Helping your child with maths

Maidenbower Junior School

ADDITION

Add numbers up to 3 digits
Use compact column addition to add 3-digit numbers.

> Only use this step if they are experiencing problems moving on from partitioning.

> Add units first, carry number underneath the line and remind pupils of actual value (3 tens add 7 tens).

Key skills for addition
✓ Know number bonds to 20.
✓ Know number bonds to 100 using multiples of 10.
✓ Add any 2-digit numbers by counting on in 10s and 1s.
✓ Add multiples and near multiples of 10 and 100.
✓ Understand place value in 3 digit numbers.
✓ Confidently add using place value (300 + 8 + 50 = 358)
✓ Add pairs of 'friendly' 3 digit numbers mentally (3.g. 320 + 450).
✓ Begin to add amounts of money using partitioning.
✓ Solve problems with addition using number facts, place value and missing numbers.

Working at greater depth – example questions:
* __ __ + __ __ + __ __ The total is 201. Each missing digit is either a 9 or a 1. Write in the missing digits. Is there only one way of doing this or lots of ways? Convince me.
* Is it always, sometimes or never true that when you add two numbers together you will get an even number?

Add numbers up to 4 digits
Continue to use the compact column method, adding units first and carrying underneath the calculation. Include money and measure contexts.
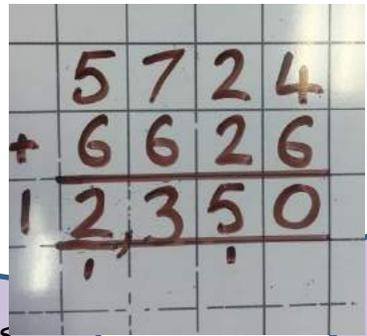
> Add the units first.

> Carry numbers underneath.

> Remind pupils of actual value, e.g. 1 ten add 9 tens..

Key skills for addition
✓ Quickly know number bonds to 100 (64 + 36) and £1 (32p + 68p)
✓ Add any 2 digit numbers by counting on or partitioning.
✓ Add to the next hundred, pound or whole number (234 + 66 = 300, 3.4 + 0.6 = 4)
✓ Confidently add using place value (300 + 8 + 50 + 4000 = 4358)
✓ Add multiples and near multiples of 10, 100 and 1000.
✓ Perform inverse operations to check.
✓ Solve 2 step problems in context.
✓ Select appropriate method and explain and why.
✓ Practise a range of mental addition strategies, e.g. round and adjust, near doubles, number bonds, etc.

Working at greater depth – example questions:
• Are these number sentences true or false?6.7 + 0.4 = 6.11

Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, partition, hundreds, tens, units, addition, columns, tens/hundreds boundary, vertical, expanded, carry, compact, increase, thousands.

SUBTRACTION

Subtract with 2 and 3-digit numbers

Begin using the formal column addition method, initially with 'friendly' numbers, with no exchanging.

Key skills for subtraction

- ✓ Understand place value in 3-digit numbers.
- ✓ Subtract 1s, 10s, 100s without difficulty; use this to add and subtract multiples of 1, 10, 100 to/from 3-digit numbers.
- ✓ Mentally subtract any pair of 2 digit numbers, e.g. 75-58.
- ✓ Recognise there are two ways of completing subtraction – counting on and counting back.
- ✓ Subtract mentally using place value and number bonds, e.g. 347-5, 347 – 40, 347 – 100.

Working at greater depth – example questions:

* Making an estimate. Which of these number sentences have the answer that is between 50 and 60? - 174 - 119,   333 – 276, 932 – 871.

Subtract with up to 4 digits

Subtract using formal column method, exchanging where appropriate.

Key skills for subtraction

- ✓ Mentally subtract any pair of two digit numbers.
- ✓ Subtract 3 digit numbers from 3 digit numbers using counting on, e.g. 426-278 by jumping along on a number line.
- ✓ Practise mental strategies, e.g. round and adjust (37 – 9), using place value.
- ✓ Use counting on in the context of money and also when subtracting from numbers ending in zeros, e.g. 4000-372.
- ✓ Count backwards, through zero, using negative numbers.

Working at greater depth – example questions:

- ▢ - 666 = 8 ▢ 5. What is the largest possible number that will go in the rectangular box? What is the smallest? Convince me.
- Making an estimate. Which of these number sentences have the answer that is between 550 and 600? 1174 - 611, 3330 – 2779, 9326 – 8777.

Vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, least, count back, how many left, how much less is …, different, count on, partition, hundred, tens, units, exchange, digit, value, inverse.

MULTIPLICATION

YEAR 3

Multiply a 2-digit number by a 1-digit number

Introduce the grid method for multiplication.

Eg. $23 \times 8 = 184$

X	20	3
8	160	24

$160 + 24 = 184$

Link the layout of the grid to an array initially:
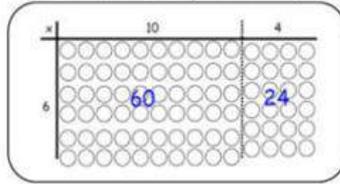
To use the grid method, children must be able to …:
- Partition numbers into tens and units
- Multiply multiples of 10 by a single digit
- Know multiplication facts for x2,3,4,5,8 times table.

Key skills for multiplication
- ✓ Understand that 4 x 8 is the same as 8 x 4.
- ✓ Know the x2, x3, x4 x5, x8, x10 times table.
- ✓ Multiply any 2-digit number by 10.
- ✓ Multiply any single digit by 100.
- ✓ Understand the effect of multiplying numbers by 10 and 100.
- ✓ Multiply a 2-digit number by a 1-digit number, beginning to use the grid.
- ✓ Solve multiplication problems involving missing numbers.

Working at greater depth – example questions
- 24 = ___ x ____. Which pairs of numbers could be written in the boxes?
- 20 x 3 = 60. Mentally use this fact to work out 21 x 3 =   22 x 3 =   23 x 3 =   24 x 3 =
- 4 × 6 = 24. How does this fact help you to solve these calculations? 40 x 6 =   20 x 6 =   24 x 6 =
- __ __ x ___. Using the digits 2, 3 and 4 in the calculation how close can you get to 100? What is the largest product? What is the smallest product?

YEAR 4

Multiply 2 and 3-digit numbers by a single digit using all multiplication facts.

Continue using the grid method. For children that show confidence in the grid method and can carry when adding,, begin using short multiplication (see Y5).

Developing the grid method:

Eg. $136 \times 5 = 680$

X	100	30	6
5	500	150	30

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500
150
+ 30
680
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Children should be able to approximate before they calculate to consider the reasonableness of their answer.

Key skills for multiplication
- ✓ Multiply 1 and 2-digit numbers by 10, 100 and 1000, understanding place value with one decimal place.
- ✓ Know all multiplication facts up to 12x12, including multiplying by zero.
- ✓ Find doubles to double 100 and beyond, using partitioning.
- ✓ Begin to double amounts of money.
- ✓ Use doubling as a strategy to multiply 2, 4, 8.
- ✓ Count in multiples of 6, 7, 9, 25 and 1000.

Working at greater depth – example questions
- * 72 = ___ x ____. Which pairs of numbers could be written in the boxes?
- 63 ÷ 9 = 7. Mentally use this fact to work out 126 ÷ 9 =   252 ÷ 7 =

* How can you use factor pairs to solve this calculation?
13 x 12   (13 x 3 x 4, 13 x 3 x 2 x 2, 13 x 2 x 6)
* __ __ __ x 7. Using the digits 3, 4 and 6 in the calculation above how close can you get to 4500? What is the largest product? What is the smallest product?

Vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value,

DIVISION

YEAR 3

Divide a 2-digit number by a 1-digit number

Example without remainder:
$40 \div 5$
Ask "How many 5s in 40?"

$5 + 5 + 5 + 5 + 5 + 5 + 5 + 5$ = 8 fives
0 5 10 15 20 25 30 35 40

Example with remainder:
$38 \div 6$

$6 + 6 + 6 + 6 + 6 + 6 + 2$ = 6 sixes with a remainder of 2
0 6 12 18 24 30 36 38

For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.

Example without remainder:
$81 \div 3$

30   30   21
10   10   7
0   30   60   81

This could either be done by working out the numbers of threes in each jump as you go along (10 threes are 30, another 10 threes makes 60, and another 7 threes makes 81. That's 27 threes altogether) or by counting in jumps of known multiples of 3 to reach 81 (30 + 30 + 21) then working out the number of threes in each jump.

Example with remainder:
$158 \div 7$

70   70   14   (2)
10   10   2
0   70   140   154 158

Model first using **Dienes**, then using **bead bar** to show link to ENL

10 x 4   2 x 4
40   8
0 ▦▦▦▦   ▦▦ 48
10 + 2=12

Grouping on a number line first without, then with remainders

Key skills for division
- ✓ Recall division facts for x2, x3, x4 x5, x8, x10 times table.
- ✓ Solve problems, in contexts, using division.
- ✓ Children develop reliable written methods for division, starting with 2-digit numbers divided by 1-digit number.
- ✓ Halve even numbers up to 50
- ✓ Solve multiplication problems involving missing numbers.

Working at greater depth – example questions
* Making links. Cards come in packs of 4. How many packs do I need to buy to get 32 cards?

YEAR 4

Divide up to 3-digit numbers by a 1-digit number.
Use the short division method once children are secure with division as grouping using number lines and arrays.

3 2
3)9 6

27
3 | 8²1

Example with remainder:

4 7 r 2
6 | 2 8⁴4

Key skills for multiplication
- ✓ Multiply 1 and 2-digit numbers by 10, 100 and 1000, understanding place value with one decimal place.
- ✓ Know all multiplication facts up to 12x12, including multiplying by zero.
- ✓ Find doubles to double 100 and beyond, using partitioning.
- ✓ Begin to double amounts of money.
- ✓ Use doubling as a strategy to multiply 2, 4, 8.
- ✓ Count in multiples of 6, 7, 9, 25 and 1000.

Working at greater depth – example questions
- $72 = \_\_\_ \times \_\_\_$. Which pairs of numbers could be written in the boxes?
- 361 children are travelling to London on a school trip. They are travelling in mini-buses which can take 6 children each. How many mini-buses are needed?

Vocabulary: share, share equally, one each, two each, group, equal groups of, lots of, array, dividing by. Divided by, division, grouping, number line, left over, inverse, short division, carry, remainder, multiple.

ADDITION

Add numbers with more than 4 digits

Including money, measure and decimals with different numbers of decimal places.

Key skills for addition

✓ Locate 5 and 6 digit numbers on a landmarked line; use to compare and order numbers.
✓ Round to ten, hundred, thousand, ten thousand.
✓ Use rounding to check accuracy.
✓ Understand a one place decimal number as number of tenths and a two place number as hundredths.
✓ Add or subtract 0.1 or 0.01 from any decimal number with confidence, e.g. 5.83 + 0.01 or 4.83 – 1.
✓ Confidently mentally add numbers less than 100.
✓ Use inverse to check calculations.

Working at greater depth – example questions:

* _____ + 1475 = 6__24. What numbers go in the gaps? What different answers are there? Convince me.

* Is it always, sometimes or never true that the sum of four even numbers is divisible by 4?

Add several numbers of increasing complexity

Including money, measure and decimals with different numbers of decimal places.

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Key skills for addition

✓ Add mentally with confidence using larger numbers and calculations of increasing complexity.
✓ Add several large numbers using written method, including decimals.
✓ Perform mental calculations, including with mixed operations and large numbers, using a range of strategies.
✓ Solve multi-step problems.
✓ Use estimation and inverse to check the validity of an answer.

Working at greater depth – example questions:

• Is it always, sometimes or never true that the sum of two consecutive triangular numbers is a square number?
• Three four digit numbers total 12435. What could they be? Convince me.
• Which questions are easy / hard to solve mentally? 213323 – 70, 512893 + 37,   8193.54 - 5.9. Explain.

Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, partition, hundreds, tens, units, addition, columns, tens/hundreds boundary, vertical, expanded, carry, compact, increase, thousands, inverse, decimal places, decimal point, tenths, hundredths, thousandths, digits.

SUBTRACTION

Subtract with at least 4-digit numbers
Including money, measure and decimals.
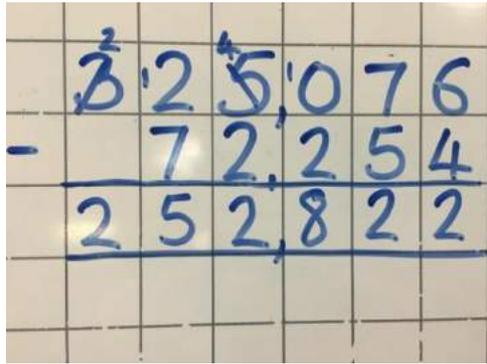
Key skills for subtraction
✓ Count backwards through zero, using negative numbers.
✓ Add or subtract 0.1 or 0.01 to/from any decimal number with confidence, e.g. 5.83 + 0.01 or 4.83 – 0.1.
✓ Children need to consider a range of subtraction strategies and written methods before choosing how to calculate.
✓ Subtract larger numbers using column subtraction.
✓ Begin to subtract decimal numbers by counting up, e.g. 6.2 – 3.5.
✓ Decide which mental methods to use and why.

Working at greater depth – example questions
• Making an estimate. Which of these number sentences have the answer that is between 0.5 and 0.6? 11.74 - 11.18, 33.3 – 32.71.
• A pack of paper has 270 sheets. 4 children take 23 each. How many sheets are left?

Subtracting with increasing complexity of numbers
Including money, measure and decimals with different numbers of decimal places.

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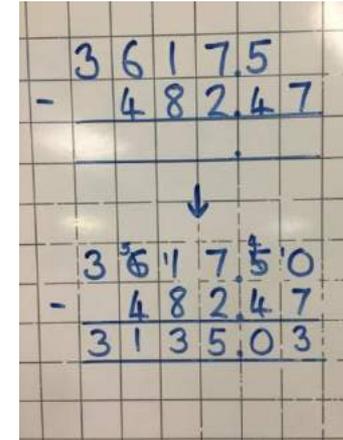
Key skills for subtraction
✓ Add mentally with confidence using larger numbers and calculations of increasing complexity.
✓ Add several large numbers using written method, including decimals.
✓ Perform mental calculations, including with mixed operations and large numbers, using a range of strategies.
✓ Solve multi-step problems.
✓ Use estimation and inverse to check the validity of an answer.

Working at greater depth – example questions
• Making an estimate. Circle the number that is the best estimate to 932.6 - 931.05:   1.3   1.5   1.7   1.9

Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, partition, hundreds, tens, units, addition, columns, tens/hundreds boundary, vertical, expanded, carry, compact, increase, thousands, inverse, decimal places, decimal point, tenths, hundredths, thousandths, digits.

YEAR 5

MULTIPLICATION

Multiply a 4-digit number by 1 and 2-digits.
Using short and long multiplication methods.

Introduce column multiplication by comparing a grid method calculation, in order to see how the steps are related. Notice how there are less steps involved.

×	300	20	7
4	1200	80	28

$$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \end{array}$$

	10	8
10	100	80
3	30	24

Move towards more complex numbers

$$\begin{array}{r} 1234 \\ \times \quad 16 \\ \hline 7404 \\ 12340 \\ \hline 19,744 \end{array}$$
(1234 × 6)
(1234 × 10)

$$\begin{array}{r} 3652 \\ \times \quad 8 \\ \hline 29,216 \end{array}$$

Key skills for multiplication
- ✓ Know and recite all times table, including division facts.
- ✓ Identify multiples and factors.
- ✓ Scale up or down a factor by 2, 5 and 10.
- ✓ Multiply integers and decimals by 10, 100, 1000.
- ✓ Recognise squared and cubed numbers, including their notations.

Working at greater depth – example questions
* Missing numbers. $6 \times 0.9 = \_\_ \times 0.03$. $6 \times 0.04 = 0.008 \times \_\_$
Which numbers could be written in the boxes?
- To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve: 48 × 25   78 × 25   4.6 × 25
- The product of a two digit and three digit number is approximately 6500. What could the numbers be?

YEAR 6

Short and long multiplication.
Multiply decimal numbers with up to 2 decimal places by a single digit, e.g. 3.19 × 8.
Use money and measures.

$$\begin{array}{r} 2673 \\ \times \quad 54 \\ \hline 10692 \\ 133650 \\ \hline 144342 \end{array}$$

Finding missing numbers:

×		4
		6
	2	4	6
8	2	0
1	0	6	6

Key skills for multiplication
- ✓ Recall multiplication facts up to 12x12.
- ✓ Use short multiplication to multiply a 4-digit number by 1-digit, including 1 or 2 decimal places.
- ✓ Use long multiplication to multiply a 2-digit number by a number with up to 4-digits.
- ✓ Multiply fractions and mixed numbers by whole numbers.
- ✓ Multiply fractions by proper fractions.
- ✓ Estimate answers by rounding and approximation.

Working at greater depth – example questions
- Is it always, sometimes or never true that when you square an even number, the result is divisible by 4?
- Is it always, sometimes or never true that multiples of 7 are 1 more or 1 less than prime numbers?
- The product of a single digit number and a number with two decimal places is 21.34. What could the numbers be?
- The area of a rugby pitch is 6,108 sq metres. A football pitch measures 112m long and 82m wide. How much larger is the football pitch?

Vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, carry, short/long multiplication, tenths, hundredths, decimal.

DIVISION

YEAR 5

Divide up to 4-digit numbers by a 1-digit number, including answers with remainders.

Using short division method.

The answer is 1678 r 3, leading onto 1678 $\frac{3}{4}$

Key skills for division
- ✓ Recall division facts for all times tables.
- ✓ Multiply and divide numbers mentally.
- ✓ Identify multiples and factors, including finding all factor pairs and common factors of two numbers.
- ✓ Solve problems including multiplication and division.
- ✓ Multiply and divide whole numbers and decimal numbers by 10, 100, 1000.
- ✓ Use vocabulary of prime numbers, prime factors and composite numbers.
- ✓ Recall prime numbers to 19.
- ✓ Use multiplication and division as inverses.

Working at greater depth – example questions
- Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?
- What goes in the missing box? 12_3 ÷ 6 = 212, 12_3 ÷ 7 =212, 22_3 ÷ 7 = 321 r 6, 323 x _1 = 13243. Prove it.
- A bag of 4 oranges cost £1.80. A bag of 5 lemons cost £1. How much more does one orange cost than one lemon?
- 1276 children are travelling to London on a school trip. They are travelling in mini-buses which contain 5 children. How many mini-buses are needed?

YEAR 6

Divide at least 4-digit numbers by single and 2-digit numbers.

Short division

Children need to be able to express a remainder as a fraction and a decimal.

Long division

432 ÷ 15 becomes

Answer: 28·8

Key skills for division
- ✓ Recall division facts for all times tables for more complex calculations.
- ✓ Multiply and divide numbers mentally.
- ✓ Identify common factors, common multiples and prime numbers.
- ✓ Solve problems involving all four operations.
- ✓ Use estimation to check answers in the context of a problem.
- ✓ Solve problems that require answers to be rounded to specific degrees of accuracy.

Working at greater depth – example questions
- Missing numbers. 2.4 ÷ 0.3 = ___ x 1.25. Which number could be written in the box?
- What goes in the missing gap? 18_4 ÷ 12 = 157, 38_5 ÷ 18 = 212.5, 33_2 ÷ 8 = 421.5, 38 x _.7 = 178.6. Prove it.
- Can you find the smallest number that can be added to or subtracted from 87.6 to make it exactly divisible by 8/7/18?
- Apples weigh 85g. How many apples would you expect to get in a 1.35kg bag?

Vocabulary: share, share equally, one each, two each, group, equal groups of, lots of, array, dividing by. Divided by, division, grouping, number line, left over, inverse, short division, carry, remainder, multiple, quotient, common factor, prime number, prime factor, composite number (non-prime).

REAL LIFE PROBLEMS

- Go shopping with your child to buy two or three items. Ask them to work out the total amount spent and how much change you will get.
- Buy some items with a percentage extra free. Help your child to calculate how much of the product is free.
- Plan an outing during the holidays. Ask your child to think about what time you will need to set off and how much money you will need to take.
- Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long they spend watching TV each day / each week?
- Use a bus or train timetable. Ask your child to work out how long a journey between two places should take? Go on the journey. Do you arrive earlier or later than expected? How much earlier/later?
- Help your child to scale a recipe up or down to feed the right amount of people.
- Work together to plan a party or meal on a budget.

GEOMETRY AND MEASURES

- TM Choose a shape of the week e.g. cylinder. Look for this shape in the environment (tins, candles etc). Ask your child to describe the shape to you (2 circular faces, 2 curved edges ...)
- TM Play 'guess my shape'. You think of a shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no' (e.g. Does it have more than 4 corners? Does it have any curved sides?)
- TM Hunt for right angles around your home. Can your child also spot angles bigger or smaller than a right angle?
- TM Look for symmetrical objects. Help your child to draw or paint symmetrical pictures / patterns?
- TM Make a model using boxes/containers of different shapes and sizes. Ask your child to describe their model.
- TM Practise measuring the lengths or heights of objects (in metres or cm). Help your child to use different rulers and tape measures correctly. Encourage them to estimate before measuring.
- TM Let your child help with cooking at home. Help them to measure ingredients accurately using weighing scales or measuring jugs. Talk about what each division on the scale stands for.
- TM Choose some food items out of the cupboard. Try to put the objects in order of weight, by feel alone. Check by looking at the amounts on the packets.
- TM Practise telling the time with your child. Use both digital and analogue clocks. Ask your child to be a 'timekeeper' (e.g. tell me when it is half past four because then we are going swimming).
  Use a stop clock to time how long it takes to do everyday tasks (e.g. how long does it take to get dressed?). Encourage your child to estimate first

PRACTISING NUMBER FACTS

- Find out which number facts your child is learning
- at school (addition facts to 10, times tables, doubles etc). Try to practise for a few minutes each day using a range of vocabulary.
- Have a 'fact of the day'. Pin this fact up around the house. Practise reading it in a quiet, loud, squeaky voice. Ask your child over the day if they can recall the fact.
- Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is needed to make 10. You can also play this game with numbers totalling 20, 100 or 1000. Encourage your child to answer quickly, without counting or using fingers.
- Throw 2 dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x). Can they do this without counting?
- Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the numbers. If they answer correctly, they keep the cards. How many cards can they collect in 2 minutes?
- Play Bingo. Each player chooses five answers (e.g. numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.
- Give your child an answer. Ask them to write as many addition sentences as they can with this answer (e.g. 10 = 6 + 4). Try with multiplication or subtraction.
- Give your child a number fact (e.g. 5+3=8). Ask them what else they can find out from this fact (e.g. 3+5=8, 8-5=3, 8-3=5, 50+30=80, 500+300=800, 5+4=9, 15+3=18). Add to the list over the next few days. Try starting with a x fact as well.
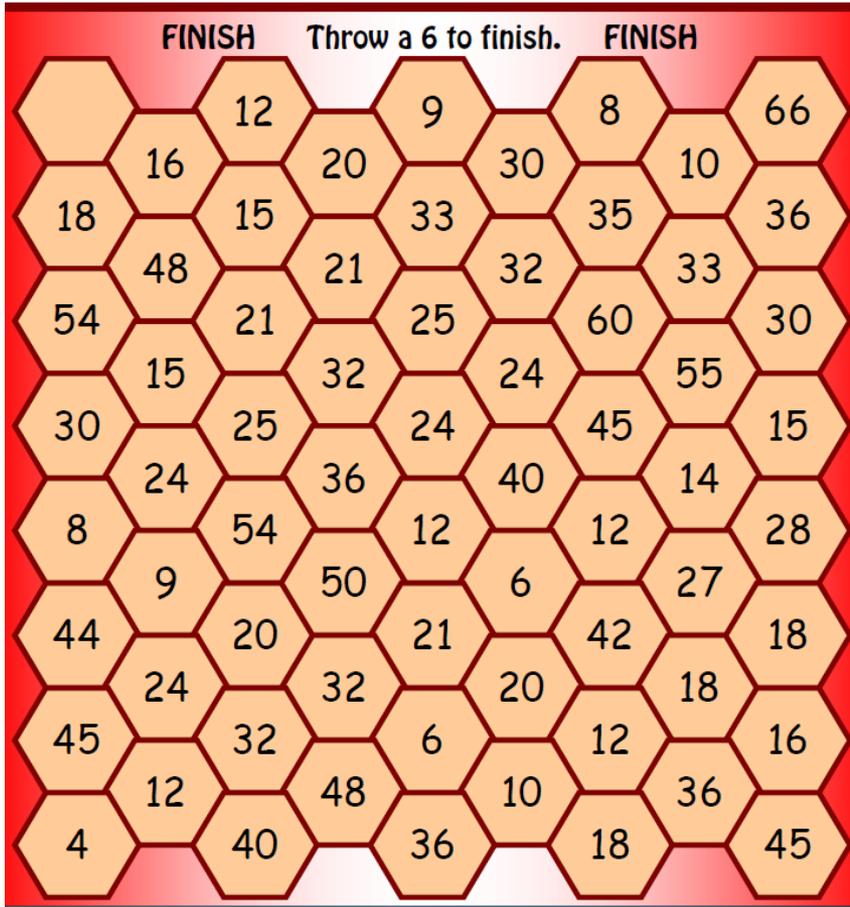
Here is an example of a board game you can download from the internet – see below for the link.

http://www.makingmathmorefun.com/samples/

Useful websites:

http://www.makingmathmorefun.com/samples/

http://www.primarygames.co.uk/
http://www.bbc.co.uk/bitesize/ks2/maths/
http://www.topmarks.co.uk/maths-games/7-11-years/problem-solving
www.sumdog.com
http://www.wldps.com/gordons/
https://www.nationalnumeracy.org.uk/family-maths-toolkit
https://www.oxfordowl.co.uk/for-home/maths-owl/maths