



Calculation at Chesswood

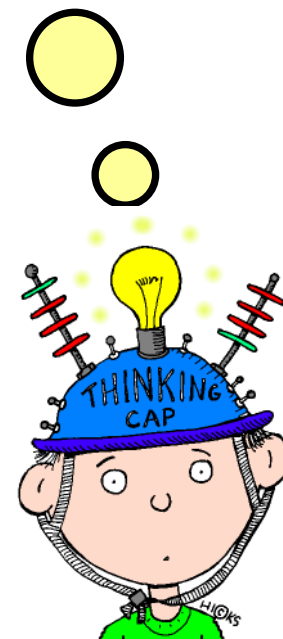
Addition

Subtraction

Multiplication

Division

Which method
do I use?
What is my
next step?





Calculation at Chesswood

Addition

Number Line



Partitioning

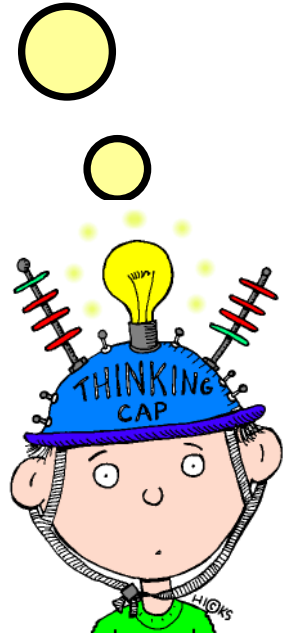


Expanded Column



Compact Column

So which method do I use?



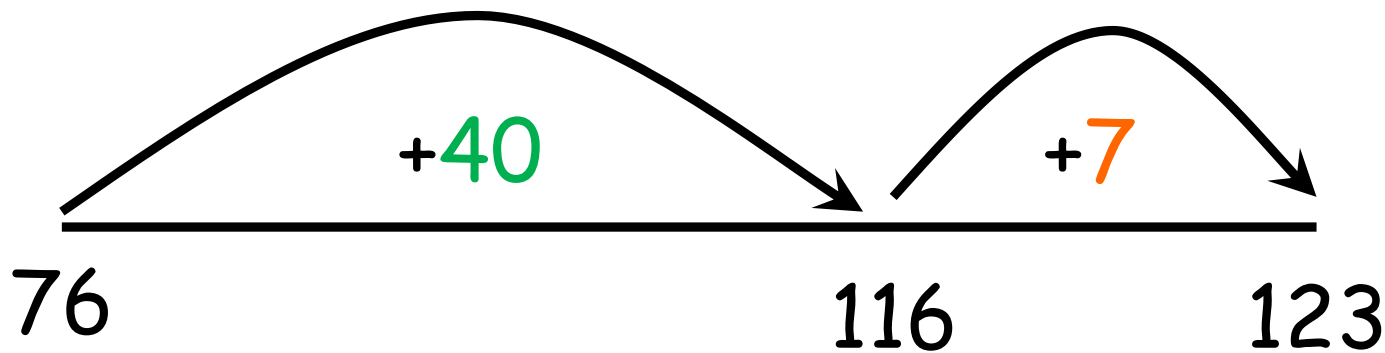
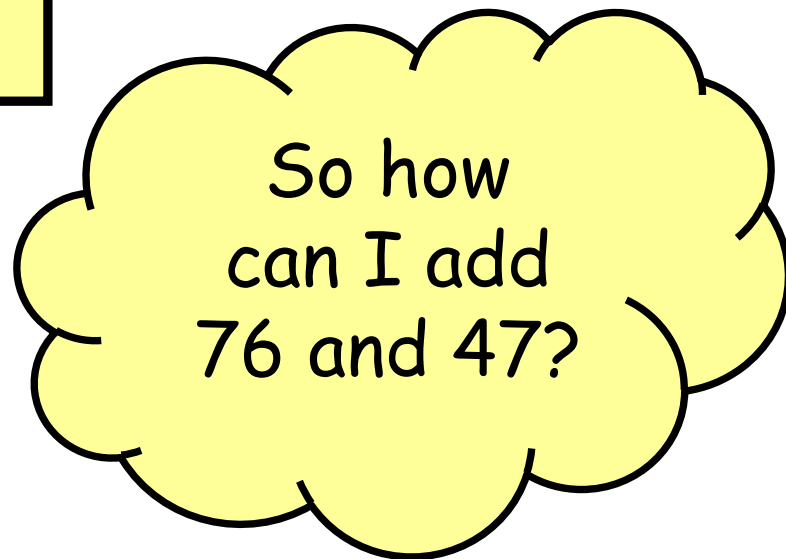


Number Line

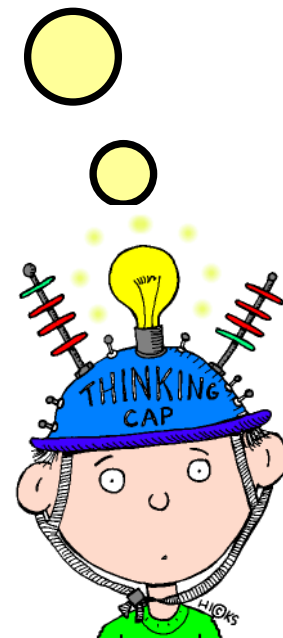
Draw a blank number line

Start with the largest number
and partition the other

...47 is 40 + 7



$$76 + 47 = 123$$

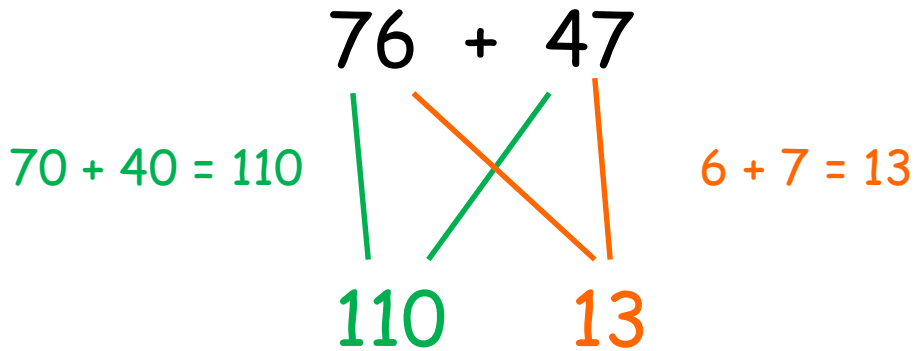




Partitioning

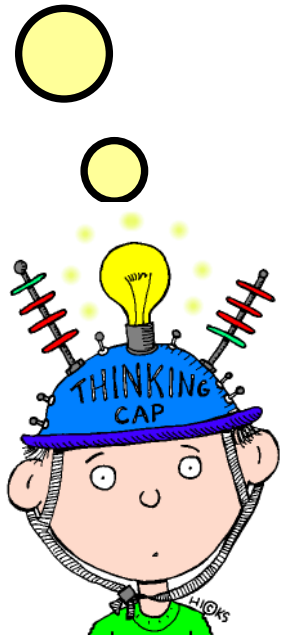
$$76 + 47 = 70 + 6 + 40 + 7$$

Or it's best to write it like this...



$$110 + 13 = 123$$

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



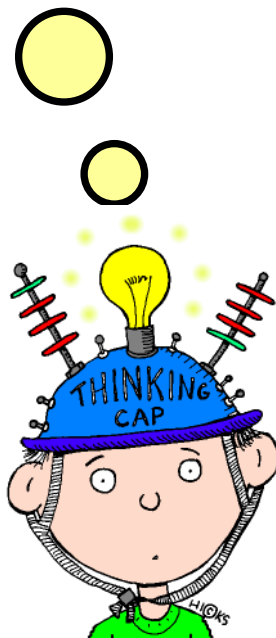
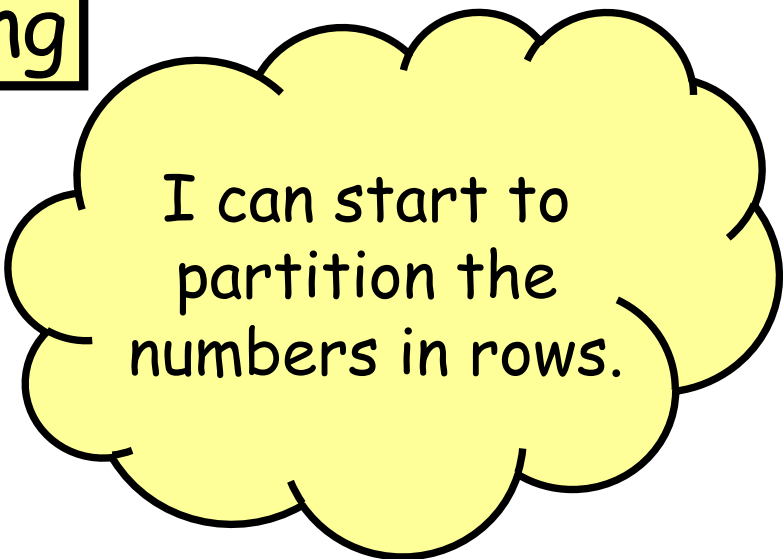
$$76 + 47 = 123$$



Horizontal Partitioning

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

$$\begin{array}{r} \text{T} \quad \text{O} \quad \text{T} \quad \text{O} \quad \text{H} \quad \text{T} \quad \text{O} \\ 7 \quad 6 \quad + \quad 4 \quad 7 \quad = \\ 7 \quad 0 \quad + \quad 4 \quad 0 \quad = \quad \underline{1 \quad 1 \quad 0} \\ \quad 6 \quad + \quad \quad 7 \quad = \quad \quad \underline{1 \quad 3} \\ \text{Recombine} \quad \quad \quad 1 \quad 2 \quad 3 \end{array}$$



$$76 + 47 = 123$$



Expanded Column - Partitioning

Use squared paper to write the numbers in columns.

$$\begin{array}{r} 70 + 6 \\ + 40 + 7 \\ \hline 110 + 13 = 123 \\ \hline \end{array}$$

The numbers must be in columns!
I will start with the ones first.

$$76 + 47 = 123$$





Expanded Column

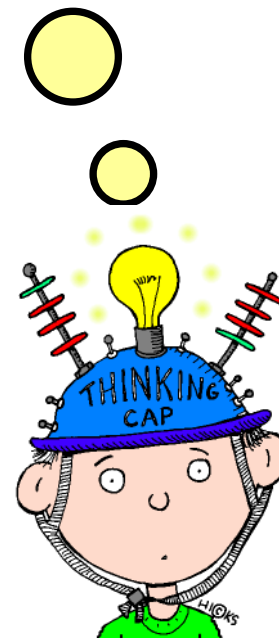
Use squared paper to write the numbers in columns.

$$\begin{array}{r} 76 \\ + 47 \\ \hline 13 \\ 110 \\ \hline 123 \\ \hline \end{array}$$

$(6 + 7)$
 $(40 + 70)$

The numbers must be in columns!

I will start with the ones first.



$$76 + 47 = 123$$



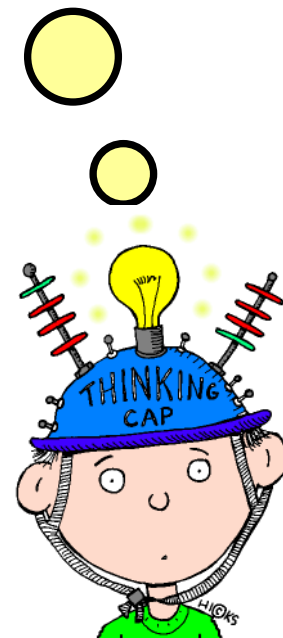
Expanded Column

Use squared paper to write the numbers in columns.

$$\begin{array}{r} 276 \\ + 147 \\ \hline 13 \quad (6 + 7) \\ 110 \quad (70 + 40) \\ 300 \quad (200 + 100) \\ \hline 423 \\ \hline \end{array}$$

$$276 + 147 = 423$$

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





Compact Column

Use squared paper to write the numbers in columns.

$$\begin{array}{r} 276 \\ + 147 \\ \hline 423 \\ \hline 11 \end{array}$$

$$6 + 7 = 13$$

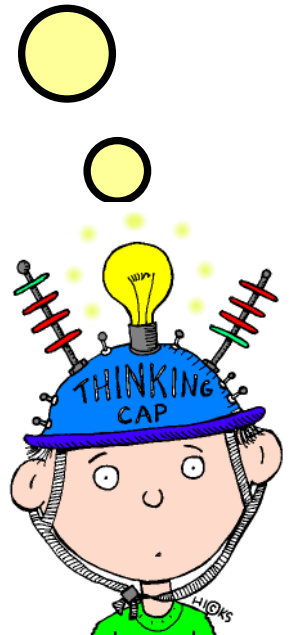
(Write the ten under the place value column to the left.)

$$7 + 4 + 1 = 12$$

(Write the ten under the place value column to the left.)

$$2 + 1 + 1 = 4$$

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



$$276 + 147 = 423$$



Calculation at Chesswood

Subtraction

Number Line



Partitioning

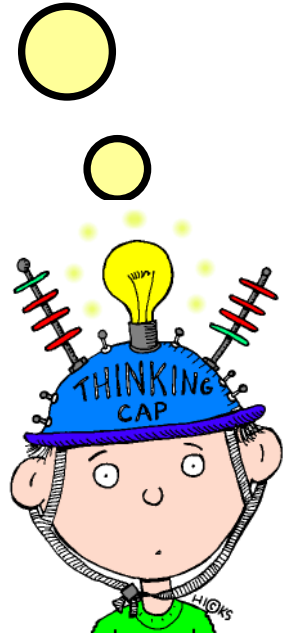


Expanded Column



Compact Column

So which method do I use?



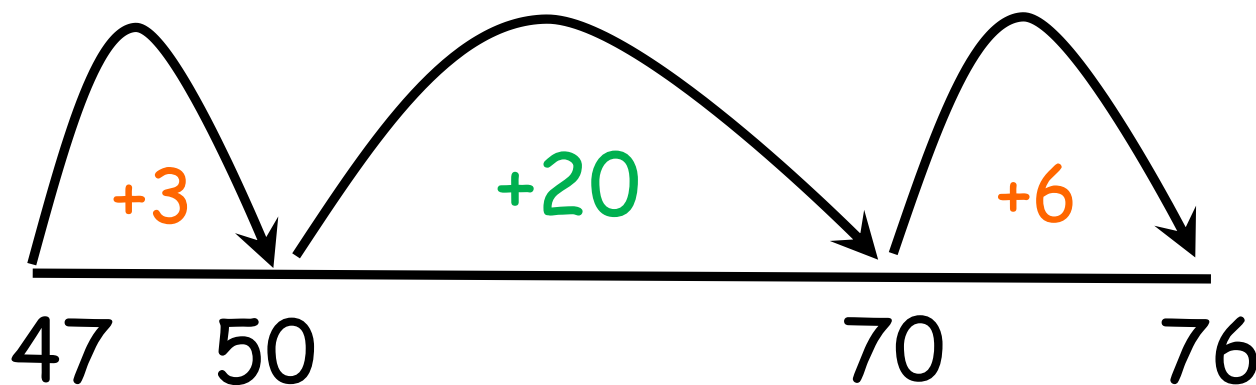


Counting on

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

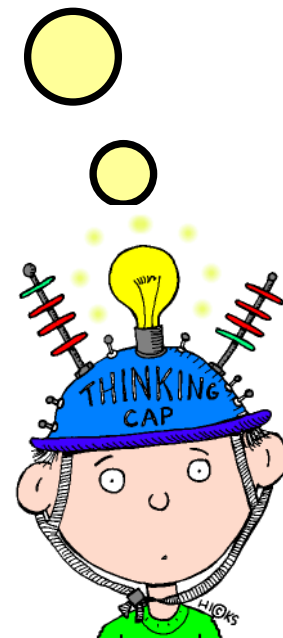
Count on in jumps of ones or tens.

Add up the jumps to find the difference between the numbers.



$$76 - 47 = 29$$

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





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.

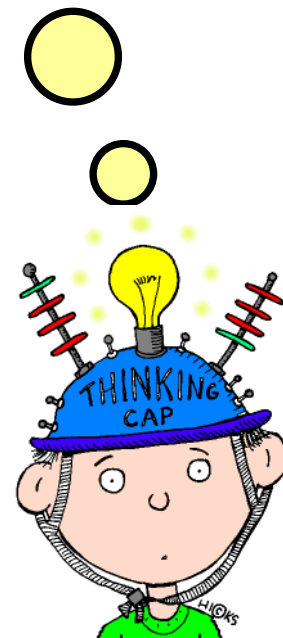


$$76 - 47 =$$

$$76 - 40 = 36$$

$$36 - 7 = 29$$

$$76 - 47 = 29$$





Horizontal Partitioning

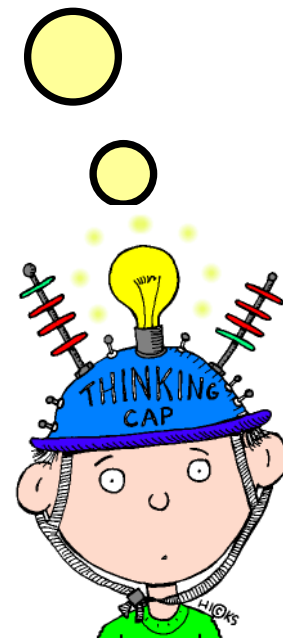
Squared paper may help line up each number in its **Ones (O)** or **Tens (T)** columns.

$$\begin{array}{r} \text{T} \quad \text{O} \quad \text{T} \quad \text{O} \quad \text{T} \quad \text{O} \\ 7 \quad 6 \quad - \quad 4 \quad 7 \quad = \\ 7 \quad 6 \quad - \quad \quad 7 \quad = \quad 6 \quad 9 \\ 6 \quad 9 \quad - \quad 4 \quad 0 \quad = \quad 2 \quad 9 \end{array}$$

I can start to partition in rows.

I will start with the ones.

$$76 - 47 = 29$$





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: $10 + 6 = 16$.

$$16 - 7 = 9$$

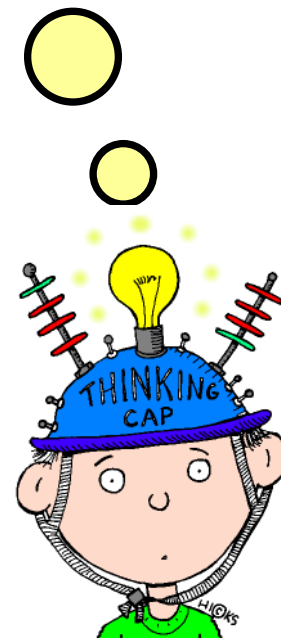
$$\begin{array}{r} 60 \quad 16 \\ \cancel{70} + \cancel{6} \\ - 40 + 7 \\ \hline 20 + 9 = 29 \end{array}$$

Now I can subtract:

$$\begin{array}{l} 16 - 7 = 9 \\ 60 - 40 = 20 \end{array}$$

$$76 - 47 = 29$$

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





Expanded Column

Use squared paper to write the numbers in columns.

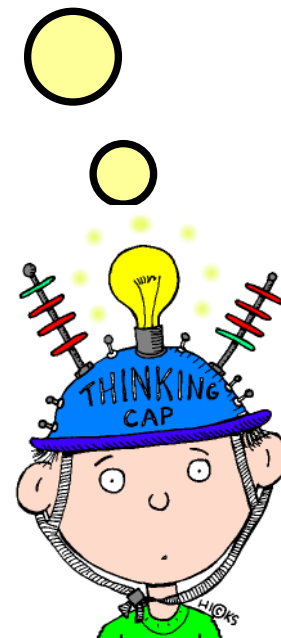
If I subtract 7 from 6, I get a negative number - I can't use this within a calculation!

I need to exchange a ten into ten ones: $10 + 6 = 16$.
 $16 - 7 = 9$

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

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

When I get more confident I can subtract larger numbers.



$$376 - 177 = 199$$



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: $10 + 6 = 16$.

$$16 - 7 = 9$$

$$\begin{array}{r} 2 \quad 16 \quad 1 \\ \cancel{3} \quad \cancel{7} \quad 6 \\ - 1 \quad 7 \quad 7 \\ \hline 1 \quad 9 \quad 9 \\ \hline \end{array}$$

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

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

$$376 - 177 = 199$$





Calculation at Chesswood

Multiplication

Number Line



Partitioning



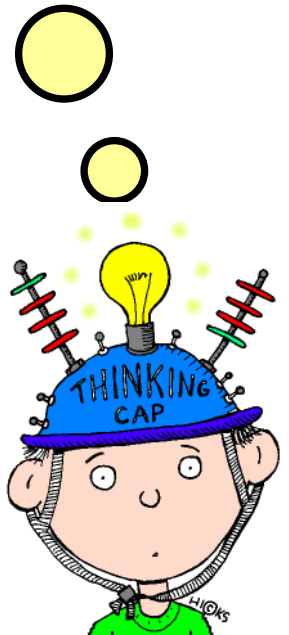
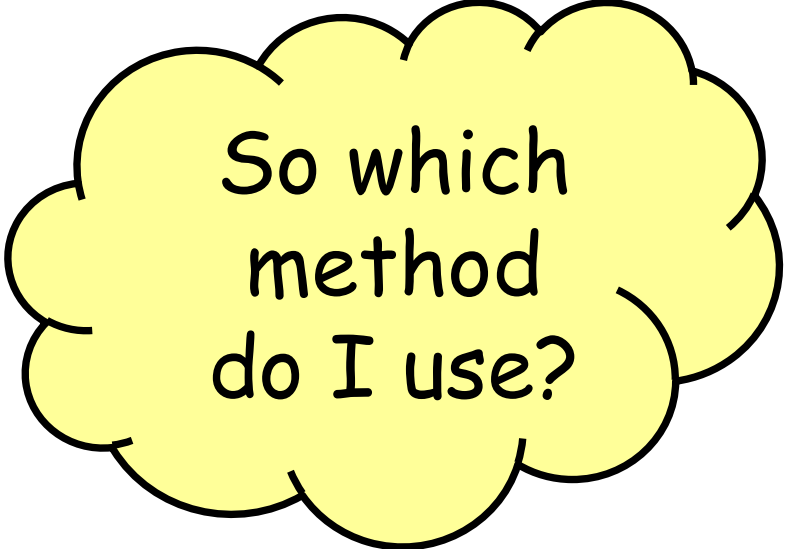
Partitioning - Grid



Expanded Column



Compact Column

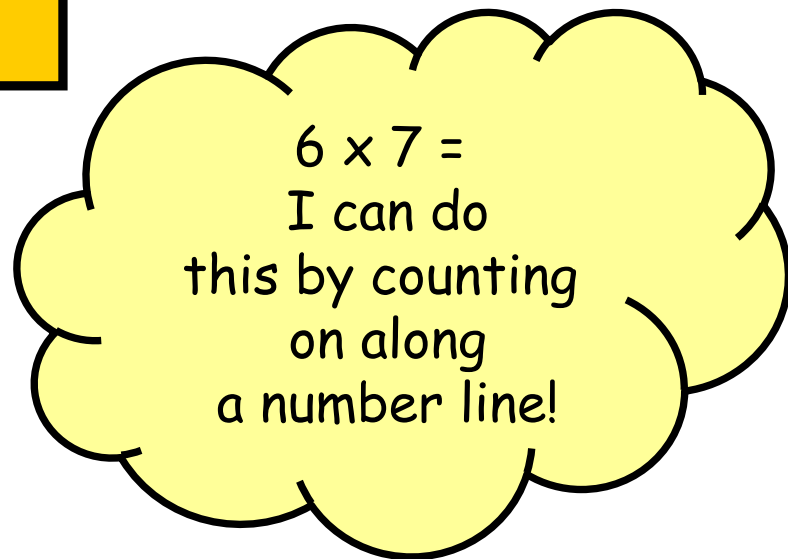
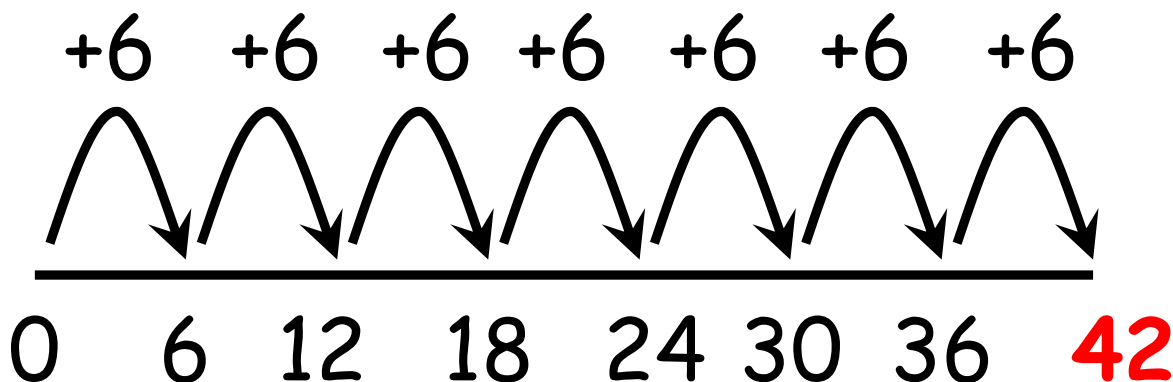




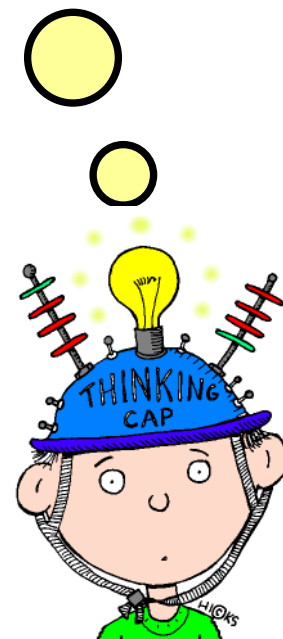
Number Line

We are multiplying by counting on... 6 each time, and do this 7 times.

Start with 0 on the number line.



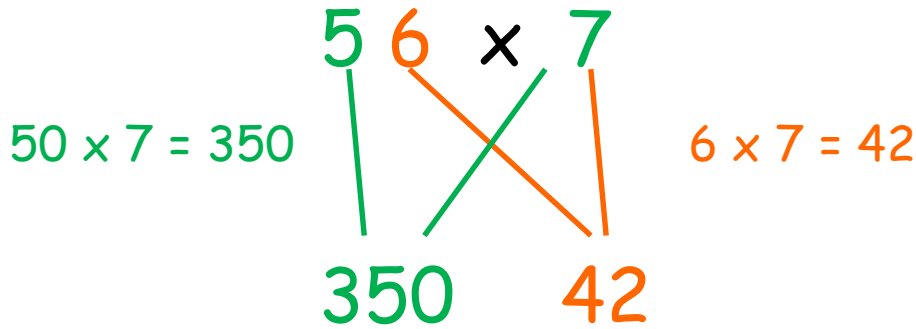
$$6 \times 7 = 42$$





Partitioning

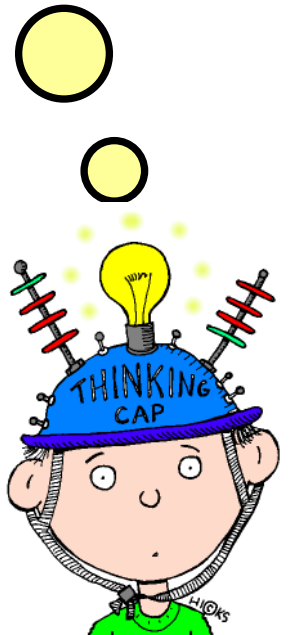
56 x 7 partition 56 to 50 and 6



$350 + 42 = 392$

$56 \times 7 = 392$

This is where I partition the larger number.





Grid - Short

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

$$50 \times 7 = 350$$

$$6 \times 7 = 42$$

50

6

7

350

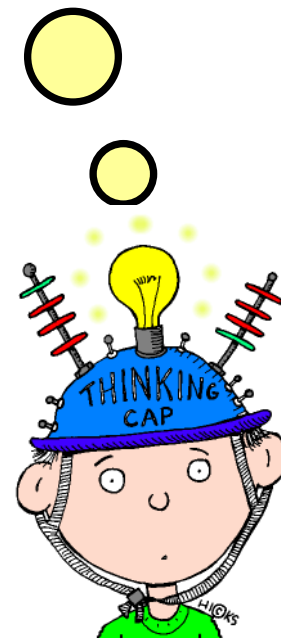
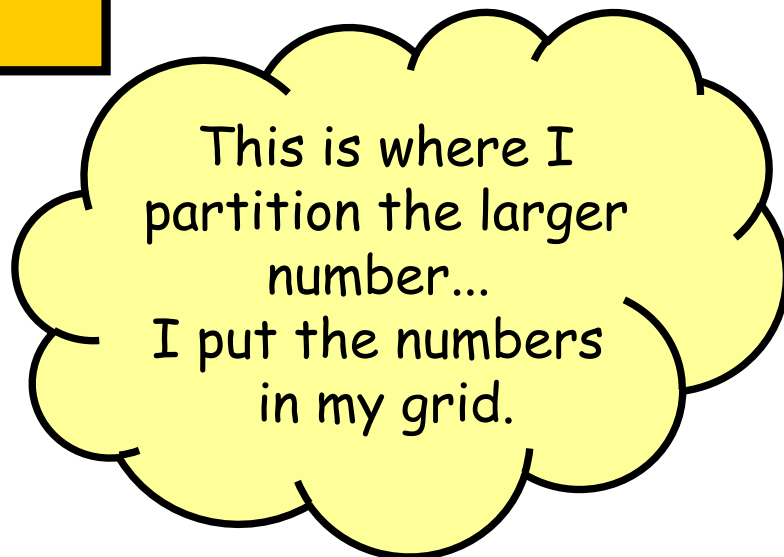
42

= 392

	50	6
7	350	42

Now add 350 and 42

$$56 \times 7 = 392$$



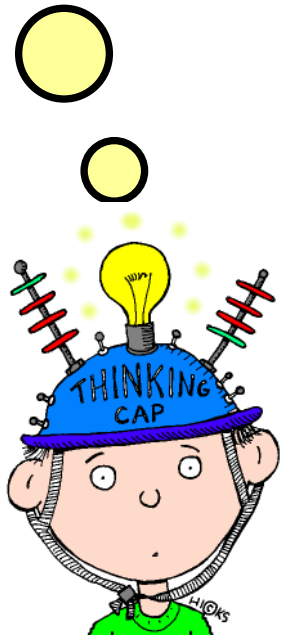


Grid - Long

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

	50	6	
20	1000	120	= 1120
7	350	42	= 392
	<hr/>		
	1120 + 392 = 1512		

I can use my partitioning skills in a larger grid.



56 x 27 = 1512

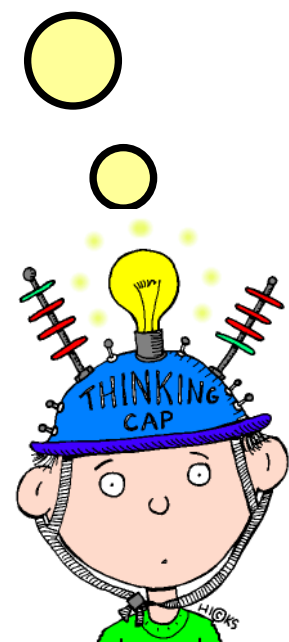


Expanded Column - Short

Use squared paper to write the numbers in columns.

$$\begin{array}{r} 56 \\ \times 7 \\ \hline 42 \quad (6 \times 7) \\ + 350 \quad (50 \times 7) \\ \hline 392 \\ \hline \end{array}$$

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



$$56 \times 7 = 392$$

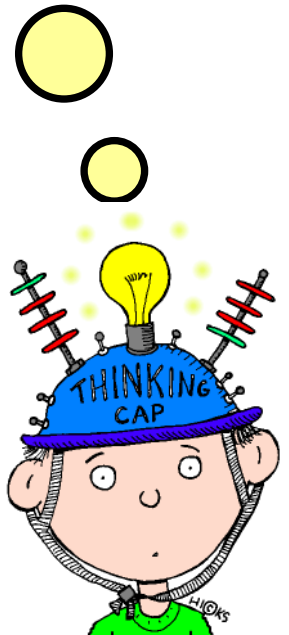


Expanded Column - Long

Use squared paper to write the numbers in columns.

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 42 \quad (6 \times 7) \\ 350 \quad (50 \times 7) \\ 120 \quad (6 \times 20) \\ + 1000 \quad (50 \times 20) \\ \hline 1512 \\ \hline 1 \end{array}$$

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



$$56 \times 27 = 1512$$



Compact Column - Short

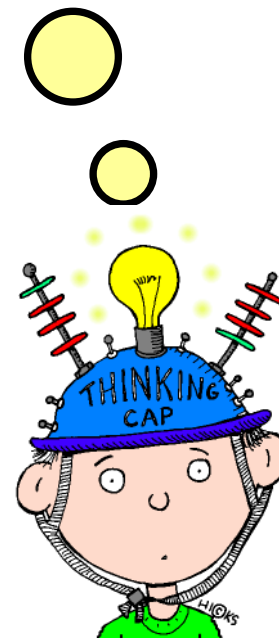
Use squared paper to write the numbers in columns.

$$\begin{array}{r} 56 \\ \times 7 \\ \hline 392 \\ \hline 4 \end{array}$$

$$(6 \times 7 = 42)$$

$$(50 \times 7 = 350)$$

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



$$56 \times 7 = 392$$



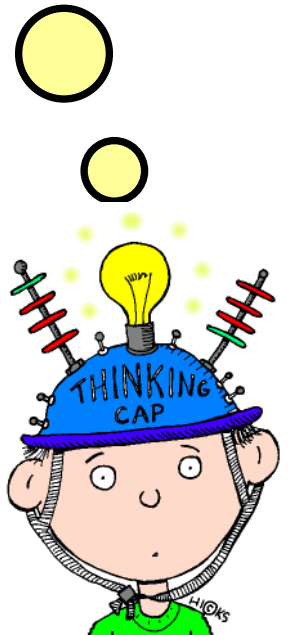
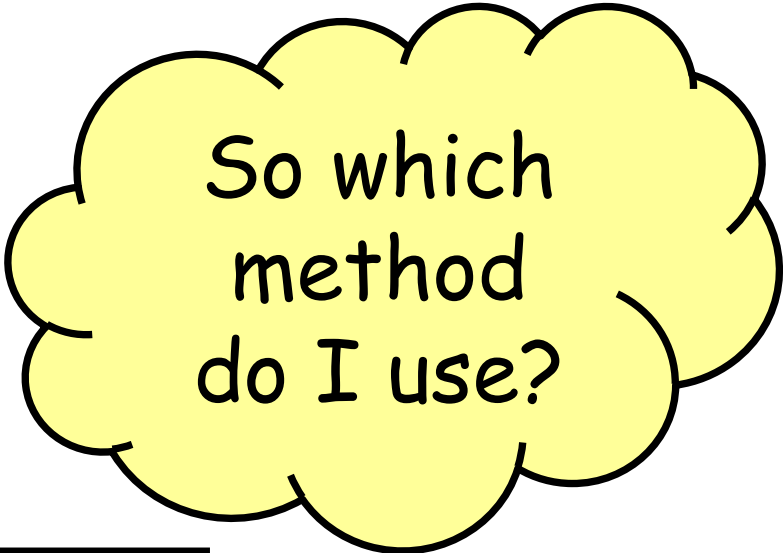
Calculation at Chesswood

Division

Number Line



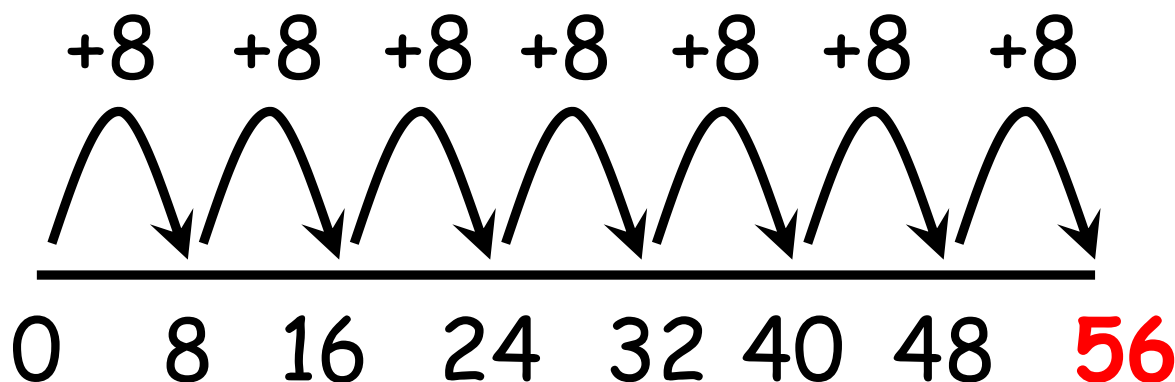
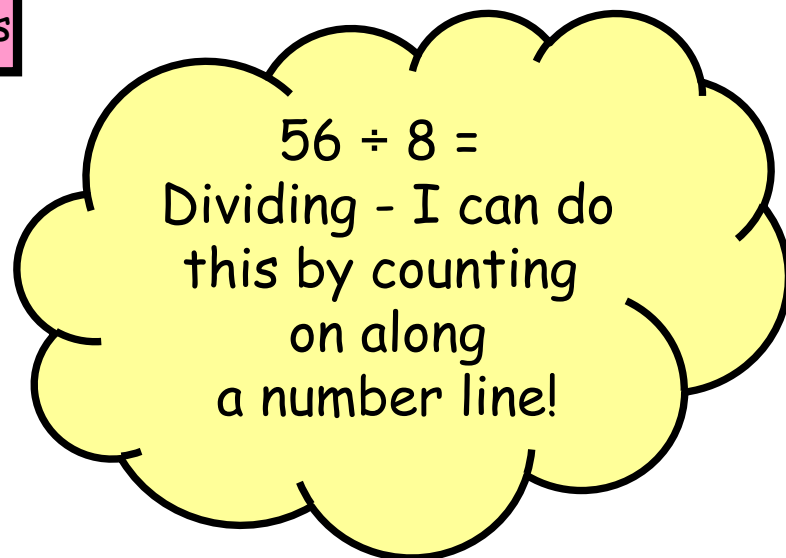
Compact Method





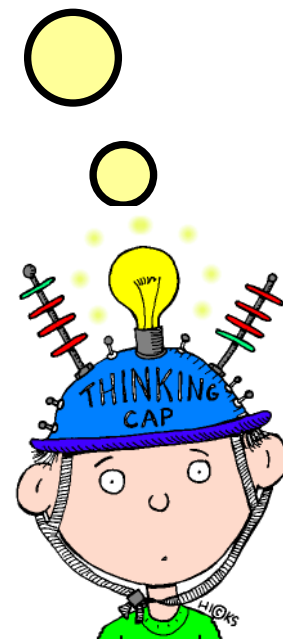
Number Line in small jumps

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



It took 7 jumps to get to 56 ... so $56 \div 8$ is 7

$$56 \div 8 = 7$$



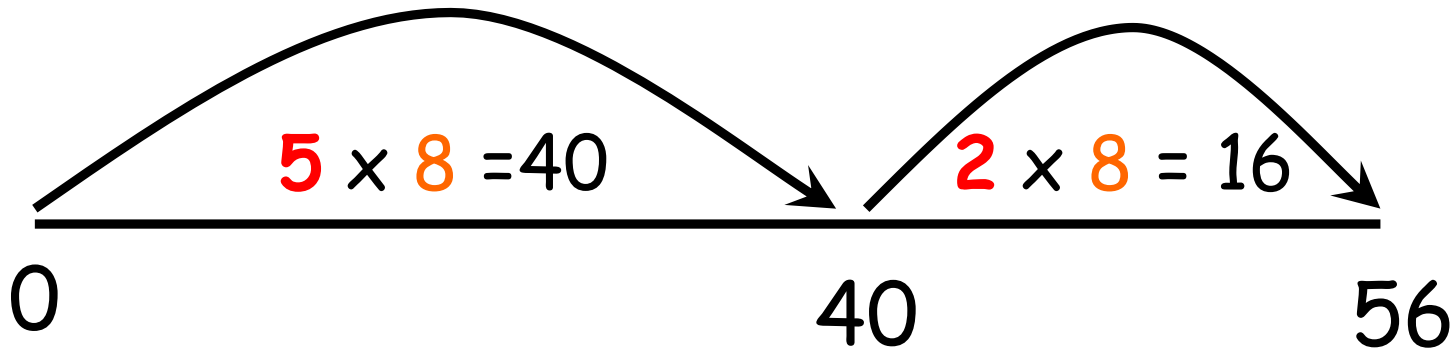
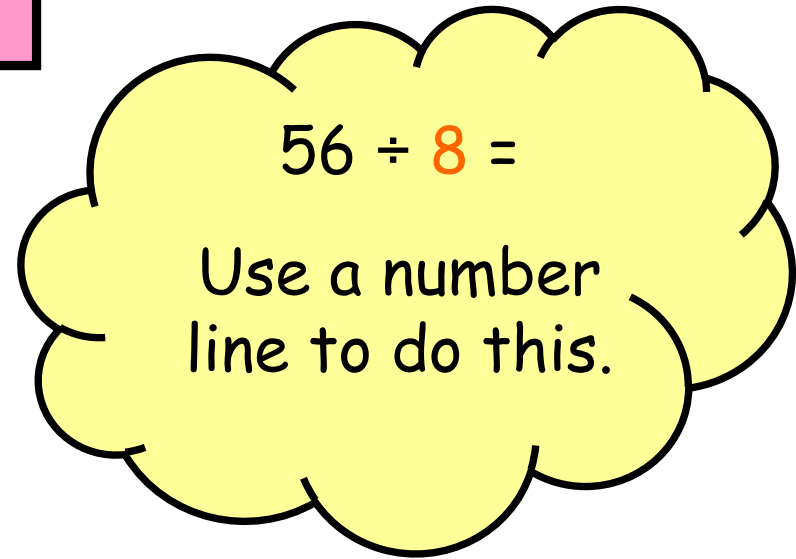


Number Line in chunks

What jumps of 8 can you make on the number line towards 56?

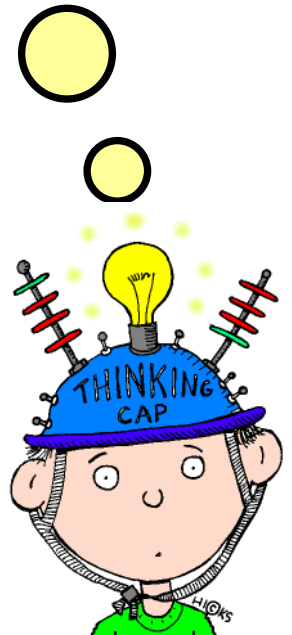
$5 \times 8 = 40$ would be good!

Now a jump of $2 \times 8 = 16$ would take you to 56.



Add 5 and 2 = 7.

$$56 \div 8 = 7$$



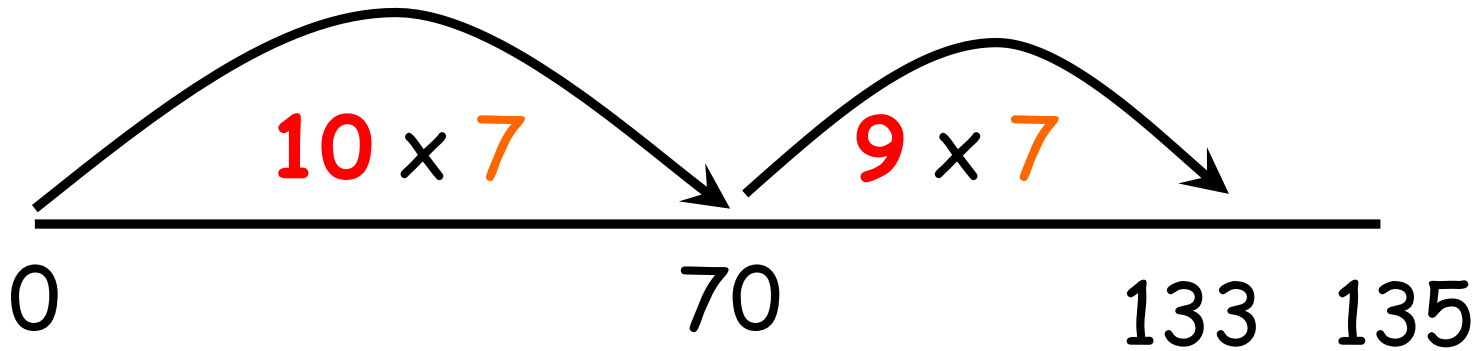
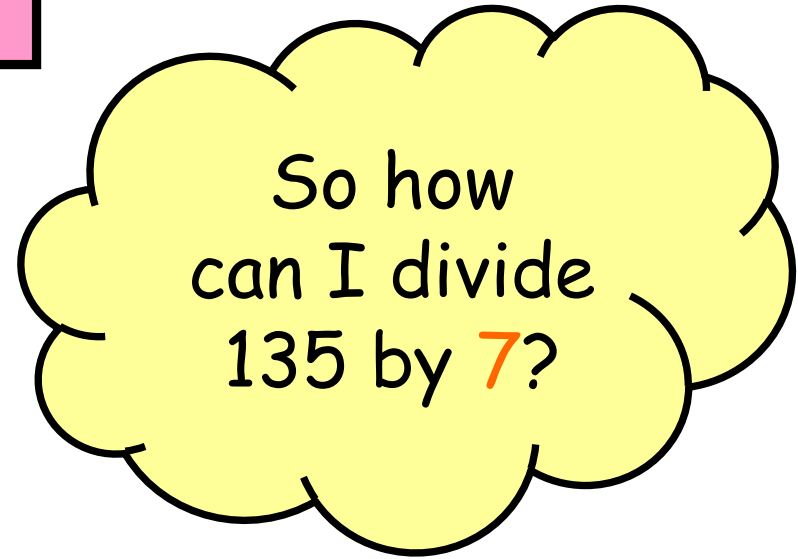


Number Line in chunks

What jumps of 7 can you make on the number line towards 135?

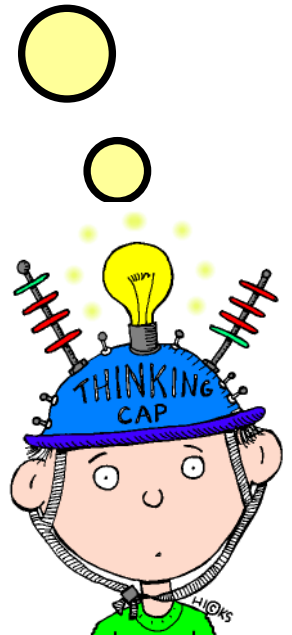
$10 \times 7 = 70$ would be good!

Now a jump of $9 \times 7 = 63$ would take you to 133. But that's not 135. There's 2 remaining.



Add 10 and 9 = 19
and don't forget
the remainder of 2.

$$135 \div 7 = 19 \text{ r}2$$





Compact Method - Short

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

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

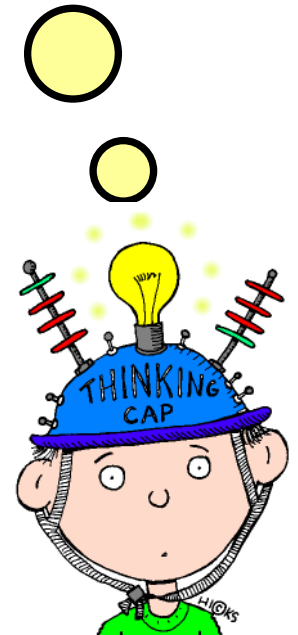
256 ÷ 7 =
I must remember to calculate one digit at a time!

$$\begin{array}{r} 125 \\ 7 \overline{) 875} \end{array}$$

$$\begin{array}{l} 8 \div 7 = 1 \text{ r}1 \\ 17 \div 7 = 2 \text{ r}3 \\ 36 \div 7 = 5 \end{array}$$

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

$$875 \div 7 = 125$$

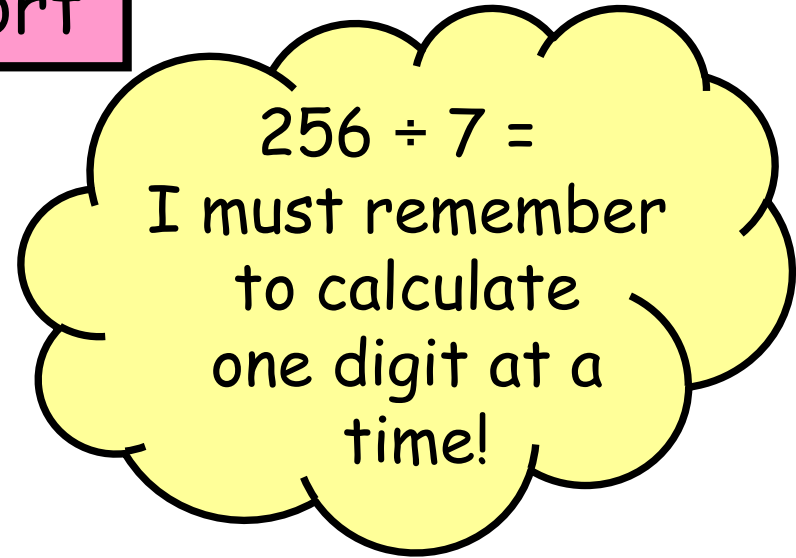




Compact Method - Short

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

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

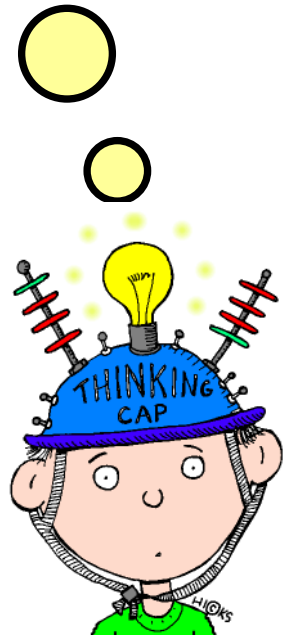


$$\begin{array}{r} 125r1 \\ 7 \overline{) 876} \end{array}$$

$$\begin{array}{l} 8 \div 7 = 1 r1 \\ 17 \div 7 = 2 r3 \\ 36 \div 7 = 5 r1 \end{array}$$

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

$$876 \div 7 = 125 r1$$





Compact Method - Long

$$\begin{array}{r} 47 \\ 2 \overline{) 94} \\ \underline{- 8} \\ 14 \\ \underline{- 14} \\ 0 \end{array}$$

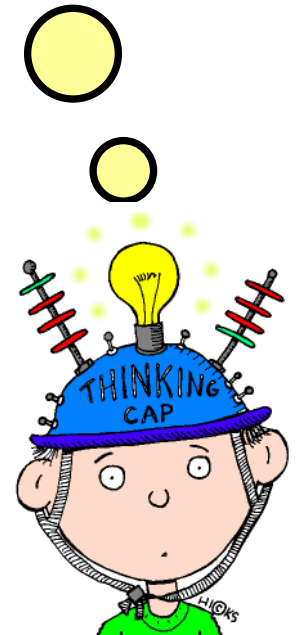
$$9 \div 2 = 4 \text{ r}1$$
$$14 \div 2 = 7$$

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)

$$94 \div 2 = 47$$





Compact Method - Long

$$\begin{array}{r} 125 \text{ r}1 \\ 7 \overline{) 876} \\ \underline{8} \\ 17 \\ \underline{14} \\ 36 \\ \underline{35} \\ 1 \end{array}$$

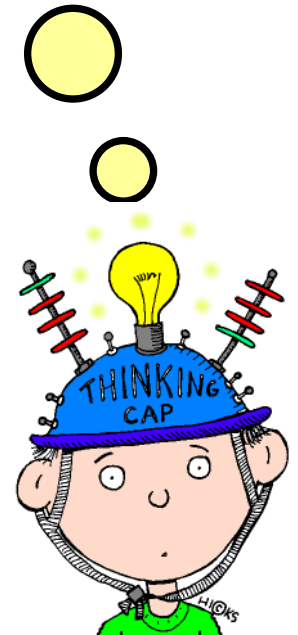
$$\begin{array}{l} 8 \div 7 = 1 \text{ r}1 \\ 17 \div 7 = 2 \text{ r}3 \\ 36 \div 7 = 5 \text{ r}1 \end{array}$$

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)

$$876 \div 7 = 125 \text{ r}1$$





Compact Method - Long

$$\begin{array}{r} 0232r8 \\ 16 \overline{) 3720} \\ \underline{37} \\ 52 \\ \underline{48} \\ 40 \\ \underline{32} \\ 8 \end{array}$$

$$3 \div 16 = 0 r3$$

$$37 \div 16 = 2 r5$$

$$52 \div 16 = 3 r4$$

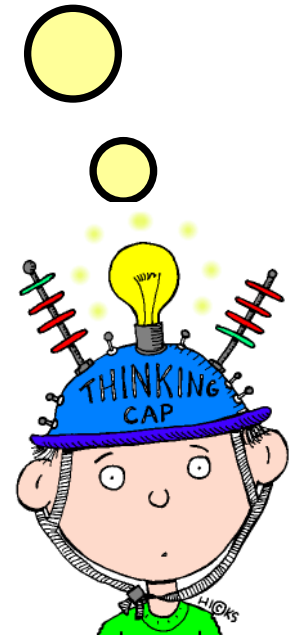
$$40 \div 16 = 2 r8$$

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

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

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

$$3720 \div 16 = 232 r8$$





Compact Method - Long Converting the remainder

$$\begin{array}{r} 0232.5 \\ 16 \overline{) 3720.0} \\ \underline{37} \\ 0 \\ \underline{-32} \\ 52 \\ \underline{-48} \\ 40 \\ \underline{-32} \\ 80 \\ \underline{-80} \\ 0 \end{array}$$

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 ($\frac{8}{16} = \frac{1}{2} = .5$)

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

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

