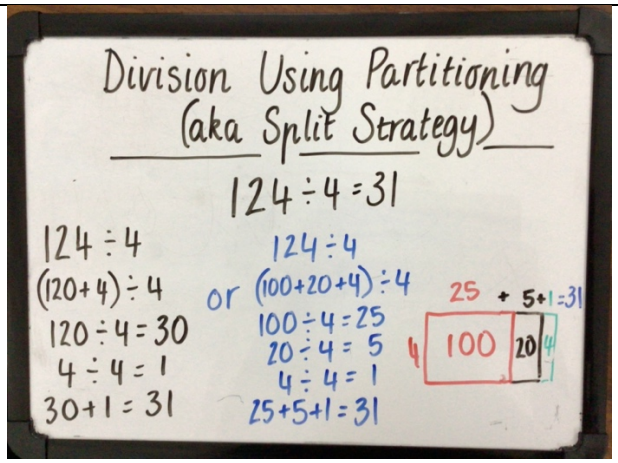


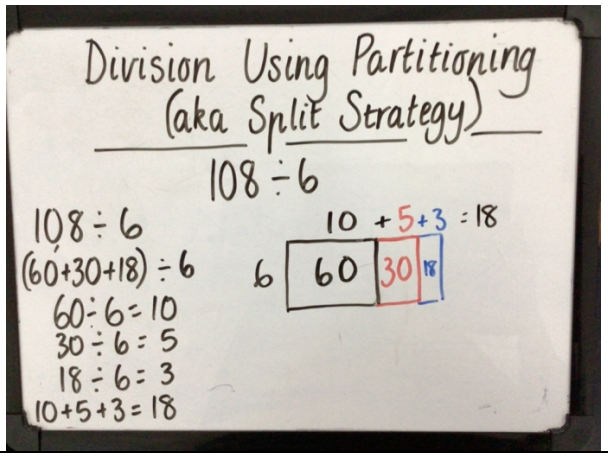
Division Strategies

Division Using Partitioning (aka Split Strategy)

This strategy involves splitting the dividend (the number being divided) into parts that you find easier to work with. How you split the number is up to you – you can split it into place value parts, like in the first two examples, or into numbers that work best for you. You can use arrays and open arrays to show your thinking visually.

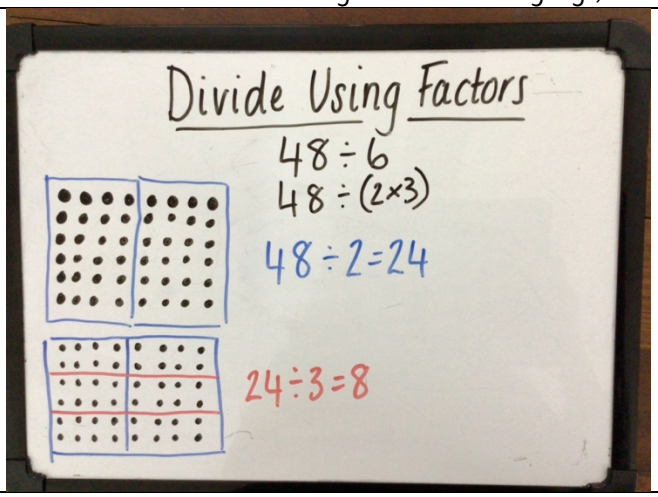


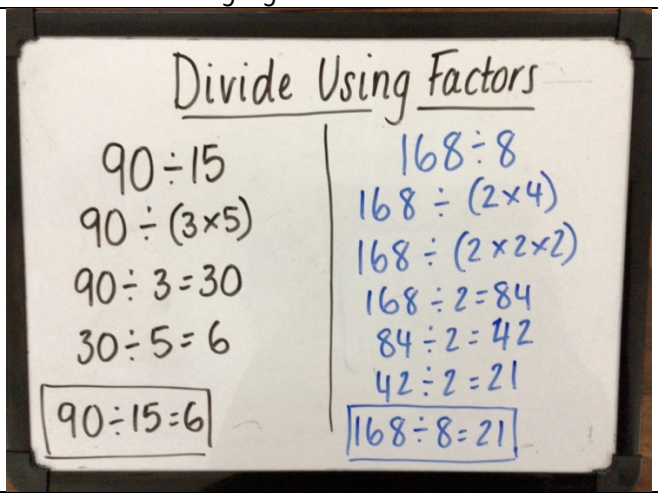




Divide Using Factors.

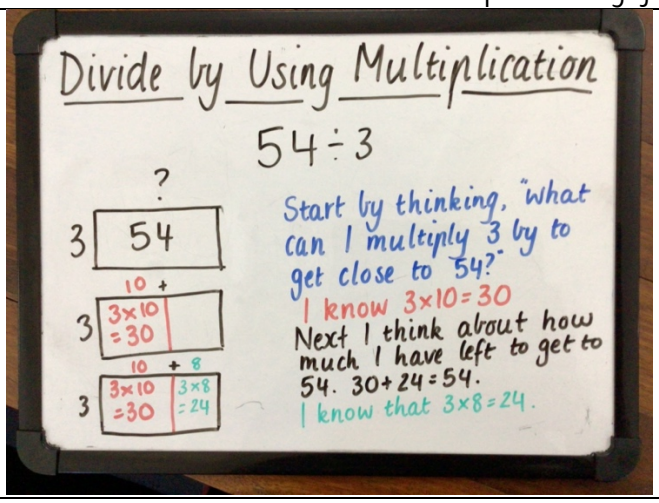
This strategy focuses on the principle that if you divide successively by the factors of the divisor (the number you are dividing by), it is the same as dividing by the divisor.

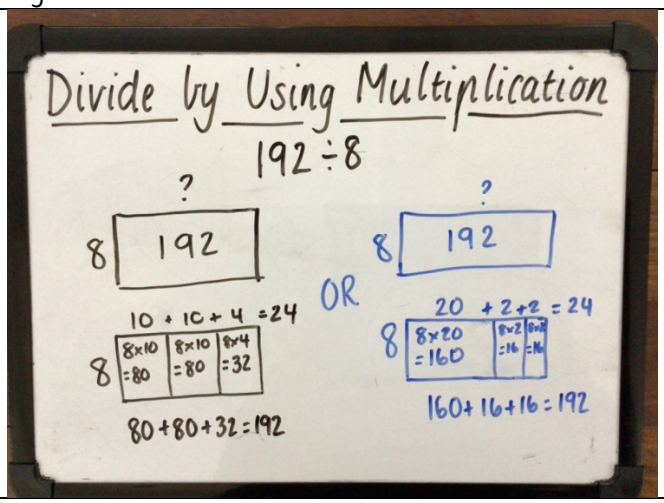


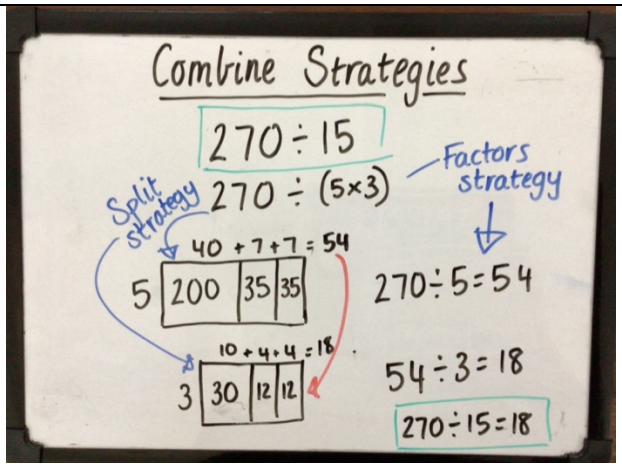


Divide Using Multiplication

Since division is the inverse of multiplication, you can use multiplication to solve division problems. You're essentially asking yourself 'what multiplied by the divisor will equal the dividend?" You can build it up in parts using 'friendly' numbers.







Fluent mathematicians use a range of strategies and can combine them depending on the numbers they are working on.