

ADDITION/SUBTRACTION

* Story of 5 Facts to 5

$$\begin{aligned}5 + 0 &= 5 \\4 + 1 &= 5 \\3 + 2 &= 5 \\2 + 3 &= 5 \\1 + 4 &= 5\end{aligned}$$

* Story of 10 Facts to 10

$$\begin{aligned}10 + 0 &= 10 \\9 + 1 &= 10 \\8 + 2 &= 10 \\7 + 3 &= 10 \\6 + 4 &= 10 \\5 + 5 &= 10 \\4 + 6 &= 10 \\3 + 7 &= 10 \\2 + 8 &= 10 \\1 + 9 &= 10 \\0 + 10 &= 10\end{aligned}$$

This principle is also used later on for the **Facts to 100**.

$$\begin{aligned}0 + 100 &= 100 \\10 + 90 &= 100 \\20 + 80 &= 100 \\30 + 70 &= 100 \\40 + 60 &= 100 \\&\text{etc}\end{aligned}$$

Using facts to 10

e.g. 1

$$\begin{aligned}8 + 4 &= 8 + (2 + 2) \\&= 10 + 2 \\&= 12\end{aligned}$$

e.g. 2

$$\begin{aligned}5 + 9 &= 9 + 5 \quad (\text{write bigger number first}) \\&= (9 + 1) + 4 \\&= 10 + 4 \\&= 14\end{aligned}$$

* Adding Doubles

$$\begin{aligned}1 + 1 &= 2 \\2 + 2 &= 4 \\3 + 3 &= 6 \\4 + 4 &= 8 \\5 + 5 &= 10 \\&\vdots \\&\vdots \\8 + 8 &= 16 \\10 + 10 &= 20\end{aligned}$$

* **Adding Using Near Doubles**

$$\begin{aligned} 5 + 6 &= 5 + 5 + 1 \\ &= 10 + 1 \\ &= 11 \end{aligned}$$

* **Adding Looking for Pairs that total 10/20**

e.g. 1

$$\begin{aligned} 6 + 5 + 4 & \\ \mathbf{6} + 5 + \mathbf{4} &= (\mathbf{6} + \mathbf{4}) + 5 \\ &= \mathbf{10} + 5 \\ &= 15 \end{aligned}$$

e.g. 2

$$\begin{aligned} 18 + 9 + 2 & \\ \mathbf{18} + 9 + \mathbf{2} &= (\mathbf{18} + \mathbf{2}) + 9 \\ &= \mathbf{20} + 9 \\ &= 29 \end{aligned}$$

* **Adding 9 by adding 10 and subtracting 1**

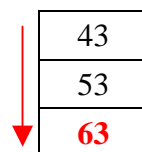
$$\begin{aligned} 7 + 9 &= (7 + 10) - 1 \\ &= 17 - 1 \\ &= 16 \end{aligned}$$

* **Using Number Grid that starts at 1**

* **To add 10 or a multiple of 10 to a 1/2-digit number.**

The spider moves down one or more rows to add 10 or a multiple of 10 to a 2-digit number.

$$43 + 20 =$$

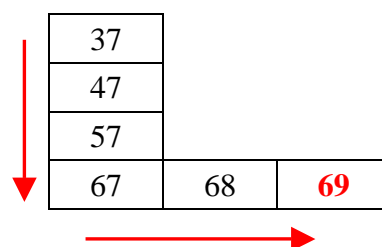


$$\therefore 43 + 20 = \mathbf{63}$$

* **To add 2-digit numbers looking for multiples of 10**

The spider moves right one or two columns to add units to a 1/2-digit number.

e.g. $37 + 32 =$



$$\therefore 37 + 32 = \mathbf{69}$$

* **Facts to 20 (Bonds of 20)**

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

* **Using partitioning of a 2-digit number to add a 2-digit number to a 1-digit number**

$$\begin{aligned}
 14 + 6 &= (10 + 4) + 6 \\
 &= 10 + 10 \\
 &= 20
 \end{aligned}$$

Or use facts to 20 (bonds of 20)

$$\begin{aligned}
 18 + 4 &= (18 + 2) + 2 \\
 &= 20 + 2 \\
 &= 22
 \end{aligned}$$

This method is only used if facts to 20 have not yet been memorised.

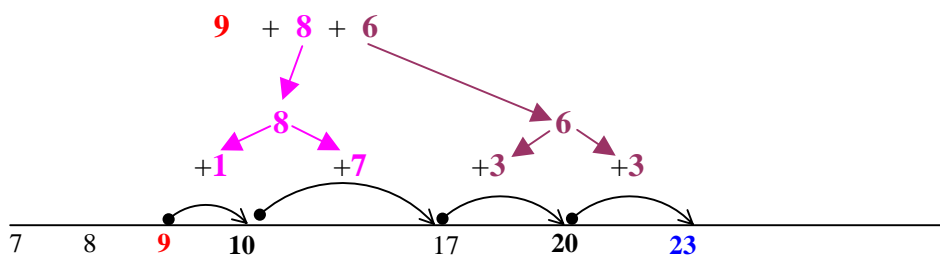
$$\begin{aligned}
 18 + 4 &= 10 + 8 + 4 \\
 &= 10 + \underline{8+2} + 2 \\
 &= 10 + \underline{10} + 2 \\
 &= 22
 \end{aligned}$$

* **Adding a number by counting on to the next multiple of 10**

(a) **adding three 1-digit numbers mentally**

e.g. $6 + 9 + 8$ (No pair of numbers that make ten are present)

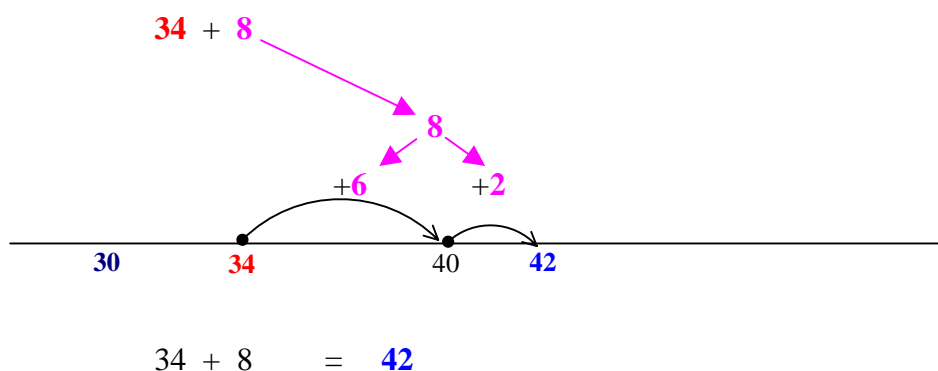
Start with largest number (9)



$$\therefore 9 + 8 + 6 = 23$$

(b) Adding a 2-digit number to a 1-digit number mentally

e.g.



*** Doubling numbers using known doubles**

$$\begin{aligned} 12 + 12 &= (10 + 2) + (10 + 2) \\ &= (10 + 10) + (2 + 2) \\ &= 20 + 4 \\ &= 24 \end{aligned}$$

Compare to coins/money

*** Using known doubles for addition of near doubles**

$$\begin{aligned} 20 + 21 &= 20 + 20 + 1 \\ &= (20 + 20) + 1 \\ &= 40 + 1 \\ &= 41 \end{aligned}$$

$$\begin{aligned} 25 + 26 &= (25 + 25) + 1 \\ &= 50 + 1 \\ &= 51 \end{aligned}$$

*** Doubling 2-digit numbers using known doubles**

To double a multiple of 5: – double the tens and then add another 10

$$\begin{aligned} 35 + 35 &= (30 + 30) + 10 \\ &= 60 + 10 \\ &= 70 \end{aligned}$$

This can be used to double 36

$$\begin{aligned} 36 + 36 &= (35 + 35) + 1 + 1 \\ &= 70 + 2 \\ &= 72 \end{aligned}$$

(36 is one more than 35 so double 36 is *two* more than 70)

* Partitioning a 3-digit number into H T U

$$\begin{aligned} 346 &= 300 + 40 + 6 \\ &= 3 \text{ hundreds} + 4 \text{ tens} + 6 \text{ units} \end{aligned}$$

* Adding Near Multiples of 10 (i.e. – 19, 29, 32 etc)

e.g. 1

$$\begin{aligned} 47 + 29 & \quad (\text{nearly } 30) \\ (47 + 30) - 1 &= 77 - 1 \quad (\text{because we have added 1 too many}) \\ &= 76 \end{aligned}$$

e.g. 2

$$\begin{aligned} 29 + 72 &= (30 + 70) - 1 + 2 \\ &= 100 - 1 + 2 \\ &= 101 \end{aligned}$$

* Adding a 2-digit number to a 3-digit number

$$21 + 176 \quad (\text{focus on 2-digit numbers part of the addition})$$

$$\begin{aligned} & 21 + 76 \\ = & 21 + 70 + 6 \\ = & 91 + 6 \\ = & 97 \end{aligned}$$

$$\therefore 21 + 176 = 197$$

* Adding two 3-digit numbers using informal method

436 + 160	or	
436 = 400 + 30 + 6		4 3 6
160 = 100 + 60	+	1 6 0
<u>500 + 90 + 6</u>		<u>5 0 0</u>
		9 0
		6
		<u>5 9 6</u>

$$\therefore 436 + 160 = 596$$

* Adding three 3-digit numbers using written methods vertically

$$364 + 123 + 255$$

H	T	U
3	6	4
1	2	3
+	2	5
7	4	2
1	1	

1. Add units in units column

$$4 + 3 + 5 = 12$$

Write units part (2) in units column and tens part (1) below in tens column.

2. Now add the tens in the tens column.

6 tens + 2 tens + 5 tens and 1 more ten is 14 tens i.e. one hundred and forty.

We write the tens digit (4) in the tens column and the hundreds digit (1) below in the hundreds column.

3. Now add the hundreds in the hundreds column.

3 hundreds + 1 hundred + 2 hundred and 1 more hundred i.e. 7 hundreds.

We put the **1** *below* in the tens column because 12 is 1 ten and 2 units; \therefore we write the **1** close to the 2 to signify 12.

$$\therefore 364 + 123 + 255 = 742$$

SUBTRACTION

* Relation between addition and subtraction

e.g. $2 + 3 = 5$
 $3 + 2 = 5$
 $5 - 3 = 2$
 $5 - 2 = 3$

* Subtracting 10 from a 'teen' (using the Number Grid)

e.g. $18 - 10 = 8$

7	8	9
17	18	19
27	28	29

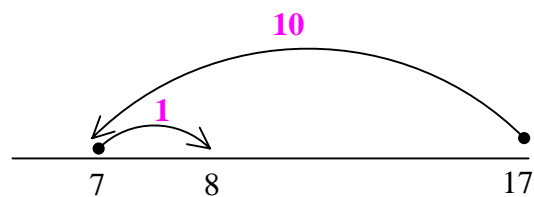
* Subtracting 10 from a 2-digit number (using the Number Grid)

e.g. $46 - 10 = 36$

35	36	37
45	46	47
55	56	57

* Subtracting a near 10

e.g. $17 - 9 = (17 - 10) + 1$
 $= 7 + 1$
 $= 8$



* Subtracting 10 and multiples of 10 from a 2-digit number

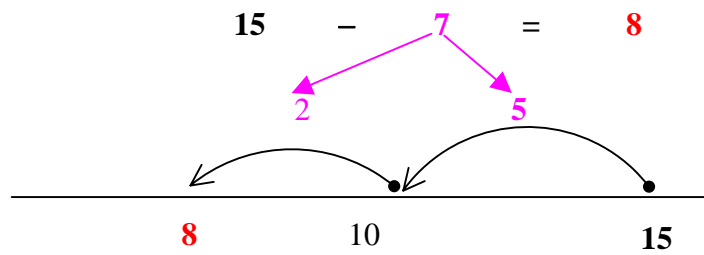
Use the number grid

e.g. $47 - 23 = (47 - 20) - 3$
 $= 27 - 3$
 $= 24$

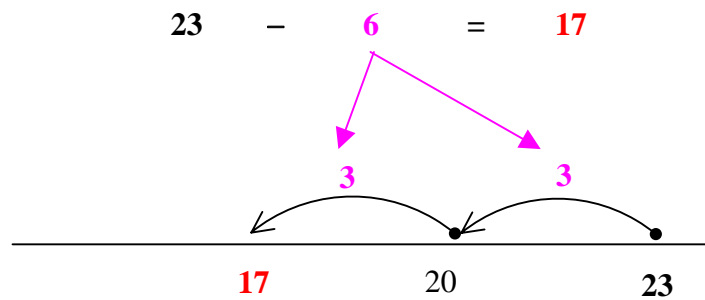
24	25	26	27
34	35	36	37
44	45	46	47

*** Subtracting a 1-digit number from a ‘teens’ and a ‘twenties’ number**

e.g. 1



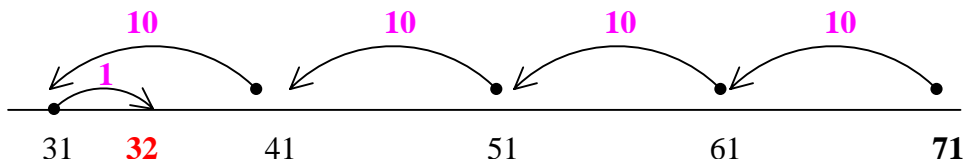
e.g. 2



*** Subtracting a near multiple of ten**

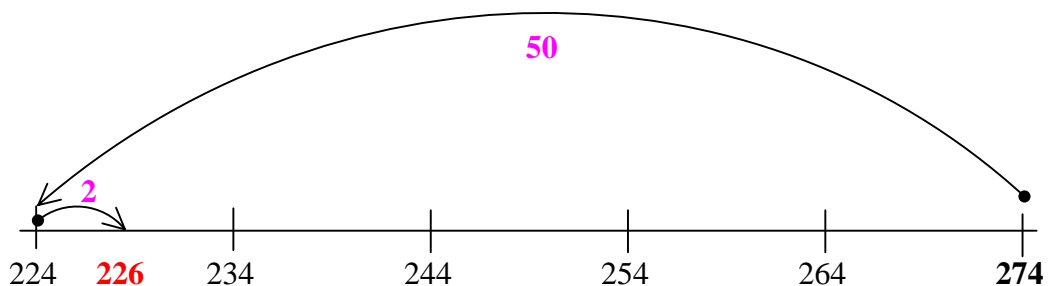
e.g. 1

$$\begin{aligned}
 &71 - 39 && (39 \text{ is nearly } 40) \\
 &= (71 - 40) + 1 && (\text{because we have subtracted } 1 \text{ too many}) \\
 &= 31 + 1 \\
 &= 32
 \end{aligned}$$

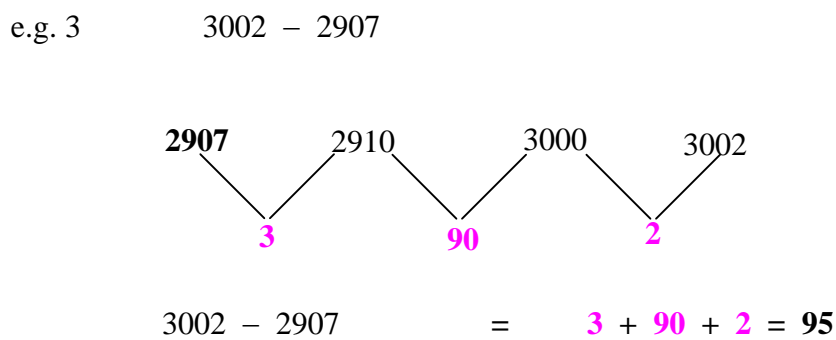
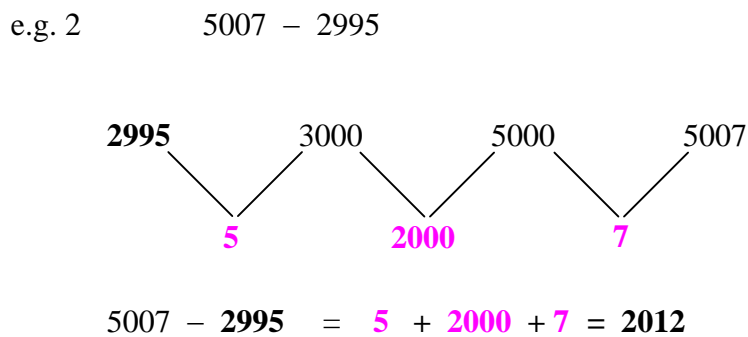
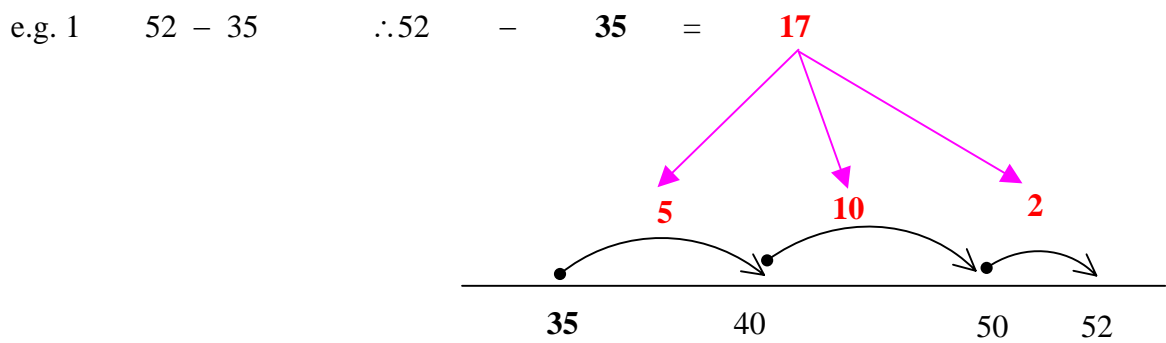


e.g. 2

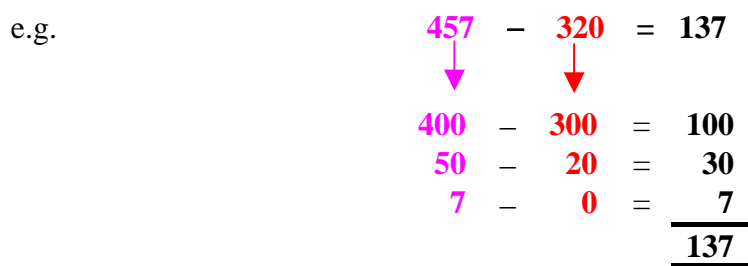
$$\begin{aligned}
 &274 - 48 && (48 \text{ is nearly } 50) \\
 &= (274 - 50) + 2 && (\text{because we have subtracted } 2 \text{ too many}) \\
 &= 224 + 2 \\
 &= 226
 \end{aligned}$$



* **Subtracting by counting on to the next ten or hundred or thousand**
(Starting from the smaller number)



* **Subtracting a 3-digit from a 3-digit number** (Use place value cards)



* Subtracting TU from HTU and HTU from HTU using *informal* written methods

e.g. $152 - 87 =$

(Record the *hops* vertically and then add all the *hops* together)

$\therefore 152 - 87 = 3 + 10 + 50 + 2$
 $= 65$

* Subtracting TU from HTU and HTU from HTU using *standard* written methods

e.g. 1 $382 - 167 = 215$

	200		
	H	T	U
		7	1
	3	8	2
-	1	6	7
	2	1	5

Steps involved

1. Give an estimate
2. Subtract the units, '*changing*' a ten for 10 units (12 units – 7 units)
3. Subtract the tens (7 tens – 6 tens)
4. Subtract the hundreds (3 hundreds – 1 hundred)
5. Check with estimate

DO NOT USE THE WORD '*BORROWING*'

The term 'borrowing' implies 'giving back'. Use instead the terms '*changing*' or '*swapping*'

e.g. 2 $527 - 192 = 335$

	300		
	H	T	U
		1	2
	4	2	7
-	1	9	2
	3	3	5

Steps involved

1. Give an estimate
2. Subtract the units (7 units – 2 units)
3. Subtract the tens '*changing*' a hundred for 10 tens (12 tens – 9 tens)
4. Subtract the hundreds (4 hundreds – 1 hundred)
5. Check with estimate

e.g. 3

$$523 - 386$$

$$\begin{array}{r} \text{100} \\ \text{H T U} \\ 5 \overset{1}{\cancel{2}} \overset{1}{3} \\ - 3 \ 8 \ 6 \\ \hline 7 \end{array}$$

Subtract the units ,
'changing' a ten
for 10 units
(13 units - 6 units)

$$\begin{array}{r} \text{100} \\ \text{H T U} \\ 4 \overset{11}{\cancel{5}} \overset{1}{\cancel{2}} \overset{1}{3} \\ - 3 \ 8 \ 6 \\ \hline 3 \ 7 \end{array}$$

Subtract the tens ,
'changing' a
hundred for 10 tens
(11 tens - 8 tens)

$$\begin{array}{r} \text{100} \\ \text{H T U} \\ 4 \overset{11}{\cancel{5}} \overset{1}{\cancel{2}} \overset{1}{3} \\ - 3 \ 8 \ 6 \\ \hline \mathbf{1 \ 3 \ 7} \end{array}$$

Subtract the
hundreds

$$\therefore 523 - 386 = \mathbf{137}$$