Addition Strategies

> ## Numberline

$34 + 24 = 58$

+10   +10   +4
34   44   54   58

> ## Visual

$213 + 4 = 217$

> ## Partitioning

$213 + 4$ $3 + 4 = 7$
210   3 $210 + 7 = 217$

$119 + 80$ $10 + 80 = 90$
109   10 $109 + 90 = 199$

$213 + 400$ $200 + 400 = 600$
13   200 $13 + 600 = 613$

> ## Column

```
  h t o
  4 3 2
+ 5 2 1
-------
  9 5 3
```

① Expanded Column

```
  2 3 6          6 9 2
+     8        +   7 0
-------        -------
    1 4              2
    3 0            1 6 0
  2 0 0          6 0 0
-------        -------
  2 4 4          7 6 2
```

② Renaming Column

```
  2³6          ⁺6 9 2          2 ³6
+   8          +  7 0        + 3 4 5
-----          ------        -------
2 4 4            7 6 2          5 8 1

 ⁺2 3 6          ⁺2⁺7 8
+3 9 1          +3 4 9
------          ------
 6 2 7           6 2 7
```
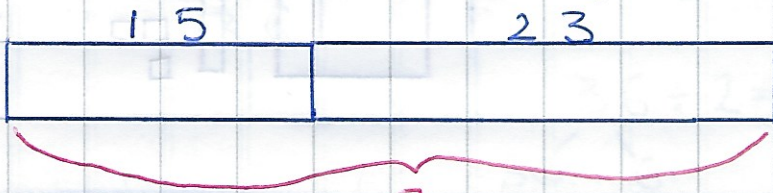
Word Problems involving Addition.

> Bar models

① Tom has 2 3 pencils.
Anna has 1 5 pencils.
How many pencils do they have altogether?

1 5	2 3

$$1 5 + 2 3 = \underline{3 8}$$

$$\begin{array}{r} 1\ 5 \\ +\ 2\ 3 \\ \hline 3\ 8 \end{array}$$

② There are 1 3 6 children in the school band and 1 9 0 in the school choir. How many are there altogether?
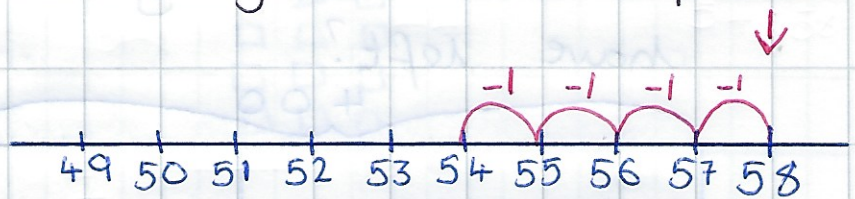
1 3 6	1 9 0

$$\begin{array}{r} 1\ 9\ 0 \\ +\ 1\ 3\ 6 \\ \hline 6 \\ 1\ 2\ 0 \\ +\ 2\ 0\ 0 \\ \hline 3\ 2\ 6 \end{array}$$

$$\begin{array}{r} {}^{+}1\ 9\ 0 \\ +\ 1\ 3\ 6 \\ \hline 3\ 2\ 6 \end{array}$$

Subtraction Strategies

> Numberline :   ① Sam had 58 cookies. He ate 4
How many did he have left?

$$-1 \quad -1 \quad -1 \quad -1$$

49 50 51 52 53 54 55 56 57 58

OR   58   the difference between 58 and 49.

$$+1 \quad +2 \quad +3 \quad +4 \quad +5 \quad +6 \quad +7 \quad +8 \quad +9$$

49 50 51 52 53 54 55 56 57 58

> Partitioning :

① 58 − 4   8 − 4 = 4
   50 8   50 + 4 = 54

② 658 − 4   8 − 4 = 4
   650 8   650 + 4 = 654

③ 658 − 40   600 − 500 = 100
   608 50   58 + 100 = 158

④ 658 − 500   600 − 500 = 100
   58   600   58 + 100 = 158

> Column   Column with renaming

$$\begin{array}{r} 975 \\ -723 \\ \hline 252 \end{array} \qquad \begin{array}{r} 8\,\overset{2}{\cancel{3}}\,^11 \\ -26 \\ \hline 805 \end{array} \qquad \begin{array}{r} \overset{5}{\cancel{6}}\,^10\,8 \\ -1\,3\,8 \\ \hline 4\,7\,0 \end{array}$$

$$\begin{array}{r} ^4\cancel{5}\,\overset{^11}{\cancel{2}}\,^10 \\ -2\,6\,9 \\ \hline 2\,5\,1 \end{array} \qquad \begin{array}{r} ^2\cancel{3}\,\overset{9}{\cancel{0}}\,^10 \\ -1\,2\,5 \\ \hline 1\,7\,5 \end{array}$$
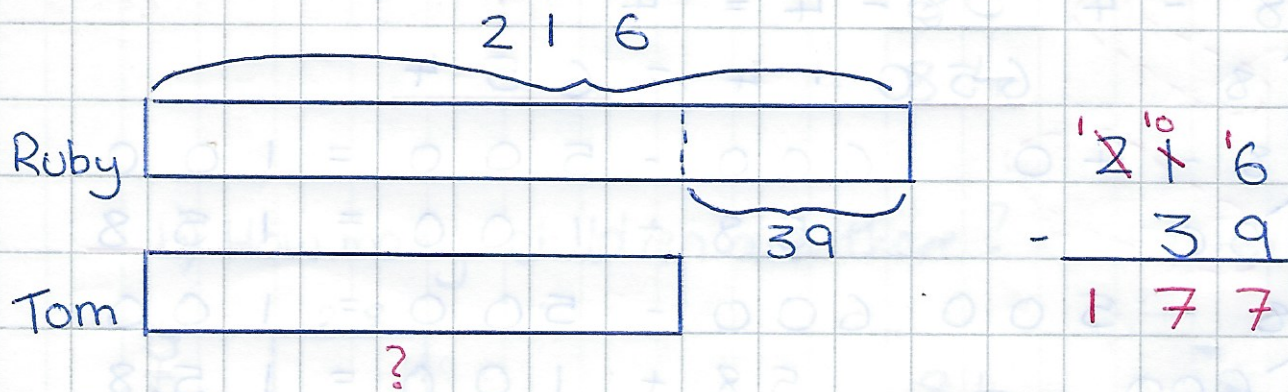
Word Problems involving Subtraction.

① Hannah baked 4 0 0 tarts. She gave
2 7 0 tarts away. How many did Hannah
have left?

$$
\begin{array}{r}
^3\!4\ ^1\!0\ 0 \\
-\ 2\ 7\ 0 \\
\hline
1\ 3\ 0
\end{array}
$$
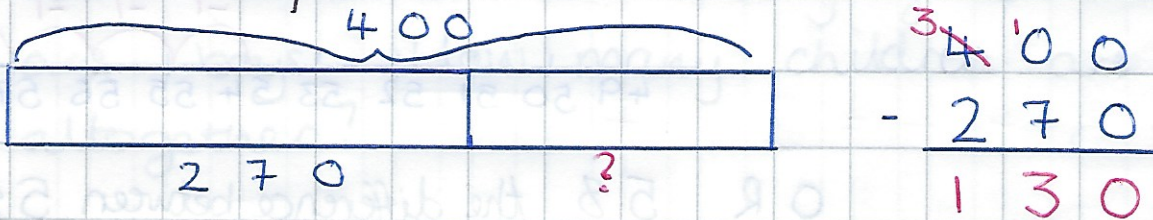
Hannah had <u>130</u> tarts left

② Ruby folds 2 1 6 paper aeroplanes. She
folds 3 9 more paper aeroplanes than
Tom. How many paper aeroplanes does
Tom fold?

$$
\begin{array}{r}
^1\!2\ ^{10}\!1\ ^1\!6 \\
-\ \ \ 3\ 9 \\
\hline
1\ 7\ 7
\end{array}
$$

Tom folds <u>1 7 7</u> paper aeroplanes

Multiplication

> Visual/array : 8 × 3

> Repeated Addition :

8 × 3

↳ 8 + 8 + 8 = 24

> 20 × 4

↳ 2 × 4 = 8

20 × 4 = 80

3 × 40

↳ 3 × 4 = 12

3 × 40 = 120

> Partitioning   12 × 4
                10   2

① 10 × 4 = 40
② 2 × 4 = 8
③ 40 + 8 = 48

32 × 3
30   2

$3×3=9$
$30×3=90$

① 30 × 3 = 90
② 2 × 3 = 6
③ 90 + 6 = 96

> Column : Expanded

```
  9 9
×   8
─────
  7 2      ① 9 × 8
7 2 0      ② 90 × 8
─────      ③ 720 + 72
7 9 2
```

```
  2 3
×   2
─────
    6
  4 0
─────
  4 6
```

① 3 × 2 = 6
② 2 × 20 = 40
③ 40 + 6 = 46

> Column : Regrouping

```
  ²4 7
×   4
─────
1 8 8
```

① 7 × 4
② 4 × 4
③ 16 + 2

```
  ²3 4
×   5
─────
1 7 0
```

① 4 × 5
② 3 × 5
③ 15 + 2

Word Problems : Multiplication

There are 2 8 boys in a group. There are 3 times as many girls as there are boys. How many children are there altogether?

2 Steps

a) How many girls are there?

28

?

$$\begin{array}{r} 28 \\ \times\ \ 3 \\ \hline 24 \\ 60 \\ \hline 84 \end{array}$$

$$\begin{array}{r} ^{2}28 \\ \times\ \ 3 \\ \hline 84 \end{array}$$

b) How many children are there?

28

84

$$\begin{array}{r} 84 \\ +\ 28 \\ \hline 12 \\ 100 \\ \hline 112 \end{array}$$

$$\begin{array}{r} ^{+}84 \\ +\ 28 \\ \hline 112 \end{array}$$

There are 1 1 2 children altogether

Division

> Grouping

$10 \div 2 = 5$

> Sharing

$10 \div 2 = 5$

> Partitioning

$68 \div 2 = 34$

60   8

① $60 \div 2 = 30$
② $8 \div 2 = 4$
③ $30 + 4 = 34$

> Partitioning
(with regrouping)

$52 \div 4 = 13$

40   12

$40 \div 4 = 10$
$12 \div 4 = 3$
$10 + 3 = 13$

$96 \div 8$

80   16

$80 \div 8 = 10$
$16 \div 8 = 2$
$10 + 2 = 12$

$68 \div 4$

40   28

$40 \div 4 = 10$
$28 \div 4 = 7$
$10 + 7 = 17$

> Long division
(Bus Stop)

$96 \div 8$

$$\begin{array}{r} 1\,2 \\ 8\overline{)9\,6} \\ -\,8\,0 \quad (80 \div 8 = 10) \to 1\,\text{ten} \\ \hline 1\,6 \\ -\,1\,6 \quad (16 \div 8 = 2) \to 2\,\text{ones} \\ \hline 0 \end{array}$$

$78 \div 6$

$$\begin{array}{r} 1\,3 \\ 6\overline{)7\,8} \\ -\,6\,0 \quad (60 \div 6 = 10) \\ \hline 1\,8 \\ -\,1\,8 \quad (18 \div 6 = 3) \\ \hline 0 \end{array}$$

$96 \div 4$

$$\begin{array}{r} 2\,4 \\ 4\overline{)9\,6} \\ -\,4\,0 \quad (40 \div 4 = 10) \\ \hline 5\,6 \\ -\,4\,0 \quad (40 \div 4 = 10) \\ \hline 1\,6 \\ -\,1\,6 \quad (16 \div 4 = 4) \\ \hline 0 \end{array}$$
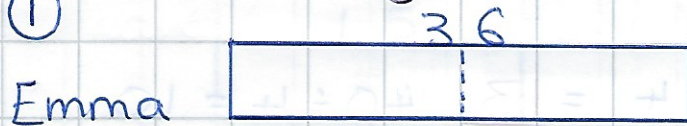
Word Problems : Division

Emma has 36 beads.
Emma has twice as many beads as
Sam.
How many beads do they have altogether?

①

Emma

$$36 \div 2 = 18$$

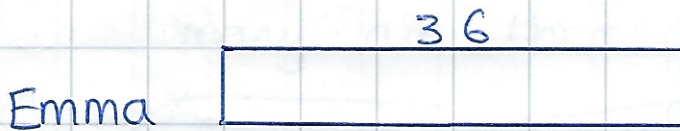$30 \quad 6$

$$30 \div 2 = 15$$
$$6 \div 2 = 3$$
$$15 + 3 = 18$$

Sam

?

Sam has 18 beads

18

$$2 \overline{\smash{)}36}$$
$$-20 \quad \binom{20 \div}{2 = 10}$$
$$16$$
$$-16 \quad \binom{16 \div 2}{= 8}$$
$$0$$

②

Emma

36

Sam

18
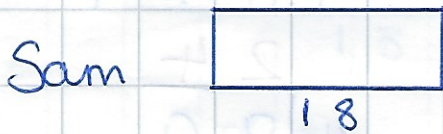
$$36 + 18 = 54$$

$$\begin{array}{r} 3\,6 \\ + 1\,8 \\ \hline 1\,4 \\ + 4\,0 \\ \hline 5\,4 \end{array}$$

$$\begin{array}{r} \overset{+}{3}\,6 \\ + 1\,8 \\ \hline 5\,4 \end{array}$$

They have 54
beads altogether

Longer Word Problems

Sam, Ravi and Elliot have 92 marbles altogether. Sam has 3 times as many marbles as Ravi. Ravi has 2 fewer marbles than Elliot. How many marbles does Ravi have?

Sam
| | | |

Ravi
| |

Elliot
| | 2 |

① To make the bars an equal value: $92 - 2 = 90$
② To find the value of each bar : $90 \div 5 = 18$

③ So:

Sam
| 18 | 18 | 18 |

Ravi
| 18 |

Elliot
| 18 | 2 |

$$
\begin{array}{r}
18 \\
5\overline{)90} \\
-50 \quad (50 \div 5 = 10) \\
\hline
40 \\
-40 \quad (40 \div 5 = 8) \\
\hline
0
\end{array}
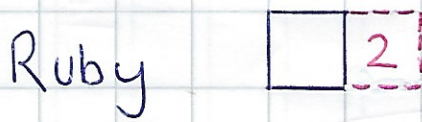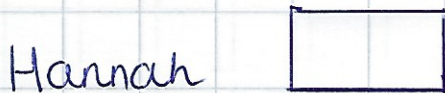$$

Sam = $18 \times 3 = 54$
Ravi = 18
Elliot = $18 + 2 = 20$

Ravi has 18 marbles

Lulu, Hannah and Ruby have 26 dolls altogether. Lulu has 5 times as many dolls as Hannah. Hannah has 2 more dolls than Ruby. How many dolls does Hannah have?
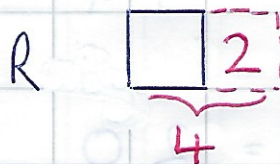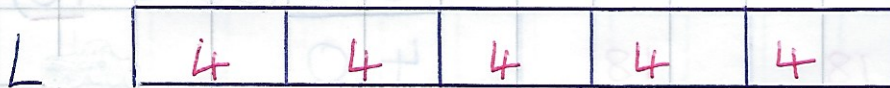
Lulu

Hannah

Ruby ☐ 2

① To make all the bars an equal value: $26 + 2 = 28$

② To find the value of each bar:
$28 \div$ the number of groups $= 28 \div 7 = 4$

③ So:

L | 4 | 4 | 4 | 4 | 4

H | 4

R | ☐ 2
  4

$$7\overline{)28}$$
$$\begin{array}{r} 4 \\ 7\overline{)28} \\ -14 \quad (14 \div 7 = 2) \\ \hline 14 \\ -14 \quad (14 \div 7 = 2) \\ \hline 0 \end{array}$$

Lulu $= 4 \times 5 = 20$

Hannah $= 4$

Ruby $= 4 - 2 = 2$