Year 2

Arithmetic

Workbook

by Richard Brown

<u>Place Value</u>

<u>Add</u>

<u>Subtract</u>

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Multiply

Divide

Fractions

Answers and Glossary

Key Language and Representations

Word Problems are the arithmetic number sentences written in a real-life reasoning and problem solving scenario.   e.g. **15** + **9** = **2 4**

Concrete Objects are manipulated or handled to calculate and represent a number sentence i.e. multilink cubes, numicon, counters, number line.

e.g. **3** + **3** = **6**   🟩🟩🟩 + 🟦🟦🟦 = 🟥🟥🟥🟥🟥🟥
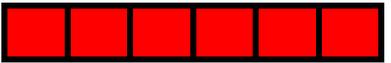
Number Lines are used to count forwards e.g. 0, 1, 2, 3, 4, 5 and also to count backwards e.g. 10, 9, 8, 7, 6, 5.

0 1 2 3 4 5 6 7 8 9 10
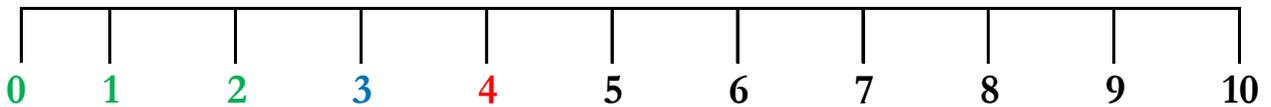
Column Addition is the formal written method of adding two or more numbers together, using a vertical arrangement in a columnar format.

	1s
	3
+	5
	8

	1s
	2
	1
+	3
	6

	10s	**1s**
	1	9
+	1	2
	3	1
	1	

Regroup 10 ones into **1** ten.

Column Subtraction is the formal written method of subtracting a smaller number from a bigger number, using a vertical arrangement in a columnar format.

	1s
	3
-	1
	2

	10s	**1s**
	2	0
-	1	0
	1	0

	10s	**1s**
	1	
	2̶ ¹0	
-	1	1
	0	9

Regroup 1 ten into **10** ones.

Strategy Applied refers to when a formal written method is used to

calculate a number senten 25 - 5 = 20

Explained using appropriate mathematical language, proven using concrete objects that can be handled, shown with pictorial representations visualising the calculations, to ensure a greater understanding of a mathematical concept.

Part Whole Models are pictorial mathematical images to represent **varied** calculations and number sentences.

e.g. 6 + 3 = ? 9
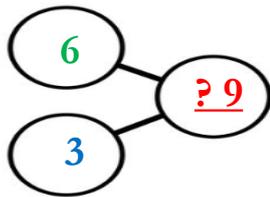
e.g. 9 - 2 = ? 7
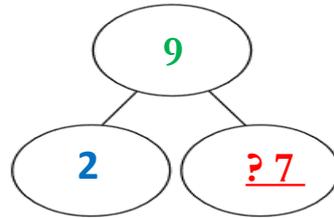
Bar Models are an image, that pictorially represents a number sentence.

e.g. 3 + 9 = ? 12

e.g. 20 - 2 = ? 18

3	9

? 12
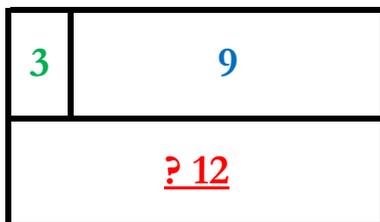
20

2	? 18
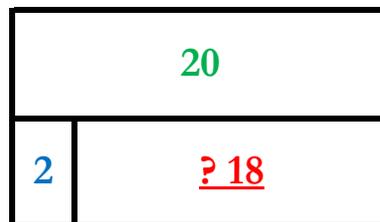
Groups of objects represents a total number of objects shared or divided into two or more groups of an equal number of the objects.

$\frac{1}{2}$ of 10 = 5

Group 1

Group 2
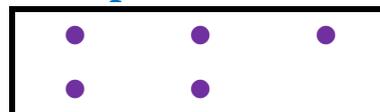
Number Grid

0	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	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149
150	151	152	153	154	155	156	157	158	159

Multiplication Square

x	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0
1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100
11	22	33	44	55	66	77	88	99	110
12	24	36	48	60	72	84	96	108	120

How Many

How many **10s** (tens) and **1s** (ones) are there in the number **18**?

1) **18** = ___

Word Problem

The number **eighteen** is a **2-digit number**.

Each of the **digits** represents the **10s** and **1s column place values**.

Work out how many **10s** and **1s**, there are in the number **eighteen**?

Place Value Grid

Hundreds	Tens	Ones
100s	10s	1s
	1	8

Strategy Applied

The number **eighteen** is to be represented on a **Place Value Grid**.

In **18**, the **1** represents the amount of **tens** in the **10s** column place value.

In **18**, the **8** represents the amount of **ones** in the **1s** column place value.

First, write **1** in the **10s** column place value, representing the amount of **tens**.

Then, write **8** in the **1s** column place value, representing the amount of **ones**.

Finally, we can see from the columns of the **Place Value Grid** that the number **eighteen** represents **1 ten** and **8 ones**.

Test Questions

For each number, **how many 10s** (tens) and **1s** (ones) are there?

1) 18 = ___

2) 21 = ___

3) 32 = ___

4) 45 = ___

5) 57 = ___

6) 69 = ___

7) 70 = ___

8) 83 = ___

9) 94 = ___

10) 99 = ___

11) 101 = ___

12) 106 = ___

13) 110 = ___

14) 120 = ___

Digit Value

What is the digit value of the **1s (**ones**)** and **10s** (tens) in the number **18**?

1) **18** = ___

Word Problem

The number **eighteen** is a **2-digit number**.

Each of the **digits** represents the **10s** and **1s column place values**.

What is the **digit value** of the **1** and **8** in the number **eighteen**?

Place Value Grid

Hundreds	Tens	Ones
100s	10s	1s
	10	8

Strategy Applied

The number **eighteen** is to be represented on a **Place Value Grid**.

In **18**, the **8** represents the digit value of the **ones** in the **1s** column place value.

In **18**, the **10** represents the digit value of the **tens** in the **10s** column place value.

First, write **8** in the **1s** column place value, representing the value of the **ones**.

Then, write **1** in the **10s** column place value, representing the value of the **tens**.

Finally, we can see from the columns of the **Place Value Grid** that the

digit value of the **8** in the number **eighteen** remains the same as, **8** and the digit value of the **1** in the number **eighteen** is ten times as big as, **10**.

Test Questions
What is the **digit value** of the **10s** (tens) and **1s** (ones) for each number?

1) 18 = ___

2) 21 = ___

3) 32 = ___

4) 45 = ___

5) 57 = ___

6) 69 = ___

7) 70 = ___

8) 83 = ___

9) 94 = ___

10) 99 = ___

11)   101   = ___

12)   106   = ___

13)   110   = ___

14)   120   = ___

1 More Than

1) **3** + **1** = **?**

Word Problem

Beaulah is thinking of a number. Her number is **one more than three**.
What is her number**?**
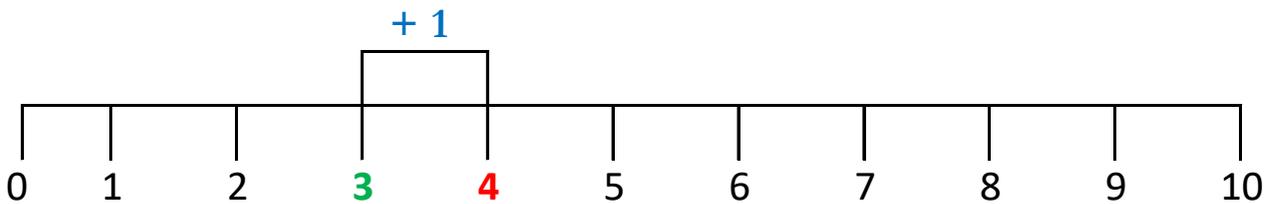
Number Line

+ 1

0   1   2   **3**   **4**   5   6   7   8   9   10

Strategy Applied

First, find and touch the number **three** on the number line.
Then, **count forwards** **one** more aloud in number order, whilst touching the numbers on the number line.
Next, the number counted on to should be **four**.
Finally, **three** plus **one** equals **four**.

Concrete Object   ## Column Addition

4
3   **3**
2   **2**
1   **1**   **1**

3 + **1** = **? 4**

1s
3
+ **1**
4
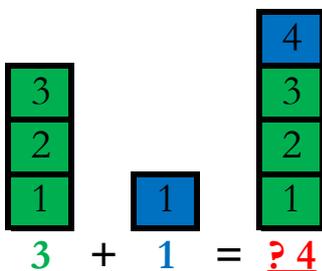
Part Whole Model   ## Bar Model
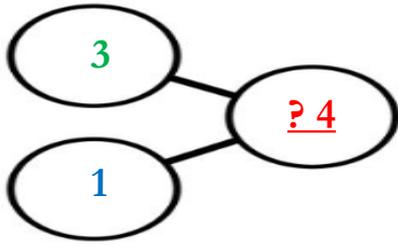
	3	1
	? 4	

Test Questions

1)   3 + 1 = ___

2)   5 + 1 = ___

3)   12 + 1 = ___

4)   19 + 1 = ___

5)   24 + 1 = ___

6)   33 + 1 = ___

7)   57 + 1 = ___

8)   86 + 1 = ___

9)   99 + 1 = ___

10)   100   + 1 = ___

11) ___ = 111   + 1

12) ___ = 121   + 1

13) 1 more than 13 is = ___

14) 1 more than ___ = 40

More Than 1

1) **16** + **3** = **?**

Word Problem

Uncle Washington has **three more** grapes than Auntie Merlin.
Aunty Merlin has **sixteen** grapes.
How many grapes does Uncle Washington have**?**

Number Line

+ 3

| 10 | 11 | 12 | 13 | 14 | 15 | **16** | **17** | **18** | **19** | 20 |
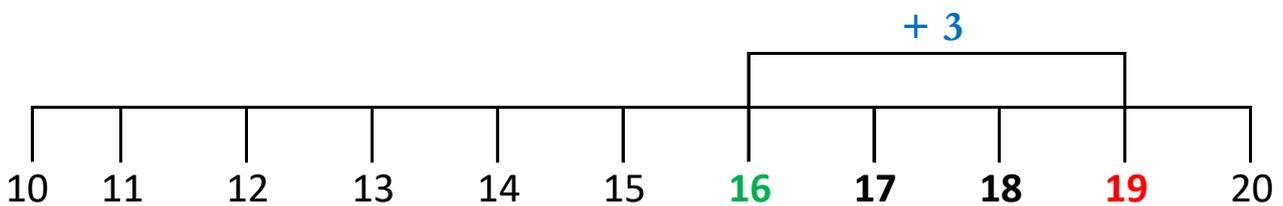
Strategy Applied

First, find and touch the number **sixteen** on the number line.
Then, **count forwards three** more aloud in number order, whilst touching the numbers on the number line.
Next, the number counted on to should be **nineteen**.
Finally, **sixteen** plus **three** equals **nineteen**.

Concrete Object

5	10	15
4	9	14
3	8	13
2	7	12
1	6	11	15

16

| 3 |
| 2 |
| 1 |

+ **3** =

5	10	15
4	9	14	18
3	8	13	17
2	7	12	16
1	6	11	15

? 19

Column Addition

	10s	1s
	1	6
+		3
	1	**9**
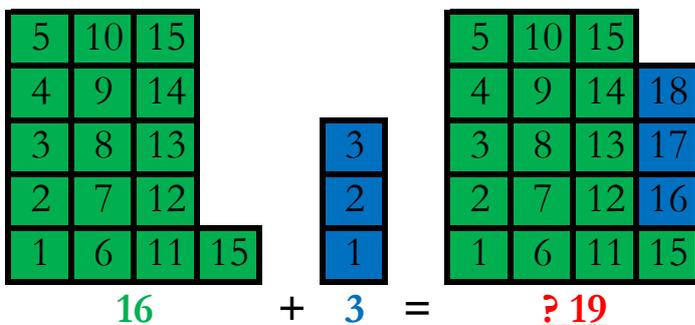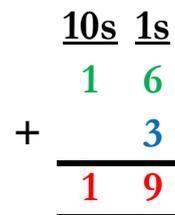
Part Whole Model

Bar Model
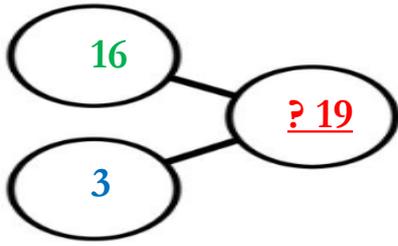
16	3
? 19	

Test Questions

1) 16 + 3 = ___

2) 2 + 9 = ___

3) 4 + 21 = ___

4) 57 + 7 = ___

5) 14 + 5 = ___

6) 1 more than 13 : = ___

7) 68 + 8 = ___

8) 44 + 6 = ___

9) 5 + 86 = ___

10) 97 + 8 = ___

11) ___ = 4 + 81

12) ___ = 7 + 52

13) ___ = 5 + 97

14) ___ = 8 + 103

10 More Than

1) **13** + **10** = **?**

Word Problem
Barry is thinking of a number. His number is **ten** **more than** **thirteen**.
What is his number**?**

Number Grid

10	11	12	**13**	14	15	16	17	18	19
20	21	22	**23**	24	25	26	27	28	29

Strategy Applied
First, find and touch the number **thirteen** on a number grid.
Then, **count down one square** which is **ten** more, aloud in number order,
whilst touching the numbers on the number grid.
Next, the number counted on to should be **twenty three**.
Finally, **thirteen** plus **ten** equals **twenty three**.

Concrete Object

5	10	
4	9	
3	8	12
2	7	12
1	6	11

13

+

5	10
4	9
3	8
2	7
1	6

10

=

5	10	15	20	
4	9	14	19	
3	8	13	18	23
2	7	12	17	22
1	6	11	16	21

? 23

Column Addition

	10s	1s
	1	3
+	1	0
	2	**3**

Part Whole Model

Bar Model
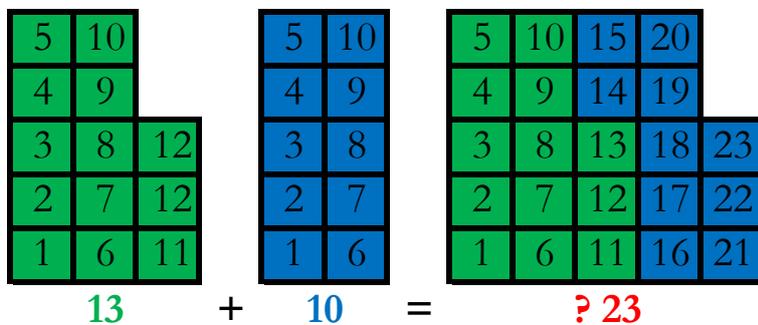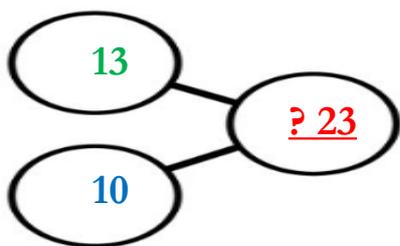
Test Questions

1) 13 + 10 = ___

2) 21 + 10 = ___

3) 10 + 10 = ___

4) 49 + 10 = ___

5) 20 + 10 = ___

6) 47 + 10 = ___

7) 73 + 10 = ___

8) 50 + 10 = ___

9) 99 + 10 = ___

10) 120 + 10 = ___

11) ___ = 10 + 20

12) ___ = 10 + 45

13) ___ = 10 + 83

14) ___ = 10 + 100

Multiples of 10s

1)   **8**   +   **20**   =   **?**

Word Problem

Lynchy has **eight** football stickers. Rodney has **twenty** **more**.
How many football stickers does Rodney have**?**

Number Grid

0	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

Strategy Applied

First, find and touch the number **eight** on a number grid.
Then, **count down one**, **two squares** which is **ten**, **twenty** more, aloud in number order whilst touching the numbers on the number grid.
Next, the number counted on to should be **twenty eight**.
Finally, **eight** add **twenty** equals **twenty eight**.
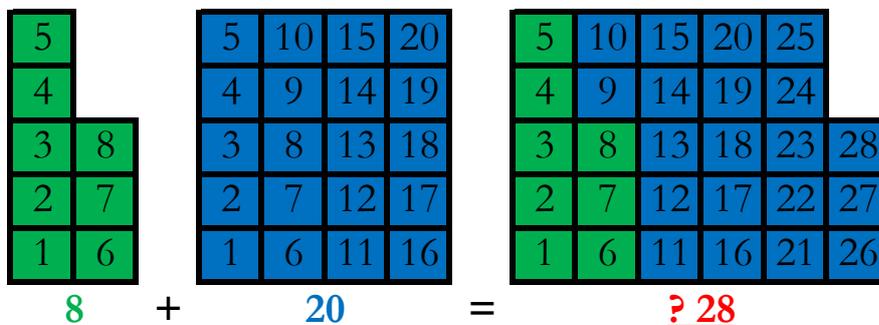
Concrete Object   ## Column Addition

		10s	1s
			8
+		2	0
		2	8

8   +   **20**   =   **? 28**

Part Whole Model   ## Bar Model

8

20

? 28
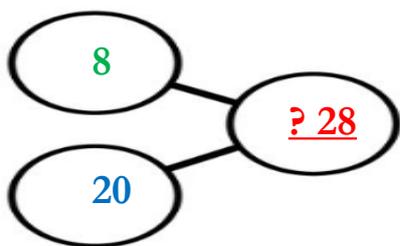
8	20
? 28	

Test Questions

1) $8 + 20 =$ ___

2) $18 + 90 =$ ___

3) $30 + 20 =$ ___

4) $34 + 40 =$ ___

5) $20 + 70 =$ ___

6) $50 + 40 =$ ___

7) $57 + 60 =$ ___

8) $26 + 50 =$ ___

9) $62 + 30 =$ ___

10) $99 + 10 =$ ___

11) ___ $= 20 + 70$

12) ___ $= 47 + 50$

13) ___ $= 20 + 100$

14) ___ $= 50 + 80$

Bonds to 10 and 100

1) **2** + **?** = **10**

Number bonds to 10, means two or more numbers added together that make the number **10**.
**Number bonds to 100**, means two or more numbers added together that make the number **100**.

Number Line

Strategy Applied
First, find and touch the number **two** on the number line.
Then, **count forwards** aloud from the next number after **two** on to **ten** in number order, whilst touching the numbers on the number line.
Next, the amount of numbers counted on should be **eight**.
Finally, **two** plus **eight** equals **ten**.

Concrete Object

2 + **8** = **? 10**

Column Addition

```
    10s  1s
          2
+         8
    1     0
    1
```

Regroup 1 ten into 10 ones.

Part Whole Model

Bar Model

Test Questions

1) 2 + ___ = 10

2) 4 + ___ = 10

3) 6 + ___ = 10

4) 8 + ___ = 10

5) ___ + 9p = 10p

6) ___ + 7p = 10p

7) ___ + £40 = £100

8) ___ + £20 = £100

9) ___ + 0 = 10

10) ___ + 80 = 100

11) ___ + 10 = 100

12) ___ + 50 = 100

13) ___ + 30 = 100

14) ___ + 70 = 100

Multiple Numbers

1) 2 + 3 + 4 = ?

Word Problem

Three children walked to school. Barbara walked **2** miles, Faye walked **3** miles and Doreen walked **4** miles.

How many miles did all the children walk in **total?**

Number Line
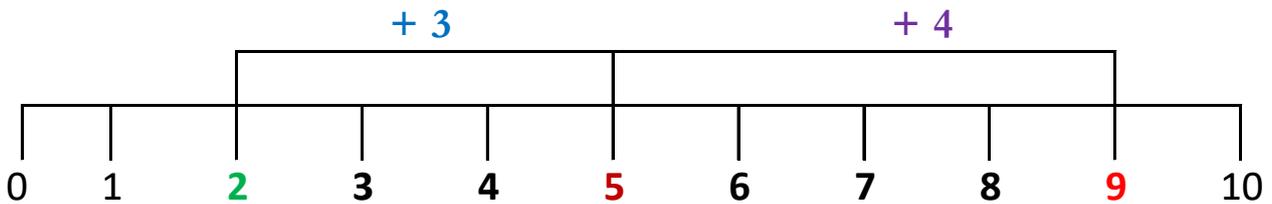
+ 3   + 4

0   1   **2**   **3**   **4**   **5**   **6**   **7**   **8**   **9**   10

Strategy Applied

First, find and touch the number **two** on the number line.

Then, **count forwards three** more aloud in number order, whilst touching the numbers on the number line.

Next, the number counted on to should be **five**.

Then, **count forwards four** more aloud in number order, whilst touching the numbers on the number line.

Next, the number counted on to should be **nine**.

Finally, **two** plus **three** plus **four** equals **nine**.

Concrete Object   ## Column Addition

1s

2

+ 3

4

9
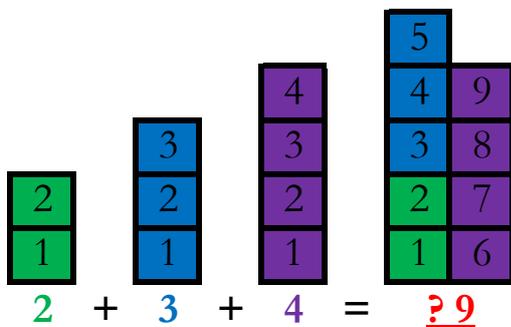
2 + 3 + 4 = **? 9**

Part Whole Model   ## Bar Model
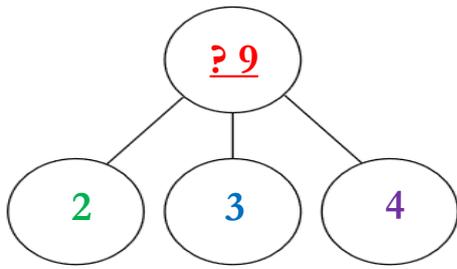
2	3	4
? 9		

Test Questions

1) 2 + 3 + 4 = ___

2) 9 + 8 + 7 = ___

3) 6 + 3 + 3 = ___

4) 3 + 30 + 3 = ___

5) 10 + 40 + 20 = ___

6) 20 + 30 + 50 = ___

7) 10p + 5p + 2p = ___

8) £4 + £5 + £9 = ___

9) 2cm + 4cm + 3cm = ___

10) 4m + 5m + 6m = ___

11) ___ = 7 + 9 + 6

12) ___ = 15 + 15 + 15

13) ___ = 9 + 9 + 7

14) ___ = 60 + 20 + 10

Multiples of 2, 3, 5 and 10

In the **number pattern** below, find the next two missing numbers.

1) **2, 4, 6,** ?, ?

Word Problem

Sebert uses cubes to make the **number pattern** of **two**, **four** and **six**.
He calculates the next two missing numbers in the number pattern.
How many cubes will he need, to make the next two numbers**?**

Concrete Object
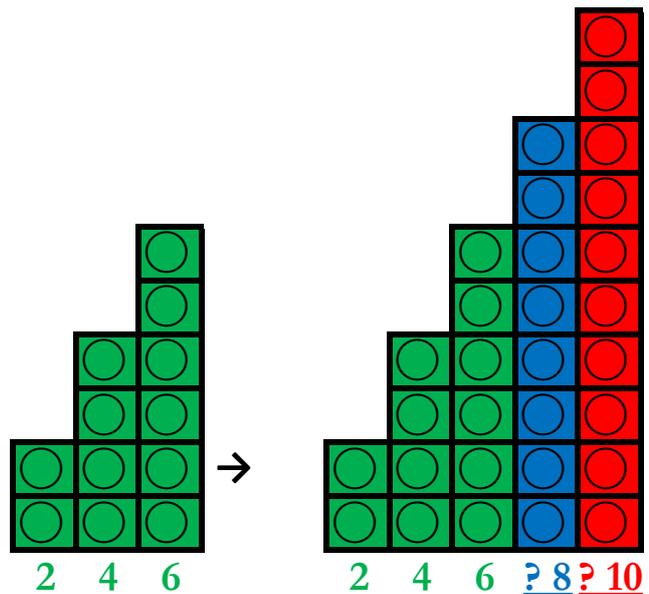
2 4 6 → 2 4 6 ? 8 ? 10

Strategy Applied

Work out the **number pattern**, by finding out the **difference between** the **three** numbers.

The difference between each of the **three** numbers is known as the **rule**.

First, **count forwards** from **two** to **four** equalling **two**, the rule is **+2**.

Then, count forwards from **four** to **six** equalling **two**, the rule is **+2**.

The rule is **+2** (**count on two**) to each of the numbers in the number pattern.

Continue this number pattern to find the next two missing numbers.

Next, find **six** on the number line and count on **two** more, total is **eight**.

Then, find **eight** on the number line and count on **two** more, total is **ten**.

Finally, the next two missing numbers in the number pattern are **eight** and **ten**.

Number Line

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Test Questions

1)   2, 4, 6, ___ , ___

2) 18, 20, 22, ___ , ___

3) 32, 34, 36, ___ , ___

4) 68, 70, 72, ___ , ___

5)   3, 6, 9, ___ , ___

6) 15, 18, 21, ___ , ___

7) 24, 27, 30, ___ , ___

8) 33, 36, 39, ___ , ___

9) 35, 40, 45, ___ , ___

10) 45, 45, 50, ___ , ___

11) 55, 60, 65, ___ , ___

12) 70, 80, 90, ___ , ___

13) 90, 100, 110, ___ , ___

14) 120, 130, 140, ___ , ___

More Than 10

1) **28** + **11** = **?**

Word Problem
The temperature was **twenty eight** degrees in the morning and **eleven** degrees warmer in the evening.
What was the temperature in the evening**?**

Number Grid

20	21	22	23	24	25	26	27	**28**	29
30	31	32	33	34	35	36	37	**38** → **39**	

Strategy Applied
Partition 11 into **multiples of 10s** and **1s**, which is **10** + **1**.
First, find and touch the number **twenty eight** on a number grid.
Then, **count down one square** which is **ten** more, aloud in number order whilst touching the numbers on the number grid.
Next, the number counted on to should be **thirty eight**.
Then, **count forwards one** more aloud in number order, whilst touching the numbers on the number grid.
Next, the number counted on to should be **thirty nine**.
Finally, **twenty eight** plus **eleven** equals **thirty nine**.

Partitioning

```
2 0 + 1 0 = 3 0
  8 +   1 =   9 +
          3 9
```

Column Addition

```
      10s 1s
        2  8
+       1  1
        3  9
```

Part Whole Model

Bar Model
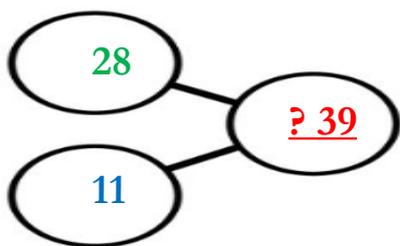
Test Questions

1) 28 + 11 = ___

2) 65 + 29 = ___

3) 26 + 66 = ___

4) 75 + 14 = ___

5) 68 + 17 = ___

6) 47 + 21 = ___

7) 37 + 44 = ___

8) 61cm + 39cm = ___

9) 19m + 81m = ___

10) £36 + £32 = ___

11) ___ = 54 + 22

12) ___ = 67 + 33

13) ___ = 55 + 17

14) ___ = 72 + 19

Doubling

1) **21** + **4** + **4** = **?**

Word Problem

At 9 a.m., there are **twenty one** cars in a car park. At 9.30 a.m., **four** cars drive in and park. An hour later, **four more** cars drive in and park..
How many cars are now in the car park in **total?**

Number Grid

20	21 → 22	23	24 → 25	26	27	28 → 29

Strategy Applied

Use **doubling**, **four** add **four** equals **eight**.
First, find and touch the number **twenty one** on a number grid.
Then, **count forwards eight** more aloud in number order, whilst touching the numbers on the number grid.
Next, the number counted on to should be **twenty nine**.
Finally, **twenty one** plus **eight** equals **twenty nine**.

Concrete Object

21

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 |

+

8

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

=

? 29

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

Column Addition

	10s	1s
	2	1
+		8
	2	9

Part Whole Model   =   ?   ## Bar Model

```
        ? 29

21      4      4
```
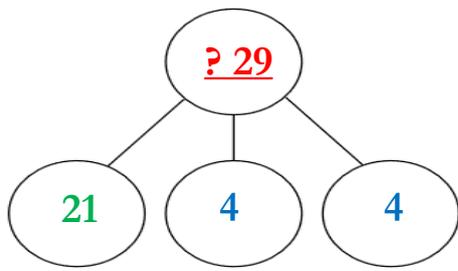
```
|           21          | 4 | 4 |
|          ? 29             |
```

Test Questions

1) 21 + 4 + 4 = ___

2) 58 + 2 + 2 = ___

3) 25 + 5 + 5 = ___

4) 36 + 3 + 3 = ___

5) 50 + 5 + 50 = ___

6)   150 + 30 + 30 = ___

7)   117 + 20 + 20 = ___

8) 45p + 10p + 10p = ___

9) 50p + 20p + 20p = ___

10) 27m + 35m + 35m = ___

11) £69 + £30 + £30 = ___

12) £99 + £40 + £40 = ___

13) ___ = 3 + 30 + 3

14) ___ = 63 + 10 + 10

Column Addition

1) **19** + **12** = **?**

Word Problem
Nineteen children voted for football, **twelve** children voted for tennis.
How many children voted for a sport**?**

Column Addition   ## Concrete Object

$$
\begin{array}{cc}
\mathbf{10s} & \mathbf{1s} \\
1 & 9 \\
+\ 1 & 2 \\
\hline
3 & 1 \\
\hline
1 &
\end{array}
$$

Regroup 10 ones into 1 ten.

19	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	

+

12	1	2	3	4	5	6	7	8	9	10
	11	12								

=

? 31	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									

Strategy Applied
First, in the **1s column**, **9** + **2**, equals 11 **ones** (**10** + **1**).
Then, write **1** in the **total value** of the **1s column.**
Next, **exchange/regroup** the **10 ones** into **1 ten** from the **1s** column to
the **10s** column and write **1 ten** below the **total value line** of the **10s column**.
Then, in the **10s column**, **1** + **1** + **1**, equals 3 **tens** (**30**).
Next, write **3** in the **total value** of the **10s column.**
Finally, **nineteen** plus **twelve** equals **thirty one**.

Bar Model   ## Part Whole Model

19	12
? 31	

19
12
? 31

Test Questions **?**

1)   1   9
+ 1   2
———

2)   1   5
+ 2   9
———

3)   1   6
+ 6   6
———

4)   2   5
+ 1   4
———

5)   2   8
+ 1   7
———

6)   4   7
+ 2   1
———

7)   3   4
+ 3   7
———

8)   4   1
+ 3   9
———

9)   5   1
+ 1   9
———

10) 2   6
+ 3   2
———

11) 2   9
+ 1   6
———

12) 5   7
+ 2   6
———

13) 2   8
+ 6   6
———

14) 7   7
+ 1   4
———

15) 6   0
+ 1   7
———

16) 5   7
+ 2   3
———

17) 4   6
+ 3   7
———

18) 6   3
+ 3   9
———

19) 8   3
+ 1   9
———

20) 3   8
+ 3   2
———

Find the Missing Number

1) **20** = **?** + **14**

Word Problem
Altogether Donald and Dennis have £**20**. Dennis has £**14**.
How much money does Donald have**?**

Number Line

+ 6

10   11   12   13   **14   15   16   17   18   19   20**
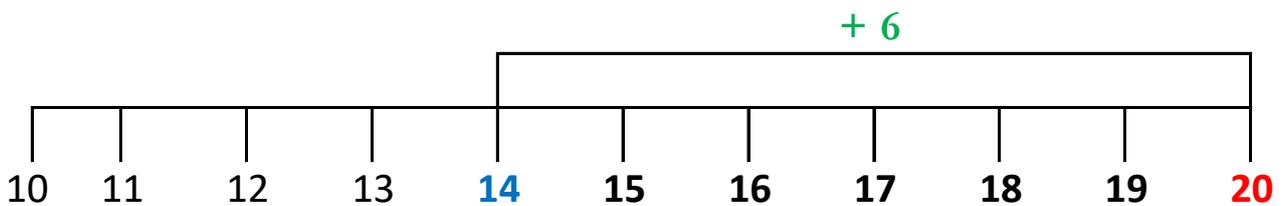
Strategy Applied
20 = **?** + **14** can be written as   **14** + **?** = **20** .
First, find and touch the number **fourteen** on the number line.
Then, count aloud from the next number after **fourteen** on to **twenty**.
Next, say how many numbers were **counted on**, it should be **six** more.
Finally, the **value** of the missing number is **six**.

Or use the **inverse** of addition, which is subtraction,   **20** - **14** = **?** .

Concrete Object   ## Column Addition

5	10	15	20
4	9	14	19
3	8	13	18
2	7	12	17
1	6	11	16

20   -   **14**   =   **? 6**

10s 1s

0

~~2~~ 1 0

-   1   4

0   6

Regroup 1 ten into 10 ones.

Page 25
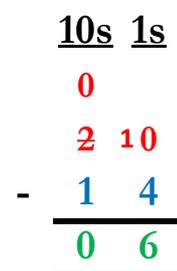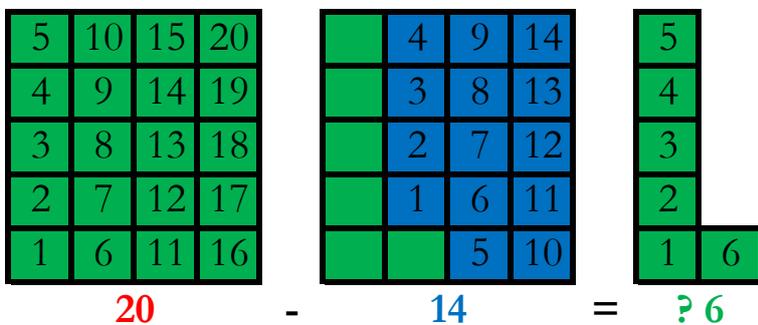
Part Whole Model   ## Bar Model
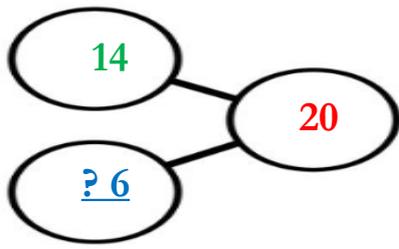
14	? 6
20	

Test Questions

1) 20 = ___ + 14

2) 72 + ___ = 92

3) 20 + ___ = 100

4) 5 + ___ + 3 = 15

5) 1 more than ___ = 40

6) 80 = 30 + ___

7) £16 + ___ = £20

8) 59L + ___ = 90L

9) 30cn + ___ = 70cm

10) 50p + ___ = 75p

11) 6mm + ___ + 6mm = 24mm

12) 5m + 8m + 80m = ___

13) 3 + ___ + 6 = 27

14) ___ = 12 + 47 + 38

1 Less Than

1) **3** - **1** = **?**

Word Problem
Uncle Nelson is thinking of a number. His number is **one** **fewer than** **three**. What is his number**?**

Number Line
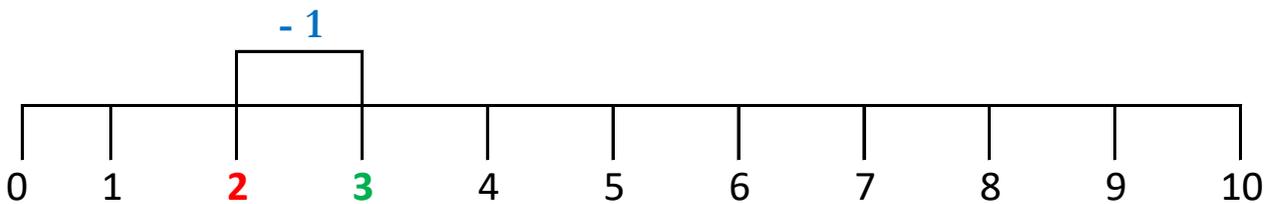
- 1

0   1   **2**   **3**   4   5   6   7   8   9   10

Strategy Applied
First, find and touch the number **three** on the number line.
Then, **count backwards** **one** less aloud in number order, whilst touching the numbers on the number line.
Next, the number counted back to should be **two**.
Finally, **three** subtract **one** equals **two**.

Concrete Object

3		1		
2				2
1				1

3 - **1** = **? 2**

Column Subtraction

1s
3
- 1
2
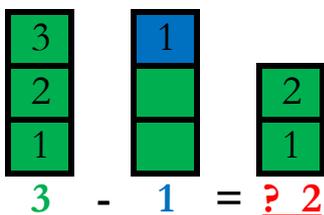
Part Whole Model

Bar Model
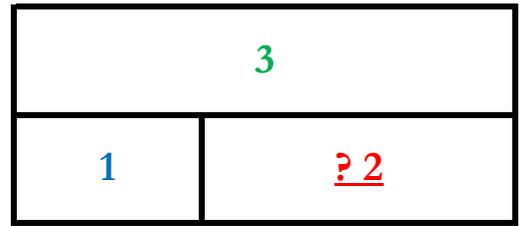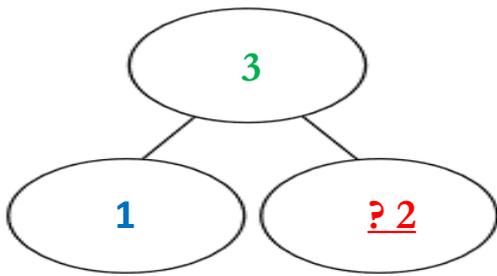
Test Questions

1) 3 - 1 = ___

2) 4 - 1 = ___

3) 6 - 1 = ___

4) 9 - 1 = ___

5) Subtract one from eleven = ___

6) One less than 7 is = ___

7) Fourteen is one less than = ___

8) 5mm - 1mm = ___

9) 7cm - 1cm = ___

10) 15m - 1m = ___

11) One less than 27 is = ___

12) 19 is one less than = ___

13) One less than 53 is = ___

14) ___ - 1km = 29km

More Than 1

1) **19** - **7** = **?**

Word Problem

Berty buys a badminton set and a cricket set, **costing** £**7**.
How much **change** does he get from £**19**.

Number Grid

0	1	2	3	4	5	6	7	8	9
10	11	**12** ←	13	14	**15** ←	16	17	**18** ←	**19**

Strategy Applied

First, find and touch the number **nineteen** on a number grid.
Then, **count backwards seven** less aloud in number order, whilst touching the numbers on the number grid.
Next, the number counted back to should be **twelve**.
Finally, **nineteen** minus **seven** equals **twelve**.

Concrete Object

5	10	15	
4	9	14	19
3	8	13	18
2	7	12	17
1	6	11	16

19

		5	
		6	4
		7	3
			2
			1

- **7** **=**

5	10	
4	9	
3	8	
2	7	12
1	6	11

? 12

Column Subtraction

	10s	1s
	1	9
-		7
	1	**2**

Part Whole Model

Bar Model
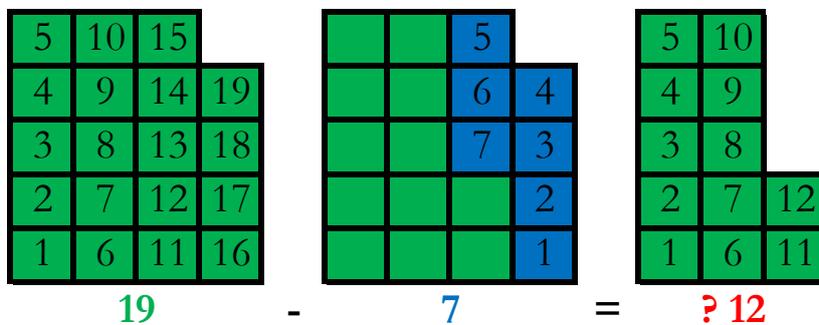
	19
7	? 12
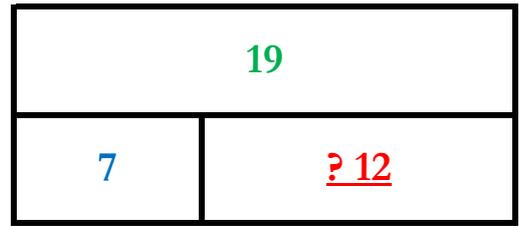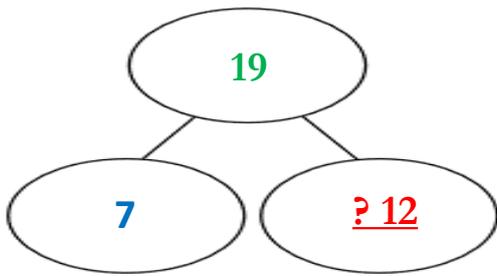
Test Questions

1) 19 - 7 = ___

2) 13 - 7 = ___

3) 52 - 5 = ___

4) 18secs - 9secs = ___

5) 8secs - 3secs = ___

6) 91mins - 7mins = ___

7) 83mins - 9mins = ___

8) 46 - 3 = ___

9) 9hrs - 7hrs = ___

10) 5hrs - 4hrs = ___

11) ___ = 33 - 8

12) ___ = 47 - 6

13) ___ = 56 - 3

14) ___ = 60 - 6

10 Less Than

1) **20** - **10** = **?**

Word Problem
Evelyn is thinking of a number. Her number is **ten** **fewer than** **twenty**.
What is her number**?**
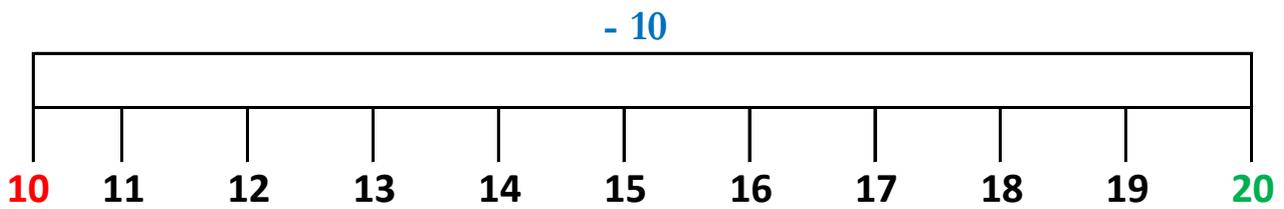
Number Line

- 10

10 11 12 13 14 15 16 17 18 19 **20**

Strategy Applied
First, find and touch the number **twenty** on the number line.
Then, **count backwards** **ten** less aloud in number order, whilst touching
the numbers on the number line.
Next, the number counted back to should be **ten**.
Finally, **twenty** subtract **ten** equals **ten**.

Concrete Object

5	10	15	20
4	9	14	19
3	8	13	18
2	7	12	17
1	6	11	16

20

		6	5
		7	4
		8	3
		9	2
		10	1

-   **10**   **=**

5	10
4	9
3	8
2	7
1	6

10

Column Subtraction

	10s	1s
	2	0
-	1	0
	1	0

Part Whole Model

Bar Model
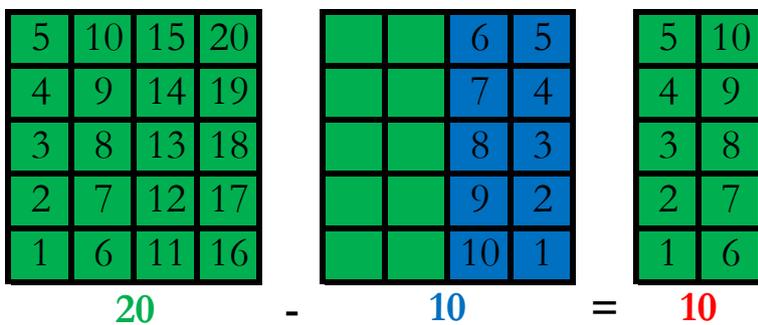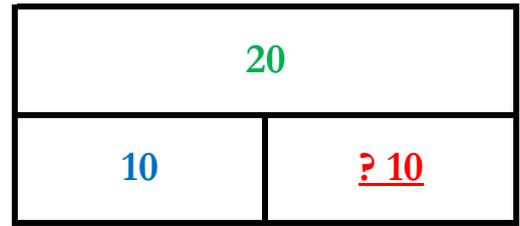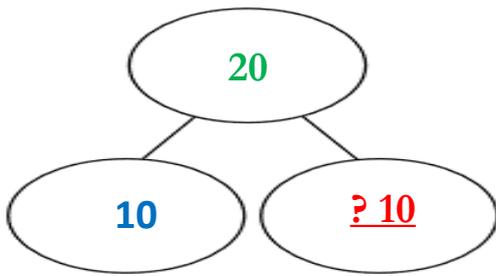
Test Questions

1) 20 - 10 = ___

2) 30 - 10 = ___

3) 52 - 10 = ___

4) 70 - 10 = ___

5) 93 - 10 = ___

6) 20 - 10 = ___

7) 46 - 10 = ___

8) 60g - 10g = ___

9) 83g - 10g = ___

10) 109kg - 10kg = ___

11) ___ = 20k - 10kg

12) ___ = 157 - 10

13) ___ = 180 - 10

14) ___ = 201 - 10

Multiples of 10s

1) **91** - **20** = <u>**?**</u>

Word Problem

A bottle contains **ninety one** millilitres of a liquid.
Twenty millilitres are poured out, to use in an experiment.
How many millilitres are **left** in the bottle**?**

Number Grid

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

Strategy Applied

First, find and touch the number **ninety one** on a number grid.
Then, **count up one**, **two squares** which is **ten**, **twenty** less, aloud in number order whilst touching the numbers on the number grid.
Next, the number counted back to should be **seventy one**.
Finally, **ninety one** subtract **twenty** equals **seventy one**.

Partitioning

```
9  0  -  2  0  =  7  0
   1  -     0  =     1  +
              _____
              7  1
```

Column Subtraction

```
      10s 1s
       9   1
   -   2   0
      _____
       7   1
```

Part Whole Model

Bar Model

91	
20	**? 71**
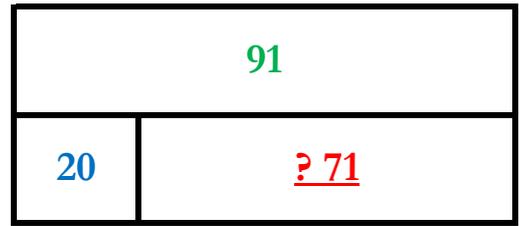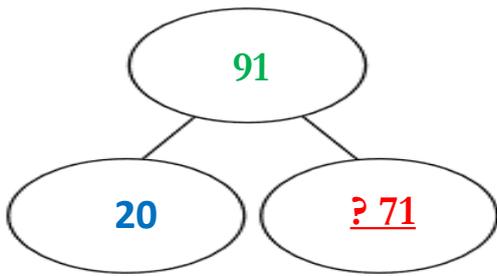
Test Questions

1) 91 - 20 = ___

2) 86 - 30 = ___

3) 60 - 50 = ___

4) 94 - 60 = ___

5) 78 - 70 = ___

6) 70 - 30 = ___

7) 43 - 20 = ___

8) 20 - 10 = ___

9) 52 - 40 = ___

10) 80 - 40 = ___

11) ___ = 36 - 20

12) ___ = 49 - 30

13) ___ = 50 - 40

14) ___ = 88 - 50

Bonds to 10 and 100

1) **10** - **5** = **?**

Number bonds to 10, means two or more numbers added together that make the number **10**.
Number bonds to 100, means two or more numbers added together that make the number **100**.

Number Line

- 5

| | | | | | | | | | |
|0|1|2|3|4|**5**|6|7|8|9|**10**|
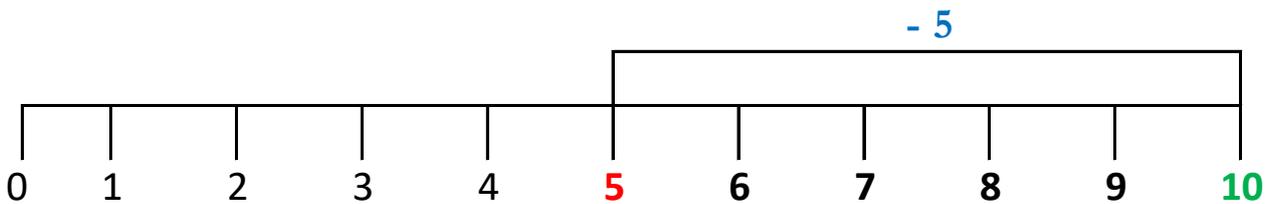
Strategy Applied

First, find and touch the number **ten** on the number line.
Then, **count backwards five** less aloud in number order, whilst touching the numbers on the number line.
Next, the number counted back to should be **five**.
Finally, **ten** subtract **five** equals **five**.

Concrete Object

5	10
4	9
3	8
2	7
1	6

	5
	4
	3
	2
	1

| 5 |
| 4 |
| 3 |
| 2 |
| 1 |

10 - **5** = **? 5**

Column Addition

```
     10s  1s
      0
      1̶  10
 -        5
      ————
          5
```

Regroup 1 ten into 10 ones.

Part Whole Model

Bar Model

```
        10                              |          10          |
   5         ? 5                        |    5     |    ? 5    |
```
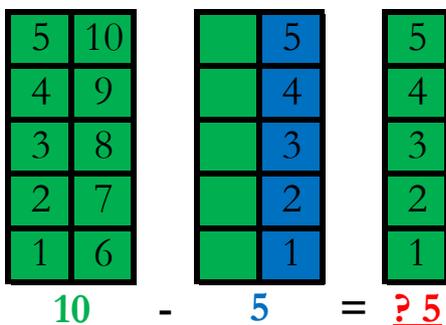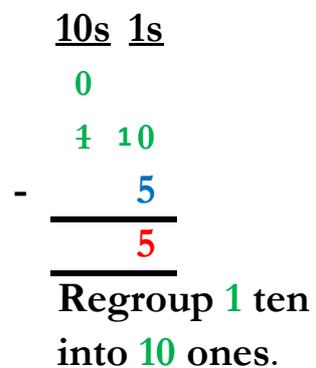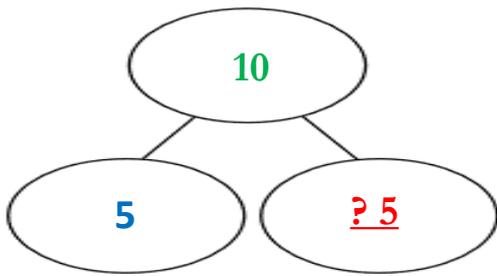
Test Questions

1) $10 - 5 = \underline{}$

2) $10 - 6 = \underline{}$

3) $10 - 7 = \underline{}$

4) $10 - 9 = \underline{}$

5) $10p - \underline{} = 4p$

6) $10p - \underline{} = 6p$

7) $100p - \underline{} = 18p$

8) $£100 - \underline{} = £29$

9) $£100 - \underline{} = £10$

10) $£100 - \underline{} = £42$

11) $100 - 32 = \underline{}$

12) $100 - 55 = \underline{}$

13) $100 - 44 = \underline{}$

14) $100 - 68 = \underline{}$

Multiple Numbers

1) **7** - **3** - **1** = **?**

Word Problem

A toy box contains **seven** coins. Angus borrows **three** coins and Colin takes **one** coin. How many coins are **left** in the toy box**?**

Number Line

- 1   - 3

0   1   2   **3**   **4**   **5**   **6**   **7**   8   9   10
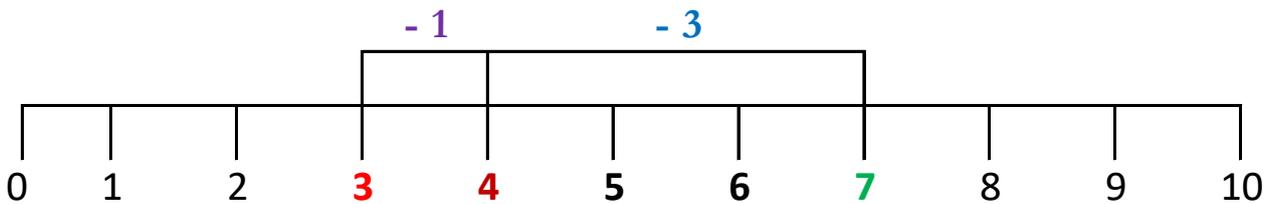
Strategy Applied

First, find and touch the number **seven** on the number line.

Then, **count backwards three** less aloud in number order, whilst touching the numbers on the number line.

Next, the number counted back to should be **four**.

Then, **count backwards one** less aloud in number order, whilst touching the numbers on the number line.

Next, the number counted back to should be **three**.

Finally, **seven** subtract **three** subtract **one** equals **three**.

Concrete Object
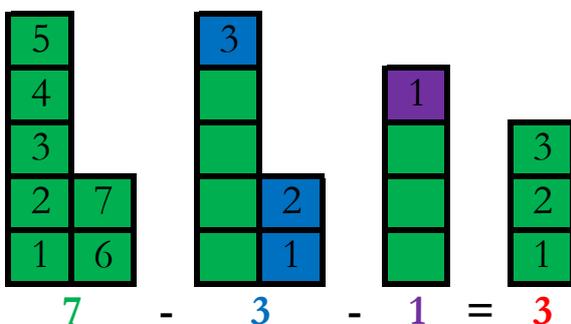
| 5 |
| 4 |
| 3 |
| 2 | 7 |
| 1 | 6 |

7 - **3** - **1** = **3**

Column Subtraction

	1s
	7
-	3
	4

	1s
	4
-	1
	3

Part Whole Model

Bar Model
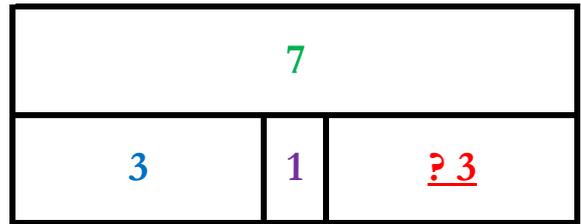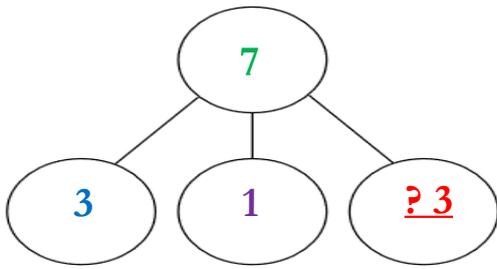
Test Questions

1) 7 - 3 - 1 = ___

2) 9 - 5 - 2 = ___

3) 12 - 6 - 3 = ___

4) 20 - 3 - 4 = ___

5) 24 - 6 - 5 = ___

6) 30 - 8 - 2 = ___

7) 36 - 5 - 7 = ___

8) 48 - 6 - 3 = ___

9) 55 - 5 - 4 = ___

10) 67 - 4 - 5 = ___

11) ___ = 50 - 30 - 20

12) ___ = 40 - 10 - 20

13) ___ = 63 - 10 - 10

14) ___ = 100 - 0 - 80

Multiples of 2, 3, 5 and 10

In the **number pattern** below, find the next two missing numbers.

1) **12 10 8** <u>**?, ?**</u>

Word Problem
The three numbers are written down in a **number pattern**.
Twelve is the **greatest** number, **ten** is the **next biggest** number and
eight is the **smallest** number.
What are the next **two** missing numbers**?**

Concrete Object
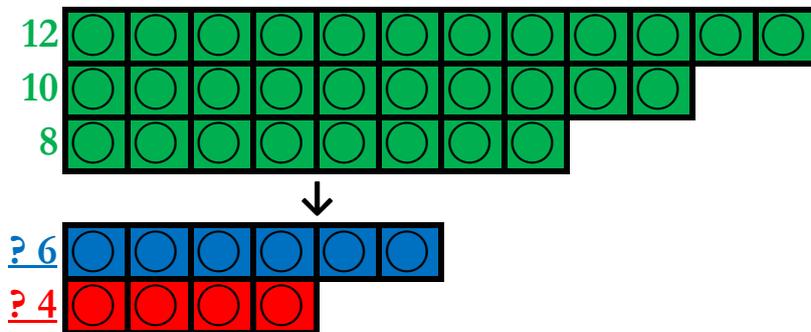
Strategy Applied
Work out the **number pattern**, by finding out the **difference between**
the **three** numbers.
The difference between each of the **three** numbers is known as the **rule**.
First, **count backwards** from **twelve** to **ten** equalling **one,** the rule is **-2**.
Then, count backwards from **ten** to **eight** equalling **one,** the rule is **-2**.
The rule is **-2** (**count back two**) from each of the numbers in the number
pattern.
Continue this number pattern to find the next two missing numbers.
Next, find **eight** on the number line and count back **two** less, total is **six**.
Then, find **six** on the number line and count back **two** less, total is **four**.
Finally, the next two missing numbers in the number pattern are **six** and
four.

Number Line

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Test Questions

1) 12, 10, 8, ___, ___

2) 28, 26, 24, ___, ___

3) 40, 38, 36, ___, ___

4) 60, 58, 56, ___, ___

5) 18, 15, 12, ___, ___

6) 27, 24, 21, ___, ___

7) 36, 33, 30, ___, ___

8) 42, 39, 36, ___, ___

9) 20, 15, 10, ___, ___

10) 30, 25, 20, ___, ___

11) 60, 55, 50, ___, ___

12) 40, 30, 20, ___, ___

13) 100, 90, 80, ___, ___

14) 200, 190, 180, ___, ___

Multiples of 10s and 1s

1) **53** - **14** = **?**

Word Problem

Sheridan needs **fifty three grams** of gluten free wheat to make bread.
There are **fourteen grams** left in the cupboard.
How many more grams does she need**?**

Number Grid

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

Strategy Applied

Partition 14 into **multiples of 10s** and **1s**, which is **10 + 4**.
First, find and touch the number **fifty three** on a number grid.
Then, **count up one square** which is **ten** less, aloud in number order whilst touching the numbers on the number grid.
Next, the number counted back to should be **forty three**.
Then, **count backwards four** less aloud in number order, whilst touching the numbers on the number grid.
Next, the number counted on to should be **thirty nine**.
Finally, **fifty three** subtract **four** equals **thirty nine**.

Bar Model   **Column Subtraction**

53		
10	4	? 39

10s 1s

$$
\begin{array}{r}
4 \\
\cancel{5}\ {}^{1}3 \\
-\ 1\quad 4 \\
\hline
3\quad 9 \\
\hline
\end{array}
$$

Regroup 1 ten into 10 ones.

Test Questions

1) 53 - 14 = ___

2) 26 - 12 = ___

3) 19 - 16 = ___

4) 77 - 48 = ___

5) 24 - 13 = ___

6) 98 - 84 = ___

7) 56 - 36 = ___

8) 93 - 67 = ___

9) 32 - 19 = ___

10) 82 - 54 = ___

11) 64 - 32 = ___

12) 87 - 51 = ___

13) ___ = 54 - 22

14) ___ = 79 - 15

Doubling

1) **20** - **3** - **3** = **?**

Word Problem

Joyce and Lance **each** take **three** of Richard's **twenty** colouring pens.
How many are **left?**

Number Line

- 6

| 10 | 11 | 12 | 13 | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
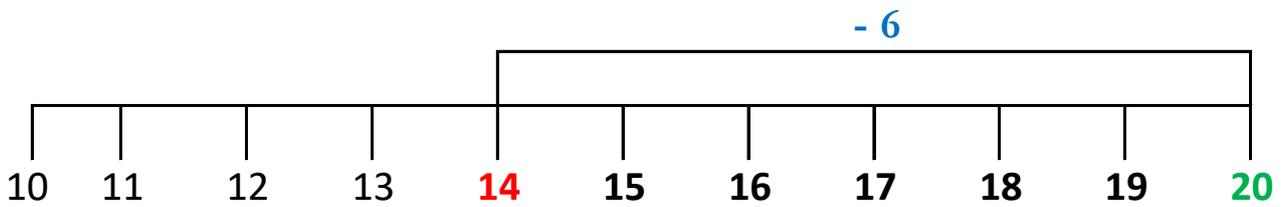
Strategy Applied

Use **doubling**, minus **three** and minus **three**, **equals** minus **six**.
First, find and touch the number **twenty** on the number line.
Then, **count backwards six** less aloud in number order, whilst touching the numbers on the number line.
Next, the number counted back to should be **fourteen**.
Finally, **twenty** subtract **six** equals **fourteen**.

Concrete Object

5	10	15	20
4	9	14	19
3	8	13	18
2	7	12	17
1	6	11	16

20

		6	5
			4
			3
			2
			1

- **6**

5	10	
4	9	14
3	8	13
2	7	12
1	6	11

= **? 14**

Column Subtraction

```
      10s 1s
       1
       2̶ ¹0
  -        6
  _____
       1   4
```

Regroup 1 ten into 10 ones.
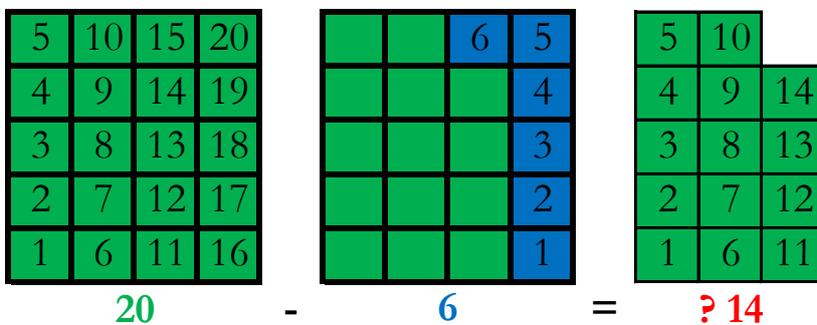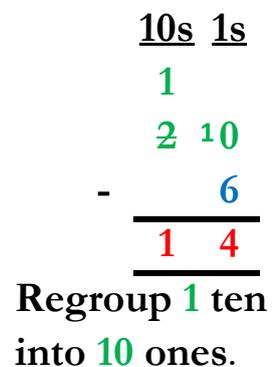
Part Whole Model   = **?**

Bar Model
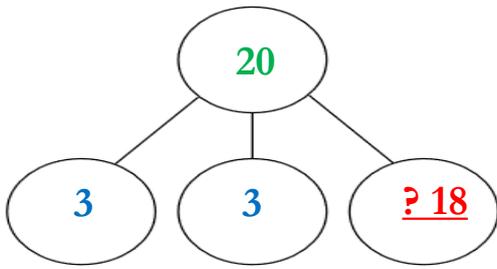
Test Questions

1) 20 - 3 - 3 = ___

2) 44 - 2 - 2 = ___

3) 28 - 3 - 3 = ___

4) 16 - 4 - 4 = ___

5) 40 - 5 - 5 = ___

6) 56 - 6 - 6 = ___

7) 25 - 7 - 7 = ___

8) 75 - 8 - 8 = ___

9) 20 - 9 - 9 = ___

10) 70 - 10 - 10 = ___

11) ___ = 47 - 2 - 2

12) ___ = 59 - 2 - 2

13) ___ = 66 - 5 - 5

14) ___ = 78 - 10 - 10

Column Subtraction

1) **52** - **15** = **?**

Word Problem

Fifty two children are on two coaches. **Fifteen** of them are on **Coach B**. How many children are on **Coach A?**

Column Subtraction

```
      10s 1s
       4
       5 ¹2
  -    1  5
       3  7
```

Regroup 1 ten into 10 ones.

Bar Model

52	
15	? 37

Part Whole Model

52

15   ? 37
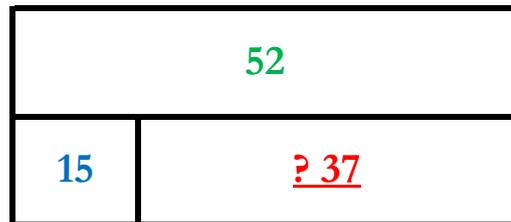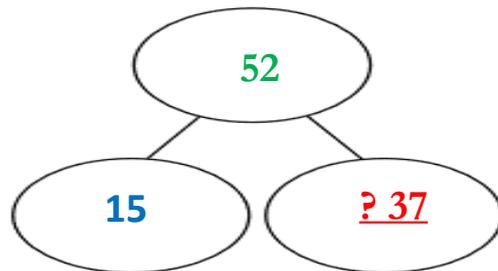
Strategy Applied

First, in **1s column**, **2** subtract **5**, you cannot do as **2** is a **lower value** than **5**. Then, **exchange/regroup 1 ten** into **10 ones** from the **10s** column to the **1s** column.

Next, cross out the **5 tens** and write **4 tens** above, then write the **exchanged/regrouped 1 ten** next to the **2 ones** to make **12 ones**.

Then, in the **1s column**, **12** subtract **5**, equals 7 **ones** (**7**), write **7** in the **total value** of the **1s column**.

Next, in the **10s column**, **4** subtract **1**, equals 3 **tens** (**30**), write **3** in the **total value** of the **10s column**.

Finally, **fifty two** subtract **fifteen** equals **thirty seven**.

Test Questions **?**

1) 5 2
-   1 5
   ─────

2) 3 6
-   1 9
   ─────

3) 2 4
-   1 3
   ─────

4) 9 3
-   6 7
   ─────

5) 3 2
-   1 9
   ─────

6) 2 6
-   1 2
   ─────

7) 7 7
-   4 8
   ─────

8) 9 8
-   8 4
   ─────

9) 5 6
-   3 6
   ─────

10) 8 2
-   5 4
   ─────

11) 4 2
-   1 6
   ─────

12) 2 6
-   1 9
   ─────

13) 1 4
-   1 3
   ─────

14) 8 3
-   6 8
   ─────

15) 2 2
-   1 9
   ─────

16) 2 7
-   1 3
   ─────

17) 7 8
-   4 9
   ─────

18) 9 9
-   8 5
   ─────

19) 5 7
-   3 7
   ─────

20) 8 3
-   5 5
   ─────

Find the Missing Number

1) **36** - **?** - **5** = **23**

Word Problem
Rodney goes into a shop with **thirty six** pence. He buys two items and has **twenty three** pence in change. One item cost **five** pence.
What is the cost of the other item**?**

Number Grid

20	21	22	23 ←	24	25	26	27	28 ←	29
30 ←	31	32	33	34	35 ←	36	37	38	39

Strategy Applied
First, find and touch the number **thirty six** on a number grid.
Then, **count backwards five** less aloud in number order, whilst touching the numbers on the number grid.
Next, the number counted back to should be **thirty one**.
Then, **count backwards** aloud from the next number before **thirty one** back to **twenty three**, whilst touching the numbers on the number grid.
Next, say how many numbers were **counted back**, it should be **eight** less.
Finally, the **value** of the missing number is **eight**.

Column Subtraction

```
     10s 1s

      3   6
  -       5
      3   1
```

Column Subtraction

```
       10s 1s
        2
        3  ¹1
  -     2   3
        0   8
```
Regroup 1 ten into 10 ones.

Part Whole Model

Bar Model

36

? 8   5   23

36		
? 8	5	23
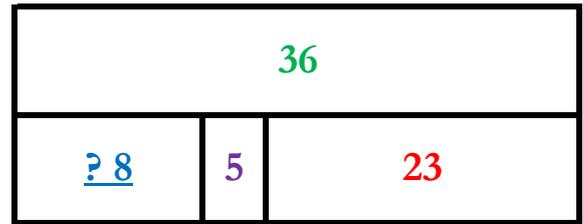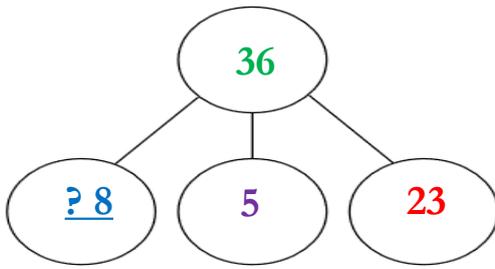
Test Questions

1)   36 - ___ - 5 = 23

2)   ___ - 31 = 16

3)   54 - ___ = 13

4)   21 + 35 =   100   - ___

5)   10 - ___ = 4

6)   62 - 10 - 10 = ___

7)   74 - ___ = 39

8)   100   - 42 - ___ = 48

9)   100   - ___ = 60

10) 34 + 13 =   100   - ___

11) 67 - ___ = 59

12)   100   - 19 = ___

13) 98 - ___ = 28

14) ___ = 15 - 2

Repeated Addition

1) **5** x **3** = **?**

Word Problem

Sarah is counting on in **fives** starting at **zero**. She counts on **three fives**.
What number has she counted on to**?**

Number Line

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
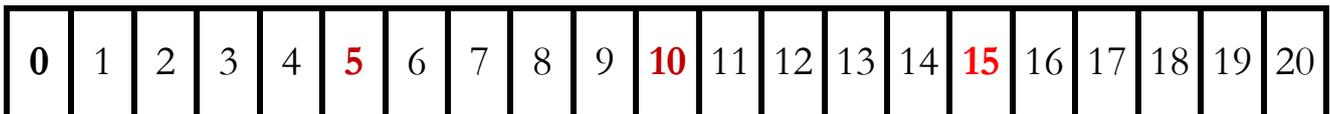
Strategy Applied

Five times **three** is the same as **three groups of** or **lots of five**.
First, find and touch the number **zero** on a number line.
Then, **count forwards five** more aloud in number order, whilst touching
the numbers on the number line, on to the number **five**.
Next, **count forwards five** more aloud in number order, whilst touching
the numbers on the number line, on to the number **ten**.
Then, **count forwards five** more aloud in number order, whilst touching
the numbers on the number line, on to the number **fifteen**.
Finally, **five** times **three** equals **fifteen**.

Concrete Object

5		5		5		5	10	15
4		4		4		4	9	14
3		3		3		3	8	13
2		2		2		2	7	12
1		1		1		1	6	11

5 + **5** + **5** = **? 15**

Column Addition

```
      10s  1s
            5
            5
  +         5
      _____
       1    5
       1
```
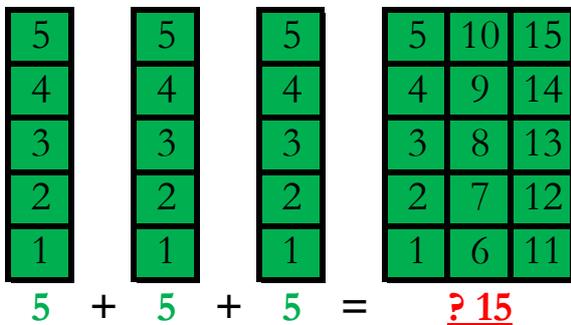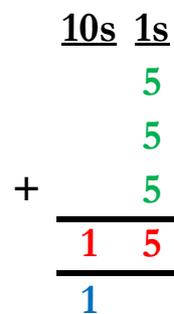
Regroup 10 ones into 1 ten.

Part Whole Model

Bar Model

5	5	5
? 15		

Test Questions

1) 5 x 3 = ___

2) 5 x 12 = ___

3) 2 x 10 = ___

4) 10 x 8 = ___

5) 5 x 9 = ___

6) 2 x 12 = ___

7) 10 x 11 = ___

8) 5 x 6 = ___

9) 5 x 7 = ___

10) 2 x 7 = ___

11) 10 x 3 = ___

12) 2 x 11 = ___

13) 5 x 4 = ___

14) 12 x 10 = ___

Step Counting

1) **3** x **2** = **?**

Word Problem

There are **two** tricycles on the playground. Each tricycle has **three** wheels. How many wheels are there **altogether?**

Number Line

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
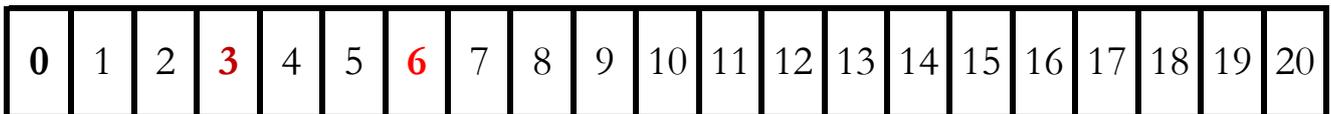
Strategy Applied

For **step counting** each **lot of three** is **added on** one at a time, expressing the **number value** as it is **counted on**.

First, find and touch the number **zero** on a number line.
Then, **count forwards three** more aloud in number order, whilst touching the numbers on the number line, on to the number **three**.
Next, **count forwards three** more aloud in number order, whilst touching the numbers on the number line, on to the number **six**.
Finally, **two** groups of **three** equals **six**.

Concrete Object   ## Step Counting
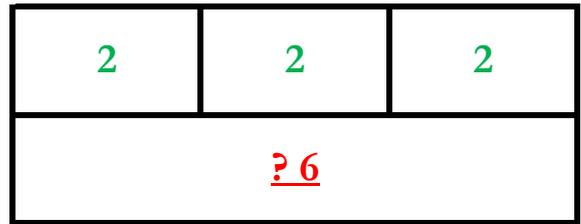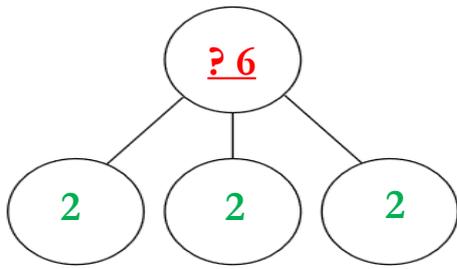
    Group 1   Group 2   3 → 6

| 1 | 2 | 3 | | 1 | 2 | 3 |

Part Whole Model   ## Bar Model

2	2	2
? 6		

? 6

2   2   2

Test Questions

1)   2   x   3   = ___

2)   2   x   4   = ___

3)   4   x   6   = ___

4)   4   x   4   = ___

5)   3   x   8   = ___

6)   3   x   4   = ___

7)   4   x   9   = ___

8)   3   x   9   = ___

9)   3   x   10   = ___

10)   4   x   10   = ___

11)   4   x   11   = ___

12)   3   x   7   = ___

13)   3   x   12   = ___

14)   4   x   7   = ___

Find the Missing Number

1) **?** x **5** = **25**

Word Problem

Linda has **five** objects in one bag. The **same** number of objects are in each of the bags. There are **twenty five** objects in **total**.
How many bags of objects does Linda have**?**

Number Line

0	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

Strategy Applied

Apply **step counting** to calculate the **missing number**, the **multiplicand**, by counting on in **lots of five** up to **twenty five**.

First, find and touch the number **zero** on a number line.
Then, **count forwards five** more aloud in number order, whilst touching the numbers on the number line, on to the number **five**.
Next, **count forwards five** more aloud in number order, whilst touching the numbers on the number line, on to the number **ten**.
Then, **count forwards five** more aloud in number order, whilst touching the numbers on the number line, on to the number **fifteen**.
Next, **count forwards five** more aloud in number order, whilst touching the numbers on the number line, on to the number **twenty**.
Then, **count forwards five** more aloud in number order, whilst touching the numbers on the number line, on to the number **twenty five**.
Finally, **five** groups of **five** equals **twenty five**.

Step Counting   Bar Model

5 → 10 → 15 → 20 → 25
● ● ● ● ●

25				
5	5	5	5	5
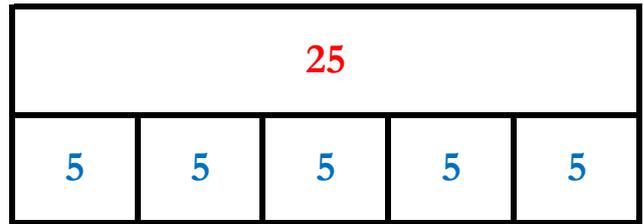
Test Questions

1) ___ x 5 = 25

2) ___ x 6 = 60

3) 2 x 5 = ___ x 2

4) 30 = 5 x ___

5) ___ x 5 = 45

6) 4 x ___ = 40

7) 3 x 10 = ___

8) 12 x ___ = 6 x 10

9) 7 x 2 = 2 x ___

10) 8 x 2 = ___ x 4

11) 5 x 12 = ___ x 5

12) 10 x ___ = 9 x 10

13) 4 x ___ = 8 x 5

14) 6 x 4 = 2 x ___

Repeated Subtraction

1) **15** ÷ **5** = **?**

Word Problem
Cookies come in **packs (groups) of five**. **Fifteen** cookies are placed on a plate.
How many **packs (groups) of** cookies were used?

Number Line

| **0** | 1 | 2 | 3 | 4 | **5** | 6 | 7 | 8 | 9 | **10** | 11 | 12 | 13 | 14 | **15** | 16 | 17 | 18 | 19 | 20 |

Strategy Applied
Count backwards in **lots of fives** from **fifteen** to **zero** and the amount of **fives** counted back will be the **missing number**.

First, find and touch the number **fifteen** on a number line.
Then, **count backwards five** less aloud in number order, whilst touching the numbers on the number line, back to the number **ten**.
Next, **count backwards five** less aloud in number order, whilst touching the numbers on the number line, back to the number **five**.
Then, **count backwards five** less aloud in number order, whilst touching the numbers on the number line, back to the number **zero**.
Finally, the **value** of the missing number is **three**.

Concrete Object

| 1 | 2 | 3 | 4 | 5 |

+

1	2	3	4	5
6	7	8	9	10	=
11	12	13	14	15

| 1 | 2 | 3 | 4 | 5 |

+

| 1 | 2 | 3 | 4 | 5 |

Part Whole Model   ## Bar Model

15

? 5   ? 5   ? 5

15		
? 5	? 5	? 5
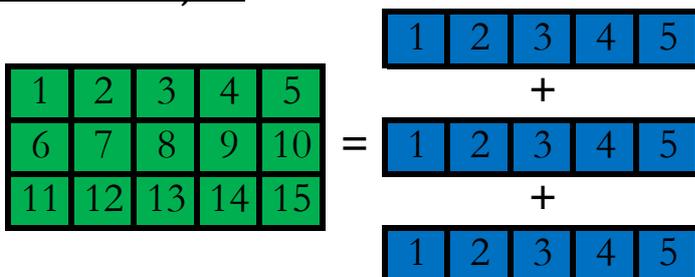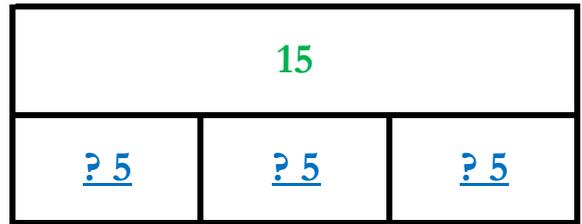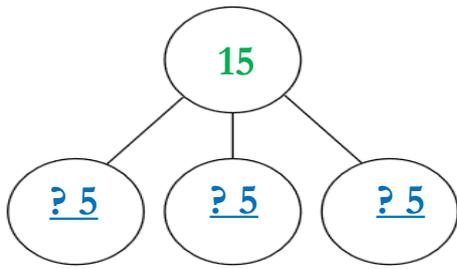
Test Questions

1) $15 \div 5 = \underline{\quad}$

2) $70 \div 10 = \underline{\quad}$

3) $60 \div 5 = \underline{\quad}$

4) $18 \div 2 = \underline{\quad}$

5) $90 \div 10 = \underline{\quad}$

6) $55 \div 5 = \underline{\quad}$

7) $16 \div 2 = \underline{\quad}$

8) $40 \div 5 = \underline{\quad}$

9) $22 \div 2 = \underline{\quad}$

10) $100 \div 10 = \underline{\quad}$

11) $24 \div 2 = \underline{\quad}$

12) $120 \div 10 = \underline{\quad}$

13) $80 \div 10 = \underline{\quad}$

14) $60 \div 5 = \underline{\quad}$

Inverse of Division

1) **18** ÷ **?** = **6**

Word Problem
At break time, friends **equally share** out **eighteen** marbles.
They **each** receive **six** marbles.
How many friends are there**?**

Number Line

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
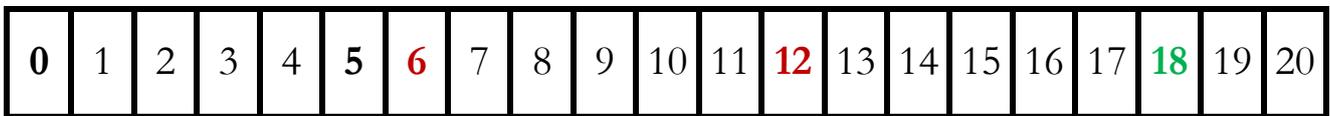
Strategy Applied
Use the **inverse** of **division** which is **multiplication**. **6** x **?** = **18**
Apply **step counting** to calculate the **missing number,** which is how
many **lots of sixes counted on** from **zero** on to **eighteen**.

First, find and touch the number **zero** on a number line.
Then, **count forwards six** more aloud in number order, whilst touching
the numbers on the number line, on to the number **six**.
Then, **count forwards six** more aloud in number order, whilst touching
the numbers on the number line, on to the number **twelve**.
Then, **count forwards six** more aloud in number order, whilst touching
the numbers on the number line, on to the number **eighteen**.
Finally, **three** groups of **six** equals **eighteen**.

Bar Model

Step Counting

6 → **12** → **18**
●　　●　　●

18		
6	6	6

Concrete Object

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18

18

=

3	6
2	5
1	4

6

+

3	6
2	5
1	4

6

+

3	6
2	5
1	4

6
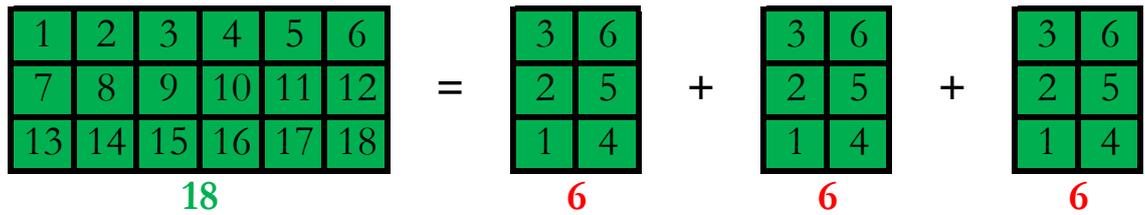
Test Questions

1) 18 ÷ ___ = 6

2) 15 ÷ ___ = 5

3) 90 ÷ ___ = 10

4) 25 ÷ ___ = 5

5) 14 ÷ ___ = 2

6) 5 ÷ ___ = 5

7) 30 ÷ ___ = 10

8) 40 ÷ ___ = 5

9) 22 ÷ ___ = 2

10) 100 ÷ ___ = 10

11) 2 = 8 ÷ ___

12) 10 = 40 ÷ ___

13) 10 = 110 ÷ ___

14) 5 = 5 ÷ ___

Find the Missing Number

1) **2** x **4** = **16** ÷ **?**

Word Problem

2   x   **4**   is **equal to** or the **same value** as   **16** ÷ **?**

or **16** ÷ **?**   is **equal to** or the **same value** as   **2** x **4**

Strategy Applied

0	1	**2**	3	**4**	5	**6**	7	**8**	9	10	11	12	13	14	15	16	17	18	19	20

Step 1

Out of the two **number sentences**, calculate the number sentence with all the **known** numbers first,   **2** x **4** .
Apply **step counting** to calculate the **product** of **two times four**.
First, find and touch the number **zero** on a number line.
Then, **count forwards two** more aloud in number order, **four** times whilst touching the numbers on the number line, **2**, **4**, **6**, **8**.

0	1	2	3	4	5	6	7	**8**	9	10	11	12	13	14	15	**16**	17	18	19	20

Step 2

If **2** x **4** = **8** , then **8** = **16** ÷ **?** , as they are the **same value**.
Use the **inverse** of **division**, which is **multiplication**,   **8** x **?** = **16**
Apply **step counting** to calculate the **missing number**, by counting on in **lots of eight** up to **sixteen**.
First, find and touch the number **zero** on a number line.
Then, **count forwards** in **lots of eight** more aloud in number order, whilst touching the numbers on the number line, up to the number **sixteen**.
Finally, **two** lots of **eight** equals to **sixteen**.

Step 1   ## Step 2

Test Questions

1)   2   x   4   =   16   ÷   ___

2)   5   x   2   =   ___   ÷   10

3)   2   x   1   =   ___   ÷   2

4)   1   x   8   =   40   ÷   ___

5)   2   x   3   =   ___   ÷   2

6)   2   x   10   =   ___   ÷   2

7)   10   x   1   =   100   ÷   ___

8)   60   ÷   ___   =   5   x   6

9)   30   ÷   ___   =   5   x   3

10)   16   ÷   ___   =   2   x   4

11)   6   ÷   ___   =   1   x   3

12)   4   ÷   ___   =   2   x   1

13)   40   ÷   ___   =   5   x   4

14)   60   ÷   ___   =   3   x   10

Fraction of a Quantity

1) $\frac{1}{2}$ of 16 = ?

Word Problem

Grandad bought a bag of **16** cherries.
Grandad ate **half** of the number of cherries in the bag.
How many cherries did Grandad eat**?**

Concrete Object

First   Then   Next

Quantity   **Group1**   **Group2**

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

→

1	2	3	4
5	6	7	8

→

1	2	3	4
5	6	7	8

↓

Finally

$\frac{1}{2}$ of 16 = 8

Strategy Applied

A fraction is part of a **whole** or part of **1** and a **half** is 1 of 2 **equal groups**.
16 is the **quantity** shared **equally** between the **total** number of **equal groups**.
2 is the **denominator**, represents the **total** number of **equal groups**.
1 is the **numerator**, represents **one** of the **equal groups**.
First, pick up **sixteen** objects and place them together. Now count aloud to check there are only **sixteen** objects; **1**, **2**, **3**, **4**, **5**, **6**, **7**, **8**, **9**, **10**, **11**, **12**, **13**, **14**, **15**, **16**.
Then, **share** the **sixteen** objects one at a time **equally between** the **two** groups, until exactly the **same quantity** of objects are in **each** of the groups.
Next, count how many objects there are **altogether** in **one group**, there should be five objects; **one, two, three, four, five**, **six**, **seven**, **eight**.
Finally, **one half** of **sixteen** equals **eight**.

Part Whole Model   Bar Model

16	
8	8
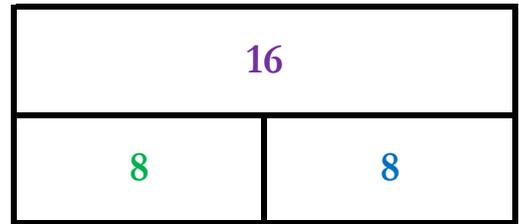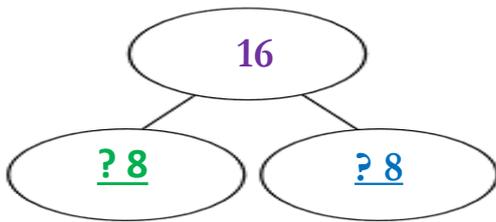
Test Questions

1) $\frac{1}{2}$ of 16 = ___

2) $\frac{1}{3}$ of 9 = ___

3) $\frac{1}{2}$ of 6 = ___

4) $\frac{1}{3}$ of 18 = ___

5) $\frac{1}{4}$ of 12 = ___

6) $\frac{2}{4}$ of 8 = ___

7) $\frac{1}{2}$ of 18 = ___

8) $\frac{3}{4}$ of 20 = ___

9) ___ = $\frac{1}{2}$ of 24

10) ___ = $\frac{1}{4}$ of 20

Fraction of a Quantity

1) $\dfrac{3}{5}$ of 10 = ?

Word Problem

Mrs O'Neal shared **ten** stickers **equally** between **five** children.
How many stickers did **three** of the children get in **altogether**?

Concrete Object

First   Then   Next

Quantity

1	2	3	4	5
6	7	8	9	10

→

Group1 | 1 / 2

Group2 | 1 / 2

Group3 | 1 / 2

Group4 | 1 / 2

Group5 | 1 / 2

↓

Finally

$\dfrac{3}{5}$ of 10 = 6
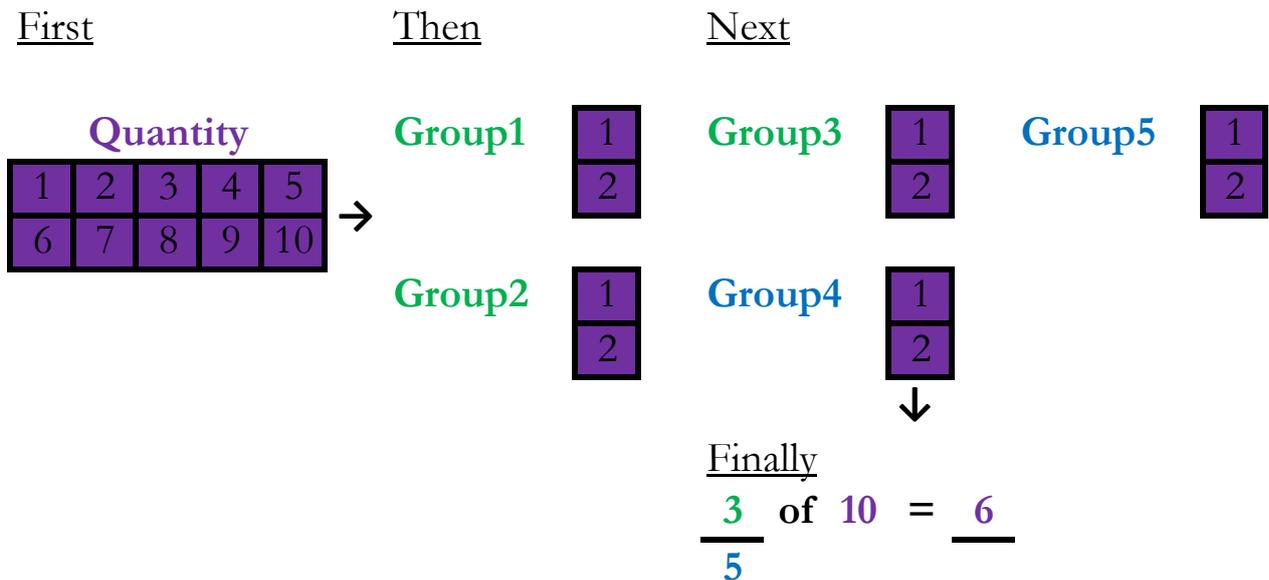
Strategy Applied

A fraction is part of a **whole** or part of **1** and a **fifth** is 1 of 5 **equal groups**.
10 is the **quantity** shared **equally** between the **total** number of **equal groups**.
5 is the **denominator**, represents the **total** number of **equal groups**.
3 is the **numerator**, represents **three** of the **equal groups**.
First, pick up **ten** objects and place them together. Now count aloud to check there are only **ten** objects; **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**.
Then, **share** the **ten** objects one at a time **equally between** the **five** groups, until exactly the **same quantity** of objects are in **each** of the groups.
Next, count how many objects there are **altogether** in **three** of the **groups**, should be six objects; **one, two, three, four, five, six**.
Finally, **three fifths** of **ten** equals **six**.

Bar Model

10				
2	2	2	2	2
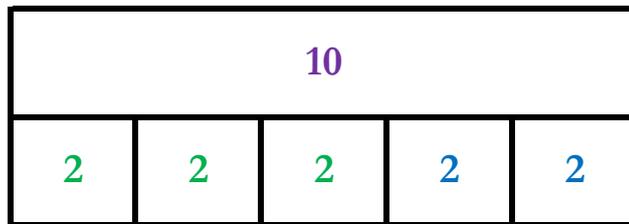
Test Questions

1) $\dfrac{3}{5}$ of 10 = ___

2) $\dfrac{1}{2}$ of 2 = ___

3) $\dfrac{3}{4}$ of 40 = ___

4) $\dfrac{2}{3}$ of 21 = ___

5) $\dfrac{1}{2}$ of 24 = ___

6) $\dfrac{2}{3}$ of 18 = ___

7) $\dfrac{2}{4}$ of 16 = ___

8) $\dfrac{1}{2}$ of 20 = ___

9) ___ = $\dfrac{1}{3}$ of 12

10) ___ = $\dfrac{1}{4}$ of 8

Fraction of a Quantity

1) $\dfrac{2}{3}$ of 18 = ?

Word Problem

Three adults share **eighteen** new reading books **equally** between them.
How many of the books will **two** of the adults have in **altogether?**

Concrete Object

First
Quantity

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18

→

Then
Group1

3
2
1

Next
Group2

3
2
1

Group3

3
2
1

↓

Finally

$\dfrac{2}{3}$ of 18 = 12
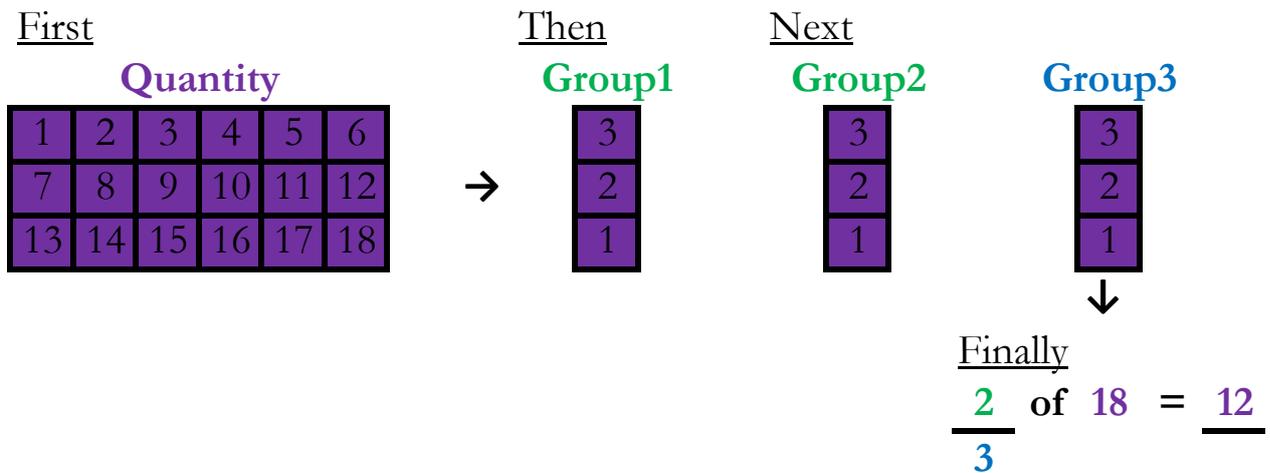
Strategy Applied

A fraction is part of a **whole** or part of **1** and a **third** is 1 of 3 **equal groups**.
18 is the **quantity** shared **equally** between the **total** number of **equal groups**.
3 is the **denominator**, represents the **total** number of **equal groups**.
2 is the **numerator**, represents **two** of the **equal groups**.
First, pick up **eighteen** objects and place them together. Now count aloud to check there are only eighteen objects; **1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18**.
Then, **share** the **eighteen** objects one at a time **equally between** the **three** groups, until exactly the **same quantity** of objects are in **each** of the groups.
Next, count how many objects there are **altogether** in **two** of the **groups**, there should be twelve objects; **one, two, three, four, five**, **six**, **seven**, **eight**, **nine**, **ten**, **eleven**, **twelve**.
Finally, **two thirds** of **eighteen** equals **twelve**.

Bar Model

18		
6	6	6

Test Questions

1) $\frac{2}{3}$ of 18 = ___

2) $\frac{2}{4}$ of 4 = ___

3) $\frac{3}{4}$ of 24 = ___

4) $\frac{1}{2}$ of 18 = ___

5) $\frac{2}{3}$ of 30 = ___

6) $\frac{3}{4}$ of 16 = ___

7) $\frac{1}{2}$ of ___ = 9

8) $\frac{1}{4}$ of ___ = 5

9) $\frac{1}{3}$ of ___ = 5

10) $\frac{3}{4}$ of ___ = 12

Answers

P. 2

1) 1 ten and 8 ones
2) 2 tens and 1 ones
3) 3 tens and 2 ones
4) 4 tens and 5 ones
5) 5 tens and 7 ones
6) 6 tens and 9 ones
7) 7 tens and 0 ones
8) 8 tens and 3 ones
9) 9 tens and 4 ones
10) 9 tens and 9 ones
11) 0 tens and 1 ones
12) 0 tens and 6 ones
13) 1 ten and 1 ones
14) 2 tens and 0 ones

P. 4

1) 10 + 8
2) 20+1
3) 30+2
4) 40+5
5) 50+7
6) 60+9
7) 70+0
8) 80+3
9) 90+4
10) 90+9
11) 0+1
12) 0+6
13) 10+1
14) 20+0

P. 6

1) 4
2) 6
3) 13
4) 20
5) 25
6) 34
7) 58
8) 87
9) 100
10) 101
11) 112
12) 122
13) 14
14) 39

P. 8

1) 19
2) 11
3) 25
4) 64
5) 19
6) 14
7) 76
8) 50
9) 91
10) 105
11) 85
12) 59
13) 102
14) 111

P. 10

1) 23
2) 31
3) 20
4) 59
5) 30
6) 57
7) 83
8) 60
9) 109
10) 130
11) 30
12) 55
13) 93
14) 110

P. 12

1) 28
2) 108
3) 50
4) 74
5) 90
6) 90
7) 117
8) 76
9) 92
10) 109
11) 90
12) 97
13) 120
14) 130

P. 14

1) 8
2) 6
3) 4
4) 2
5) 1p
6) 3p
7) £60
8) £80
9) 10
10) 20
11) 90
12) 50
13) 70
14) 30

P. 16

1) 9
2) 24
3) 12
4) 36
5) 70
6) 100
7) 17p
8) 18
9) 9cm
10) 15m
11) 22
12) 45
13) 25
14) 90

P. 18

1) 8, 10
2) 24, 26
3) 38, 40
4) 74, 76
5) 12, 15
6) 24, 27
7) 33, 36
8) 42, 45
9) 50, 55
10) 55, 60
11) 70, 75
12) 100, 110
13) 120, 130
14) 150, 160

P. 20

1) 39
2) 94
3) 92
4) 89
5) 85
6) 68
7) 81
8) 100cm
9) 100m
10) £68
11) 76
12) 100
13) 72
14) 91

Answers

P. 22	**P. 24**	**P. 24**	**P. 26**	**P. 28**
1) 29	1) 31	11) 45	1) 6	1) 2
2) 62	2) 44	12) 83	2) 20	2) 3
3) 35	3) 82	13) 94	3) 80	3) 5
4) 42	4) 39	14) 91	4) 7	4) 8
5) 105	5) 45	15) 77	5) 39	5) 10
6) 210	6) 68	16) 80	6) 50	6) 6
7) 157	7) 71	17) 83	7) 4	7) 15
8) 65p	8) 80	18) 102	8) 31L	8) 4mm
9) 90p	9) 70	19) 102	9) 40cm	9) 6cm
10) 97m	10) 58	20) 70	10) 25p	10) 14m
11) £129			11) 12mm	11) 26
12) £179			12) 93m	12) 20
13) 36			13) 18	13) 52
14) 83			14) 97	14) 30km

P. 30	**P. 32**	**P. 34**	**P. 36**	**P. 38**
1) 12	1) 10	1) 71	1) 5	1) 1
2) 6	2) 20	2) 56	2) 4	2) 2
3) 47	3) 42	3) 10	3) 3	3) 3
4) 9secs	4) 60	4) 34	4) 1	4) 13
5) 5secs	5) 83	5) 8	5) 6p	5) 13
6) 84mins	6) 10	6) 40	6) 4p	6) 20
7) 74mins	7) 36	7) 23	7) 82p	7) 24
8) 43	8) 50g	8) 10	8) £71	8) 39
9) 2hrs	9) 73g	9) 12	9) £90	9) 46
10) 1hrs	10) 99kg	10) 40	10) £58	10) 58
11) 25	11) 110kg	11) 16	11) 68	11) 0
12) 41	12) 147	12) 19	12) 45	12) 10
13) 53	13) 170	13) 10	13) 56	13) 43
14) 54	14) 191	14) 38	14) 32	14) 20

Answers

P. 40	P. 42	P. 44	P. 46	P. 48	P. 48
1) 6, 4	1) 39	1) 14	1) 8	1) 37	11) 26
2) 22, 20	2) 14	2) 40	2) 47	2) 17	12) 13
3) 34, 32	3) 3	3) 22	3) 41	3) 11	13) 11
4) 54, 52	4) 29	4) 8	4) 44	4) 26	14) 15
5) 9, 6	5) 11	5) 30	5) 6	5) 13	15) 3
6) 18, 15	6) 14	6) 44	6) 42	6) 14	16) 14
7) 27, 24	7) 20	7) 11	7) 35	7) 29	17) 29
8) 33, 30	8) 26	8) 59	8) 10	8) 14	18) 14
9) 5, 0	9) 13	9) 2	9) 40	9) 20	19) 20
10) 15, 10	10) 28	10) 50	10) 53	10) 28	20) 28
11) 45, 40	11) 32	11) 43	11) 8		
12) 10, 0	12) 36	12) 55	12) 81		
13) 70, 60	13) 32	13) 56	13) 70		
14) 170, 160	14) 64	14) 58	14) 13		

P. 50	P. 52	P. 54	P. 56	P. 58	P. 60	P. 62
1) 15	1) 6	1) 5	1) 3	1) 2	1) 2	1) 8
2) 60	2) 8	2) 10	2) 7	2) 3	2) 100	2) 3
3) 20	3) 24	3) 5	3) 12	3) 9	3) 4	3) 3
4) 80	4) 16	4) 6	4) 9	4) 5	4) 5	4) 6
5) 45	5) 24	5) 9	5) 9	5) 7	5) 12	5) 3
6) 24	6) 12	6) 10	6) 11	6) 1	6) 40	6) 4
7) 110	7) 36	7) 30	7) 8	7) 3	7) 10	7) 9
8) 30	8) 27	8) 5	8) 8	8) 8	8) 2	8) 15
9) 35	9) 30	9) 7	9) 11	9) 11	9) 2	9) 12
10) 14	10) 40	10) 4	10) 10	10) 10	10) 2	10) 5
11) 30	11) 44	11) 12	11) 12	11) 4	11) 2	
12) 22	12) 21	12) 9	12) 12	12) 4	12) 2	
13) 20	13) 36	13) 10	13) 8	13) 11	13) 2	
14) 120	14) 28	14) 12	14) 12	14) 1	14) 2	

Answers

P. 64	P. 66
1) 6	1) 12
2) 1	2) 2
3) 30	3) 18
4) 14	4) 9
5) 12	5) 20
6) 12	6) 12
7) 8	7) 18
8) 10	8) 20
9) 4	9) 15
10) 2	10) 16

Glossary

Amount is something that has a numerical value, for e.g. 10 cubes

Bar Model is a pictorial representation of a number sentence in the form of bars or boxes used to solve number problems.

Column is a vertical arrangement for example, in a table the cells arranged vertically.

Column Place Value is the value of a digit that relates to its position or place in a number within a column.

Concrete Objects are objects that can be handled and manipulated to support understanding of the structure of a mathematical concept. Materials such as Dienes(Base 10 materials), Cuisenaire, Numicon, are all examples of concrete objects.

Denominator is the number written below the line i.e. the divisor. e.g. in the fraction ⅔ the denominator is 3.

Digit is one of the symbols of a number system most commonly the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. Examples: the number 29 is a 2-digit number; there are three digits in 2.95. The position or place of a digit in a number conveys its value.

Digit Value is the value of a digit that relates to its position or place **in a** number. e.g. in 82 the digits represent 8 tens and 2 ones.

Dividend in division, is the number that is divided. e.g. in 15 ÷ 3, 15 is the dividend.

Divisor is the number by which another is divided. e.g. In the calculation 30 ÷ 6 = 5, the divisor is 6. In this example, 30 is the dividend and 5 is the quotient.

Glossary

Efficient Methods A means of calculation (which can be mental or written) that achieves a correct answer with as few steps as possible.
In written calculations this often involves setting out calculations in a columnar layout.

Equals is the symbol: =, read as 'is equal to' or 'equals'. and meaning 'having the same value as'. e.g. $7 - 2 = 4 + 1$ since both expressions, $7 - 2$ and $4 + 1$ have the same value, 5.

Expanded Form is a way to break up a number to show the value of each digit (Partition).

Fraction is the result of dividing one integer by a second integer, which must be non- zero. The dividend is the numerator and the non-zero divisor is the denominator. See also decimal fraction, equivalent fraction, improper fraction, proper fraction, unit fraction and vulgar fraction.

Formal Written Method is the way of setting out working in columnar form. In addition and subtraction, the formal written methods can be referred to as expanded and column addition and/or subtraction. In multiplication, the formal written methods are called short or long multiplication depending on the size of the numbers involved. Similarly in division the formal written methods are called short or long division.

Grid a lattice created with two sets of parallel lines. Lines in each set are usually equally spaced. If the sets of lines are at right angles and lines in both sets are equally spaced, a square grid is created.

Hundred Square is a 10 by 10 square grid numbered 1 to 100. A similar grid could be numbered as a $0 - 99$ grid.

Inverse is the opposite or reverse operation.

Glossary

Mental Calculations refer to calculations that are largely carried out mentally, but may be supported with a few simple written jottings.

Multiple is the result of multiplying a number by an integer, e.g. 12 is a multiple of 3 because3 × 4 = 12.

Multiplicand is a number to be multiplied by another. e.g. in 6 × 4, 4 is the multiplier as it is how many lots/groups of 6.

Multiplier is a number to be multiplied by another. e.g. in 5 × 3, 5 is the multiplicand as it is the number to be multiplied by 3.

Number Bond is a pair of numbers with a particular total.

Number Line is a line where numbers are represented by points upon it.

Number Sentence is a mathematical sentence involving numbers. e.g. 3 + 6 = 9 and 9 > 3

Numerator is the number written on the top– the dividend (the part that is divided). In the fraction ⅔, the numerator is 2.

Operations that, when they are combined, leave the entity on which they operate unchanged. Examples: addition and subtraction are inverse operations e.g. 5 + 6 – 6 = 5. Multiplication and division are inverse operations e.g. 6 × 10 ÷ 10 = 6.

Part Whole Model is a pictorial representation of the relationship between a number or number sentence and its component parts.

Glossary

Partition 1) To separate a set into subsets. 2) To split a number into component parts. e.g. the two-digit number 38 can be partitioned into 30 + 8 or 19 + 19. 3) A model of division. e.g. 21 ÷ 7 is treated as 'how many sevens in 21?'

Pictorial Representations do enable learners to use pictures and images to represent the structure of a mathematical concept.
The pictorial representation may build on the familiarity with concrete objects. e.g. a square to represent a Dienes 'flat' (representing 100).
Pupils may interpret pictorial representations provided to them or create a pictorial representation themselves to help solve a mathematical problem.

Place Holder In decimal notation, the zero numeral is used as a place holder to denote the absence of a power of 10.

Place Value is the value of a digit that relates to its position or place in a number. e.g. in 1482 the digits represent 1 thousand, 4 hundred, 8 tens and 2 ones respectively; in 12.34 the digits represent 1 ten, 2 ones, 3 tenths and 4 hundredths respectively.

Product is the result of multiplying one number by another.
e.g. the product of 2 and 3 is 6 since $2 \times 3 = 6$.

Quotient is the result of a division. e.g. $46 \div 3 = 15\frac{1}{3}$ and $15\frac{1}{3}$ is the quotient of 46 by 3. Where the operation of division is applied to the set of integers, and the result expressed in integers.
e.g. $46 \div 3 = 15$ remainder 1 then 15 is the quotient of 46 by 3 and 1 is the remainder.

Glossary

Regrouping is to exchange a number for another of equal value. The process of regrouping is used in some standard compact methods of calculation. e.g.: 'carrying figures/exchanging' in addition, multiplication or division; and 'decomposition' in subtraction.

Remainder in the context of division requiring a whole number answer (quotient), the amount remaining after the operation.
 e.g. 29 divided by 7 = 4 remainder 1.

Repeated Addition is the process of repeatedly adding the same number or amount. One model for multiplication. e.g. 5 + 5 + 5 + 5 = 5 x 4.

Repeated Subtraction is The process of repeatedly subtracting the same number or amount. One model for division.
e.g. 20 -5 - 5 - 5 - 5 = 0 so 20 ÷ 4 = 5 remainder 0.

Sequence is succession of terms formed according to a rule. There is a definite relation between one term and the next and between each term and its position in the sequence. e.g. 0, 4, 8, 12, 16 etc.

Step Counting is the process of repeatedly adding the same number or amount. One model for multiplication. e.g. 5 + 10 + 15 + 20 = 5 x 4.

Total Value is the sum to a calculation.

Zero in a place value system, a place-holder. e.g. 105