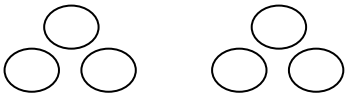
**Calculation Policy**

# Addition

## Milestone 1

**Combining objects**



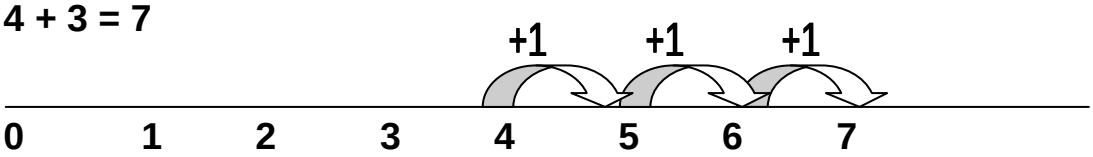
**3 + 3 = 6**

**Number bonds**
- **bonds to 10**
- **bonds to 20**
- **bonds to 100**

**Number lines**

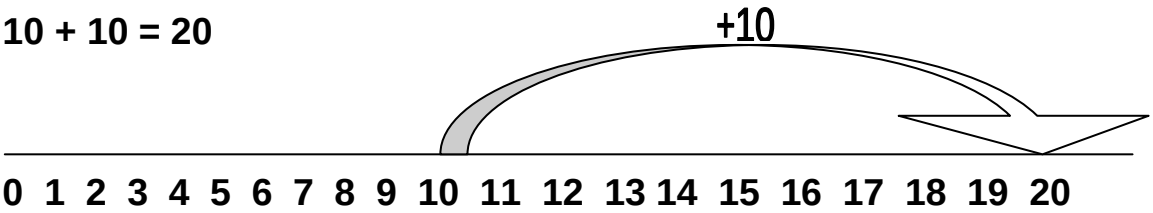
**Adding units**

**4 + 3 = 7**

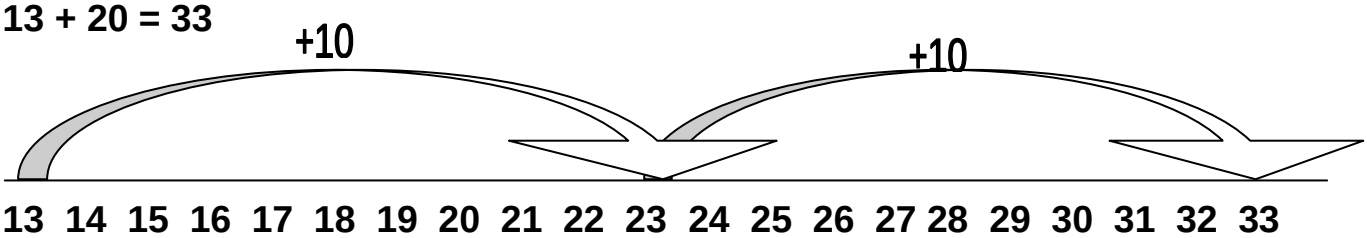



**Adding tens**

**10 + 10 = 20**

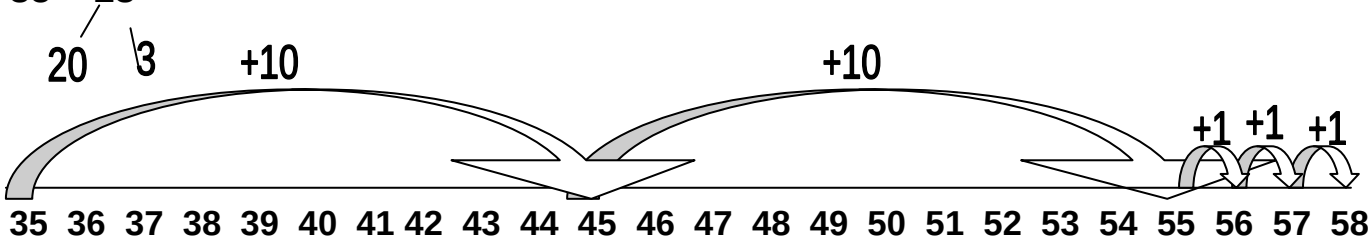



**13 + 20 = 33**



## Adding tens and units

**35 + 23 =**




## Hundred Squares

**Adding tens** **e.g** **24 + 10 = 34** **47 + 20 = 67**

**Adding tens and units** **e.g** **41 + 12 =** **72 + 24 = 4**

10 2 20 4

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 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 |

# Milestone 2

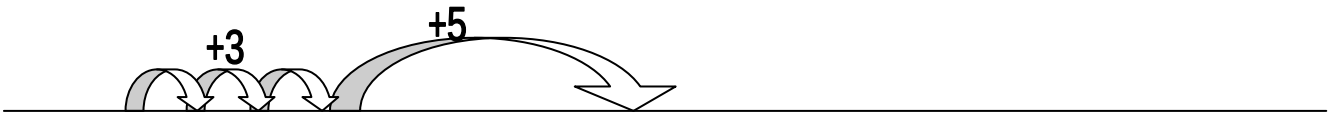
## Bridging

**37 + 8 =**

**37 + (3+5) =**

**37 + 3 = 40**

**40 + 5 = 45**




## Partitioning

**76 + 32 = 108**

70 6 30 2

**70 + 30 = 100**

**6 + 2 = 8**

**100 + 8 = 108**

**245 + 336 = 581**

200 5 300 6

40 30

**200 + 300 = 500**

**40 + 30 = 70**

**5 + 6 = 11**

**500 + 70 + 11 = 581**

## Column Addition

**Starting with the units and exchanging (not borrowing)**

| | H | T | U |
|---|---|---|---|
| | 2 | 3 | 6 |
| + | 1 | 4 | 7 |
| | 3 | 8 | 3 |

1

# Milestone 3

**Using decimals and starting with the smallest unit**

```
  H  T  U  .  t  h
  1  3  4  .  3  6
+ 7  4  2  .  4  5
  8  7  6  .  8  1
           1
```

**Adding multiples of 10, 100, 1000 etc using place value**

**e.g.**

**1 4 6 7 + 3 0 = 1 4 9 7**

**2 6 5 4 + 3 0 0 = 2 9 5 4**

**5 4 3 2 1 + 4 0 0 0 = 58321**

# Subtraction

## Milestone 1

**Taking away**

**5 - 2 = 3**

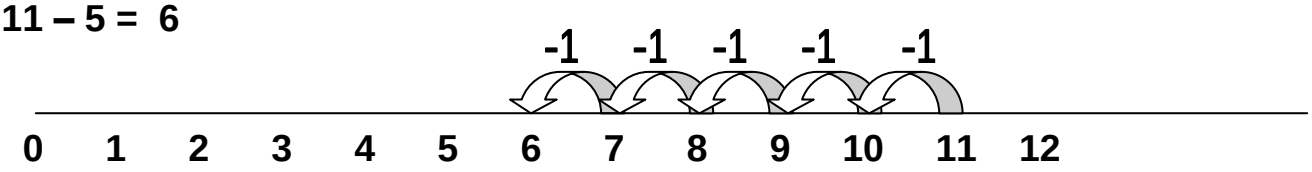
**Number bonds – subtraction facts**

- **bonds to 10 subtraction facts**
- **bonds to 20 subtraction facts**
- **bonds to 100 subtraction facts**

**Number lines**

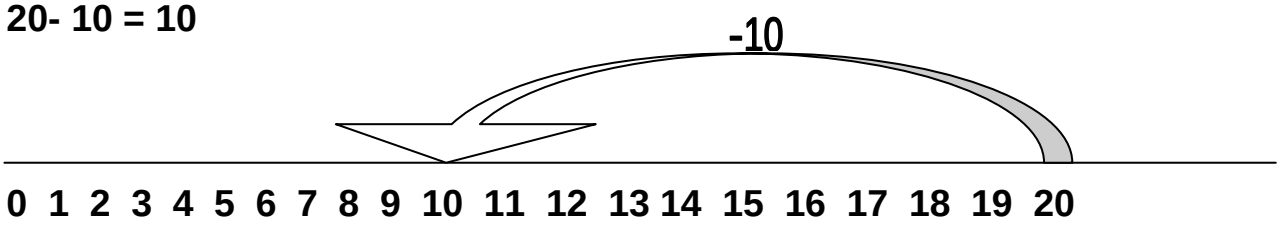
**Subtracting units**

**11 – 5 = 6**

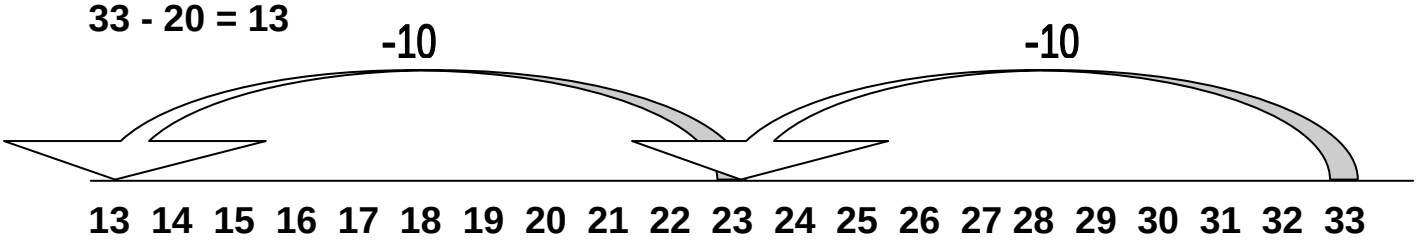



**Subtracting tens**

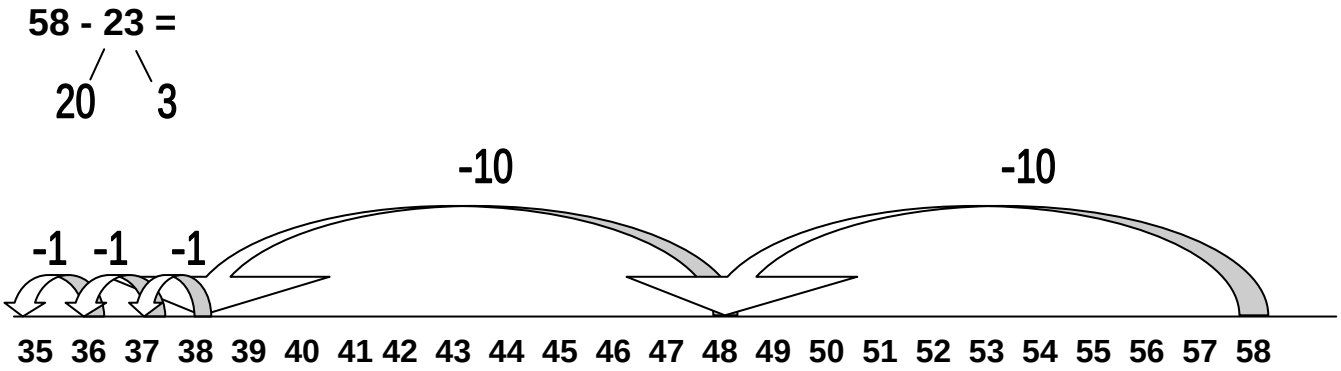
**20- 10 = 10**




**33 - 20 = 13**



## Subtracting tens and units




## Hundred Squares

**Subtracting tens** e.g 34 + 10 = 24 67 + 20 = 47

**Subtracting tens and units** e.g 53 - 12 = 41 96 + 24 =

10 2 20 4

| 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 |

# Milestone 2

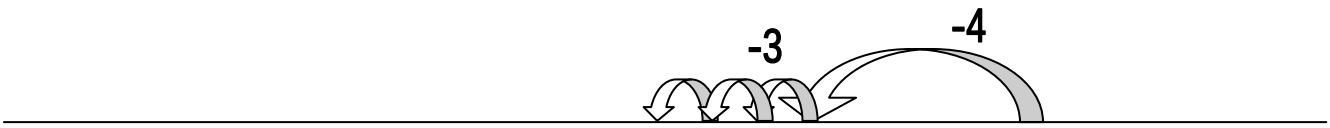
## Bridging

**54 – 7 = 47**

**54 – (4+3)**

**54 – 4 = 50**

**50 – 3 = 47**




**35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58**

## Partitioning

**98 - 32 = 66**

30 2

**98 - 30 = 68**

**68 - 2 = 62**

**98 – 32 = 66**

**588 - 336 = 252**

300 6

30

**500 - 300 = 200**

**80 - 30 = 50**

**8 - 6 = 2**

**200 + 50 + 2 = 252**

## Column Subtraction

**Starting with the units and exchanging (not borrowing)**

| H | T | U |
|---|---|---|
| 2 | $^{7}\not{8}$ | $^{1}6$ |
| - 1 | 4 | 7 |
| 1 | 3 | 9 |

# Milestone 3

**Using decimals and starting with the smallest unit**

| H | T | U | . | t | h |
|---|---|---|---|---|---|
| $^{6}\not{7}$ | $^{1}3$ | $^{3}\not{4}$ | . | $^{1}3$ | 6 |
| - 1 | 4 | 2 | . | 4 | 5 |
| 5 | 9 | 1 | . | 9 | 1 |

**Subtracting multiples of 10, 100, 1000 etc using place value**

**e.g.**

**1 4 6 7 - 3 0 = 1 4 3 7**

**2 6 5 4 3 - 3 0 0 0 = 2 3 5 4 3**

**5 4 3 2 1 - 4 0 0 0 = 5 0 3 2 1**

# Multiplication

## Milestone 1

**Early tables, counting and chanting**

**1x, 2x, 10x and 5x**

**Sequences**

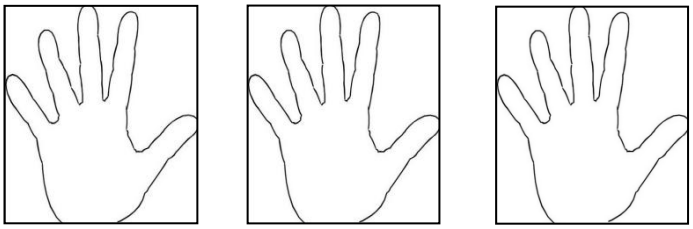
**1, 2, 3, 4, 5 . . .**

**2, 4, 6, 8, 10 . . .**

**5, 10, 15, 20, 25 . . .**

**10, 20, 30, 40, 50 . . .**

**Repeated addition**



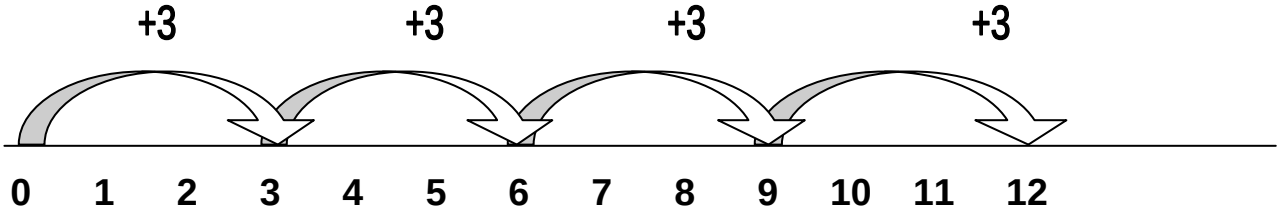
**5 + 5 + 5 = 15**

**3 lots of 5 = 15**

**3 x 5 = 15**

**Using a number line**

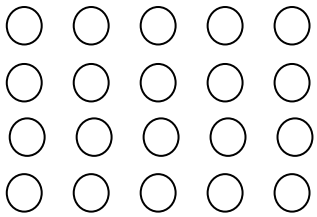
**4 x 3 = 12**



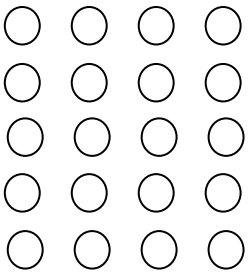
**Arrays**

**Use to explore commutative law**

**4 x 5 = 20**



**5 x 4 = 20**



# Milestone 2

## Grid method

**TU x U**

**12 x 6 = 72**

10 2

| X | 10 | 2 |
|---|---|---|
| 6 | 60 | 12 |

**60 + 12 = 72**

**TU x TU**

**22 x 15 = 330**

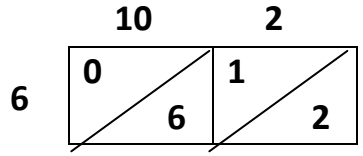
20 2 10 5

| X | 20 | 2 |
|---|---|---|
| 10 | 200 | 20 |
| 5 | 100 | 10 |

**200 + 100 + 20 + 10 = 330**

## Alternative to Grid Method

**12 x 6 = 72**




**Then add the diagonals**

**0**

**1+6 = 7**

**2**

**Therefore 12 x 6 = 72**

## Connections

**X2 – Doubling**

**X4 – Double and double again**

**X8 – Double, double and double again**

**X20 – Multiply by 10 and double**

**X5 – Multiply by 10 and halve**

**X200 - Multiply by 100 and double**

**Short cut tricks for mental calculation**

**e.g. 13 x 8 =**

**Double 13 = 26**

**Double 26 = 52**

**Double 52 = 104**

**<u>Multiplying by 10, 100, 1000 etc</u>**

**Place value sliders are useful for illustrating this.**

**2 x 10 = 20**

**2 x 100 = 200**

**2 x 1000 = 2000**

**0.45 x 10 = 4.5**

**0.45 x 100 = 45**

**0.45 x 1000 = 450**

**Linking multiplication tables**

**e.g.**

**7 x 3 = 21**

**700 x 3 = 2100**

**7000 x 3 = 21,000**

**<u>Written Method</u>**

**Alongside recalling tables to 12 x 12**

**TU x U**

**T U**

**3 6**

**<u>X 4</u>**

**2 4 (6 x 4)**

**<u>1 2 0</u> (30 x 4)**

**1 4 4**

**Leading to...**

| H | T | U |
|---|---|---|
| | 3 | 6 |
| X | | 4 |
| 1 | 4 | 4 |
| | 2 | |

6 x 4 = 24

4 - units in the units column

20 – 2 in the tens column

30 x 4 = 120
Remember to add the 2 tens from 6x4

120 + 20 = 140

100 – 1 in hundreds column

40 - 4 in tens column

## Short multiplication

| Th | H | T | U |
|---|---|---|---|
| | 6 | 3 | 7 |
| X | | | 9 |
| 5 | 7 | 3 | 3 |
| | 3 | 6 | |

# Milestone 3

**With decimals...**

```
    4  0 . 2 8
X           6
-------------
  2  4  1 . 6 8
        1    4
```

**Long Multiplication**

**Th H T U**

```
    1 5 9
X     2 8
-------
 1  2  7 2  (159 x 8)
   4  7
 3  1  8 0 (159 x 20)
 1  1
-------
 4  4  5 2
    1
```

```
    3  7 . 2 5
x         2 9
-------------
  3 3  5 . 2 5
     6  2   4

  7 4  5 . 0 0
  1      1
-------------
1 0 8 0 . 2 5
-------------
```

**Using the same method for up to 4 digit x 4 digit**

**Facts**

**Factors**

**e.g. 12 1, 2, 3, 4, 6 and 12**

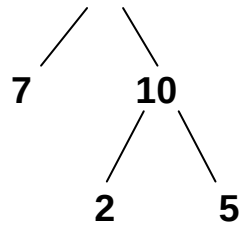
**Common factors**

**e.g. 12 1, 2, 3, 4, 6 and 12**

**30 1, 2, 3, 5, 6, 10, 15 and 30**

**Factor Trees**

**e.g. 70**




**So 70 = 7 x2 x 5**

**Prime numbers**

**The only factors are 1 and itself**

**e.g. 2, 3, 5, 7, 11, 13, 17 etc**

**Square numbers**

**$2^2$ = 2 x 2 = 4**

**$3^2$ = 3 x 3 = 9**

**$4^2$ = 4 x 4 = 16**

**etc.**

**Cubed numbers**

**$2^3$ = 2 x 2 x 3 = 8**

**$3^3$ = 3 x 3 x 3 = 27**

**$4^3$ = 4 x 4 x 4 = 64**

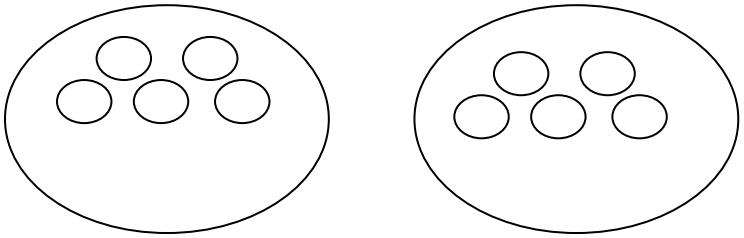
**etc.**

# Division

## Milestone 1

**Sharing practically**

**10 shared between 2**



**5 each**

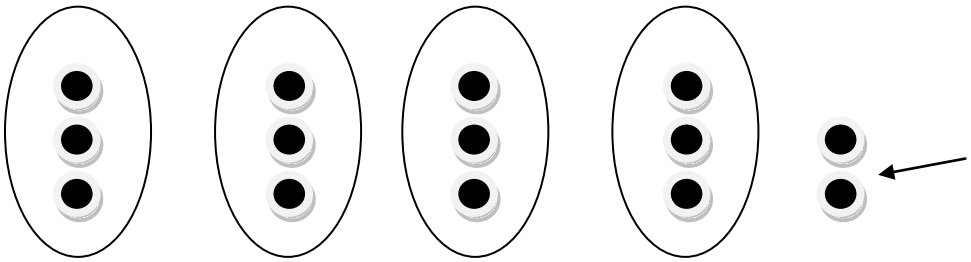
**Groups of**

**10 shared into 2 *equal* groups**

**10 ÷ 2 = 5**

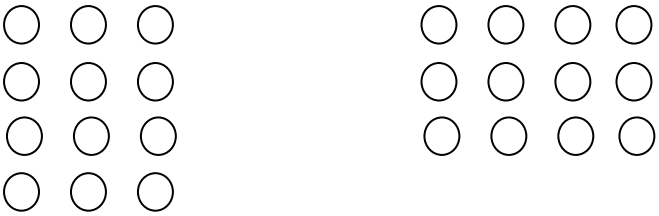
**Remainders**

**14 ÷ 4 = 3 r 2**

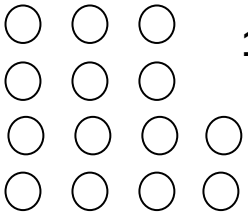


**2 left over**

**Sharing and grouping with arrays**



**12 ÷ 3 = 4** **or** **12 ÷ 4 = 3**

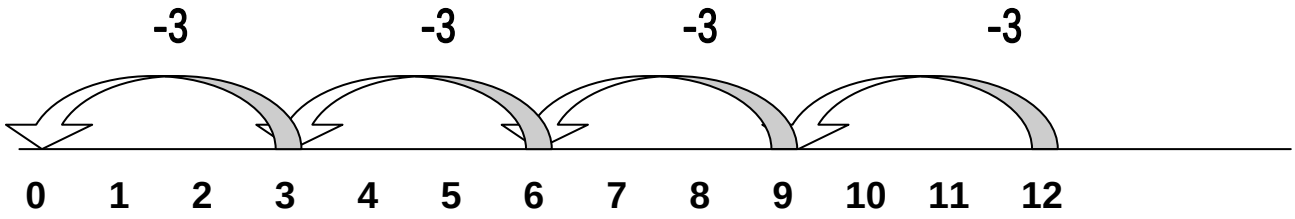


**14 ÷ 3 = 4 r 2**

**Repeated Subtraction**

**e.g.**

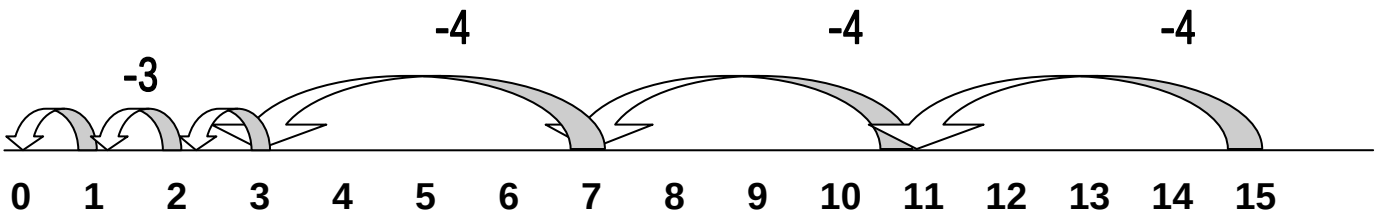
**12 ÷ 3 = 4**



# Milestone 2

**Repeated subtraction with remainders...**

**15 ÷ 4 = 3 r 3**




**Dividing multiples of 10, 100, 1000 etc**

**Place value sliders are useful for illustrating this.**

**e.g. 80 ÷ 4 = 10x (8 ÷ 4)**

**= 10 x 2**
**= 20**

**e.g. 270 ÷ 3 = 10 x (27 ÷ 3)**

**= 10 x 9**

**= 90**

**e.g. 800 ÷ 4 = 10 x (8 ÷ 4)**

**= 10 x 2**
**= 20**

**Written method**

**TU ÷ U**

**Chunking**

**Repeated subtraction as chunking**

**72 ÷ 4 = 18**

**7 2**
**- 4 0 (10 x 4)**
**3 2**
**- 3 2 (8 x 4)**
**0**

**10 + 8 = 18**

Leading to . . .

**Short Division (Bus Stop Method)**

72 ÷ 4 = 18

$$\begin{array}{r} 1\ 8 \\ 4\overline{)\,7^{3}2} \end{array}$$

With remainders . . .

74 ÷ 4 = 18 r 2

# Milestone 3

Chunking

**7 4**

**- 4 0 (10 x 4)**

**3 4** → **10 + 8 = 18**

**- 3 2 (8 x 4)**

**2** ← **2 left over or remaining**

**Short Division**

$$\begin{array}{r} 18\ r\ 2 \\ 4\overline{)\,7^{3}4} \end{array}$$

**HTU ÷ U, HTU ÷ TU and ThHTU ÷ U using Short Division**

$$\begin{array}{r} 16 \\ 11\overline{)\,1\ 7^{6}6} \end{array}$$

$$\begin{array}{r} 14\ 7\ r\ 2 \\ 9\overline{)\,1\ 3^{4}2\ ^{6}5} \end{array}$$

**Interpreting remainders in context**

**e.g. A classroom was set up in tables of 6. There were 27 children in the class. How many tables of 6 would be needed?**

**27 ÷ 6 = 4 r 3**

**Therefore 5 tables needed, 4 tables of 6 and another table with only 3 children on.**

**Remainders as fractions and decimals**

**Fractions**

**57 ÷ 4 = 14 ¼**

$$\begin{array}{r} 14\ r\ (1) \\ (4)\overline{)\,5^{1}7} \end{array}$$

**57** ÷ 4 = 14 with 1 out of 4 left over

57 ÷ 4 = 14 ¼

## Decimals

- **57 ÷ 4 = 14.25**

```
   1 4 . 2 5
4) 5 1 7 . 1 0 2 0
```

- **370.6** ÷ 4 = 92.65

```
     9 2 . 6 5
4) 3 7 1 0 . 2 6 2 0
```

## Long Division

**Beginning with recapping chunking**

**853** ÷ 24 = 35 r 13

```
24 ) 8 5 3
-    7 2 0   ( 30 x 24)        ──►  30 + 5 = 35
     1 3 3
-    1 2 0   ( 5 x 24 )        ◄──
       1 3   ◄──  13 left over or remaining
```

**Leading to . . .**

## Formal Long Division

**4259** ÷ 18 = 236 r 11

```
      2 3 6 r 11
18 ) 4 2 5 9
-    3 6
       6 5
-      5 4
       1 1 9
-      1 0 8
         1 1
```

**With decimals**

**57.75** ÷ 35 = 1.65