Calculation at Chesswood

Addition

Subtraction

Multiplication

Division

Which method do I use?

What is my next step?

Year group core expectations written in bottom corner

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Addition

Number Line

Partitioning

Expanded Column

Compact Column

So which method do I use?

THINKING CAP

Year group core expectations written in bottom corner
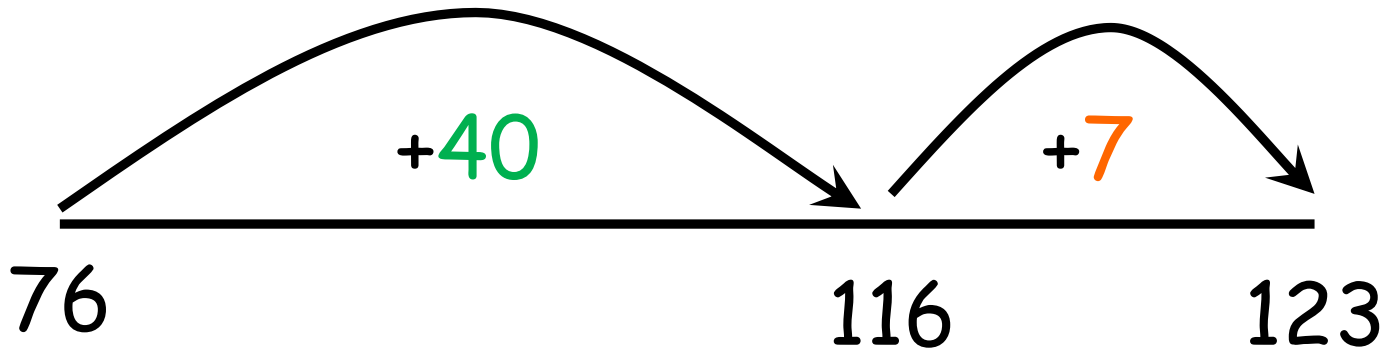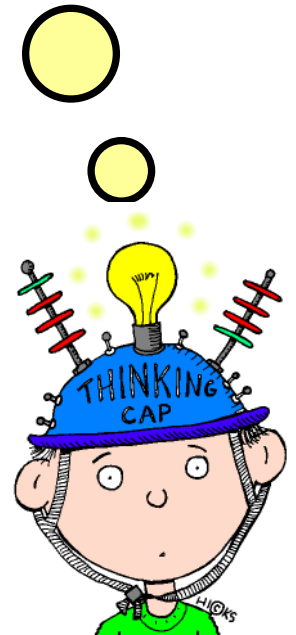
Number Line

Draw a blank number line

Start with the largest number and partition the other
...47 is 40 + 7

So how can I add 76 and 47?

+40   +7

76   116   123

76 + 47 = 123

THINKING CAP

Year 1/2

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Partitioning

$76 + 47 = 70 + 6 + 40 + 7$

Or it's best to write it like this…

$$76 + 47$$

$70 + 40 = 110$ $6 + 7 = 13$

110   13

$110 + 13 = 123$

$76 + 47 = 123$

This is where I partition each number… so 76 is 70 + 6 and 47 is 40 + 7

THINKING CAP

Year 1/2

Addition   3

Horizontal Partitioning

Squared paper may help line up each number in its Ones (O), Tens (T) or Hundreds (H) columns.
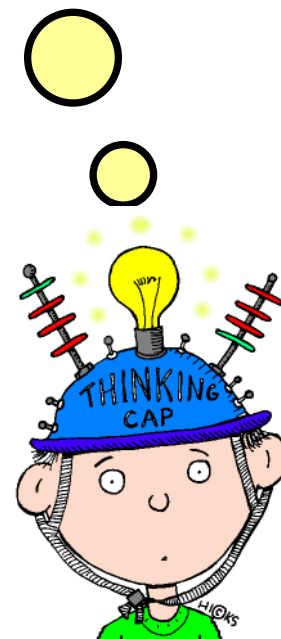
I can start to partition the numbers in rows.

T	O		T	O		H	T	O
7	6	+	4	7	=			
7	0	+	4	0	=	1	1	0
	6	+		7	=		1	3
Recombine						1	2	3

76 + 47 = 123

Expanded Column - Partitioning

Use squared paper to write the numbers in columns.

The numbers must be in columns!

I will start with the ones first.

$$
\begin{array}{r}
7\ 0 + \ 6 \\
+ \quad 4\ 0 + \ 7 \\
\hline
1\ 1\ 0 + 1\ 3 = 1\ 2\ 3 \\
\hline
\end{array}
$$

76 + 47 = 123

Year 3

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Expanded Column

Use squared paper to write the numbers in columns.

```
    7 6
  + 4 7
  -------
    1 3     (6 + 7)
  1 1 0     (40 + 70)
  -------
  1 2 3
  -------
```

The numbers must be in columns!

I will start with the ones first.

$$76 + 47 = 123$$
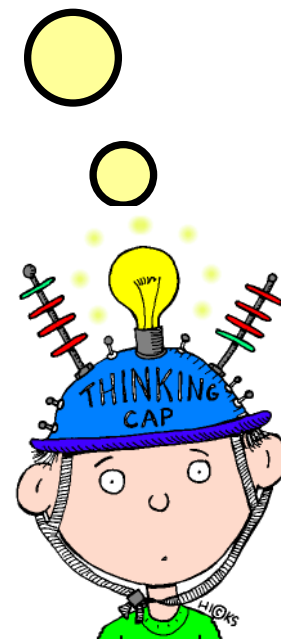
THINKING CAP

Expanded Column

Use squared paper to write the numbers in columns.

```
    2 7 6
  + 1 4 7
    _____
    1 3      (6 + 7)
  1 1 0      (70 + 40)
  3 0 0      (200 + 100)
    _____
    4 2 3
```

When I understand this I can do it without the brackets.
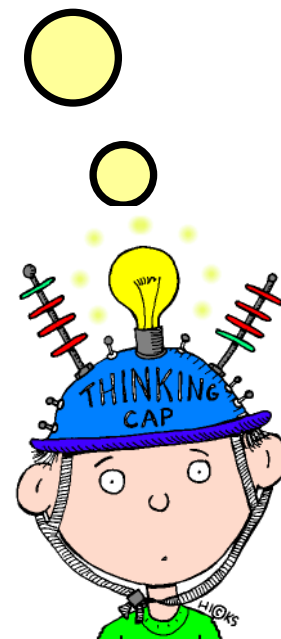
276 + 147 = 423

Compact Column

Use squared paper to write the numbers in columns.

When I understand place value better, I can do it this way!

```
  2 7 6
+ 1 4 7
-------
  4 2 3
  1   1
-------
```

6 + 7 = 13
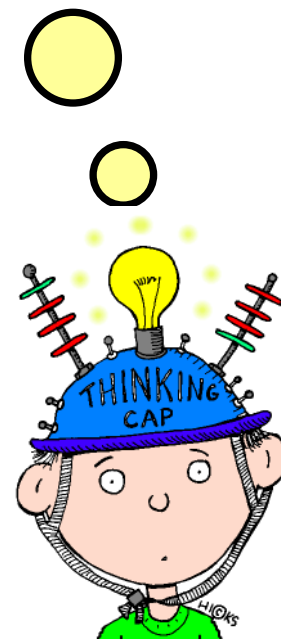(Write the ten under the place value column to the left.)

7 + 4 + 1 = 12
(Write the ten under the place value column to the left.)

2 + 1 + 1 =   4

276 + 147 = 423

Year 3 GD
Year 4

Calculation at Chesswood
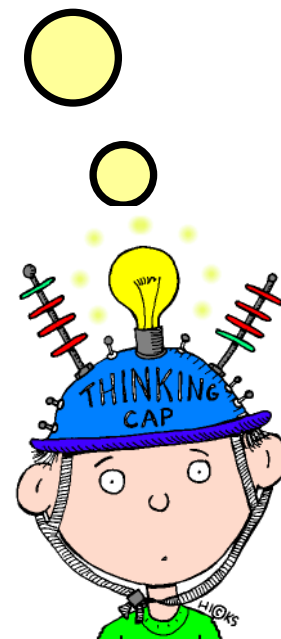
Subtraction

Number Line

Partitioning

Expanded Column

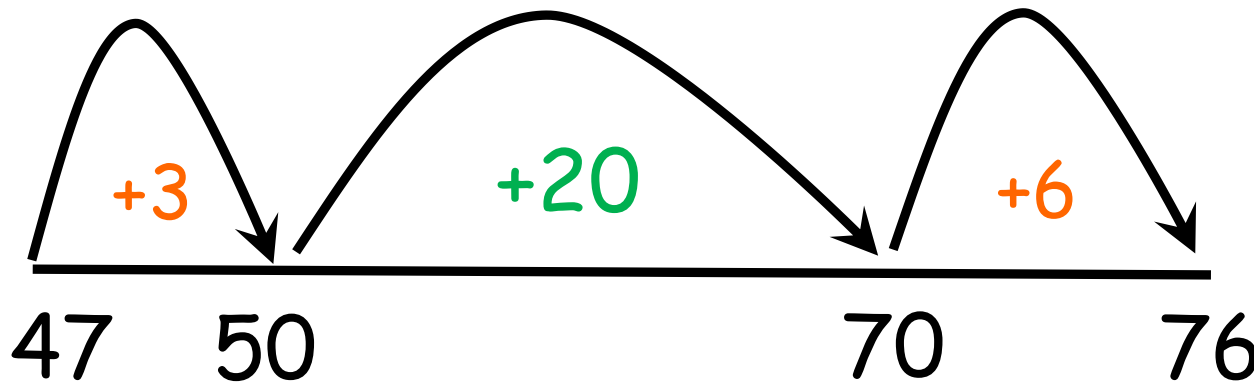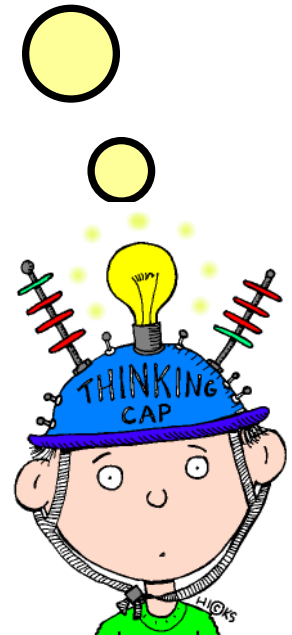Compact Column

So which method do I use?

Counting on

Start with the 47 and 76 at each end of the number line.

Count on in jumps of ones or tens. Add up the jumps to find the difference between the numbers.

This can help me 'find the difference' between 76 and 47.

+3   +20   +6

47   50   70   76

$$76 - 47 = 29$$

Counting back

Start with the 76 on the right of the number line.

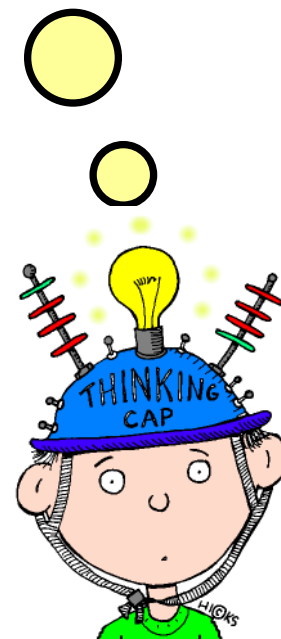Then count back, partitioning the 47. First subtract the tens, then subtract the ones.

76 – 47 =
76 – 40 = 36
36 – 7 = 29

-7   -40

29   36   76

76 - 47 = 29

THINKING CAP

Year 1/2

Horizontal Partitioning

Squared paper may help line up each number in its Ones (O) or Tens (T) columns.

I can start to partition in rows.

I will start with the ones.
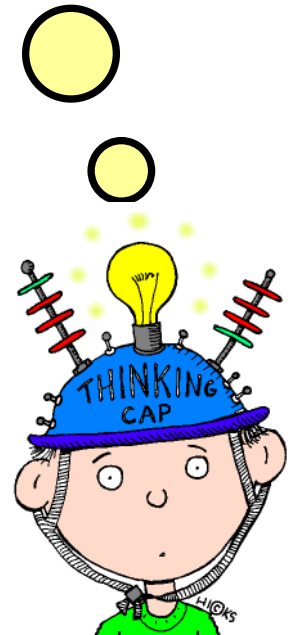
```
 T O   T O   T O
 7 6 - 4 7 =
 7 6 -   7 = 6 9
 6 9 - 4 0 = 2 9
```

76 - 47 = 29

Subtraction 4

Expanded Column

Use squared paper to write the numbers in columns.

If I subtract 7 from 6,
I get a negative number – I can't use this within a calculation!
I need to exchange a ten into ten ones: 10 + 6 = 16.
16 - 7 = 9

I can start to use my place value knowledge to subtract the ones and tens separately.

$$
\begin{array}{r}
\overset{60}{\cancel{70}} + \overset{16}{\cancel{6}} \\
- \quad 40 + 7 \\
\hline
20 + 9 = 29
\end{array}
$$

Now I can subtract:
16 - 7 = 9
60 – 40 = 20

76- 47 = 29

Expanded Column

Use squared paper to write the numbers in columns.

If I subtract 7 from 6, I get a negative number – I can't use this within a calculation! I need to exchange a ten into ten ones: 10 + 6 = 16. 16 - 7 = 9
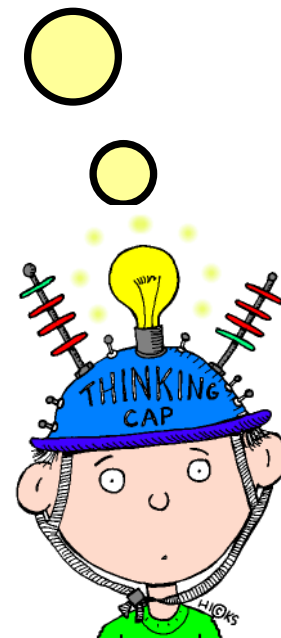
When I get more confident I can subtract larger numbers.

$$
\begin{array}{r}
\cancel{200} \quad \cancel{160} \\
\cancel{60} \quad \cancel{16} \\
\cancel{300} + \cancel{70} + \cancel{6} \\
- \quad 100 + 70 + 7 \\
\hline
200 + 90 + 9 = 299 \\
\hline
\end{array}
$$

But now I can't subtract 70 from 60! I need to exchange a hundred into ten tens: 100 + 60 = 160. 160 – 70 = 90

$$376 - 177 = 199$$

Subtraction | **6**

Compact Column

Use squared paper to write the numbers in columns.

If I subtract 7 from 6,
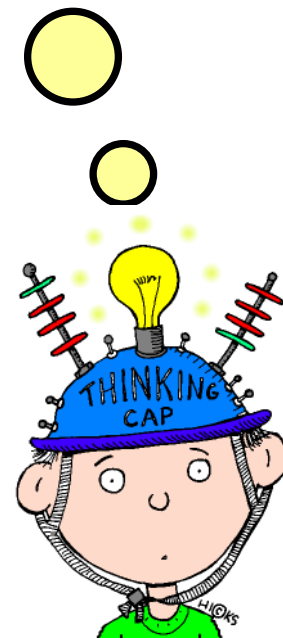I get a negative number – I can't use this within a calculation!
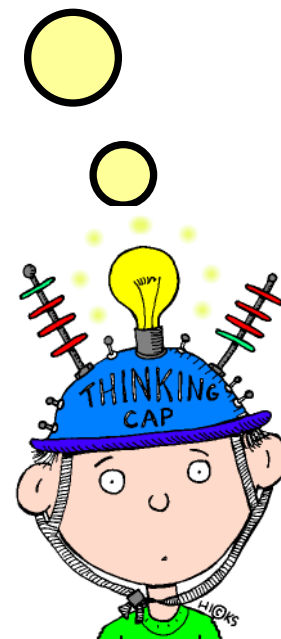I need to exchange a ten into ten ones: 10 + 6 = 16.
16 - 7 = 9

When I am more confident with place value, I can do it this way!

2   16   1

3̶ 7̶ 6
- 1 7 7
—————
   1 9 9

But now I can't subtract 70 from 60!
I need to exchange a hundred into ten tens: 100 + 60 = 160.
160 – 70 = 90

376 – 177 = 199

Year 3 GD
Year 4

Calculation at Chesswood

Multiplication

Number Line

Partitioning

Partitioning - Grid

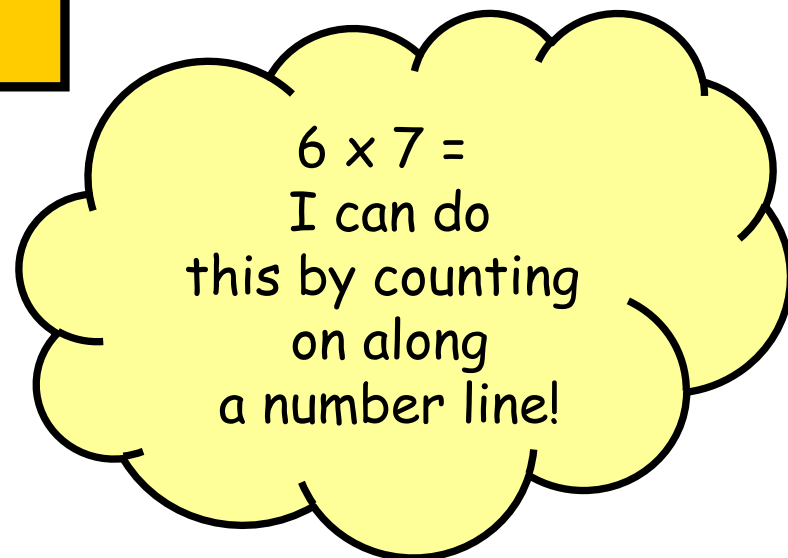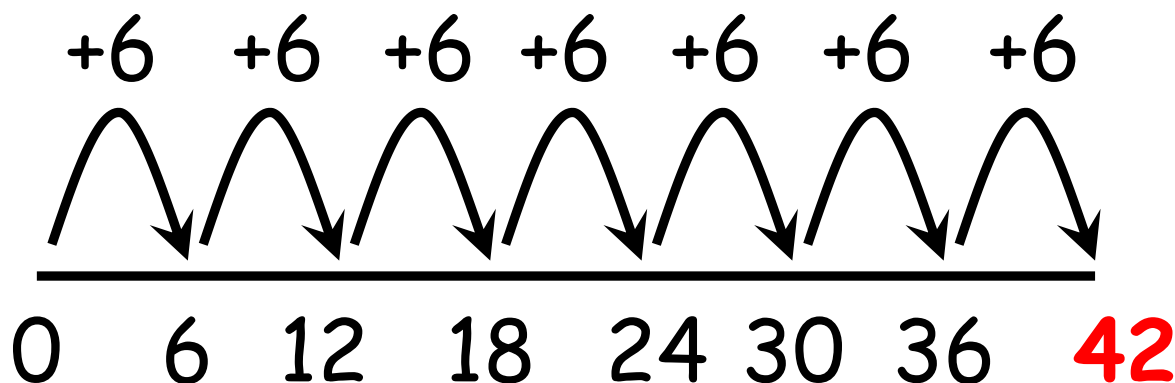Expanded Column

Compact Column
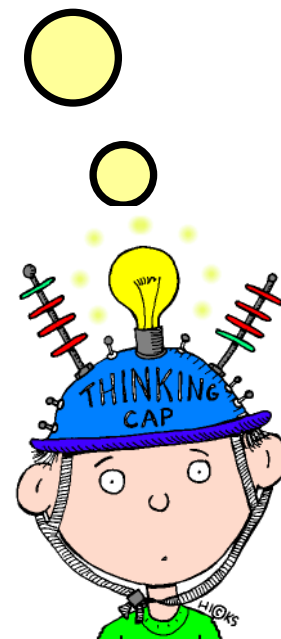
So which method do I use?

Multiplication 1

Number Line

We are multiplying by counting on… 6 each time, and do this 7 times. Start with 0 on the number line.

6 x 7 =
I can do this by counting on along a number line!

+6 +6 +6 +6 +6 +6 +6

0   6   12   18   24   30   36   **42**

6 x 7 = 42

Multiplication **2**

Partitioning

56 x 7 ..... partition 56
to **50** and **6**

5 6 x 7

50 x 7 = 350   6 x 7 = 42

350   42

350 + **42** = **392**

This is where I partition the larger number.

56 x 7 = 392

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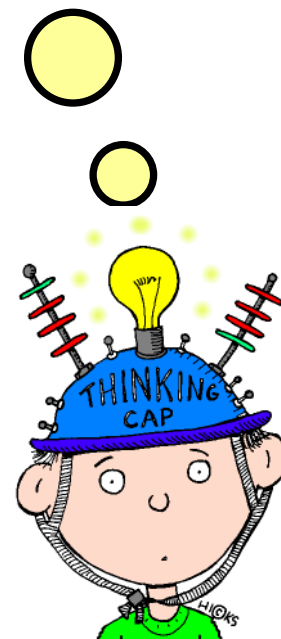
Grid - Short

56 x 7... partition 56 to **50** + **6**

50 x 7 = **350**

6 x 7 = **42**

	50	**6**
7	**350**	**42**

= **392**

This is where I partition the larger number...
I put the numbers in my grid.

Now add **350** and **42**

$$56 \times 7 = 392$$

THINKING CAP

Year 3
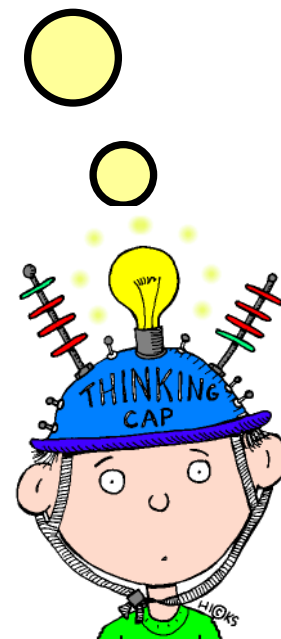
Grid - Long

56 x 27 ..... partition 56 to **50** + **6**
and ...... 27 to **20** + **7**

I can use my partitioning skills in a larger grid.

	50	**6**	
20	1000	120	= 1120
7	350	42	= 392

1120 + 392 = 1512

56 x 27 = 1512

Multiplication 5

Expanded Column - Short

Use squared paper to write the numbers in columns.

```
      5 6
  ×     7
  ─────────
      4 2    (6 × 7)
 +  3 5 0   (50 × 7)
  ─────────
    3 9 2
  ─────────
```

When I understand this, I can do it without the brackets.

56 × 7 = 392

Year 3 GD
Year 4

Multiplication **6**
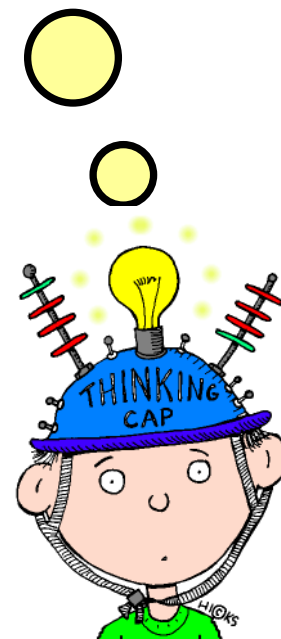
Expanded Column - Long

Use squared paper to write the numbers in columns.

```
      5 6
  x   2 7
  _____
      4 2    (6 x  7)
    3 5 0    (50 x  7)
    1 2 0    (6 x 20)
+ 1 0 0 0    (50 x 20)
  _____
    1 5 1 2
        1
```

When I understand this, I can do it without the brackets.

56 x 27 = 1512
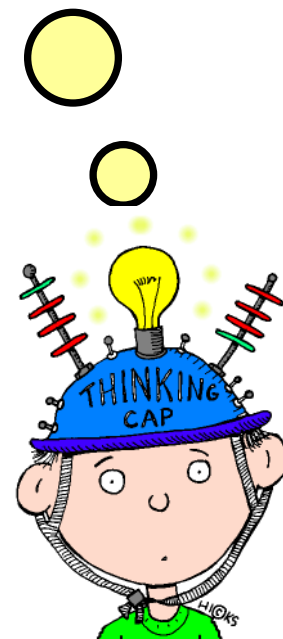
Compact Column - Short

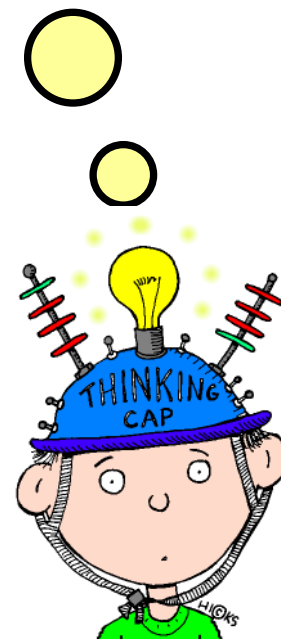Use squared paper to write the numbers in columns.

I can calculate mentally and use carrying.
I must start with the ones.

$$
\begin{array}{r}
5\ 6 \\
\times \quad\ 7 \\
\hline
3\ 9\ 2 \\
\hline
\ 4
\end{array}
$$

(6 x 7 = 42)
(50 x 7 = 350)

56 x 7 = 392

Multiplication 8

Compact Column - Long

Use squared paper to write the numbers in columns.

I can calculate mentally and use carrying with larger numbers.

$$
\begin{array}{r}
5\ 6 \\
\times\quad 2\ 7 \\
\hline
3\ 9\ 2 \\
_4 \\
+\ 1\ 1\ 2\ 0 \\
_1 \\
\hline
1\ 5\ 1\ 2 \\
\end{array}
$$

(56 x 7)

(56 x 20)

56 x 27 = 1512
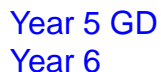
Calculation at Chesswood

Division

Number Line

Compact Method

So which method do I use?

Division | **1**
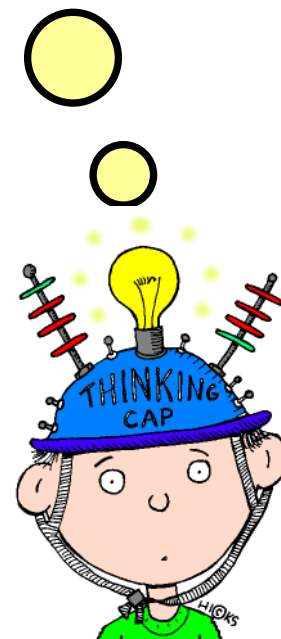
Number Line in small jumps

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We are dividing by counting on 8 each time since we are dividing by 8.

56 ÷ 8 =
Dividing - I can do this by counting on along a number line!

$$+8 \quad +8 \quad +8 \quad +8 \quad +8 \quad +8 \quad +8$$

0   8   16   24   32   40   48   **56**
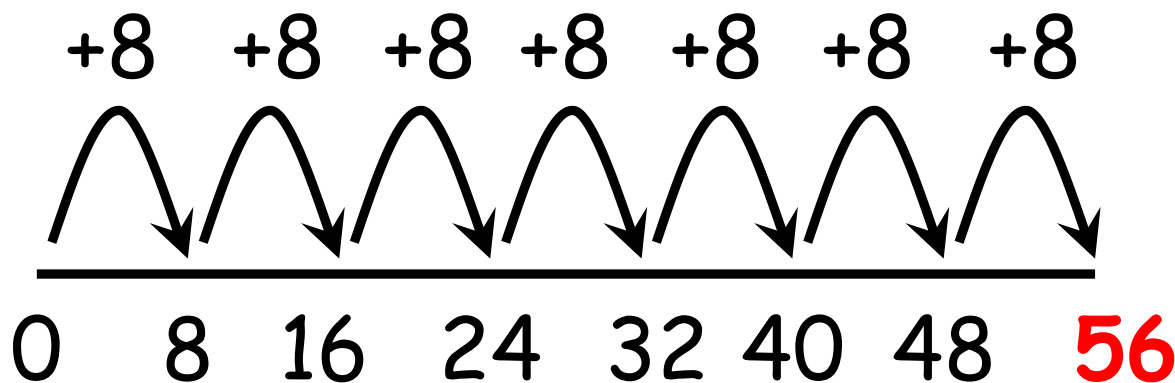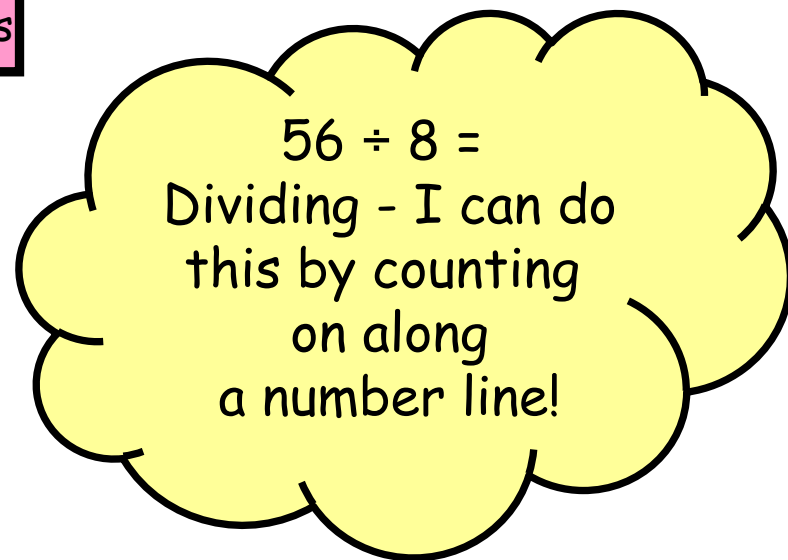
It took 7 jumps to get to 56 ... so 56 ÷ 8 is 7

$$56 ÷ 8 = 7$$

THINKING CAP

Division | 2

Number Line in chunks

Use a key facts box of known multiplication facts to support - 1 x, 2 x, 5 x and 10 x.

What jumps of 8 can you make on the number line towards 56?
5 x 8 = 40 would be good!

Now a jump of 2 x 8 = 16 would take you to 56.

Key Facts
1 x 8 = 8
2 x 8 = 16
5 x 8 = 40
10 x 8 = 80

$56 \div 8 =$

Use a number line to do this.

5 x **8** =40   **2** x **8** = 16

0   40   56

Add **5** and **2** = 7.

$$56 \div 8 = 7$$

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Number Line in chunks

Use a key facts box of known multiplication facts to support - 1 x, 2 x, 5 x and 10 x.

What jumps of 8 can you make on the number line towards 56?
5 x 8 = 40 would be good!

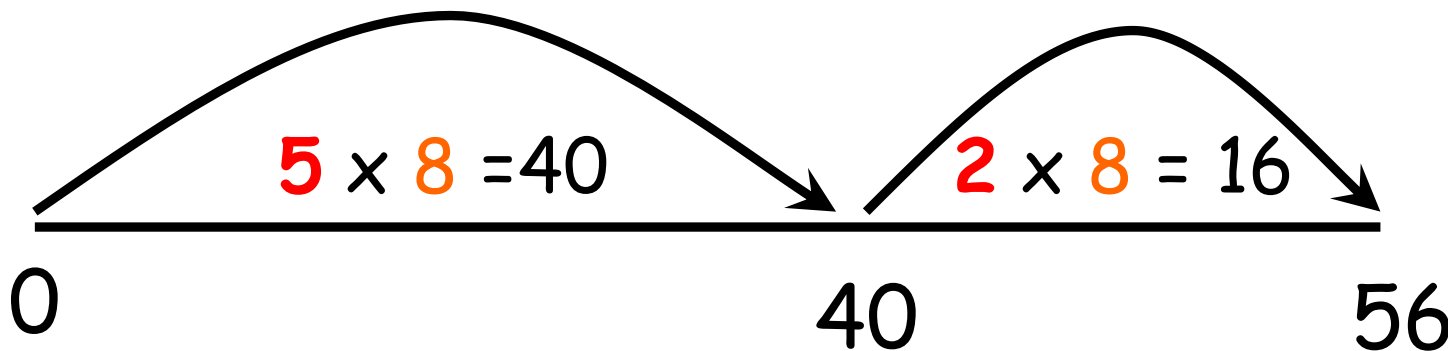Now a jump of 2 x 8 = 16 would take you to 56.

Key Facts
1 x 8 = 8
2 x 8 = 16
5 x 8 = 40
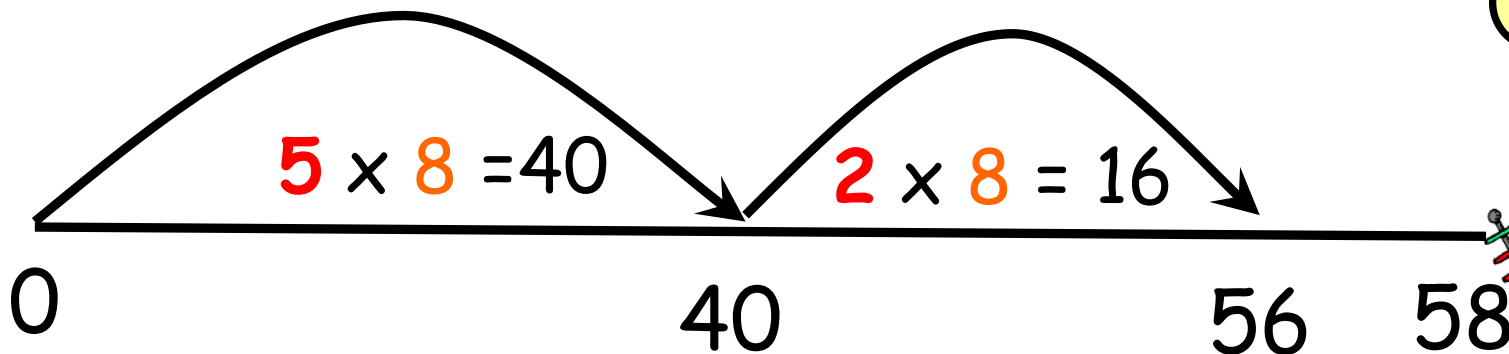10 x 8 = 80

58 ÷ 8 =

Use a number line to do this.

5 x **8** =40   **2** x **8** = 16

0   40   56   58

Add **5** and **2** = 7 and don't forget the remainder 2.

58 ÷ 8 = 7 r2
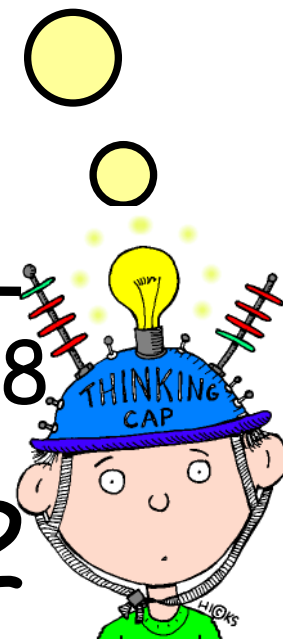
THINKING CAP

Division 4

Compact Method - Short

Use squared paper to help write in the place value columns.

Always start dividing from the largest value digit (8 = 800)

256 ÷ 7 =
I must remember to calculate one digit at a time!

$$\begin{array}{r} 1\ 2\ 5 \\ 7\overline{)\ 8^17^35} \end{array}$$

$8 ÷ 7 = 1\ r1$
$17 ÷ 7 = 2\ r3$
$36 ÷ 7 = 5$

(Write the remainder next to the digit in the place value column to the right.)

$$875 ÷ 7 = 125$$

Compact Method - Short

Use squared paper to help write in the place value columns.

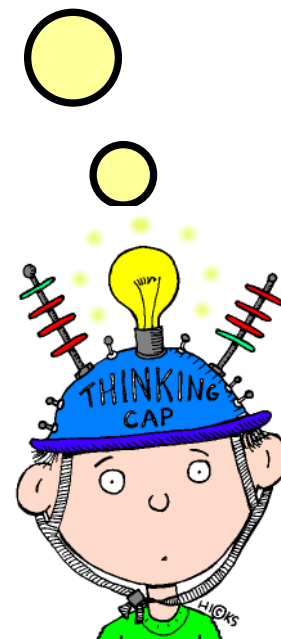Always start dividing from the largest value digit (8 = 800)

256 ÷ 7 =
I must remember to calculate one digit at a time!

$$1\ 2\ 5\ r1$$
$$7\ |\ 8^17^36$$

$8 ÷ 7 = 1\ r1$
$17 ÷ 7 = 2\ r3$
$36 ÷ 7 = 5\ r1$

(Write the remainder next to the digit in the place value column to the right.)

$$876 ÷ 7 = 125\ r1$$

THINKING CAP

Compact Method - Long

$$\begin{array}{r} 4\ 7 \\ 2\overline{)9\ 4} \\ 9 \\ -\ 8 \\ \hline 1\ 4 \\ -\ 1\ 4 \\ \hline 0 \end{array}$$

9 ÷ 2 = 4 r1

14 ÷ 2 = 7

94 ÷ 2 =
I must remember
to calculate one digit
at a time!
Knowing my times tables
will help.

Use squared paper to help write
in the place value columns.

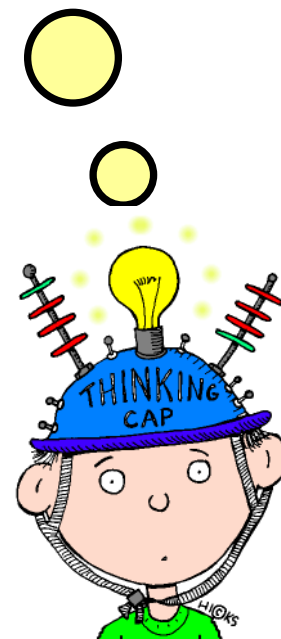Always start dividing from the
largest value digit (4 = 40)

94 ÷ 2 = 47

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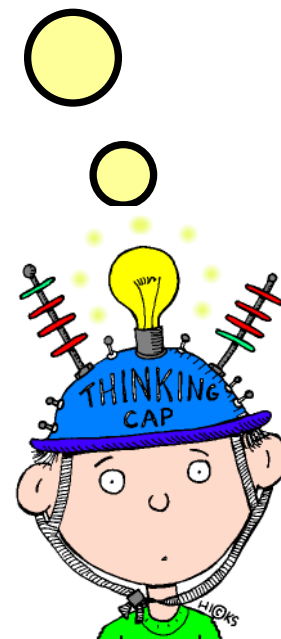
Compact Method - Long

$$
\begin{array}{r}
1\ 2\ 5\ r1 \\
7\ \overline{)\ 8\ 7\ 6} \\
8 \\
-7 \\
\overline{1\ 7} \\
-\ 1\ 4 \\
\overline{3\ 6} \\
-\ 3\ 5 \\
\overline{1}
\end{array}
$$

$8 \div 7 = 1\ r1$

$17 \div 7 = 2\ r3$

$36 \div 7 = 5\ r1$

876 ÷ 7 =
I must remember to calculate one digit at a time!
Knowing my times tables will help.

Use squared paper to help write in the place value columns.

Always start dividing from the largest value digit (8 = 800)

$$876 \div 7 = 125\ r1$$

THINKING CAP

Division | **8**

Compact Method - Long

3720 ÷ 16 =
I must remember to calculate one digit at a time!
A 'cheat sheet' would help.

```
      0 2 3 2 r8
16 | 3 7 2 0
     3 7
    -3 2
       5 2
      - 4 8
         4 0
        - 3 2
           8
```

3 ÷ 16 = 0 r3
37 ÷ 16 = 2 r5
52 ÷ 16 = 3 r4
40 ÷ 16 = 2 r8

Use squared paper to help write in the place value columns.

Always start dividing from the largest value digit (3 = 3000)

3720 ÷ 16 = 232 r8
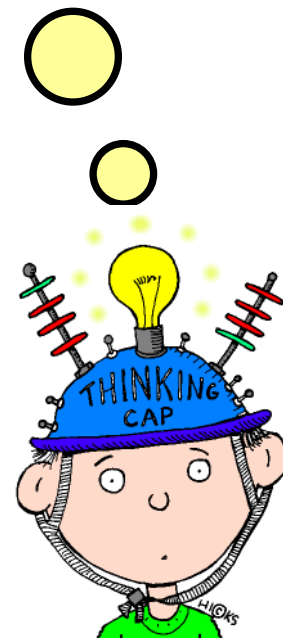
Compact Method – Long
Converting the remainder

```
        0 2 3 2 . 5
16 |  3 7 2 0 . 0
      3 7
     -3 2
        5 2
       - 4 8
          4 0
         - 3 2
            8 0
           - 8 0
              0
```

Decimals: include another 0 after the decimal point and keep calculating in the same way (up to 2 decimal places).

Fractions: remainder 8 out of 16 ($\frac{8}{16}$ = $\frac{1}{2}$ = .5)

I can convert a remainder into a fraction or a decimal.

$3720 \div 16 = 232$ r8 or $232\frac{8}{16}$
or $232 \frac{1}{2}$ or 232.5
or round to 233!