Welcome to our Maths workshop KS2 – Operations

Session Aims:

What does maths look like in KS2?

How is maths taught at St John's?

How can you support your child at home?

What does Maths learning look like at St John's?

How do teachers teach and make decisions about what to teach?

Our curriculum is based on the national curriculum and Local authority materials that support the delivery of the curriculum.

As a school we source and access a wide range of maths materials to assist in delivering our lessons.

What are the National Curriculum Programmes of Study?

Number – addition, subtraction, multiplication and division

Statutory requirements

Pupils should be taught to:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for
- divide numbers up to 4 digits by a two-digit of short division where appropriate, interpre
- perform mental calculations, including with
- identify common factors, common multiples
- use their knowledge of the order of operatic four operations
- solve addition and subtraction multi-step pr operations and methods to use and why

Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

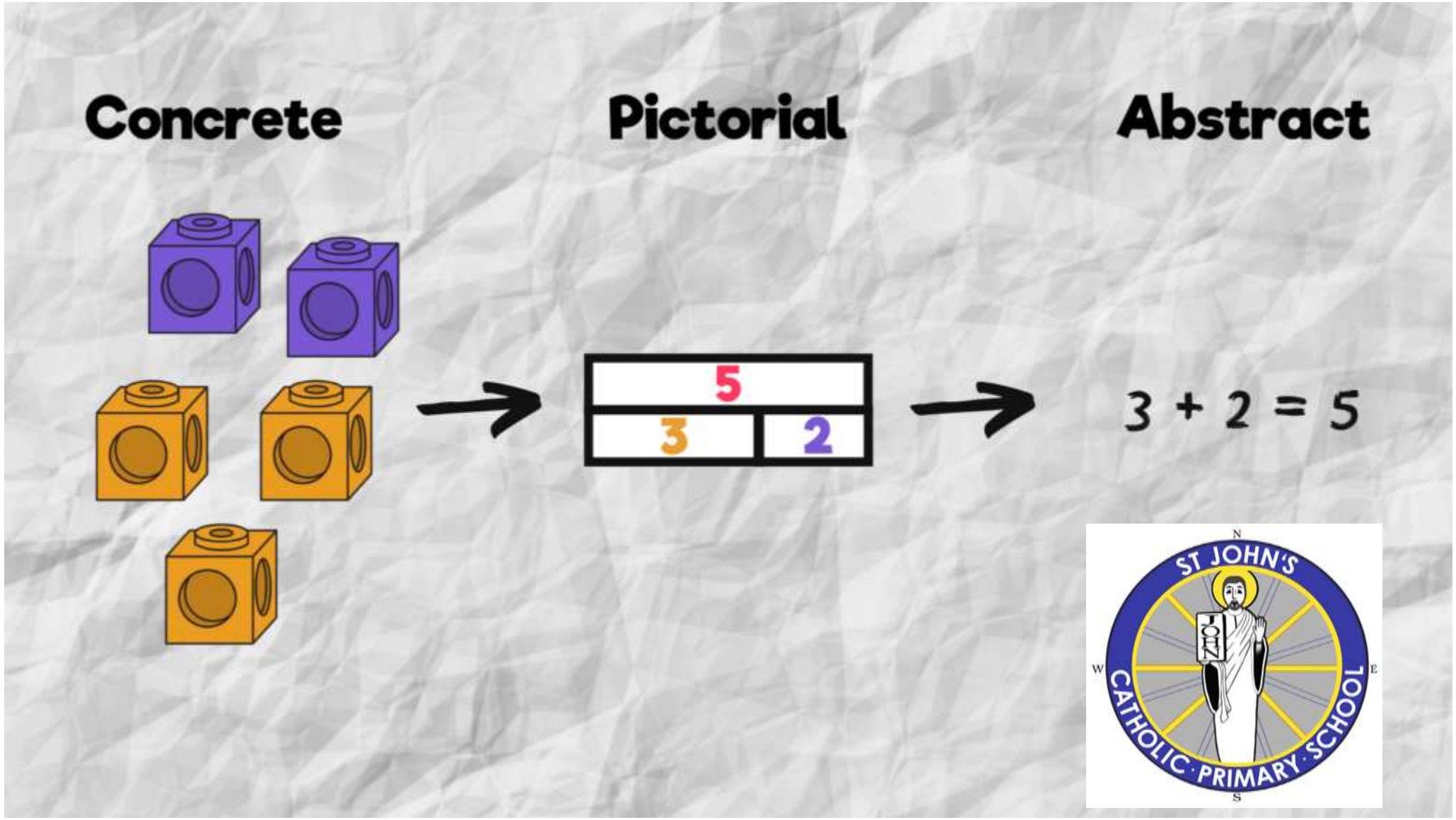
The link below will take you to the programmes of study for each year group. This shows you what your child will be learning when at school and what a child of that age is expected to achieve by the end of the year (Age Related Expectations).

National Curriculum Programmes of Study for Key Stage 1 and Key Stage 2

Number - Number and Place Value.
Number - Addition and Subtraction.
Number - Multiplication and Division.
Number – Fractions (Decimals and Percentages)
Measurement – Time, weight, height and length…
Geometry - Properties of Shape.

Using all of the above in
problem solving and reasoning
activities

CPA Approach



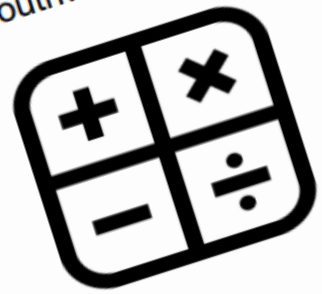
What is CPA?

C is for concrete: New concepts are introduced through the use of physical objects or practical equipment.

P is for pictorial: Once children are confident with a concept using concrete resources, they progress to pictorial representations.

A is for abstract. Once children have a secure understanding of the concept through the use of concrete resources and visual images, they are then able to move on to the abstract stage.

Written Calculation
Policy for Southwark Primary Schools



(Aligned with the 2014 National Curriculum)

Diane Andrews, Maths Consultant
Revised April 2017

Mental Calculation Strategies for Y1-Y6

Diane Andrews, Maths Consultant
(With thanks to Judith Lambert, Ivydale Primary School)
October 2017

Year 3

Underpinning skills (end of year expectation)

- Given a number, identify 10 or 100 more/less
- Recognise the place value of each digit in a three-digit number
- Recall addition and subtraction facts for multiples of 10 to 100
- Derive addition and subtraction facts for multiples of five to 100
- Derive addition and subtraction facts for multiples of 100 to 1000
- Understand the commutative properties of addition and the inverse relationship between addition and subtraction
- Derive doubles of all two-digit numbers (e.g. double 42 is 84)
- Estimate the answer to a calculation and use inverse operations to check

Year 4

Underpinning skills (end of year expectation)

- Given a number, identify 10, 100 or 1000 more/less
- Recognise the place value of each digit in a four-digit number
- Round any number to the nearest 10, 100 or 1,000
- Recognise the place value of each digit in a decimal number with up to two decimal places
- Round decimal numbers with one decimal places to the nearest whole number
- Find pairs of decimal numbers that total one (e.g. 0.6 + 0.4)
- Know addition/subtraction facts for multiples of 100 that total 1,000
- Derive addition and subtraction facts for all pairs of numbers that total 100 e.g. 68 + 32
- Derive addition and subtraction facts for multiples of 50 to 1,000 and multiples of 10 to 1,000
- Recall doubles of two-digit numbers and derive doubles of three-digit numbers
- Estimate the answer to a calculation, including using the skill of rounding, and use inverse operations to check

Year 5

Underpinning skills (end of year expectation)

- Given a number identify 10/ 100/ 1,000/ 10,000 more or less
- Recognise the place value of each digit in a six-digit whole number
- Round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000
- Recognise the place value of each digit in a decimal number with up to three decimal places
- Round decimal numbers with two decimal places to the nearest whole number or to one decimal place
- Derive complements of 1 e.g. 0.83 and 0.17 = 1
- Derive doubles of three-digit and four-digit numbers (and decimal numbers with up to two decimal places) and find the corresponding halves
- Estimate the answer to a calculation, including using the skill of rounding, and use inverse operations to check

Year 6

Underpinning skills (end of year expectations)

- Given a number identify 10/ 100/ 1,000/ 10,000/ 100,000/ 1,000,000 more or less
- Recognise the place value of each digit in a seven-digit whole number
- Round any number up to 10,000,000 to the nearest 10, 100, 1,000, 10,000, 100,000 or 1,000,000
- Recognise the place value of each digit in a decimal number with up to three decimal places
- Round decimal numbers with two decimal places to the nearest whole number or to one decimal place
- Derive complements of 1 e.g. 0.64 and 0.36 = 1
- Estimate the answer to a calculation, including using the skill of rounding, and use inverse operations to check
- Derive doubles of three-digit and four-digit numbers (and decimal numbers with up to three decimal places)

Addition Strategies

1.Counting On

Start with the larger number and count up.

2.Number bonds to 10 (to 100, to 1000)

3.Make Ten (Bridging Ten)

Break numbers to reach the next ten, then add the rest.

Example: 8+7=8+2+5=15.

4.Partitioning (Split Strategy)

Break numbers into place values (e.g., tens and ones).

Example: 23+45=(20+40)+(3+5)=68.

5.Compensating

Round one number, calculate, then adjust.

Example: 49+36=(50+36)−1 =85.

6.Doubles and Near Doubles

Use knowledge of doubles.

Example: 6+7=(6+6)+1=13.

Subtraction Strategies

1.Counting Back

Count backwards from the larger number.

2.Counting Up (Complementing)

Find the difference by counting up from the smaller number.

Example: 42−38=38+4 (counting up 4)

3.Partitioning

Subtract tens, then ones.

Example: 64−32=(60−30)+(4−2)=32.

4.Compensating

Adjust to make subtraction easier.

Example: 72−49=(72−50)+1=23.

Multiplication Strategies

1.Repeated Addition

Add the same number multiple times.

Example: 4×3=4+4+4=124

2.Skip Counting

Count in steps (e.g., 2s, 3s, 5s, 10s).

3.Doubling and Halving

Double one number and halve the other.

Example: 8×25=4×50=2008

4.Using Known Facts

5.Distributive Property

Break a problem into smaller parts.

Example: 6×14=(6×10)+(6×4)=

Division Strategies

1.Repeated Subtraction

Subtract the divisor until reaching zero.

Example: 15÷3=15−3−3−3−3-3

2.Sharing Equally

Split the total into equal groups.

3.Using Multiplication Facts

Work backwards from known multiplication facts.

Example: 36÷6=? because 6×6=36

4.Chunking

Subtract large multiples of the divisor.

Example: 96÷8=(80÷8)+(16÷8)=10+2=1296 \div 8 = (80 \div 8) + (16 \div 8) = 10 + 2 = 1296÷8=(80÷8)+(16÷8)=10+2=12.

Cognitive Load

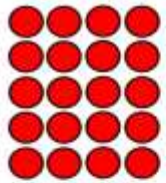
Working Memory

Cognitive Load –How hard something is to do.

Working Memory – Short term memory that you can dedicate to it.

Process – step by step

Calculation



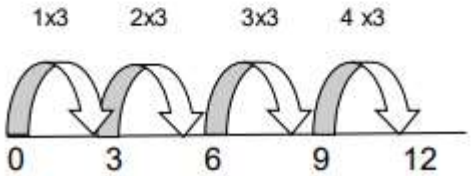
4 x 5 = 20

5 x 4 = 20

Use an **empty number** line to count on:

4 x 3 = 12

'0, 3, 6, 9, 12'



Grid Method for multiplication of a teen number teen number by a one- digit number:

13 x 8 = 104

X	10	3
8	80	24

80 + 24 = 104

'Partition 13 into 10 + 3 then multiply each number by 8. Add the partial products (80 and 24) together.'

This will lead into **expanded short multiplication:**

13 x 8 = 104

$$\begin{array}{r} 10 + 3 \\ \times \quad 8 \\ \hline 24 \quad (3 \times 8) \\ +\ 80 \quad (10 \times 8) \\ \hline 104 \end{array}$$

Include an addition symbol when adding partial products.

36 x 4 = 144

X	30	6
4	120	24

120 + 24 = 144 (add the partial products)

Expanded short multiplication (two-digit number by a one-digit number):

36 x 4 = 144

30 + 6
X 4
24 (4 x 6 = 24)
+120 (4 x 30 = 120)
144

Include an addition symbol when adding partial products.

Refine the recording in preparation for formal short multiplication:

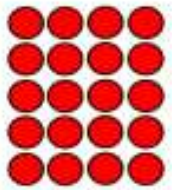
36
x 4
24 (4 x 6)
+120 (4 x 30)
144

Short multiplication (formal method) of a two–digit number multiplied by a one-digit number:

36 x 4 = 144

36
x 4
144
2

Use the language of place value to ensure understanding.
Ensure that the digit 'carried over' is written under the line in the correct column.



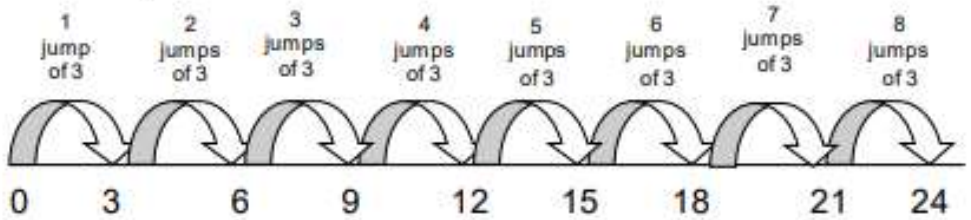
$20 \div 5 = 4$

$20 \div 4 = 5$

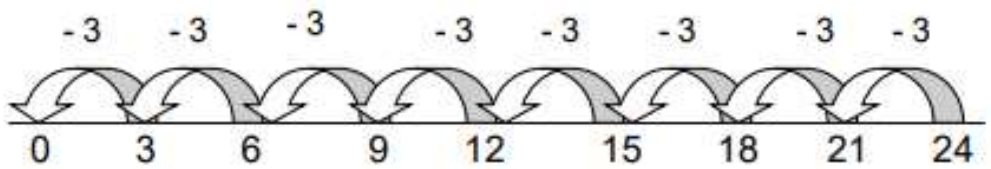
Use an empty number line to count forwards…

$24 \div 3 = 8$

'How many threes are there in 24?'



…also jump back from 24 to make the link with repeated subtraction.



$24 \div 3 = 8$

This can also be recorded as…

$$3\overline{)24}\quad 8$$

$$
\begin{array}{r}
45\ \text{r}\ 1 \\
\hline
11\ \big)\ 496 \\
-\ \underline{440} \quad (40 \times 11) \\
\quad 56 \\
-\ \underline{55} \quad (5 \times 11) \\
\quad\ 1 \quad \text{(remainder)}
\end{array}
$$

Multiples of the divisor (11) have been subtracted from the dividend (496)

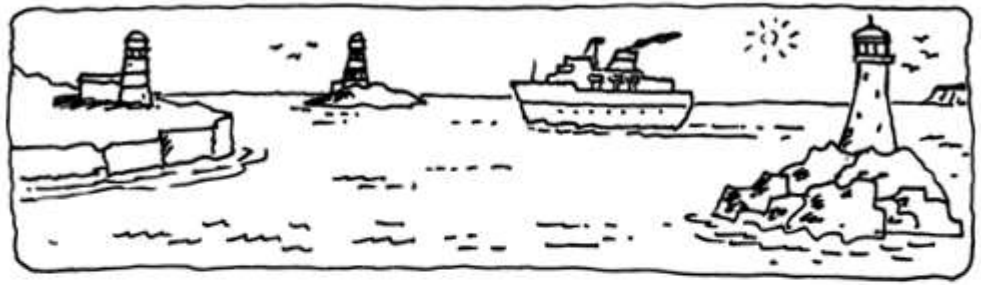
'40 (lots of 11) + 5 (lots of 11) = 45 (lots of 11)'

'1 is the remainder'

Answer: $45\frac{1}{11}$

Lighthouses

On the coast there are three lighthouses.



The first light shines for 3 seconds, then is off for 3 seconds.

The second light shines for 4 seconds, then is off for 4 seconds.

The third light shines for 5 seconds, then is off for 5 seconds.

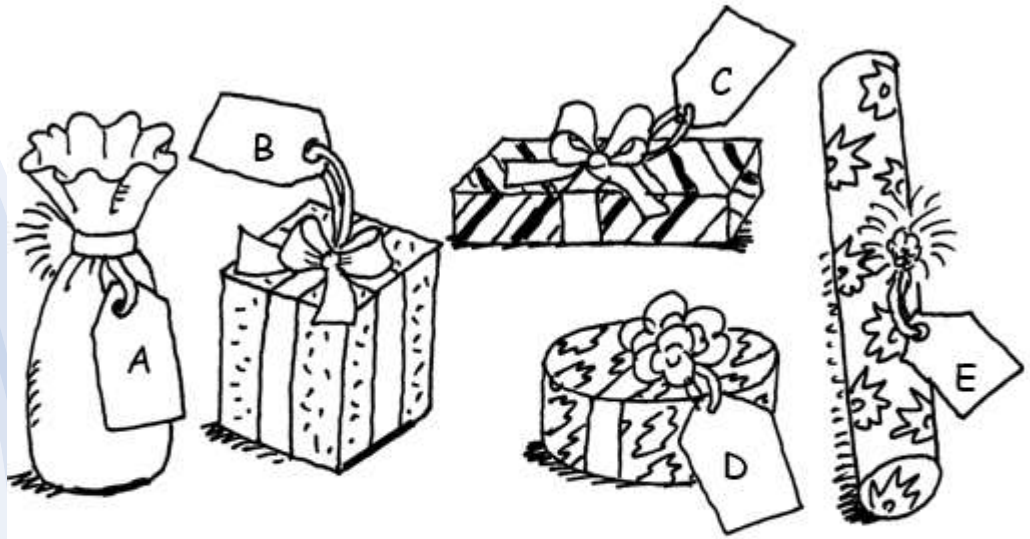
All three lights have just come on together.

When is the first time that all three lights will be off?

When is the next time that all three lights will come on at the same moment?

Presents

Gurmit paid £21 for five presents.



For A and B he paid a total of £6.

For B and C he paid a total of £10.

For C and D he paid a total of £7.

For D and E he paid a total of £9.

How much did Gurmit pay for each present?

https://www.nationalnumeracy.org.uk/sites/default/files/documents/Free%20FMT%20resources/YrR_FMT_Activity_Pack_2022.pdf

https://www.nationalnumeracy.org.uk/sites/default/files/documents/Free%20FMT%20resources/Yr%201%20FMT%20Activity%20Pack%202021.pdf

https://www.nationalnumeracy.org.uk/sites/default/files/documents/Free%20FMT%20resources/Yr%202%20FMT%20Activity%20Pack%202021.pdf


Dice bingo

Family Maths Toolkit

Play a game of bingo together.

Copy the grid below for each person.

4	1	5
6	2	3

Take it in turns to roll a die. If you roll a number shown on your card, you may colour or cover it. Only the person rolling can colour or cover that number. Who has coloured or covered all their numbers first?

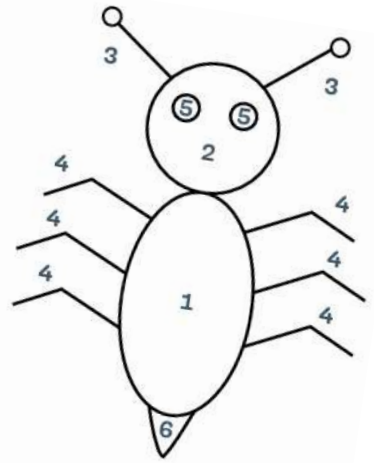
Helpful hints: You could make different grids for each person playing. Encourage your child to recognise the pattern of dots before counting them.


Play the game of 'Beetle' by taking turns to throw a die. If you throw a 1, you may draw a body; 2 is for the head; 3 is for two antennae; 4 is for six legs; 5 for the eyes and 6 will give your beetle a tail. First one to finish is the winner.

Who will be first to complete a beetle? When you have won, you can add a nose and mouth!

Have fun!

Helpful hints: Any number of people can play this game; you can make the game harder by saying that you cannot add antennae or legs until you have the head or body. Also you could say that you can only draw a single leg (or eye, or antenna) each time you roll a 4 (or 5, or 3), rather than all of them.



Websites to support children's Maths skills

- CBeebies have lots of fun and interactive games and activities to help get our younger children excited about Maths
- I See Maths – a useful site with a plethora of ideas for fun games that all the family
- Primary Games Arena - It is a free website that encourages children to play online maths games linked to their home learning. It breaks the games down into concepts which is really helpful.
- Hit the Button – children love this game as it helps to increase confidence through practising times tables and number bonds.
- Maths Zone – this site is jam-packed with fun ways to learn more about maths.
- BBC Bitesize – lots of information alongside short videos help to make the learning enjoyable and accessible for all children.

At Home

- Take away their fear.
- Reassure and praise whenever possible. Positive mindset…
- Let them see you using Maths in your everyday routines – portioning meals between the family, chopping vegetables into halves and quarters etc.
- Play with numbers and shapes through games.
- Seeing mistakes as an opportunity to learn and using them as a discussion point.
- Recognising the **importance** and value of Maths in our everyday lives e.g. managing money and telling the time.