

Numeracy
Information
Evening

April 2013

Mental Calculation Strategies ~ Addition and Subtraction

- Count all
- Count on from first number
- Count on from largest number
- Step counting
- Use known facts or skills
- Derived facts
- 2 digit numbers

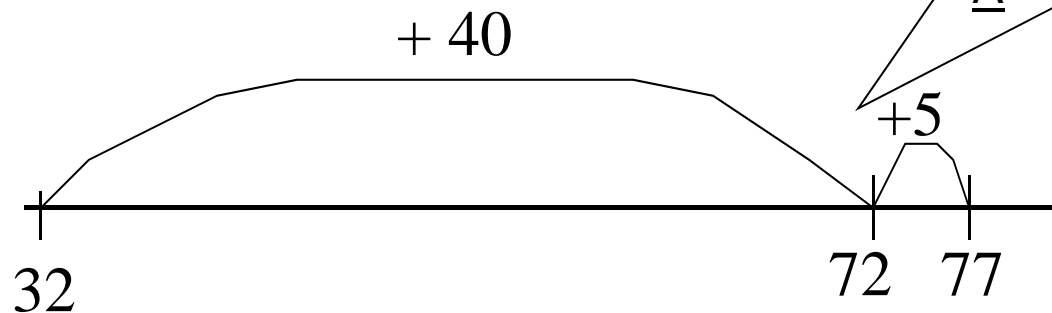
Mental Calculation Strategies ~ Multiplication and Division

- Use the relationship between multiplication and division
- Multiply / divide by 2 as double / halve
- Number trios
- Multiply / divide by 10
- Use doubling / halving to build on known number facts
- 4 x tables as double, double, 8 x table as double, double, double
- Use related facts
- Partition 2 digit numbers
- Multiply / divide by 100
- Use factors

Written Calculation Strategies ~ Addition and Subtraction

Empty Number lines

Find the total of 32 and 45



Partition the 45: jump on in tens first, as four jumps of 10 or one jump of 40. Label where we land. Then jump on 5 to make final landing.

$$32 + 45 = 77$$

B
This is the number sentence which represents the calculation shown on the number line

Written Calculation Strategies ~ Addition and Subtraction

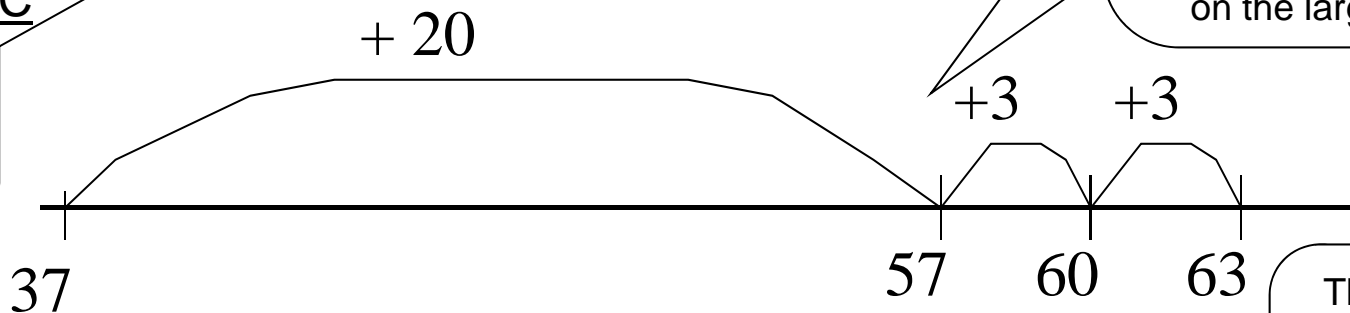
Empty Number lines

Find the difference between 63 and 37

$$63 - 37 = 26$$

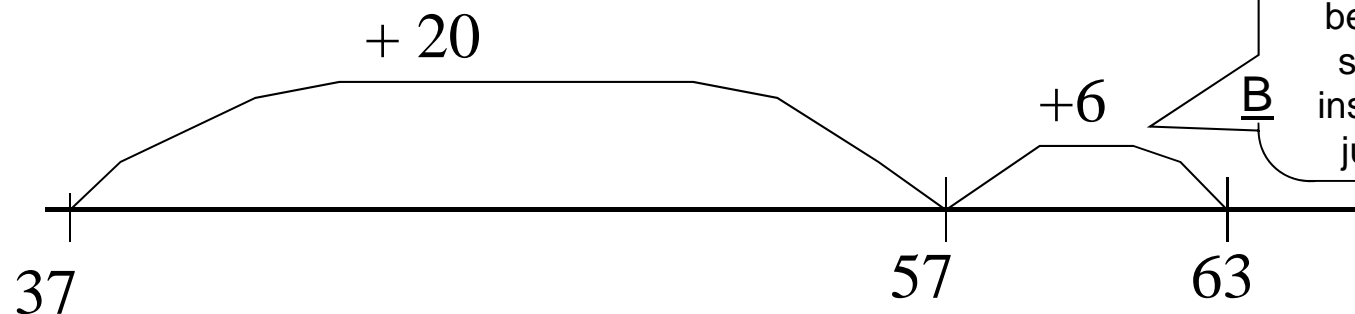
The answer is the amount jumped.

C



Counting on from the smaller number until we get to the larger number. Jumping in tens until we get close to the larger number, then jumping to the next ten number and then finally jumping to land on the larger number.

A



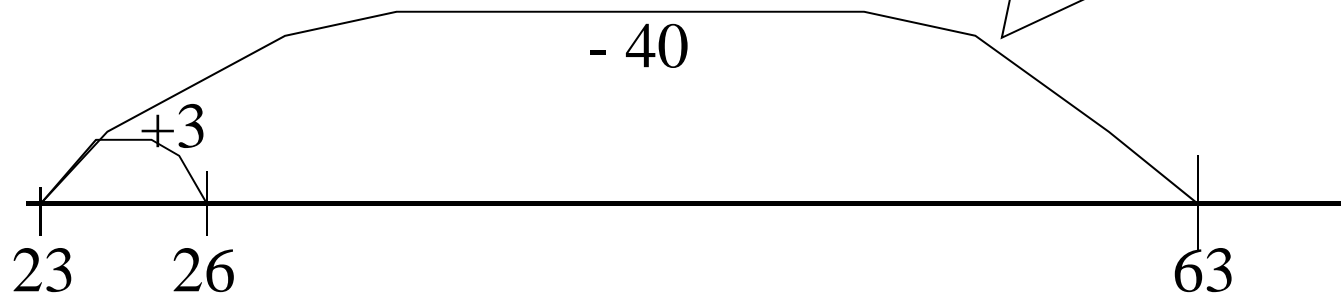
The jump from 57 to 63 could be done as a single jump instead of two jumps of 3.

B

Written Calculation Strategies ~ Addition and Subtraction

Empty Number lines

Find the difference between 63 and 37



This is the compensation method. Counting back to the nearest next multiple of 10 to the smaller number and then compensating by adding on the difference the smaller number and the nearest ten number.

A

$$63 - 37 = 26$$

The answer comes from the final number landed on after over jumping and then compensating.

B

Written Calculation Strategies ~ Addition

Expanded method

Find the total of 625 and 48

$$\begin{array}{r} 625 \\ + \quad 48 \\ \hline 13 \\ 60 \\ \hline 600 \\ \hline 673 \end{array}$$

$5 + 8 = 13$

$20 + 40 = 60$

$600 + 0 = 600$

$13 + 60 + 600$

Written Calculation Strategies ~ Addition

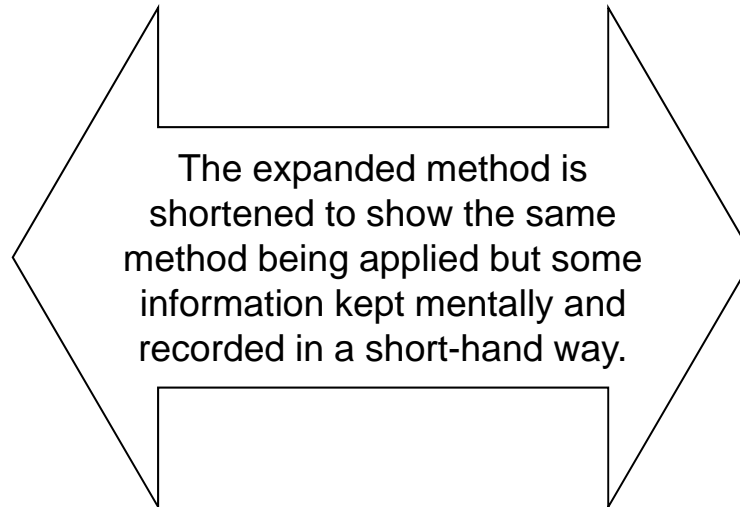
Expanded method



Contracted method

Find the total of
378 and 94

$$\begin{array}{r} 378 \\ + \quad \underline{94} \\ 160 \\ \underline{300} \\ \underline{472} \end{array}$$



$$\begin{array}{r} 378 \\ + \quad \underline{94} \\ \underline{472} \\ 11 \end{array}$$

Written Calculation Strategies ~ Subtraction

Expanded method

Find the difference between 578 and 154

$$\begin{array}{r} 500 + 70 + 8 \\ - 100 + 50 + 4 \\ \hline 400 + 20 + 4 = 424 \end{array}$$

Partition the numbers into their component parts.

Subtract each part of the number in turn.

Reconstruct the number to give the final answer.

Written Calculation Strategies ~ Subtraction

Expanded method

Find the difference between 475 and 127

$$\begin{array}{r} 400 + 70 + 5 \\ - \underline{100 + 20 + 7} \end{array}$$

$$\begin{array}{r} 400 + 60 + 15 \\ - \underline{100 + 20 + 7} \\ \underline{300 + 40 + 8} \end{array}$$

$$475 - 127 = 348$$

Use the same process to partition the numbers into hundreds, tens and units.

If there are not enough units to complete the first subtraction, repartition the numbers.

Then subtract each part of the number before recombining to give the answer.

Written Calculation Strategies ~ Subtraction

Expanded method

Find the difference between 632 and 74

$$\begin{array}{r} 600 + 30 + 2 \\ - \quad \quad \underline{70 + 4} \end{array}$$

$$\begin{array}{r} 600 + 20 + 12 \\ - \quad \quad \underline{70 + 4} \end{array}$$

$$\begin{array}{r} 500 + 120 + 12 \\ - \quad \quad \underline{70 + 4} \\ \hline \underline{500 + 50 + 8} \end{array}$$

$$632 - 74 = 558$$

Use the same process to partition the numbers into hundreds, tens and units.

If there are not enough units to complete the first subtraction, repartition the numbers. This may need to be repeated if there are not enough tens to complete the subtraction.

Then subtract each part of the number before recombining to give the answer.

Written Calculation Strategies ~ Subtraction

Expanded method  Contracted method

Find the difference between 372 and 54

$$\begin{array}{r} 300 + 70 + 2 \\ - \quad \underline{50 + 4} \\ \hline \end{array} \quad \longrightarrow \quad \begin{array}{r} 300 + \overset{60}{\cancel{70}} + \overset{12}{\cancel{2}} \\ - \quad \underline{50 + 4} \\ \hline 300 + 10 + 8 \\ \hline \end{array} \quad \longrightarrow \quad \begin{array}{r} \overset{6}{\cancel{3}} \overset{12}{\cancel{7}} \overset{2}{\cancel{2}} \\ - \quad \underline{54} \\ \hline 318 \\ \hline \end{array}$$

$$372 - 54 = 318$$

The same partitioning processes are applied as before.

As confidence builds the processes are applied mentally and a shorthand is used to note the partitioning, which leads to the contracted method.

Written Calculation Strategies ~ Multiplication

Grid method

Calculate 725×6

\times	700	20	5
6	4200	120	30

= 4350

The number being multiplied is partitioned and set out in a grid. This helps to see how each number is calculated.

Each part of the number is then multiplied by the multiplier.

The sum of the parts then gives the final answer.

Written Calculation Strategies ~ Multiplication

Grid method

Calculate 3495×7

The same process can be applied regardless of the size of the numbers

\times	3000	400	90	5
7	21,000	2800	630	35

= 24465

Written Calculation Strategies ~ Multiplication

Grid method

Calculate 573×24

\times	500	70	3
20	10,000	1400	60
4	2000	280	12

The same process can be applied when multiplying by 2 (or more) digit numbers.

Here each row is totalled and then the total of each row is added together to give the final answer.

$$= 11460$$

$$= \underline{2292} +$$

$$\underline{13752}$$

Written Calculation Strategies ~ Division

Chunking

Calculate $455 \div 7$

$$10 \times 7 = 70$$

$$100 \times 7 = 700$$

$$50 \times 7 = 350$$

$$60 \times 7 = 420$$

$$70 \times 7 = 490$$

A

Note down what we already know about multiples of 7.

Use what we do know to find other facts about multiples of 7.

Stop when finding numbers around the dividend.

Use this information to identify the biggest 'chunk' of 7 that can be taken from the dividend.

Identify how many 'chunks' of 7 that leaves.

The answer is the total number of 'chunks' of 7 taken.

B

$$\begin{array}{r} 455 \\ - \underline{420} \\ 35 \\ - \underline{35} \\ 0 \end{array}$$

60 x 7

5 x 7

$$455 \div 7 = 65$$

Written Calculation Strategies ~ Division

Chunking ~ with remainders

Calculate $353 \div 8$

$$10 \times 8 = 80$$

$$20 \times 8 = 160$$

$$30 \times 8 = 240$$

$$40 \times 8 = 320$$

$$50 \times 8 = 400$$

The same process is applied when the calculation gives rise to a remainder.

The remainder is the number left when all possible 'chunks' of the divisor have been taken.

The remainder can also be shown as a fraction of the amount left out of the divisor.

$$\begin{array}{r} 353 \\ - \underline{320} \\ 33 \\ - \underline{32} \\ 1 \end{array} \quad \begin{array}{l} \boxed{40} \times 8 \\ \boxed{4} \times 8 \end{array}$$

$$353 \div 8 = 44 \text{ r } 1$$

$$353 \div 8 = 44 \frac{1}{8}$$

Written Calculation Strategies ~ Division

Chunking ~ with remainders

Try $285 \div 6$

$$10 \times 6 = 60$$

$$20 \times 6 = 120$$

$$30 \times 6 = 180$$

$$40 \times 6 = 240$$

$$50 \times 6 = 300$$

As the children are able, they are expected to represent the fraction in its lowest terms.

$$\begin{array}{r} 285 \\ - \underline{240} \\ 45 \\ - \underline{42} \\ 3 \end{array}$$

$\boxed{40} \times 6$
 $\boxed{7} \times 6$

$$285 \div 6 = 47 \text{ r } 3$$

$$285 \div 6 = 47 \frac{3}{6}$$

$$285 \div 6 = 47 \frac{1}{2}$$