

**Calculation
Evening
14th November
2013**



How good is
your maths?

[telegraph maths test](#)

At Swindon Village, Children are encouraged to adopt the 4 B's to enable them to become resilient learners.

Brain, Book, Buddy and Boss



Addition

The mental methods that lead to column addition generally involve partitioning, e.g. adding the tens and units separately, often starting with the tens as this is the larger part of the number. They can also include the use of number lines, tracks and squares for counting on.

R

Practical/recorded using ICT (eg digital photos/pictures on IWB)

Age related expectations:

Addition as 'combining 2 groups'

1. Pictures / Objects

I eat 2 cakes and my friend eats 3.
How many cakes did we eat altogether?



Might be recorded as:
 $2 + 3 = 5$

2. Symbols

8 people are on the bus. 5 more get on at the next stop. How many people are on the bus now?



[Might be recorded as: $8 + 5 = 13$]

1

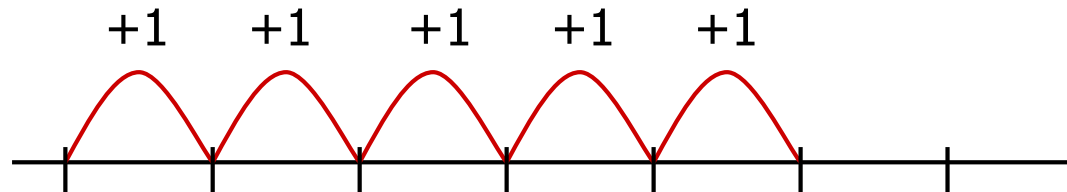
Practical/recorded using ICT. Year 1 children will also build upon pictures and symbol methods mentioned above

Age related expectations:

Addition as counting on
U+U and TU+U
(bridging 20)

1. Number track / Number line – jumps of 1
(modelled using bead strings)

$$18 + 5 = 23$$



2. Partitioning

$$35 + 47$$

$$40 + 30 = 70$$

$$7 + 5 = 12$$

2

Picture/Symbols,
number lines and
partitioning

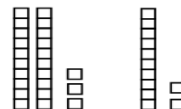
**Age related
expectations:**

TU+TU (bridging
10s and 100s)

1. Pictures / Symbols POT (Partition Ones Tens)

$$23 + 12 = 35$$

(without crossing ten boundaries)



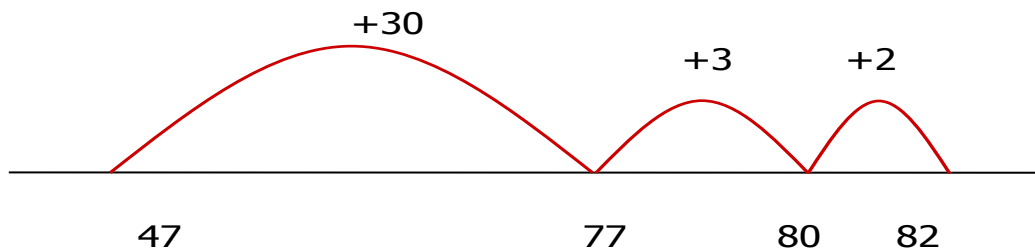
$$28 + 17 = 45$$

(crossing ten boundaries)

POET (Partition Ones EXCHANGE Tens)

2. Number line – jumps in 10s and 1s

$$35 + 47$$



[Also jumps can be in 10s and 1s]

3. No number line

$$35 + 47$$

$$47 + 30 = 77$$

$$77 + 3 = 80$$

$$80 + 2 = 82$$

4. Partitioning

$$35 + 47$$

$$40 + 30 = 70$$

$$7 + 5 = 12$$

3

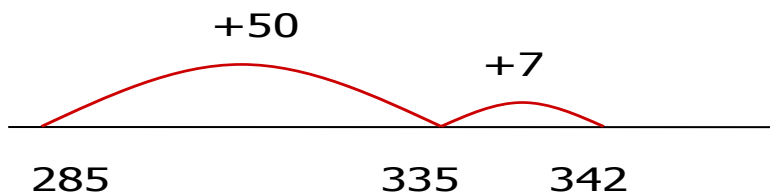
*Number lines,
partitioning and
expanded vertical
method and
compact method*

Age related expectations:

TU + TU
(bridging 100)
HTU + TU
(not bridging 1000)
HTU + HTU
(not bridging 1000)

1. Number line

$$57 + 285 = 342$$



2. Partitioning

$$57 + 285$$

$$\begin{array}{r} 200 + 0 = 200 \\ 80 + 50 = 130 \\ 5 + 7 = 12 \end{array}$$

3. Expanded vertical

$$336 + 87 = 423$$

$$\begin{array}{r} 300 \text{ and } 30 \text{ and } 6 \\ + \quad \quad \quad 80 \text{ and } 7 \end{array}$$

$$300 \text{ and } 110 \text{ and } 13$$

4. Compact vertical

$$\begin{array}{r} 374 \\ + 248 \\ \hline 622 \\ \hline 11 \end{array}$$

4

*Number lines,
partitioning and
compact method*

Age related expectations:

HTU + TU

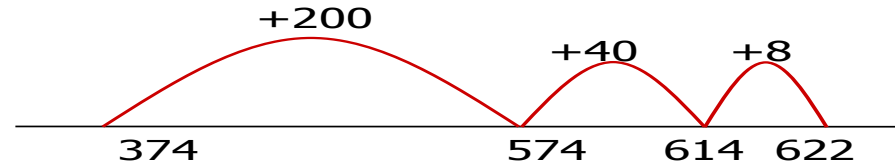
HTU + HTU

(incl bridging 1000)

Decimals: money
(£7.85 + £3.49)

1. Number line

$$374 + 248 =$$



2. No number line

$$374 + 248$$

$$374 + 200 = 574$$

$$574 + 40 = 614$$

$$614 + 8 = 622$$

3. Partitioning

$$374 + 248$$

$$300 + 200 = 500$$

$$70 + 40 = 110$$

$$4 + 8 = 12$$

4. Compact vertical

$$\begin{array}{r} 374 \\ + 248 \\ \hline 622 \\ 11 \end{array}$$

5. Decimals: money

Introduce process with decimals (to 1 d.p. moving to 2 d.p.)

£6.72 + £8.56 + £2.33 exchanging of both tenths and hundredths

5

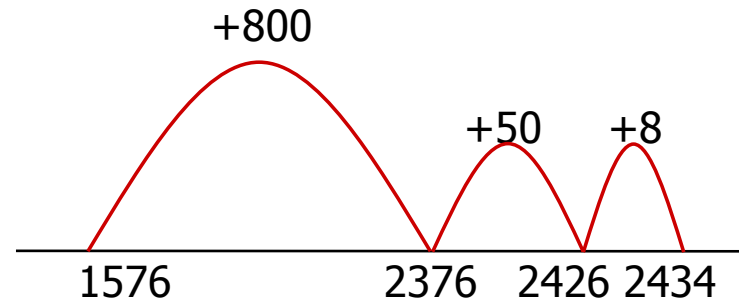
*Number lines,
partitioning and
compact method*

**Age related
expectations:**
ThHTU + HTU

Decimals up to 2dp
(23.7 + 48.56)

1. Number line

$$1576 + 858 =$$



2. Partitioning

$$1576 + 858$$

$$1000 + 0 = 1000$$

$$500 + 800 = 1300$$

$$70 + 50 = 120$$

$$6 + 8 = 14$$

3. Compact vertical

$$\begin{array}{r} 23.70 \\ + 48.56 \\ \hline \end{array}$$

$$72.26$$

$$11$$

6

*Number lines,
partitioning and
compact method*

**Age related
expectations:**

*Consolidate /
extend Y5
including:*
Three numbers
Decimals up to 3dp
(context: measures)

1. Compact vertical

$$\begin{array}{r} 3.243 \\ + 18.070 \\ \hline \end{array}$$

$$\begin{array}{r} 21.313 \\ \hline 1 \quad 1 \end{array}$$

Subtraction

Mental methods should involve counting back in single digit numbers, leading onto counting back in multiples of 10, possibly using a number square. Children find subtraction difficult particularly when they are introduced to column methods at an early stage when they are not ready for it. With continued practise and reinforcement, children will become very comfortable using counting on methods on a number line.

R

*Practical/recorded
using ICT (eg
digital
photos/pictures on
IWB)*

Age related expectations:

Subtraction as
'taking away' from
a group

1. Pictures / Objects

I have five cakes. I eat two of them. How many do I have left?



Might be recorded as:
 $5 - 2 = 3$

2. Symbols

Mum baked 9 biscuits. I ate 5. How many were left?

[Might be recorded as: $9 - 5 = 4$]



1

Practical/recorded using ICT. Taking away and counting on

Age related expectations:

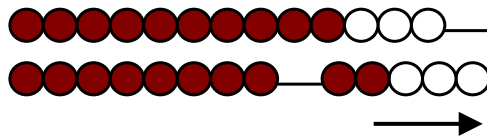
Subtraction as 'taking away' and 'difference' (by counting on)

U – U
TU – U
(bridging 10)

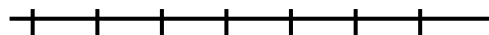
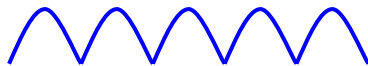
1. Taking away – jumps of 1

(modelled using bead strings)

$$13 - 5 = 8$$



-1 -1 -1 -1 -1

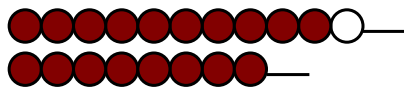


8 9 10 11 12 13

2. Counting on – jumps of 1

(modelled using bead strings)

$$11 - 8 = 3$$



+1 +1 +1



0 1 2 3 4 5 6 7 8 9 10 11

2

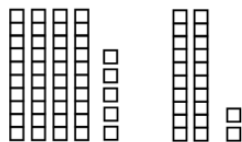
*Pictures/symbols,
number lines,
partitioning*

**Age related
expectations:**

Subtraction as
inverse of addition
TU – TU
(bridging 10s)

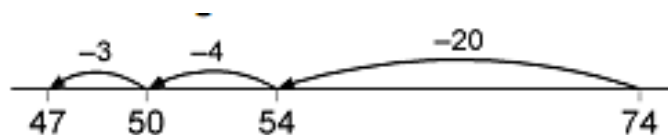
1. Pictures / Symbols

$$45 - 22 = 23$$



2. Number lines - taking away

$$74 - 27 = 47$$



[Also jumps can be in 10s and 1s]

3. Partitioning

$$74 - 27$$

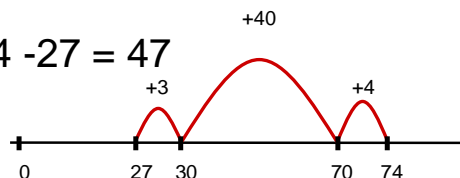
$$74 - 20 = 54$$

$$54 - 4 = 50$$

$$50 - 3 = 47$$

4. Number lines – counting on

$$74 - 27 = 47$$



[Also jumps can be in 10s and 1s]

3

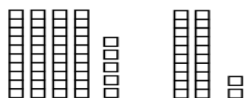
*Pictures/symbols,
number lines and
decomposition*

**Age related
expectations:**

TU – TU
HTU – TU
HTU – HTU

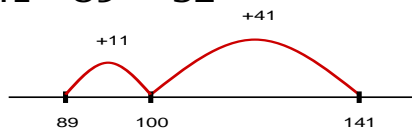
1. Pictures / Symbols

$$45 - 22 = 23$$



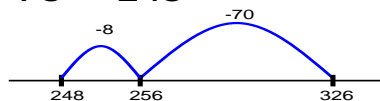
2. Number line – counting on

$$141 - 89 = 52$$



3. Number line - taking away

$$326 - 78 = 248$$



Vertical number line may be used to record calculation

4. Decomposition

$$272 - 48 = 224$$

[Red Alert]

200	70	2
-	40	8
200	60	12
	40	8
200	20	4

5. Decomposition

(compact method)

$$\begin{array}{r}
 \overset{5}{7} \overset{13}{4} \overset{11}{1} \\
 - 367 \\
 \hline
 374
 \end{array}$$

4

*Number lines,
partitioning, and
decomposition*

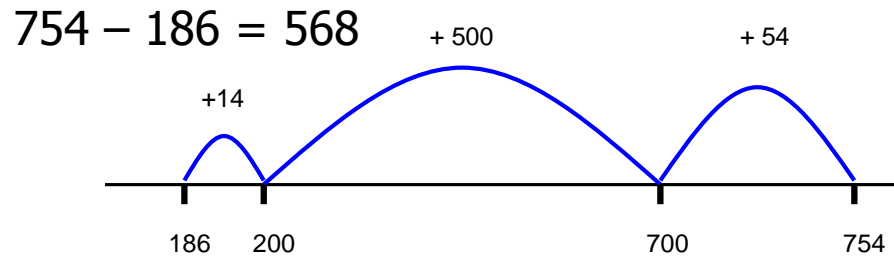
**Age related
expectations:**

HTU – TU

HTU – HTU

Decimals: money
(£7.85 - £3.49)

1. Number lines – counting on



2. Partitioning

$$754 - 186$$

$$754 - 100 = 654$$

$$654 - 80 = 574$$

$$574 - 6 = 568$$

3. Decomposition

(compact method)

$$72.5 - 45.7$$

$$\begin{array}{r} 72.5 \\ - 45.7 \\ \hline 26.8 \end{array}$$

5

Counting on and decomposition and selecting a written method for efficiency

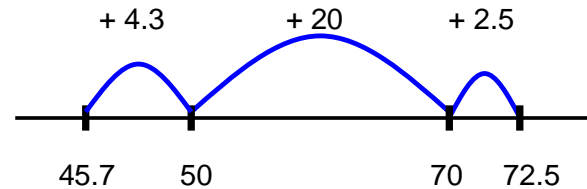
Age related expectations:

ThHTU – HTU

Decimals up to 2dp
(72.5 – 45.7)

1. Number lines – counting on

$$72.5 - 45.7 = 26.8$$



2. Decomposition

(compact method)

$$72.5 - 45.7$$

$$\begin{array}{r} 72.5 \\ - 45.7 \\ \hline 26.8 \end{array}$$

6

Age related expectations:

Consolidate and extend. Y5 methods including decimals up to 3d.p relating to measures

1. Recognise when one written method is more efficient. (*See Y5 methods of recording*)

- There was 2.5 litres in the jug. Stuart drank 385 ml. How much was left?
- $18.07 \text{ km} - 3.243 \text{ km}$

Multiplication

Early stages of multiplication will focus on groups and sets, leading onto the learning of multiplication tables facts up to 10×10 . Most children should have a secure knowledge of *all multiplication facts by the end of Year 4.*

The next stage is to learn how to multiply a 2-digit number by a 1-digit number. To do this, children will need to be able to partition the 2-digit number and multiply both the tens and the units part separately. This can be done using the grid method as shown below.

R

Practical/recorded using ICT (eg digital photos/pictures on IWB) pictures, objects and symbols

Age related expectations:

Count repeated groups of the same size (1s, 2s and 10s)

1. Pictures / Objects

3 plates, 2 cakes on each plate:



2. Symbols

3 plates, 2 cakes on each plate:



1

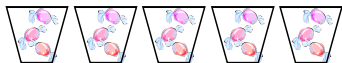
*Practical/recorded
using ICT/ pictures,
symbols and number
tracks*

**Age related
expectations:**

Solve practical
problems that
involve combining
groups of 2, 5 or 10

1. Pictures / Symbols

There are three sweets in one bag.
How many sweets are there in five bags?

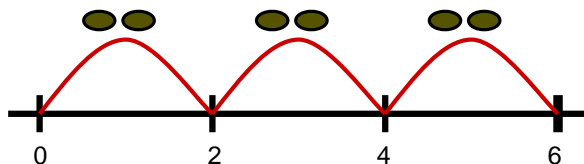


2. Number tracks / Number line

(modelled using bead strings)

2 x 3 or 3 x 2

[two, three times] or [three groups of two]



2

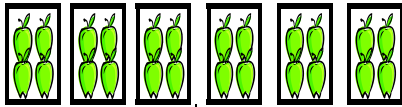
*Pictures, symbols,
repeated addition
and arrays*

**Age related
expectations:**

Multiplication as
repeated addition
and arrays

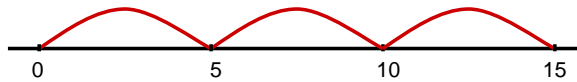
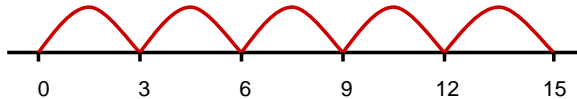
1. Pictures / Symbols

There are four apples in each box.
How many apples in six boxes



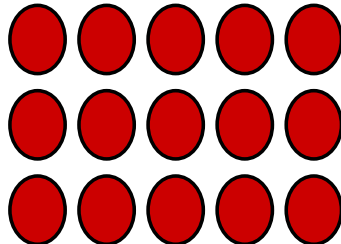
2. Repeated addition

5×3 or 3×5



3. Arrays

5×3 or 3×5



Also 14×2 as $(10 \times 2$ and $4 \times 2)$

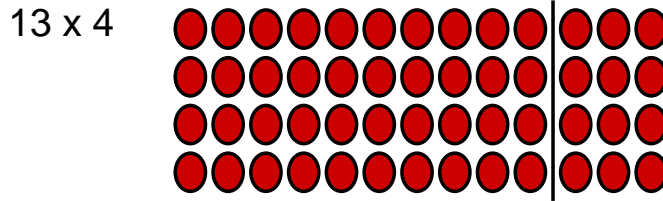
3

*Building upon Y2
methods and
partitioning*

**Age related
expectations:**

TU x U (eg. 13 x 4)

1. Arrays

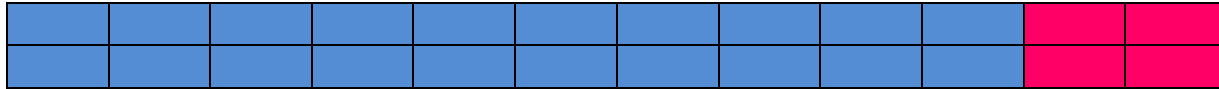


$$10 \times 4 = 40$$

$$3 \times 4 = 12$$

Can be drawn as a grid to extend the children's knowledge- moving towards compact grid method

$$12 \times 2 = 24$$



2. Partitioning

$$43 \times 6$$

(estimate: $40 \times 6 = 240$)

$40 \times 6 = 240$ – note: there should be some relation to times tables knowledge eg $4 \times 6 = 24$ leads to $40 \times 6 = 240$ – pattern spotting

$$3 \times 6 = 18$$

4

Building upon Y3 methods of arrays and partitioning, including grid method and vertical methods

Age related expectations:

TU x U (eg. 16 x 8; 43 x 6)

1. Compact grid method

$$43 \times 6$$

x	40	3
6	240	18

2. Expanded vertical

$$\begin{array}{r} 43 \\ \times 6 \\ \hline 18 \quad (3 \times 6) \\ 240 \quad (40 \times 6) \\ \hline 258 \end{array}$$

3. Grid method

$$47 \times 36$$

(estimate: $50 \times 40 = 2000$)

x	40	7	
30	1200	210	1410
6	240	42	282
			1692

5

Building upon Y4 methods of partitioning, grid method and expanded vertical. Also, using grid method and compact vertical method

Age related expectations:

Refine and use efficient methods:

HTU x U
TU x TU
U.t x U

1. Grid method – really important to emphasise the estimation first to get an approximate answer to check final answer against

$$5.65 \times 9$$

(estimate: $6 \times 9 = 54$)

×	5	0.6	0.05	
9	45	5.4	0.45	50.85

Answer: $5.65 \times 9 = 50.85$

2. Compact Vertical

$$4.7 \times 8$$

(estimate: $5 \times 8 = 40$)

$$\begin{array}{r} 4.7 \\ \times \quad 8 \\ \hline 37.6 \\ \quad 5 \end{array}$$

6

To use compact vertical method

Age related expectations:

use efficient methods:

Integer x U
(eg 2307 x 8)
Decimal x U
(eg 31.6 x 7)
TU x TU
HTU x TU

1. Compact Vertical- multiply by units then ten

$$256 \times 18$$

(estimate: $250 \times 20 = 5000$)

$$\begin{array}{r} 256 \\ \times 18 \\ \hline 2048 \\ \underline{2560} \\ 4608 \\ 1 \end{array}$$

Answer: $256 \times 18 = 4608$

Division

Using written methods for division can be the most difficult for children. Early mental approaches should involve grouping and sharing. Discussing the sharing out of sweets is an example. When there are some left over, the term remainder can be introduced.


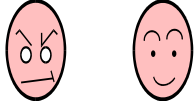
R

Practical/recorded using ICT (eg digital photos/pictures on IWB) pictures, objects and symbols

Age related expectations:

Share objects into equal groups and count how many in each group

1. Pictures / Objects

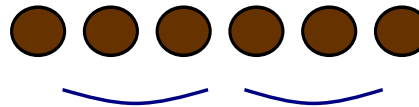
6 cakes shared between 2 


6 cakes put into groups of 2



2. Symbols

6 cakes shared between 2



1

Practical/recorded using ICT.
(Pictures on IWB) pictures, objects and symbols

Age related expectations:

Solve practical problems that involve sharing into groups

1. Pictures / Symbols

How many apples in each bowl if I share 12 apples between 3 bowls?

**2**

Pictures, symbols, number lines, arrays and partitioning

Age related expectations:

Division and sharing and grouping including remainders
 $TU \div U$
(where divisor is 2, 5 or 10)

1. Pictures / Symbols

Four eggs fit in a box. How many boxes would you need to pack 20 eggs?

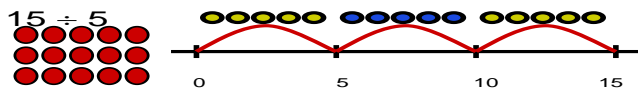
**3**

Y3 build upon the Y2 methods

Age related expectations:

$TU \div U$
(where divisor is 2, 3, 4, 5, 6 or 10)

Round remainders up / down, depending on the context

2. Number lines / Arrays**3. Partitioning**

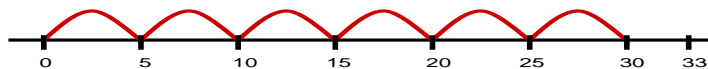
$$28 \div 2$$

$$20 \div 2 = 10$$

$$8 \div 2 = 4$$

4. Number lines (start from zero)

$$33 \div 5 = 6 \text{ r}3$$



4

Number lines, partitioning, grouping and short division

Age related expectations:

Record, support and explain:

TU ÷ U
(eg 98 ÷ 6)

5

Y5 build upon Y4 methods

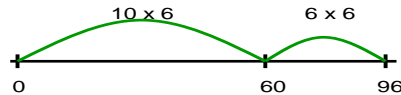
Age related expectations:

**Refine and use efficient methods:
Call the formal method bus stop**

HTU ÷ U

1. Number lines (start from zero)

$$96 \div 6 = 16$$



2. Partitioning (multiples of the divisor)

$$67 \div 4 = 16 \text{ r}3$$

$$10 \times 4 = 40$$

$$6 \times 4 = 24 \quad (64)$$

3. Grouping (vertical layout)

$$96 \div 7$$

$$\begin{array}{r} 96 \\ -70 \quad (7 \times 10) \\ \hline 26 \\ -21 \quad (7 \times 3) \\ \hline 5 \end{array}$$

Answer: 13 R 5

4. Grouping (efficient)

$$25.6 \div 8$$

(estimate: $24 \div 8 = 3$)

$$\begin{array}{r} 8 \overline{)25.6} \\ -24.0 \quad (8 \times 3.0) \\ \hline 1.6 \\ -1.6 \quad (8 \times 0.2) \\ \hline 0 \end{array}$$

Answer: $25.6 \div 8 = 3.2$

5. 'Short' division

$$291 \div 3 \quad (\text{estimate: } 270 \div 3 = 90)$$

$$3 \overline{)290+1} = 3 \overline{)270+21} \quad \begin{array}{r} 90+7 \\ 3 \overline{)270+21} \end{array}$$

This is then shortened to:

$$\begin{array}{r} 97 \\ 3 \overline{)2921} \end{array}$$

6

*'Short' division and
'Long' division*

**Age related
expectations:**

**Use efficient
methods**

Integer \div U

(eg $123 \div 7$)

Decimal \div U

(eg $27.6 \div 8$)

HTU \div TU

1. 'Short' division

$$43.4 \div 7$$

$$\text{(estimate: } 42 \div 7 = 6\text{)}$$

$$6.2$$

$$7 \overline{) 43.4}$$

2. 'Long' division

$$560 \div 24 \text{ (estimate: } 550 \div 25 = 22\text{)}$$

$$\begin{array}{r} 23 \\ 24 \overline{) 560} \\ \underline{-480} \\ 80 \\ \underline{-72} \\ 8 \end{array}$$

Answer: 23 R 8

OR

$$\begin{array}{r} 023r8 \\ 24 \overline{) 55680} \end{array}$$

New Primary Curriculum 2014



Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline 11 \end{array}$$

Answer: 1431

874 - 523 becomes

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \\ \hline \end{array}$$

Answer: 351

932 - 457 becomes

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ \cancel{9} \quad \cancel{3} \quad 2 \\ - 4 \quad 5 \quad 7 \\ \hline 4 \quad 7 \quad 5 \\ \hline \end{array}$$

Answer: 475

932 - 457 becomes

$$\begin{array}{r} 1 \quad 1 \\ 9 \quad 3 \quad 2 \\ - \cancel{4} \quad \cancel{5} \quad 7 \\ \quad 5 \quad 6 \\ \hline 4 \quad 7 \quad 5 \\ \hline \end{array}$$

Answer: 475

Short multiplication

24 × 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline 21 \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ \hline 42 \end{array}$$

Answer: 16 446

Long multiplication

24 × 16 becomes

$$\begin{array}{r} 2 \\ 24 \\ \times 16 \\ \hline 240 \\ 144 \\ \hline 384 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} 12 \\ 124 \\ \times 26 \\ \hline 2480 \\ 744 \\ \hline 3224 \\ \hline 11 \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} 12 \\ 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ \hline 11 \end{array}$$

Answer: 3224

Short division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{150} \\ 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{150} \\ 12 \end{array}$$

15×20

15×8

$$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{150} \\ 120 \\ \underline{150} \\ 0 \end{array}$$

Answer: 28.8