National Curriculum Programme of Study:

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward.
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

MENTAL CALCULATION
Multiplication & Division

FLUENCY

By the end of Year 2, children should fluently derive and recall:

- doubles of all numbers to 20, e.g. double 16, and corresponding halves
- doubles of multiples of 10 to 50, e.g. double 30, and corresponding halves
- multiplication facts for the 2, 5 and 10 times-tables, and corresponding division facts
- odd and even numbers to 100

COUNT IN STEPS OF 2, 3, AND 5 FROM 0, AND IN TENS FROM ANY NUMBER, FORWARD AND BACKWARD

Teaching should focus on:

- Counting on and back to zero in steps of 2, 3, and 5.
- Counting on and back in 10s from any given number

- The counting stick can be considered as part of a continuous or 'empty number line' with clearly marked intervals along the stick to represents specific points.

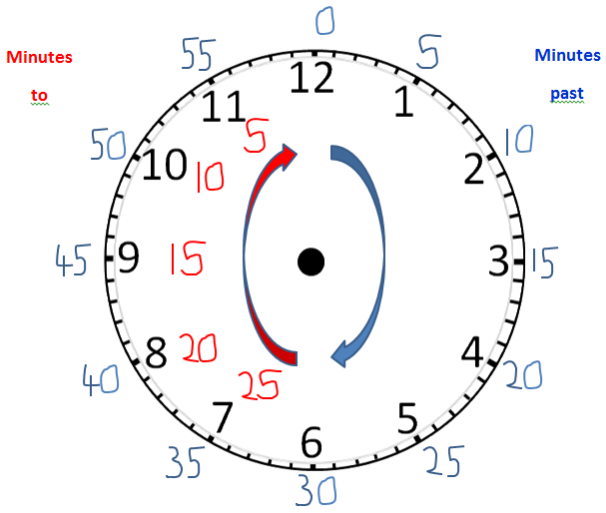
Tell the children, they are counting in steps of 3 and practice counting forwards and backwards from a starting point of zero, counting in steps of 3 as each interval line is touched. Attach number cards to the interval lines to remind children of the steps. Make links to multiplication and division. What are 2 steps of 3? How many steps of 3 make 30? How do you know? How could we write that?

When counting on in 10s, make the beginning of the stick any number, for example 14. Count along the stick in 10s from 14. What patterns do the children notice? Ask, if this is 14 and we are counting on in 10s, what number will this be (point to an interval further along the stick.)?

Point to the centre of the stick and say, if this is 77 and we are counting in 10s, what are the numbers either side? What are the numbers at the beginning and end of the stick?

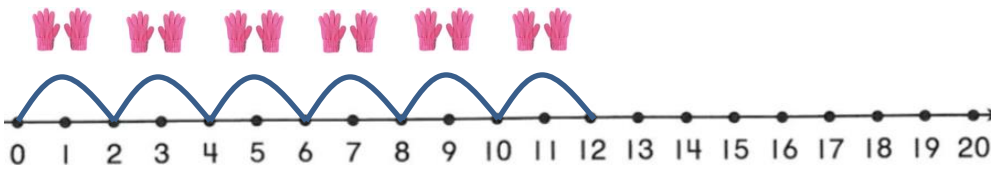
- Seat the pupils in a circle and explain that you will be counting in 2s. Holding a beanbag, count 0 and then throw to a pupil who continues the count in 2s (by saying 2). They in turn, throw it to another pupil who says 4 and so on. Alter the rules so that when you say 'backwards', the next person who catches the bean bag has to count back in 2s. This continues until you say 'forwards'. Use also for counts of 3, 5 and 10.

- Link counting on in 5s to the division of a clock face. Explain that there are small divisions all the way around a clock face that measure minutes. However, when we are telling the time it would be difficult to count each minute on a clock face so we count them in groups of 5. Ask the children if they can see where the first group of 5 minutes would be and label that point. Where would be the next group of 5 minutes? How many minutes would that be altogether (10)? Label that point and continue around the clock until all intervals are labelled. How many minutes are there all around the clock? When the big (minute) hand travels all the way around the clock, how much time has passed? (60 minutes or 1 hour)?



- Alongside a practical counting activity, demonstrate using a number line to count on in steps of 2, 3 and 5.
  For example, "How many gloves altogether?"

6 steps of 2 would look like:



Using write on/wipe off number lines, ask pupils to count on a given amount of steps, for example 'Show me 7 jumps of 5 on a number line'. What number do you end on? How can you write this as an addition sentence? How can you write this as a multiplication sentence?

RECALL AND USE MULTIPLICATION AND DIVISION FACTS FOR THE 2, 5 AND 10 MULTIPLICATION TABLES, INCLUDING RECOGNISING ODD AND EVEN NUMBERS

Teaching should focus on:

- Deriving and recalling multiplication facts for the 2, 5 and 10 times-tables and corresponding division facts
- Recognising odd and even numbers to 100
- Recognising multiples of 2, 5 and 10
- Connecting the 10 x table to place value knowledge.

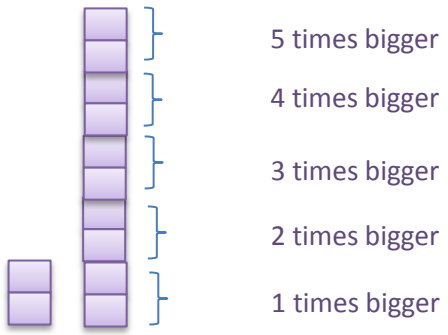
- Show pupils how to use their fingers to keep track of counting in steps. To calculate, for example 2 x 6, they could hold up 6 fingers and move each in turn as they count on in twos (each finger representing a count of 2). Encourage pupils to see the link between multiplication and division by asking, 'How many 2s in 12?'

To calculate 5 x 7, the pupil would hold up 7 fingers and count on in fives. Overtime, pupils may be able to visualise this process in their head and calculate without the use of their fingers.

- Ask pupils what patterns they see in the 10 x table. How can these patterns help them to recall the 10 x table facts? Show them a place value chart. Each row is 10 x bigger than the row above it. Explain that when a number is multiplied by 10, the digits move one place to the left and the spare place is filled with a zero because zero is a place holder. Remove some of the numbers from the place value chart, can the pupils work out what the missing numbers are? What is the value of the 2 digit in each of the numbers 2, 20 and 200?

1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900

- Look at scaling through the language of , for example, " 10 times larger/ bigger than …"
  What number is 10 times bigger than 5?
  Make a tower 5 times bigger than this one. How many cubes will we need?



- Put out 3 chairs and label them hundreds (H), tens (T) and units or ones (U/O). Seat a child in the units chair and give them the number 5. Explain that when 5 is multiplied by 10, the digits move one place to the left. Ask another pupil to move the seated pupil one place to the left. What do we do with the empty chair? Seat another pupil in the units chair and give them a 0 to hold. What number do we make when we multiply 5 by 10? What was the value of the 5 digit at the start? What is the value of the 5 digit now? What would happen if we multiplied by 10 again? Repeat with other numbers.

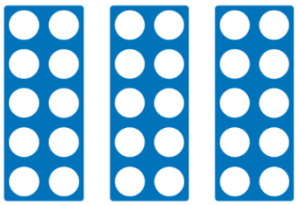
- Look at patterns in the 2, 5 and 10 times tables. Would the number 32 be in any of these tables if we extended them past x 12? How do you know? Why wouldn't 32 be in the 5 or 10 times tables? Repeat with other numbers. Can you think of any numbers that will be in the 2 and the 5 times tables or the 2, 5 and 10 times tables?

- Create a set of cards with multiplications facts for the 2, 5 and 10 times tables on one side and the answers on the other side. Ask the children to lay the cards with the multiplication facts showing. Playing in groups of twos or threes, the pupils take it in turns to select a card and say what the answer is, turning the card over to check. If the answer is incorrect they must leave the card with the multiplication fact showing. Play continues until all the cards are turned off. Alternatively, place the cards with the answers showing and pupils need to determine what the multiplication fact is.

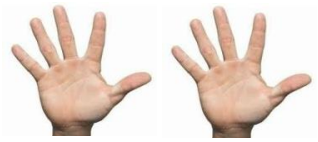
5 x 7	10 x 4	2 x 3
2 x10	10 x 8	5 x 12

35	40	6
20	80	60

- Look at a selection of multiplication facts such as 5 x 2, 10 x 3, 2 x 6 etc. Ask the pupils to match the statements with representations using structural apparatus. For example



10 x 3



5 x 2

2 x 6

- In year 1, pupils will have explored odd and even numbers and how to identify them up to 20. Ask pupils to colour in the even numbers on a hundred square in red. What patterns can they see in the red coloured numbers and in the non-coloured numbers? Can they use these patterns to determine whether 107 would be coloured red? What about 134? Why/ why not?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

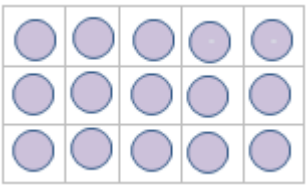
SHOW THAT MULTIPLICATION OF TWO NUMBERS CAN BE DONE IN ANY ORDER (COMMUTATIVE) AND DIVISION OF ONE NUMBER BY ANOTHER CANNOT

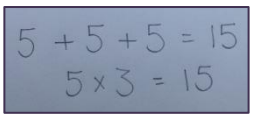
Teaching should focus on:

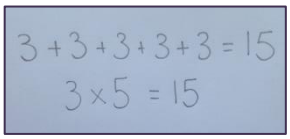
- Making and annotating arrays

See also ***Written Calculation Guidance,***
Year 2 Multiplication *'Making arrays using physical objects and representing them in drawings' and 'Annotating arrays using multiplication'*
Year 2 Division *'Introducing arrays for visualisation of division'*

- Place a row of 5 counters onto a grid (in order to maintain a well organised array). Ask the pupils how many counters they can see. Place another row of 5 counters below the first row. Ask the pupils how many counters altogether now. Encourage the pupils to count on in 5s as opposed to ones. Repeat with another row. Model writing the corresponding addition and multiplication sentences. Look at how many counters in one column. How many counters in 2 columns? In 3 columns? In 4 columns? In 5 columns. Again, writing the corresponding addition and multiplication sentences. What do the children notice? What is the same and what is different about the number sentences?

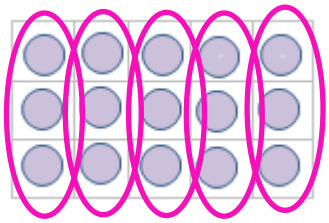






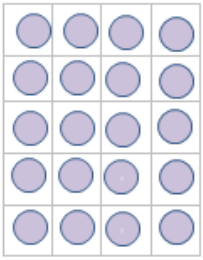
Ask the pupils, 'Do you think that this will be the same for all arrays?'. Investigate with other arrays to see if 2 numbers can be multiplied in any order.

- Use this array to show 15 ÷ 3 as how many groups of 3 in 15.



Ask pupils, 'Will we get the same answer if we work out 15 ÷ 5?' Demonstrate finding how many groups of 5 in 15.

- Explore the multiplication and division sentences that can be worked out using an array. What patterns can the pupils see?



4 x 5 = 20
5 x 4 = 20
20 ÷ 5 = 4
20 ÷ 4 = 5

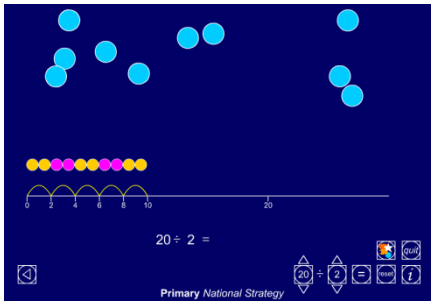
SOLVE PROBLEMS INVOLVING MULTIPLICATION AND DIVISION, USING MATERIALS, ARRAYS, REPEATED ADDITION, MENTAL METHODS, AND MULTIPLICATION AND DIVISION FACTS, INCLUDING PROBLEMS IN CONTEXTS.

Teaching should focus on:

- Working with a range of materials and apparatus to represent multiplication and division problems.
- Using grouping and sharing strategies to solve division problems.
- Presenting problems in a range of contexts including fractions and measures.

See also ***Written Calculation Guidance,***
Year 2 Division '*Considering remainders when dividing'* and *'Using base-ten resources to support division'*

- Pupils should be told that they are learning about Division and that 'sharing' and 'grouping' are different division approaches as opposed to over emphasising the vocabulary of 'sharing' in place of division.



- Use the Interactive Teaching Programme ' Grouping'

to demonstrate division by grouping on a number line

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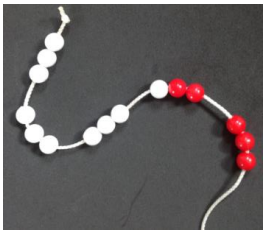
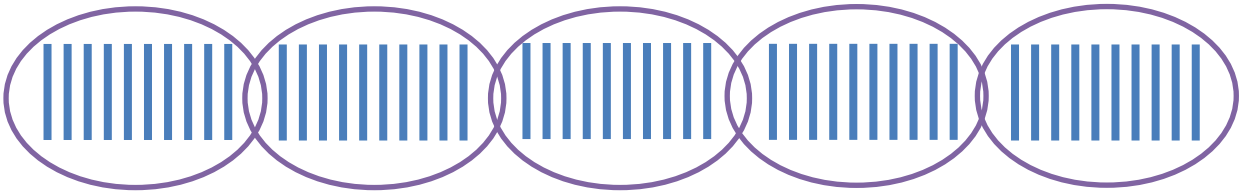
- Pupils can also use bead strings to count on in small groups and to group for division.

What is 3 x 5?

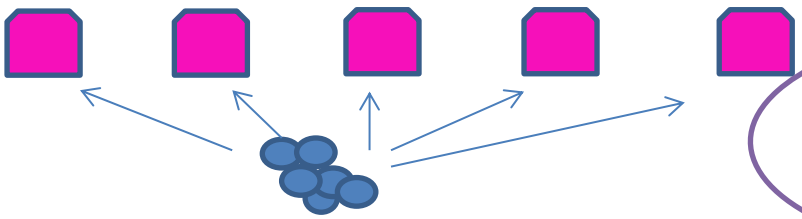


How many groups of 3 can you make from 15 beads?

- Using a range of structural apparatus and the strategies detailed above, ask pupils to represent problems such as
    - Pencils are bought in packs of 10. The teacher has 50 pencils, how many packs has he bought? Explain how you have solved this.

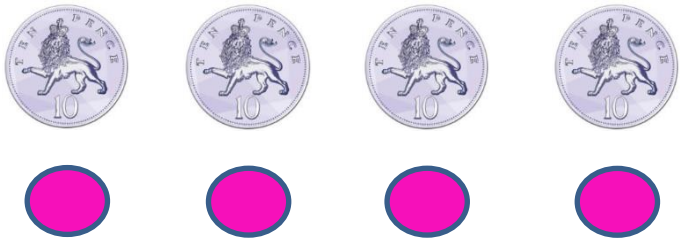


    - Which of these numbers would have a remainder of 1 when divided by 5? Which one (s) would not? How do you know? 20, 56, 37, 42, 75, 81
    - Kate needs to make up 5 party bags. She has 30 sweets. How many does she need to put into each bag so that they hold the same amount?



" One for this bag, one for this bag, one for this bag...." ..leading to 6 sweets in each bag.

- A bubble gum costs 10p, how much will it cost to buy 4 bubble gums?



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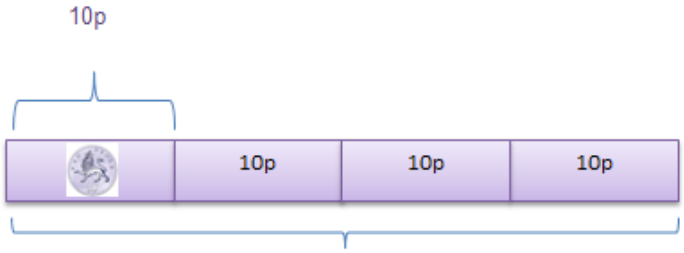


?

10p + 10p + 10p + 10p = 40p

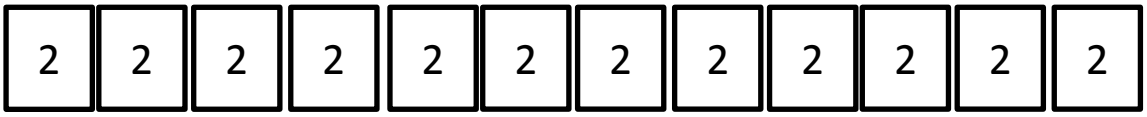
10p x 4 = 40p

- Find half of 24…..double 18…double 60

  Half of 20 = 10
  Half of 4 = 2
  Half of 24 = 10 + 2 = 12

  Double 10 = 20
  Double 8 = 16
  Double 18 = 36

- It takes Tom 2 minutes to read a page of his book. How long will it take him to read 12 pages?



OR Using Cuisenaire rods/ bars