Progression in Calculation Policy

Rudyard Kipling Primary School

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RUDYARD KIPLING PROGRESSION IN ADDITION

Vocabulary

More
Add
Make
Double
Total
Altogether
One more, two more etc
How many more to make..?
How many more is … than…?
Is the same as

Resources

Counters
Number lines / large and small.
Number bibs
Compare bears
Number bus
Grab mats
Numicon
Collection of rhymes and songs.
Dice
Bead Strings
Cubes
Board games

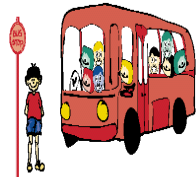### 1) Pictorial representation (objects or pictures)

How many altogether?

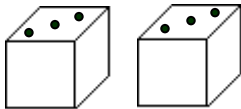There are 3 bears, 2 more makes?

3

2

Double the number of objects/spots
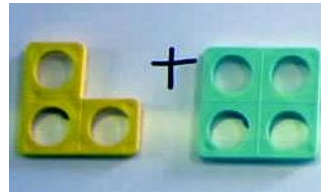
Also topic related number lines e.g. people-
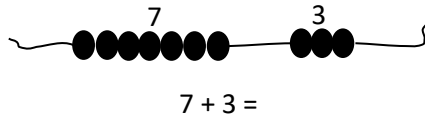
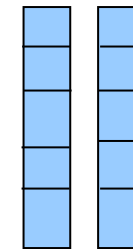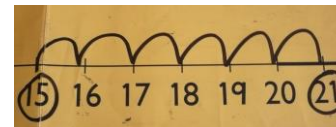KQ: There are 5 people on the bus, how many more to make 10?

Double 3 is 6.

2) Equipment to represent

Number bonds

7   3

7 + 3 =

4+3=7

5+5=10

Marks to represent numbers

Use number line and Numicon to show addition, and addition can be done in any order.

3) Use a number line to count on in 1s (up to 10, 20 and then 30)

3 + 5 = 8

15 + 6 = 21

0 1 2 ③ 4 5 6 7 ⑧

⑮ 16 17 18 19 20 ㉑

3 + 4 + 7 = 3 + 7 + 4

RUDYARD KIPLING PROGRESSION IN ADDITION

Vocabulary

Add
Addition
More
Plus
Make
Sum
Total
Altogether.
Double
Near double
One more, two more, 10 more.
How may more to make ….?
How many more is than …?
How much more is …than …?
Is the same as
Equals, sign
Tens
Units
Place holder
One digit
Two digit

Resources

Counters
Number lines / large and small.
Dice
Bead Strings
Cubes
Numicon
Dienes
100 square

---

4)   Add a 1 digit number to a 2 digit number by counting on.

$56 + 3 = 59$

$15 + 3 = 18$

$15 + 6 = 21$

5)   Add a 2 digit number to a 2 digit number (without bridging 10).

$12 + 23$
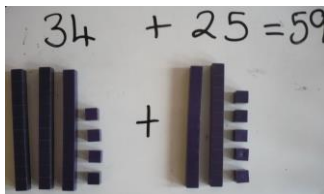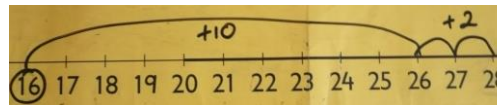
$57 + 41 = 98$

$50 + 40 = 90$

$7 + 1 = 8$

Partitioning

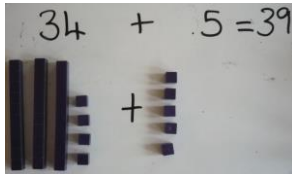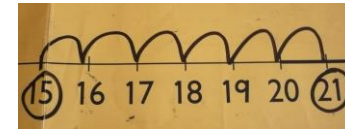# RUDYARD KIPLING PROGRESSION IN ADDITION

Vocabulary

Add
Addition
More
Plus
Make
Sum
Increase
Total
Altogether.
Double
Near double
One more, two more, 10 more.
How may more to make ….?
How many more is than …?
How much more is …than …?
Is the same as
Equals, sign
Tens
Units
One
Place holder
One digit
Two digit
Three digit
Partition
Expanded method
Most/least significant digit
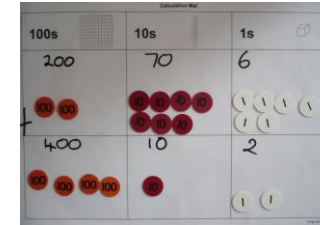Tenth
Hundredth
Thousandth
Decimal point

Resources

Place Value Counters

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6)   Horizontal expanded method to add 2 and 3 digit numbers (no bridging)

$$30 + 6$$
$$\underline{50 + 3} \quad = 89$$

$$200 \ + 70 \ + 6$$
$$\underline{400 \ + 10 \ + 2} \quad = 688$$
$$600 \ + 80 \ + 8$$

Place Value Counters

7)   Horizontal expanded (carrying)

$$200 + 70 + 6$$
$$\underline{400 + 10 \ + 7} \quad = 693$$
$$600 + 90 \ + 3$$

$$200 + 60 + 9$$
$$\underline{100 \ + 50 \ + 3} \quad = 422$$
$$400 + 20 + 2$$

8)   Compact method (no bridging)

```
  621
+ 147
-----
  768
```

```
  471
+ 327
-----
  798
```

9)   Compact method (carrying)

```
  278
+ 414
-----
  692
   1
```

```
  368
  496
-----
  864
   11
```

```
  7648
+ 1486
------
  9134
   111
```

10)   Compact method (decimals)

```
  6.72
  8.56
  2.30
------
£17.58
  1
```

```
 489.21
 134.95
+201.30
-------
 825.46
 111
```

Empty box

```
  4 □ 3
  □ 5 □
-------
  9 3 1
```
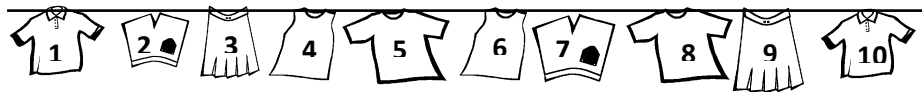
RUDYARD KIPLING PROGRESSION IN SUBTRACTION

Vocabulary

Take away
Leave
Less
How many are left?
How many have gone?
One less, two less, 10 less etc
How many fewer is …than …?
Difference between
Is the same as

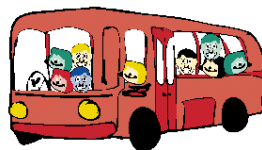## 1) Number order, counting backwards practically

Washing line

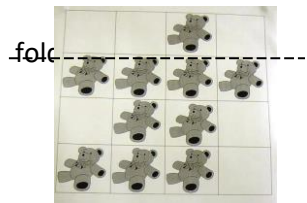Number line to 10 then 20 – counting backwards

6 objects in a bag

I take 1 away-

How many left

Number Bus

9 on the bus, take 1 away

10 teddies, hide 1, how

fold

Songs:

♫ 10 in the bed

♫

♫ 5 little ducks

KQ – There are 10 counters in the ping ping tin. I take 3 out how many left?

KQ – Write this as a number sentence

$$29 – 7 = 22$$

-7

0   22   29

2) Counting backwards in ones

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

$$17 – 4 = 13$$

Resources

Counters
Number lines / large and small.
Number bibs
Compare bears
Number bus
Grab mats
Numicon
Collection of rhymes and songs.
Dice
Bead Strings
Cubes
Board games

Vocabulary

Take away
Leave
Less
Subtract
Minus
Increase
How many are left?
How many have gone?
One less, two less, 10 less etc
How many fewer is …than …?
How much less is?
Half, halve
Difference between
Is the same as
Equals sign
Number sentence
Operation

Resources

Number lines
100 squares
Place value counters
Dienes
Cubes
Numicon

3) Subtracting tens then ones

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

$45 - 11 = 34$

$27 - 11 = 16$

$55 - 23 =$

$50 - 20 = 30$

$5 - 3 = 2$

_____

32

Partitioning

29   33   43   53

$53 - 24$

RUDYARD KIPLING PROGRESSION IN SUBTRACTION

4) Finding the difference

What is the difference?

4   6

$10 - 4 = 6$

84 - 56

+4   +10   +10   +4

0   56   60   70   80   84
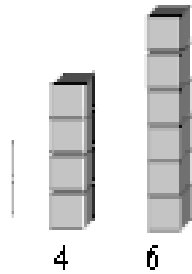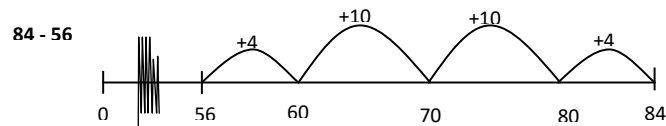
Counting up from the smaller to the larger number

$84 - 56$ $56 + 4 + 20 + 4 = 84$
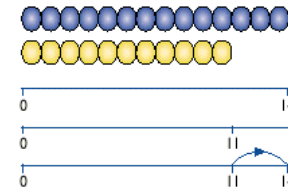
The difference between 11 and 14 is 3.
$14 - 11 = 3$
$11 + \square = 14$

0   14
0   11
0   11   14

163 - 47

+3   +50   +60   +3

0   47   50   100   160   163

RUDYARD KIPLING PROGRESSION IN SUBTRACTION

5) Horizontal expanded (no exchanging)

55 - 23 =

```
   50   5
-  20   3
   _____
   30   2        = 32
```

858 - 427 =

```
   800  50   8
-  400  20   7
   _____
   400  30   1        = 431
```

Place Value Counters

5) Horizontal expanded with exchanging

75 - 48 =

```
   60   15
   70   5
   _____
   40   8
   20   7        = 27
```

675 - 398 =

```
   500  160  15
        60
   600  70   5        = 277
   300  90   8
   _____
   200  70   7
```

RUDYARD KIPLING PROGRESSION IN SUBTRACTION

Vocabulary	
Take away Leave Less Subtract Minus How many are left? How many have gone? One less, two less, 10 less etc How many fewer is …than …? How much less is? Half, halve Difference between Is the same as Equals sign Number sentence Operation	**6) Compact without exchanging** 697 - 284 ――― 413 24.98 - 12.25 ――― 12.73 **7) Compact with exchanging** 75 - 48 = 87.5 - 54.8 = 6 15 7 5̶ - 4 8 ―――― 2 7 6 15 8 7̶ . 5̶ - 5 4 . 8 ―――― 3 2 . 7
Resources	

RUDYARD KIPLING PROGRESSION IN MULTIPLICATION

1) Counting groups of objects

Double this number

Number line

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10$$
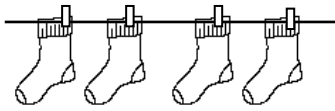
4 socks 2 pairs

Making pairs of
gloves / socks etc

3 + 3 = 6 spots

Thread beads in 2 colours in patterns of 2s

Matching groups of
Numicon to a given plate
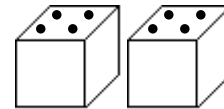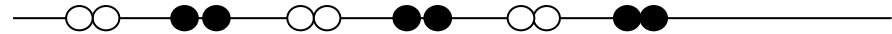
Double 4 is 8
Half of 8 is 4
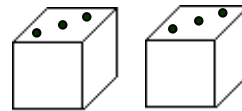
Double 3 is 6.
Half of 6 is 3

Using fingers to count multiples of 2 (or 5, or 10)

How many 2s have I counted?

I've counted four 2s. what number have I
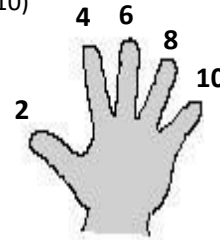
4 6
8
10
2

10p + 10p + 10p = 30p

3 lots of 10p = 30p

10, 20, 30

RUDYARD KIPLING PROGRESSION IN MULTIPLICATION
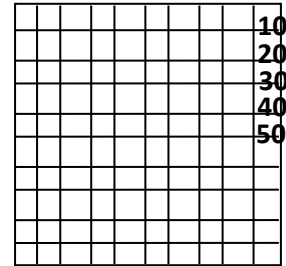
Vocabulary

Double
Lots of
Groups of
Pairs of
Times
Multiply
Multiple
Repeated addition
Array
Column
Row
Twice as big/wide/long

Resources

Cubes
Counters
Peg boards
100 square
Objects
Multiplication square
Ping Ping tin

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2) Counting in 2s, 5s and 10s

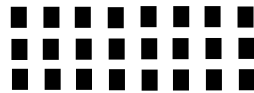**Maths Mission**

Learning times tables up to 12 x 12

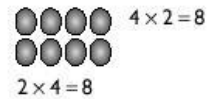Counting in 10s on 100 square

3) Multiplication as an array

24 = 8 + 8 + 8 = 8 x 3

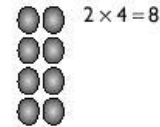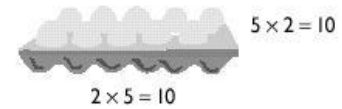24 = 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 =

3 x 8

3 times 8 is 24

$4 \times 2 = 8$

$2 \times 4 = 8$

$2 \times 4 = 8$

$4 \times 2 = 8$

$5 \times 2 = 10$

$2 \times 5 = 10$

$2 \times 5 = 10$

$5 \times 2 = 10$

RUDYARD KIPLING PROGRESSION IN MULTIPLICATION

Vocabulary

Double
Lots of
Groups of
Pairs of
Times
Multiply
Multiple
Product
Repeated addition
Array
Column
Row
Twice as big/wide/long

Resources

Washing lines
100 Square
Number lines
Counters
Beads
Cuisenaire Rods

4) Repeated addition on a number line

0   4   8   12   16   20   24

$2 + 2 + 2 + 2 + 2 = 10$

$2 \times 5 = 10$

2 multiplied by 5

5 pairs

5 hops of 2

0   2   4   6   8   10

For example,

4 added together 6 times is 4 + 4 + 4 + 4 + 4 + 4

or

3 hops of 8

3   3   3   3   3   3   3   3

8 hops of 3

Blank number line:

5 x 4   1 x 4

0   20   24

3 x 5 = 15

5 x 3 = 15

RUDYARD KIPLING PROGRESSION IN MULTIPLICATION

Vocabulary

Double
Lots of
Groups of
Pairs of
Times
Multiply
Multiple
Product
Repeated addition
Array
Column
Row
Twice as big/wide/long

5) Partitioning

15 x 5 =
10 x 5 = 50
 5 x 5 = 25
_____
    75

6) Long Multiplication
(always start with units first)

```
      64
    x  8      (8 x 4)
   _____
      32      (8 x 60)

     480
   _____
     512
```

```
      64
    x 38      (8 x 4)

      32      (8 x 60)

     480      (30 x 4)

     120
```

```
     164
   x   8      (8 x 4)
  _____
      32      (8 x 60)

     480      (8 x 100)

     800
```

7) Compact Multiplication

```
     1 6 4
       x 5
   _____
     8 2 0
     3 2
```

```
     2 3 7
   x    2 5
   11¹8³5

   47¹4 0
 = 5 9 2 5
```

```
   1 .6 4
      x 5
   _____
   8 .2 0
     3 2
```

Resources

Place Value Counters

RUDYARD KIPLING PROGRESSION IN DIVISION

Vocabulary

Share
Share equally
Group
Pair
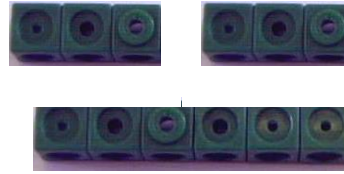Divide
Divide by
Divide into
Equal groups
Half
Halve

Resources

Cubes
Counters
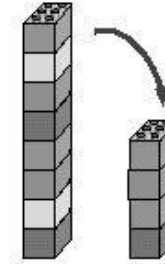Pairs of socks/gloves
Numicon
Washing line
Objects
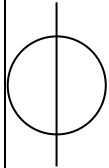
1) Halving

Sharing between two

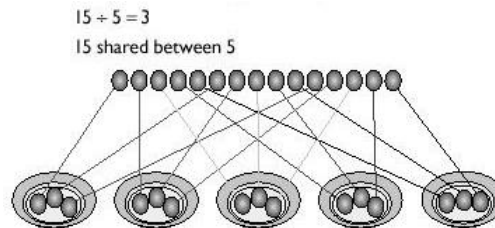½ of 1
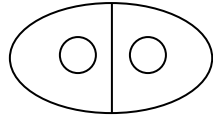
½ of one group of

Halving unifix

half of 8 is 4

$8 \div 2 = 4$

Half of six is three

2) Sharing

Share Equally

Sorting a number of objects into 2 equal groups

$15 \div 5 = 3$

15 shared between 5
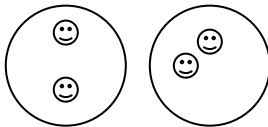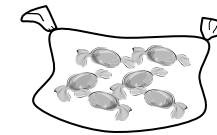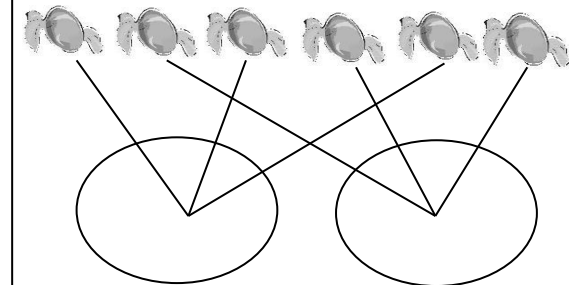
Share a bag of 6 sweets between 2 children – one for you, one for you……..

6 sweets are shared equally between 2 people.

Be able to write number sentence when halving

$8 \div 2 = 4$
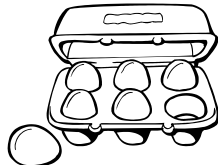
Sharing 'eggs' into egg boxes

RUDYARD KIPLING PROGRESSION IN DIVISION

Vocabulary

Share
Share equally
Group
Pair
Divide
Divide by
Divide into
Equal groups
Half
Halve
Remainder
Inverse

Resources

Cubes
Objects
Counters
Number lines
Bead strings

3) Grouping

Interpret 8 ÷ 2 as 'how many 2s make 8?'

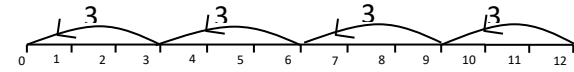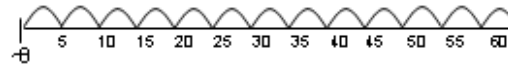In a word problem, "there are 8 shoes outside the mosque. How many people are inside?"

÷

A bag of 15 sweets. How many children can have 3 sweets each?
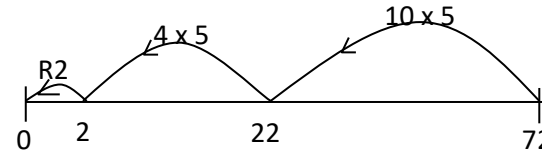
How many 3s in 15?

USE DIVISION SYMBOL → 15 ÷ 3 = 5

Division as sharing equally and as grouping

must be introduced alongside one

Introducing division as repeated subtraction

$72 \div 5 = 14 \text{ r } 2$

R2   4 x 5   10 x 5

0   2   22   72

Check answer using the inverse

$15 \div 3 = 5$
$5 \times 3 = 15$

RUDYARD KIPLING PROGRESSION IN DIVISION

Vocabulary

Share
Share equally
Group
Pair
Divide
Divide by
Divide into
Equal groups
Half
Halve
Remainder
Inverse
Divisible by
Factor
Quotient

Resources

---

4) Word problems rounding answer up or down

Examples of rounding down
• I have £62. Tickets cost £8 each.
$62 \div 8 = 7$ r 6.
I can buy only 7 tickets.

• I have 42 cakes. I can only sell full boxes. One full box holds 8 cakes.
$42 \div 8 = 5$ r 2
I could only sell 5 full boxes of cakes.

Examples of rounding up
• I have 62 cakes. One box holds 8 cakes.
$62 \div 8 = 7$ r 6
I will need 8 boxes to hold all 62 cakes.

• There are 27 people. There are 8 seats at a table.
$27 \div 8 = 3$ r 3
I will need 4 tables to seat everyone.

5) Long Division

```
     _____                 _____
7 ) 256              6 ) 39
-   210  30 x 7      -  36   6 x 6
    46                  ___
    42   6 x 7          r 3
Answer:  36 r 4      Answer: 6 r 3
```

7) Represent remainders as fractions and decimals

$256 \div 7 = 36$ r 4 =
r 4 = $^4/_7$ = 0.57

6) Short Division

```
  0  3  6 r4
7 ) 2 ²5 ⁴6
```