

Calculation Procedures

Level 10

Addition	Subtraction	Multiplication	Division
<p>Language – put together, add, altogether, total, distance between, more than.</p> <p>Solving 1 step problems using concrete objects and pictorial representations.</p> <p>+ & = signs and missing numbers (0-20)</p> <p> $3 + 4 = \square$ $\square = 3 + 4$ $3 + \square = 7$ $7 = \square + 4$ $\square + 4 = 7$ $7 = 3 + \square$ $\square + \nabla = 7$ $7 = \square + \nabla$ </p> <p>Number lines (numbered)</p> <p>e.g. $7 + 4$</p> <p>Recording by - drawing jumps on prepared lines (<i>over the line</i>)</p> <p>Progress to - constructing own lines, Teacher model number lines with missing numbers</p> <p>(Teachers model jottings appropriate for larger numbers)</p>	<p>Language – take away, difference between, less than.</p> <p>Pictures / marks (1 step problems)</p> <p>Sam spent 4p. What was his change from 10p?</p> <p>Also using concrete objects to support.</p> <p>= & - signs and missing numbers (0-20)</p> <p> $7 - 3 = \square$ $\square = 7 - 3$ $7 - \square = 4$ $4 = \square - 3$ $\square - 3 = 4$ $4 = 7 - \square$ $\square - \nabla = 4$ $4 = \square - \nabla$ </p> <p>Number lines (numbered to 20)</p> <p>$11 - 7$ (Counting back (less than) – <i>under the line</i>)</p> <p>The difference between 7 and 11 (Counting up – <i>over the line</i>)</p> <p>Recording by - drawing jumps on prepared line Progress to - constructing own lines</p> <p>(Teachers model jottings appropriate for larger numbers)</p>	<p>Calculating 1 step problems using concrete objects, pictorial representations/symbols and arrays with the support of the teacher (Can link to Number & place value – counting in 2s, 5s, 10s, doubling)</p> <p>There are 3 sweets in one bag. How many sweets are there in 5 bags?</p> <p>(Recording on a number line modelled by the teacher when solving problems)</p> <p>Arrays with objects, dots etc:</p>	<p>Calculating simple 1 step problems using concrete objects, pictorial representations/symbols and arrays with the support of the teacher</p> <p>Can link to number and place value – counting in 2s, 5s, 10s, finding simple fractions of objects, numbers, quantities)</p> <p>12 children get into teams of 4 to play a game. How many teams are there?</p>

Calculation Procedures

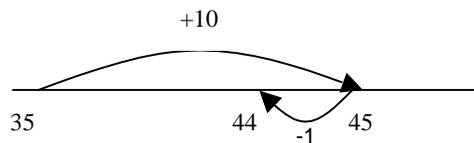
Level 11

Addition	Subtraction	Multiplication	Division						
<p><u>New Language</u> – sum, difference.</p> <p>Solving addition problems to 20 using concrete objects and pictorial representations to include numbers, quantities, measures.</p> <p><u>+ = signs and missing numbers</u> Continue using a range of equations as in Level 1 but with appropriate, larger numbers. Extend to: + a two-digit number and ones $12 + 3 = \square$ + a two-digit number and tens $12 + 30 = \square$ + a two two-digit numbers $12 + \square = 30$ + three one-digit numbers $8 + 9 + \square = 24$</p> <p>Also to be used to show commutative addition, inverse relationships.</p> <p>Other signs - less than: < more than: ></p> <p><u>Partition into tens and ones and recombine</u></p> $\begin{array}{l} 12 + 23 = 10 + 2 + 20 + 3 \text{ - partition} \\ = 30 + 5 \quad \text{- add tens then ones} \\ = 35 \quad \text{- add both together} \end{array}$ <p><u>Refine to partitioning the second number only using a number line (own numbers):</u></p> $23 + 12 = 23 + 10 + 2$ $= 33 + 2$ $= 35$	<p><u>New Language</u> – difference.</p> <p>Solving subtraction problems to 20 using concrete objects and pictorial representations to include numbers, quantities, measures.</p> <p><u>- = signs and missing numbers</u> Continue using a range of equations as in level 1 but with appropriate numbers. - a two-digit number and ones $12 - 3 = \square$ - a two-digit number and tens $45 - 10 = \square$ - two two-digit numbers $22 - \square = 9$</p> <p><u>Find a small difference by counting up – number lines.</u></p> $42 - 39 = 3$ <p><u>Subtract a near multiple of ten.</u> Subtract 9 or 11 by subtracting ten then adjusting by one. Begin to add/subtract 19 or 21 $35 - 9 = 26$</p>	<p>Introduce 2, 3, 5 and 10 x tables.</p> <p><i>One step problems in this level.</i></p> <p><u>x = signs and missing numbers (to 20)</u></p> $\begin{array}{ll} 2 \times 6 = \square & \square = 2 \times 6 \\ 2 \times \square = 12 & 12 = \square \times 6 \\ \square \times 6 = 12 & 12 = 2 \times \square \\ \square \times \nabla = 12 & 12 = \square \times \nabla \end{array}$ <p><u>Arrays and repeated addition</u></p> <p style="text-align: right;">4 x 2</p> <p>or repeated addition</p> <p>$2 + 2 + 2 + 2$ or $4 + 4$ (look at how multiplication of 2 numbers is commutative – shown below)</p> <p style="text-align: center;">0 1 2 3 4 5 6 7 8</p> <p><u>Partition</u></p> 15×2 $20 + 10 = 30$ <p>OR</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border-right: 1px solid black; padding: 0 5px;">x</td> <td style="border-right: 1px solid black; padding: 0 5px;">10</td> <td style="padding: 0 5px;">5</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 0 5px;">2</td> <td style="border-right: 1px solid black; padding: 0 5px;">20</td> <td style="padding: 0 5px;">10</td> </tr> </table>	x	10	5	2	20	10	<p><i>One step problems in this level.</i></p> <p><u>÷ = signs and missing numbers (using 2, 5, 10 x tables)</u></p> $\begin{array}{ll} 6 \div 2 = \square & \square = 6 \div 2 \\ 6 \div \square = 3 & 3 = 6 \div \square \\ \square \div 2 = 3 & 3 = \square \div 2 \\ \square \div \nabla = 3 & 3 = \square \div \nabla \end{array}$ <p><u>Understand division as sharing and grouping</u></p> <p>$6 \div 2$ can be modelled as:</p> <p>Sharing – 6 sweets are shared between 2 people. How many do they have each?</p> <p>Grouping – There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)</p> <p>Move on to – linking to fractions, e.g $40 \div 2 = 20$, 20 is half of 40.</p>
x	10	5							
2	20	10							

Calculation Procedures

Add a near multiple to 10.

Add 9 or 11 by adding 10 and adjusting by 1
 $35 + 9 = 44$



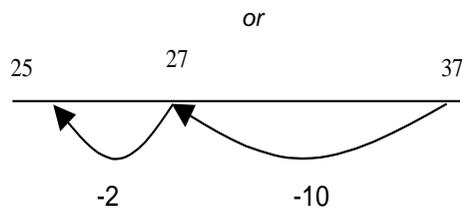
Column methods

If appropriate – recording simple addition sums in columns to support place value & to prepare for formal written methods with larger numbers.

$\begin{array}{r} 16 \\ + 20 \\ \hline 36 \end{array}$	$\begin{array}{r} 15 \\ + 13 \\ \hline 28 \end{array}$
--	--

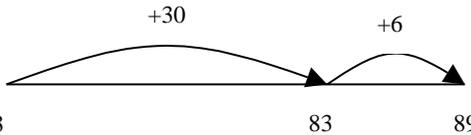
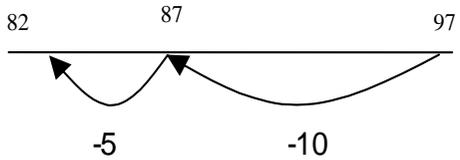
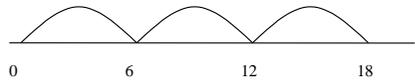
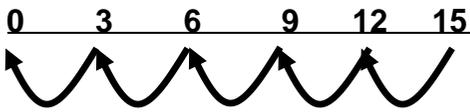
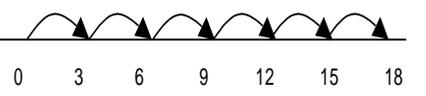
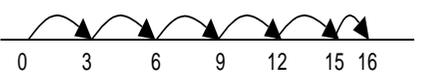
Use known number facts and place value to subtract (partition second number only)

$$\begin{aligned} 37 - 12 &= 37 - 10 - 2 \\ &= 27 - 2 \\ &= 25 \end{aligned}$$

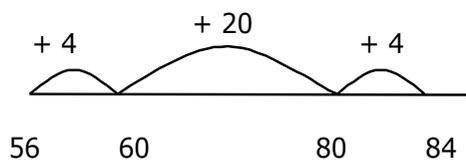


Calculation Procedures

Level 12

Addition	Subtraction	Multiplication	Division																											
<p>Pupils progress to adding a 3 digit number and ones, tens and hundreds at this level.</p> <p><u>+ = signs and missing numbers</u> Continue using a range of equations as in Level 10 and 11 but with appropriate, larger numbers, using same symbols - □ & ▽</p> <p><u>Partition into tens and ones and recombine</u> Partition both numbers and recombine. Refine to partitioning the second number only e.g. $36 + 53 = 53 + 30 + 6$ $= 83 + 6$ $= 89$</p> <p style="text-align: center;">or</p> <div style="text-align: center;">  </div> <p><u>Add a near multiple of 10 to a two-digit number</u> Continue as in Level 11 but with appropriate numbers e.g. $35 + 19$ is the same as $35 + 20 - 1$.</p> <p><u>Column method (leading on to formal written methods)</u> Adding tens first, then ones with numbers up to 3 digits. $83 + 42 = 125$</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <table style="border-collapse: collapse;"> <tr><td style="padding: 2px;">$80 + 3$</td><td style="padding: 2px;">or</td><td style="padding: 2px;">83</td></tr> <tr><td style="padding: 2px;">$+40 + 2$</td><td></td><td style="padding: 2px;">$+ 42$</td></tr> <tr><td style="padding: 2px;">$120 + 5 = 125$</td><td></td><td style="padding: 2px;">120</td></tr> <tr><td></td><td></td><td style="padding: 2px;">$\underline{5}$</td></tr> <tr><td></td><td></td><td style="padding: 2px;">$\underline{125}$</td></tr> </table> </div>	$80 + 3$	or	83	$+40 + 2$		$+ 42$	$120 + 5 = 125$		120			$\underline{5}$			$\underline{125}$	<p>Pupils progress to subtracting a 3 digit number and ones, tens and hundreds at this level.</p> <p><u>- = signs and missing numbers</u> Continue using a range of equations as in Level 1 and 2 but with appropriate numbers.</p> <p><u>Find a small difference by counting up (up to 3 digits)</u> Continue as in Level 11 but with appropriate numbers e.g. $102 - 97 = 5$</p> <p><u>Subtract mentally a 'near multiple of 10' to or from a two-digit number (up to 3 digits)</u> Continue as in Level 2 but with appropriate numbers e.g. $78 - 49$ is the same as $78 - 50 + 1$</p> <p><u>Use known number facts and place value to subtract (up to 3 digits)</u> Continue as in Level 11 but with appropriate numbers e.g. $97 - 15 = 72$</p> <div style="text-align: center;">  </div> <p><u>Complementary addition</u> $84 - 56 = 28$</p>	<p>Introduce 4, 8 x tables.</p> <p>Working at a 2 digit multiplied by a 1 digit number at this level.</p> <p><u>x = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers.</p> <p>Number lines 6×3</p> <div style="text-align: center;">  </div> <p><u>Arrays and repeated addition</u> Continue to understand multiplication as repeated addition and continue to use arrays (as in Level 11).</p> <p>Start with multiplying a two-digit number by a one-digit number, progressing to formal written method of short multiplication.</p> <p><u>Partition</u> 2×35 becomes:</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr><td style="border-right: 1px solid black; padding: 2px 5px;">x</td><td style="padding: 2px 5px;">30</td><td style="padding: 2px 5px;">5</td></tr> <tr><td style="border-right: 1px solid black; padding: 2px 5px;">2</td><td style="padding: 2px 5px;">60</td><td style="padding: 2px 5px;">10</td></tr> </table> <p style="margin-left: 40px;">$60 + 10 = 70$</p> <p>3×32 becomes:</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr><td style="border-right: 1px solid black; padding: 2px 5px;">x</td><td style="padding: 2px 5px;">30</td><td style="padding: 2px 5px;">2</td></tr> <tr><td style="border-right: 1px solid black; padding: 2px 5px;">3</td><td style="padding: 2px 5px;">90</td><td style="padding: 2px 5px;">6</td></tr> </table>	x	30	5	2	60	10	x	30	2	3	90	6	<p><u>÷ = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers.</p> <p><u>Understand division as sharing and grouping (up to 2 digits)</u> $15 \div 3$ can be modelled as: Sharing – 15 shared between 3 (see Level 2 diagram) OR</p> <div style="text-align: center;">  </div> <p>Or $18 \div 3$ can be modelled as: Sharing – 18 shared between 3 (see Level 2 diagram)</p> <p>Grouping - How many 3's make 18?</p> <div style="text-align: center;">  </div> <p><u>Simple remainders (but not formally introduced until Y5/Level 14)</u> $16 \div 3 = 5 \text{ r}1$ Sharing - 16 shared between 3, how many left over? Grouping – How many 3's make 16, how many left over? e.g.</p> <div style="text-align: center;">  </div>
$80 + 3$	or	83																												
$+40 + 2$		$+ 42$																												
$120 + 5 = 125$		120																												
		$\underline{5}$																												
		$\underline{125}$																												
x	30	5																												
2	60	10																												
x	30	2																												
3	90	6																												

Calculation Procedures



Column subtraction (leading on to formal written methods)

$$83 - 42 = 125$$

$$\begin{array}{r} 80 + 3 \\ - 40 + 2 \\ \hline 40 + 1 = 41 \end{array} \quad \text{or} \quad \begin{array}{r} 83 \\ - 42 \\ \hline 40 \\ \quad 1 \\ \hline 41 \end{array}$$

Formal written methods:

$$874 - 523 \text{ becomes}$$

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

Answer: 351

(If using decomposition at this stage, only use 1 exchange with up to 3 digits)

$$90 + 6 = 96.$$

Short multiplication formal written method:

32 X 3 becomes:

$$\begin{array}{r} 32 \\ \times 3 \\ \hline 6 \text{ (2 x 3)} \\ 90 \text{ (30 x 3)} \\ \hline 96 \end{array} \quad \text{or} \quad \begin{array}{r} 32 \\ \times 3 \\ \hline 96 \end{array}$$

Ravenswood School

Leading on to formal written methods – short division:

98 ÷ 7 becomes

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

Answer: 14

Calculation Procedures

Level 13

Addition	Subtraction	Multiplication	Division																											
<p>Adding up to 4 digits</p> <p><u>+ = signs and missing numbers</u> Continue using a range of equations as in Level 1 and 2 but with appropriate, larger numbers, using same symbols - □ & ▽</p> <p><u>Partition into tens and ones and recombine</u> Either partition both numbers and recombine or partition the second number only e.g. $55 + 37 = 55 + 30 + 7$ $= 85 + 7$ $= 92$</p> <div style="text-align: center;"> </div> <p><u>Add the nearest multiple of 10, then adjust</u> Continue as in Level 11 and 12 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 - 1</p> <p><u>Column addition(with numbers up to 4 digits)</u> Steps 1, 2</p> $358 + 73 = 431$ <p>either or</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">300+50+8</td> <td style="text-align: right;">358</td> </tr> <tr> <td style="text-align: right;">+ 70+3</td> <td style="text-align: right;"><u>73</u></td> </tr> <tr> <td style="text-align: right;">$300+120+11 = 431$</td> <td style="text-align: right;">11</td> </tr> <tr> <td></td> <td style="text-align: right;">120</td> </tr> <tr> <td></td> <td style="text-align: right;"><u>300</u></td> </tr> <tr> <td></td> <td style="text-align: right;">431</td> </tr> </table> <p><i>Note units first in step 2.</i></p>	300+50+8	358	+ 70+3	<u>73</u>	$300+120+11 = 431$	11		120		<u>300</u>		431	<p><u>Subtract up to 4 digits</u></p> <p><u>- = signs and missing numbers</u> Continue using a range of equations as in Level 1 and 2 but with appropriate numbers. (up to and more than 4 more numbers).</p> <p><u>Find a small difference by counting up</u> e.g. $5003 - 4996 = 7$ This can be modelled on an empty number line (see complementary addition below).</p> <p><u>Subtract the nearest multiple of 10, then adjust.</u> Continue as in Level 11 and 12 but with appropriate numbers.</p> <p><u>Use known number facts and place value to subtract</u> $92 - 15 = 77$</p> <div style="text-align: center;"> </div> <p><u>Complementary addition</u> $754 - 86 = 668$</p> <div style="text-align: center;"> </div>	<p>Using multiplication facts up to 12 x 12</p> <p>Pupils multiply a 2 digit number by 1 digit, and a 3 digit number by 1 digit.</p> <p><u>x = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers</p> <p><u>Partition</u> $23 \times 4 = 92$</p> $23 \times 4 = (20 \times 4) + (3 \times 4)$ $= (80) + (12)$ $= 92$ <p>OR</p> <p>Use the grid method of multiplication (as below)</p> <p><u>Grid method</u> 23×7 is approximately $20 \times 10 = 200$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</td> <td style="border-bottom: 1px solid black; padding: 5px;">20</td> <td style="border-bottom: 1px solid black; padding: 5px;">3</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">7</td> <td style="padding: 5px;">140</td> <td style="padding: 5px;">21</td> </tr> </table> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">x</td> <td style="border-bottom: 1px solid black; padding: 5px;">70</td> <td style="border-bottom: 1px solid black; padding: 5px;">2</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">30</td> <td style="padding: 5px;">2100</td> <td style="padding: 5px;">60</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">8</td> <td style="padding: 5px;">560</td> <td style="padding: 5px;">16</td> </tr> </table>	x	20	3	7	140	21	x	70	2	30	2100	60	8	560	16	<p><u>÷ = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers.</p> <p><u>Sharing and grouping</u> $30 \div 6$ can be modelled as: grouping – groups of 6 taken away and the number of groups counted e.g.</p> <div style="text-align: center;"> </div> <p>sharing – sharing among 6, the number given to each person</p> <p>Remainders $41 \div 4 = 10 \text{ r}1$</p> <div style="text-align: center;"> </div> <p>OR</p> <div style="text-align: center;"> </div> <p>OR $41 = (10 \times 4) + 1$</p> <p><u>Subtracting groups (Nb use remainders if appropriate)</u></p> <p>$72 \div 5$ lies between $50 \div 5 = 10$ and $100 \div 5 = 20$</p> 72 $- \underline{50} \quad (10 \text{ groups}) \text{ or } (10 \times 5)$ 22 $- \underline{20} \quad (4 \text{ groups}) \text{ or } (4 \times 5)$ 2 <p>Answer : 14 remainder 2</p>
300+50+8	358																													
+ 70+3	<u>73</u>																													
$300+120+11 = 431$	11																													
	120																													
	<u>300</u>																													
	431																													
x	20	3																												
7	140	21																												
x	70	2																												
30	2100	60																												
8	560	16																												

Calculation Procedures

Extend to decimals in the context of money (vertically)
 $£ 2.50 + £ 1.75 = £ 4.25$

$$\begin{array}{r} £ 2.50 \\ + £ 1.75 \\ \hline £ 4.25 \end{array}$$

(Revert to expanded methods if the children experience any difficulty, see below for carried numbers.)

Column addition Step 3

142 + 227 becomes

$$\begin{array}{r} 142 \\ + 227 \\ \hline 369 \end{array}$$

Answer 369

Carried numbers (if appropriate)

789 + 642 becomes

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

Answer: 1431

Formal written methods

932 – 457 becomes

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$$

Answer: 475

Note - Exchange more than once with 3 or 4 digit numbers.

If using up to 2 decimal places, e.g money, exchange once.

Formal written methods

Leading on to...

24 x 6

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

24 (4 x 6)
 120 (20 x 6)
 144

or

24 x 6 becomes

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

Answer: 144

Formal written methods

98 ÷ 7 becomes

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

Answer: 14

Using remainders in appropriate (but not formally introduced until Y5/L14)

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \end{array}$$

Answer: 86 remainder 2

Calculation Procedures

Extend to numbers with at least four digits
 $3587 + 675 = 4262$

$$\begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \\ \hline \end{array}$$

Revert to expanded methods if the children experience any difficulty.
 Extend to decimals (same number of decimal places) and adding several numbers (with different numbers of digits).

Model negative numbers using a number line.

Formal written methods

Column addition as Level 13.

Formal written methods

Column method as Level 13 (up to and more than 4 digits)

$932 - 457$ becomes

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

Answer: 475

Decimal places – subtract with up to 3 decimal places to link with measures, fractions.

Long multiplication

24×16 becomes

$$\begin{array}{r} 2 4 \\ \times 1 6 \\ \hline 2 4 0 \\ 1 4 4 \\ \hline 3 8 4 \end{array} \qquad \begin{array}{r} 1 2 \\ 1 2 4 \\ \times 2 6 \\ \hline 2 4 8 0 \\ 7 4 4 \\ \hline 3 2 2 4 \\ 1 1 \end{array}$$

Answer: 384

Answer: 3224

Moving to formal methods of multiplication for decimals. Carrying numbers underneath.

Answer: 36 remainder 6
Formal written methods – use guidance in Level 12, 13 and also:

$496 \div 11$ becomes

$$\begin{array}{r} 4 5 r1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

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

Formal method of long division

$432 \div 15$ becomes

$$\begin{array}{r} 2 8 r12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer: 28 remainder 12

$432 \div 15$ becomes

$$\begin{array}{r} 2 8 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array} \begin{array}{l} 15 \times 20 \\ 15 \times 8 \end{array}$$

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

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

Calculation Procedures

Level 15																																	
Addition	Subtraction	Multiplication	Division																														
<p><u>+ = signs and missing numbers</u> Continue using a range of equations as in Level 10 and 11 but with appropriate, larger numbers, using same symbols - □ & ▽</p> <p><u>Partition into hundreds, tens, ones and decimal fractions and recombine</u> Either partition both numbers and recombine or partition the second number only e.g. $35.8 + 7.3 = 35.8 + 7 + 0.3$ $= 42.8 + 0.3$ $= 43.1$</p> <p>or</p> <p>$35.8 \quad \quad \quad 42.8 \quad \quad \quad 43.1$</p> <p><u>Add the nearest multiple of 10, 100 or 1000, then adjust</u> Continue as in Level 11, 12, 14 and 14 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc</p> <p><u>Column</u> Extend to numbers with any number of digits and decimals with 1 and 2 decimal places. $124.9 + 117.25 = 242.15$</p> $\begin{array}{r} 124.9 \\ + 117.25 \\ \hline 242.15 \\ \hline \end{array}$ <p>Revert to expanded methods if the children experience any difficulty. Extend to decimals (either one or two decimal places).</p>	<p><u>- = signs and missing numbers</u> Continue using a range of equations as in Level 10 and 11 but with appropriate numbers.</p> <p><u>Find a difference by counting up</u> e.g. $0.5 - 0.31 = 0.19$ This can be modelled on an empty number line (see complementary addition below).</p> <p>$0.31 \quad \quad \quad 0.4 \quad \quad \quad 0.5$</p> <p><u>Subtract the nearest multiple of 10, 100 or 1000, then adjust</u> Continue as in Level 11, 12, 13 and 14 but with appropriate numbers. Use known number facts and place value to subtract Continue as level 14</p> <p><u>Complementary addition</u> $6467 - 2684 = 3783$</p> <p>$2684 \quad 2700 \quad \quad \quad 3000 \quad \quad \quad 6467$</p> <p>Leads on to...</p> $\begin{array}{r} 16 \text{ (2700)} \\ 300 \text{ (3000)} \\ 3467 \text{ (3467)} \\ \hline 3783 \\ \hline \end{array}$ <p><u>Column method</u> as Level 13 , 14</p>	<p><u>x = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers</p> <p><u>Partition</u> $87 \times 6 = 522$ $87 \times 6 = (80 \times 6) + (7 \times 6)$ $= (480) + (42)$ $= 522$</p> <p>OR</p> $\begin{array}{r} 87 \\ \times 6 \\ \hline 42 \text{ (6 x 7)} \\ 480 \text{ (6 x 80)} \\ \hline 522 \text{ (units, then tens, hundreds etc)} \end{array}$ <p>OR</p> <p>Use the grid method of multiplication (as below)</p> <p><u>Grid method</u> 372×24 is approximately $400 \times 20 = 8000$</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">300</td> <td style="padding: 5px;">70</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="padding: 5px;">20</td> <td style="padding: 5px;">6000</td> <td style="padding: 5px;">1400</td> <td style="padding: 5px;">40</td> </tr> <tr> <td style="padding: 5px;">4</td> <td style="padding: 5px;">1200</td> <td style="padding: 5px;">280</td> <td style="padding: 5px;">8</td> </tr> </table> <p>Then add numbers together.</p> <p>Extend to decimals with up to two decimal places.</p> $\begin{array}{r} 12.5 \\ \times 2.5 \\ \hline 1.25 \text{ (2.5 x 0.5)} \\ 5.0 \text{ (2.5 x 2.0)} \\ \hline 25.0 \text{ (2.5 x 10.0)} \\ \hline 31.25 \end{array}$	x	300	70	2	20	6000	1400	40	4	1200	280	8	<p><u>÷ = signs and missing numbers</u> Continue using a range of equations as in Level 11 but with appropriate numbers.</p> <p><u>Sharing and grouping</u> Continue to understand division as both sharing and grouping (repeated subtraction).</p> <p><u>Remainders – as level 14.</u> Progressing to... Quotients expressed as fractions or decimal fractions $676 \div 8 = 84.5$</p> <p>OR</p> <p><u>Estimate and group</u> $977 \div 36$ is approximately $1000 \div 40 = 25$</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">977</td> <td style="padding: 5px;">977</td> </tr> <tr> <td style="padding: 5px;">$- \underline{360} \text{ (10 groups)}$</td> <td style="padding: 5px;">$- \underline{720}$</td> </tr> <tr> <td style="padding: 5px;">$\quad \quad \quad 617$</td> <td style="padding: 5px;">$\quad \quad \quad 257$</td> </tr> <tr> <td style="padding: 5px;">$- \underline{360} \text{ (10 groups)}$</td> <td style="padding: 5px;">refine to $- \underline{180}$</td> </tr> <tr> <td style="padding: 5px;">$\quad \quad \quad 257$</td> <td style="padding: 5px;">$\quad \quad \quad 77$</td> </tr> <tr> <td style="padding: 5px;">$- \underline{180} \text{ (5 groups)}$</td> <td style="padding: 5px;">$- \underline{72}$</td> </tr> <tr> <td style="padding: 5px;">$\quad \quad \quad 77$</td> <td style="padding: 5px;">$\quad \quad \quad 5$</td> </tr> <tr> <td style="padding: 5px;">$- \underline{72} \text{ (2 groups)}$</td> <td></td> </tr> <tr> <td style="padding: 5px;">$\quad \quad \quad 5$</td> <td></td> </tr> </table>	977	977	$- \underline{360} \text{ (10 groups)}$	$- \underline{720}$	$\quad \quad \quad 617$	$\quad \quad \quad 257$	$- \underline{360} \text{ (10 groups)}$	refine to $- \underline{180}$	$\quad \quad \quad 257$	$\quad \quad \quad 77$	$- \underline{180} \text{ (5 groups)}$	$- \underline{72}$	$\quad \quad \quad 77$	$\quad \quad \quad 5$	$- \underline{72} \text{ (2 groups)}$		$\quad \quad \quad 5$	
x	300	70	2																														
20	6000	1400	40																														
4	1200	280	8																														
977	977																																
$- \underline{360} \text{ (10 groups)}$	$- \underline{720}$																																
$\quad \quad \quad 617$	$\quad \quad \quad 257$																																
$- \underline{360} \text{ (10 groups)}$	refine to $- \underline{180}$																																
$\quad \quad \quad 257$	$\quad \quad \quad 77$																																
$- \underline{180} \text{ (5 groups)}$	$- \underline{72}$																																
$\quad \quad \quad 77$	$\quad \quad \quad 5$																																
$- \underline{72} \text{ (2 groups)}$																																	
$\quad \quad \quad 5$																																	

Calculation Procedures

Moving to formal methods of multiplication for decimals. Carry numbers underneath.

Long multiplication formal written method (if appropriate) examples:

24×16 becomes 124×26 becomes

$$\begin{array}{r} \\ 2 \ 4 \\ \times 1 \ 6 \\ \hline 2 \ 4 \ 0 \\ 1 \ 4 \ 4 \\ \hline 3 \ 8 \ 4 \end{array}$$

Answer: 384

$$\begin{array}{r} \\ 1 \ 2 \ 4 \\ \times \ 2 \ 6 \\ \hline 2 \ 4 \ 8 \ 0 \\ \ 7 \ 4 \ 4 \\ \hline 3 \ 2 \ 2 \ 4 \\ \hline \end{array}$$

Answer: 3224

Answer: $27 \frac{5}{36}$

Ravenswood School

Formal written methods: Long division (if appropriate)

(short division shown in Level 12,13)

Long division – 3 examples shown, using the same numbers in each example. Each example shows both a different way of setting out the calculation and a different way of setting out the result (with a remainder, as a mixed number and a decimal).

$432 \div 15$ becomes

$$\begin{array}{r} \ 8 \ r12 \\ 1 \ 5 \overline{) 4 \ 3 \ 2} \\ \underline{3 \ 0 \ 0} \\ 1 \ 3 \ 2 \\ \underline{1 \ 2 \ 0} \\ 1 \ 2 \end{array}$$

Answer: 28 remainder 12

$432 \div 15$ becomes

$$\begin{array}{r} \ 8 \cdot 8 \\ 1 \ 5 \overline{) 4 \ 3 \ 2 \cdot 0} \\ \underline{3 \ 0} \downarrow \\ \ 3 \ 2 \downarrow \\ \underline{1 \ 2 \ 0} \downarrow \\ \ 2 \ 0 \downarrow \\ \underline{1 \ 2 \ 0} \\ 0 \end{array}$$

Answer: 28.8

$432 \div 15$ becomes

$$\begin{array}{r} \ 8 \\ 1 \ 5 \overline{) 4 \ 3 \ 2} \\ \underline{3 \ 0 \ 0} \\ 1 \ 3 \ 2 \\ \underline{1 \ 2 \ 0} \\ 1 \ 2 \end{array}$$

15×20
 15×8

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

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



Calculation Procedures

Level 16

Ravenswood School

Addition	Subtraction	Multiplication	Division