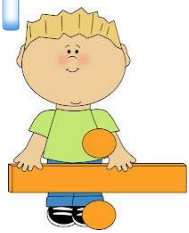
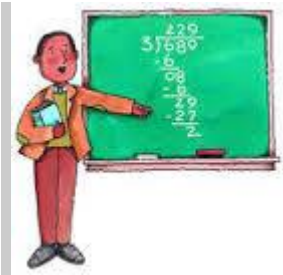
The Linden Academy

Maths Information

Booklet 4

Division





Stage 1: Mental division using partitioning

One way to work out TU ÷ U mentally is to partition TU into a multiple of the divisor plus the remaining units, then divide each part separately.

Informal recording in Year 4 for 84 ÷ 7 might be:

84

70 + 14

÷ 7

10 + 2 = 12

In this example, using knowledge of multiples, the 84 is partitioned into 70 (the highest multiple of 7 that is also a multiple of 10 and less than 84) plus 14 and then each part is divided separately using the distributive law.

Another way to record is in a grid, with links to the grid method of multiplication.

×		
7	70	14

→

×	10	2
7	70	14

10 + 2 = 12

As the mental method is recorded, ask: ‘How many sevens in seventy?’ and: ‘How many sevens in fourteen?’

Stage 1: Mental division using partitioning

Also record mental division using partitioning:

$$64 \div 4 = (40 + 24) \div 4$$
$$= (40 \div 4) + (24 \div 4)$$
$$= 10 + 6 = 16$$

$$87 \div 3 = (60 + 27) \div 3$$
$$= (60 \div 3) + (27 \div 3)$$
$$= 20 + 9 = 29$$

Remainders after division can be recorded similarly.

$$96 \div 7 = (70 + 26) \div 7$$
$$= (70 \div 7) + (26 \div 7)$$
$$= 10 + 3 \text{ R } 5 = 13 \text{ R } 5$$

Stage 2: Short division of TU ÷ U

For 81 ÷ 3, the dividend of 81 is split into 60, the highest multiple of 3 that is also a multiple 10 and less than 81, to give 60 + 21. Each number is then divided by 3.

$$\begin{aligned} 81 \div 3 &= (60 + 21) \div 3 \\ &= (60 \div 3) + (21 \div 3) \\ &= 20 + 7 \\ &= 27 \end{aligned}$$

The short division method is recorded like this:

$$3\overline{)\,60 + 21}\;\;20 + 7$$

This is then shortened to:

$$3\overline{)\,8\,{}^{2}1}\;\;2\;7$$

The carry digit ‘2’ represents the 2 tens that have been exchanged for 20 units. In the first recording above it is written in front of the 1 to show that 21 is to be divided by 3. In second it is written as a superscript.

The 27 written above the line represents the answer: 20 + 7, or 2 tens and 7 ones.

Stage 3: ‘Expanded’ method for HTU ÷ U

$97 \div 9$

$9\overline{)97}$

$-\ 90 \quad 9 \times 10$

7

Answer: $10\ \mathrm{R}\ 7$

HTU ÷ U

$6\overline{)196}$

$-\ 60 \quad 6 \times 10$

136

$-\ 60 \quad 6 \times 10$

76

$-\ 60 \quad 6 \times 10$

16

$-\ 12 \quad 6 \times\ 2$

$4 \qquad 32$

Answer: $32\ \mathrm{R}\ 4$

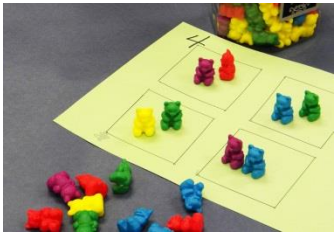
Stage 3: ‘Expanded’ method for HTU ÷ U

To find 196 ÷ 6, we start by multiplying 6 by 10, 20, 30, … to find that 6 × 30 = 180 and 6 × 40 = 240. The multiples of 180 and 240 trap the number 196. This tells us that the answer to 196 ÷ 6 is between 30 and 40.

Start the division by first subtracting 180, leaving 16, and then subtracting the largest possible multiple of 6, which is 12, leaving 4.

$$
\begin{array}{rll}
6\overline{)196} & \\
-\ \underline{180} & 6\times 30 \\
16 & \\
-\ \underline{12} & 6\times \underline{2} \\
4 & 32 \\
\text{Answer:} & 32\,\text{R}\,4
\end{array}
$$

The quotient 32 (with a remainder of 4) lies between 30 and 40, as predicted.



Stage 4: Short division of HTU ÷ U

For 291 ÷ 3, because 3 × 90 = 270 and 3 × 100 = 300, we use 270 and split the dividend of 291 into 270 + 21. Each part is then divided by 3.

$$\begin{aligned} 291 \div 3 &= (270 + 21) \div 3 \\ &= (270 \div 3) + (21 \div 3) \\ &= 90 + 7 \\ &= 97 \end{aligned}$$

The short division method is recorded like this:

$$3\overline{)290+1} = 3\overline{)\overset{90+\ 7}{270+21}}$$

This is then shortened to:

$$3\overline{)\begin{array}{r} 9\ 7 \\ 2\ 9^{2}1 \end{array}}$$

The carry digit '2' represents the 2 tens that have been exchanged for 20 units. In the first recording above it is written in front of the 1 to show that a total of 21 units are to be divided by 3.

The 97 written above the line represents the answer: 90 + 7, or 9 tens and 7 units.

Stage 5: Long division

How many packs of 24 can we make from 560 biscuits?
Start by multiplying 24 by multiples of 10 to get an estimate. As 24 × 20 = 480 and 24 × 30 = 720, we know the answer lies between 20 and 30 packs.
We start by subtracting 480 from 560.

$$
\begin{array}{rrl}
24\overline{)\,560} & & \\
20 - & \underline{480} & 24 \times 20 \\
 & 80 & \\
3 & \underline{72} & 24 \times 3 \\
 & 8 &
\end{array}
$$

Answer: 23 R 8

In effect, the recording above is the long division method, though conventionally the digits of the answer are recorded above the line as shown below.

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

Answer: 23 R 8