

Addition Strategies

Place Value and Known Facts

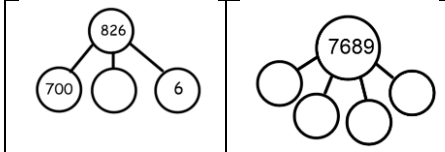
Adding 1s, 10s, 100s, 1000s, 10,000s, 100,000s, 0.1s and 0.01s to larger/smaller numbers. Use of part whole models and place value charts to show addition where no boundaries are crossed:

$435 + 30 = \underline{\quad}$
 $40 + 1000 = \underline{\quad}$
 $\underline{\quad} = 6000 + 90$
 $789 + 100 = \underline{\quad}$
 $0.7 + 3.01 = \underline{\quad}$

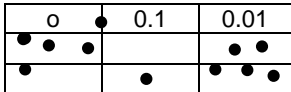
Part Whole Model

Partition numbers in as many ways as you can, or give part whole with one of the parts missing.

$3,050020 = 3,000,000 + \underline{\quad} + 20$
 $826 = 700 + \underline{\quad} + 6$



Place Value Chart with Counters or Digits
e.g $3.02 + 1.13$ (not crossing boundaries)



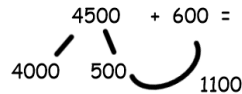
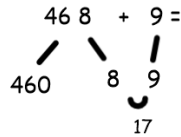
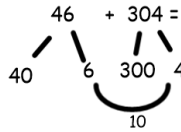
Complements

Include revision of complements to 100 and how these relate to complements to powers of 10.

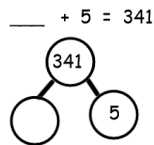
E.g. $56 + \underline{\quad} = 100$
 $560 + \underline{\quad} = 1000$
 (56 tens + $\underline{\quad}$ tens = 100 tens).

Partitioning

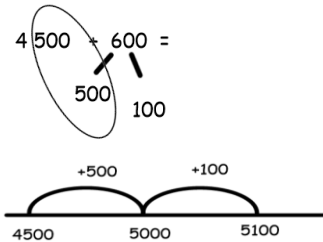
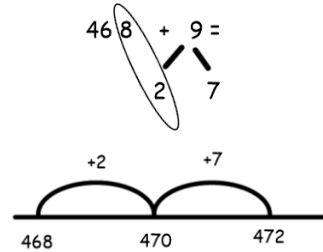
Involves number bonds, doubles, near doubles, bridging strategies



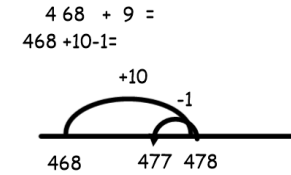
Explore Addition/Subtraction Relationships (inverse)



Bridging



Compensations/ Adjustment (Manipulation of Numbers)



OR

$468 + 9 =$
 Mentally move one from 468 to 9, so $467 + 10$.
 $122,456 + 11,999 =$
 $122,456 + 12,000 - 1$ (show on number line)
 Or $122,455 + 12,000$ (mentally move the one).

Also include:

$+199$
 $+999$
 $+\pounds 1.99$ etc
 Examples where need to **adjust by 3,4 5 etc (e.g. $457 + 95$)**.
 $2.7 + 3.014$

Manipulation:

Mentally move one digit to calculate
 $39 + \underline{\quad} = \underline{\quad} + 40$
 $248 + \underline{\quad} = 46 + 247$
 $2.7 + 3.01 = 2 + \underline{\quad}$

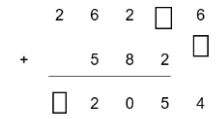
Column Methods

$\underline{\quad} = 936 + 285$

$\underline{\quad} = 8275 + 82$

$707 + 1818 =$

Missing Number Problems/ What is My Mistake?'



Write the inverse calculation to check a given 2-digit addition (in column format).

And how they relate to complements to other multiples of 100.

$$\begin{array}{|c|c|} \hline \square & 8 \\ \hline \end{array} + \begin{array}{|c|c|} \hline \square & 8 \\ \hline \end{array} = \begin{array}{|c|} \hline 200 \\ \hline \end{array}$$

E.g.

Link to complements to 1 with tenths, complements to 0.1 with hundredths in context of decimals).

Unitising

Unitising language when boundaries crossed:

$$\begin{array}{r} \underline{\quad} = 3936 + 200 \\ \quad \swarrow \quad \searrow \\ 3900 \quad 36 \end{array}$$

39 hundreds + 2 hundreds + 36 = 41 hundreds + 36

Number Sequences

4856, 4956, _____, _____ etc.

Include negative numbers.

E.g. -17, -12, -7, _____, _____.

| | |
|-----|---|
| 341 | |
| | 5 |

Write an inverse calculation to check a column addition/subtraction.

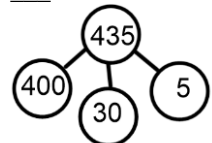


Subtraction Strategies

Place Value/ Known Facts

Subtracting 1s, 10s, 100s, 1000s, 10,000s, 100,000s, 0.1s and 0.01s from larger/smaller numbers. Use of part whole models and place value charts to show subtraction where no boundaries are crossed:

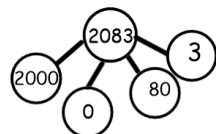
$\underline{\quad} = 435 - 30$



Unitising

Unitising language when boundaries crossed:

$2083 - 300 =$



$2000 = 300 =$
20 hundreds - 3 hundreds.

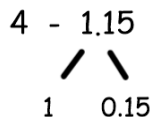
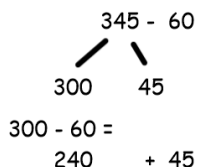
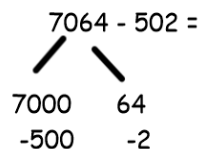
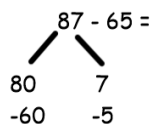
Explore Relationships

$\underline{\quad} - 10 = 298$
 $\underline{\quad} - 100 = 1059$

| | |
|------|-----|
| ? | |
| 1059 | 100 |

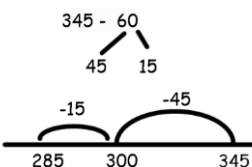
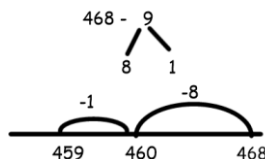
Partitioning

Including halving/near halves



$4 - 1 = 3$
 $3 - 0.15$ (use knowledge of complements to 100).

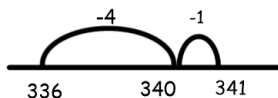
Bridging



Explore Addition/Subtraction Relationships (inverse)

$\underline{\quad} + 5 = 341$
Explore parts and whole relationship on bar model or part whole then solve.

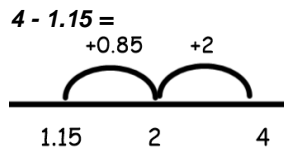
| | |
|-----|---|
| 341 | |
| | 5 |



Difference/Comparison/ Counting On

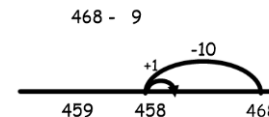
$345 - 60 =$

| | |
|-----|--|
| 345 | |
| 60 | |



$602 - \underline{\quad} = 594$

Compensations/Adjustment (Manipulation of Numbers)



$9 - 1.9 = 9 - 2 + 0.1$

Constant Difference

Discussion point as it works in a different way to addition. The difference between 21 and 29 is the same as the difference between 20 and 28 so $29 - 21 = 28 - 20$.



$5000 - 2356$ as formal method can be difficult, so make equivalent calculation, $4999 - 2355 =$

$122,456 - 11,999 =$
 $122,456 - 12,000 + 1$
OR $122,457 - 12,000$.

Column Methods

$4912 - 824 =$

$7064 - 502 =$

$\underline{\quad} = 5776 - 855$

$37.8 - 14.67 =$

$5.87 - 3.12 =$

Include complements:

1-0.15.

2-0.15 etc.

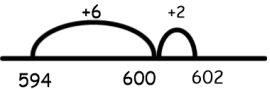
Discussion of most efficient method.

Missing Number Problems/ What is My Mistake?

Include these questions and use part whole model and PV grid to show exchange alongside column method.

Write the inverse calculation to check a given 2-digit subtraction (in column format).

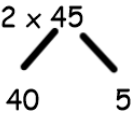
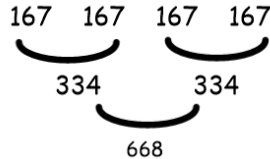
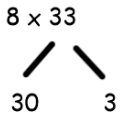
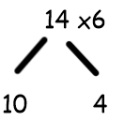
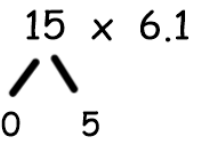
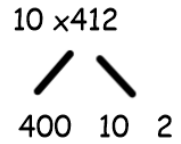
Number Talk Strategies Year 5

| | | | | | |
|--|---|--|---|--|--|
| | $\begin{array}{r} 602 - 594 \\ \swarrow \quad \searrow \\ 600 \quad 2 \\ -594 \\ \hline 600 - 594 + 2. \end{array}$ | | <p>Explore parts and whole on bar model, then use number line or mental method to count up.</p>  | | |
|--|---|--|---|--|--|



Number Talk Strategies Year 5

Multiplication Strategies

| <u>Place Value and Known Facts</u> (Also see Scaling) | <u>Doubling//Halving/Tripling</u> | <u>Partitioning</u> (Distributive Law) | <u>Scaling and Associated Language</u> | <u>Associative Law</u> | <u>Written Methods</u> |
|---|---|--|---|---|---|
| <p>$213 \times 0 =$</p> <p>$1 \times 314 =$</p> <p><u>PV Counters</u> Use PV counters (tens) to show relationship between 3×40 and 30×40. Link to scaling – make 30×4 ten times greater.</p> <p>$30 \times 4 =$ $30 \times 40 =$ $5 \times 70 =$ $50 \times 70 =$</p> <p>$6^2 =$ $3^3 =$</p> <p>Revise regularly known facts within 100 and links to larger powers of 10 and also decimals. Show links (e.g. halving 25 to find 12.5) on bar models.</p> <p>$_ \times 2 = 100.$ $_ \times 2 = 1$ $_ \times 4 = 100.$ $_ \times 4 = 1$ $_ \times 5 = 100.$ $_ \times 5 = 1$ $_ \times 8 = 100.$ $_ \times 8 = 1$</p> | <p>2×45</p>  <p>$16 \times 8 =$ double 8×8.</p> <p>$\times 4$ - By doubling and doubling again $\times 8$ - $\times 2, \times 2, \times 2$</p> <p>$167 \times 4$</p>  <p>Or partition and \times all parts by 4).</p> <p><u>Tripling</u></p> <p>8×33</p>  <p>Triple 8 by doubling then adding one more (or use known facts). $8 \times 3 = 24$ $80 \times 3 = 240$, so 264.</p> | <p>$14 \times 6 =$</p>  <p>$14 \times 6 = _ \times 6 + _ \times 6$</p> <p>$15 \times 6.1$</p>  <p>$10 \times 6.1 = 61$ $5 \times 6.1 = 30.5$</p> <p><u>Compensation</u> $9 \times 41 =$ Use counting stick or draw number line and show 10×41 then subtract (1×41).</p> | <p>Across tables, use language of scaling.</p> <p>3×10 means 10 lots of 3 or 3 ten times. Show both on part whole and bar models and number lines (See Times table Programme of Study).</p> <p>Make 45 twice as big Make 45 four times larger. Make 41 ten times greater. Make 45 eight times larger.</p> <p>41×10 41×100 2345×1000 25.34×10</p> <p><u>PV Counters</u> Use PV chart and counters to show making each counter ten times its value ($\times 100 = \times 10$, then $\times 10$).</p>  | <p>$5 \times 4 \times 10$ See Times Table Programme of study for examples of visuals</p> <p>30×40 50×70</p> <p>Explore visually how $3 \times 40 = 3 \times 10 \times 4$ then scale up to $30 \times 40 = 30 \times 4 \times 10$.</p> <p>$0.9 \times 200 = 0.9 \times 100 \times 2$. (Show on place value grid).</p> <p>0.5×28</p> <p>$3.9 \times 30 = 3.9 \times 3 \times 10$</p> | <p>$879 \times 3$</p> <p>$418 \times 6$</p> <p>$541 \times 8$</p> <p>$3468 \times 6$</p> <p>$836 \times 7$</p> <p>$71 \times 46$</p> <p>$785 \times 23$</p> <p>$5413 \times 86$</p> <p>Include missing numbers in column methods.</p> |



OR $33 \times 2 \times 2 \times 2$
(associative law) – doubling,
doubling, doubling again

71×8

Find 71×4 and double it
(show relationship between
 $\times 4$ and $\times 8$ on bar model).

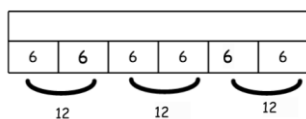
Find $\times 20$ by doubling $\times 10$

$\times 5$ by halving $\times 10$.

Explore Relationships

E.g. $\times 4$, $\times 8 / \times 6$, $\times 12 / \times 3$, $\times 6$

E.g. 6×6



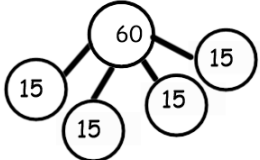
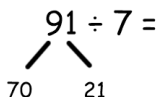
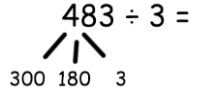
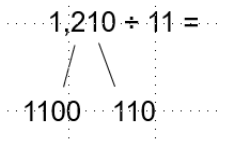
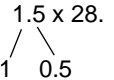
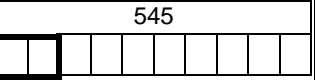
$14 \times 3 = _ \times 6$ etc.

(See Scaling for halving
examples -
cover halves of multiples of
10, 100, 1000 etc.)

Division Strategies



Number Talk Strategies Year 5

| <u>Place Value and Known Facts</u> | <u>Halving/Halving Again</u> | <u>Partitioning</u> | <u>Scaling and Associated Language</u> | <u>Associative Law</u> | <u>Written Methods</u> | | | | | | | | | | | | |
|---|---|---------------------|--|------------------------|------------------------|-----|--|-----|--|----|----|----|----|---|--|---|--|
| <p>$326 \div 1$ $838 \div 1$ $505 \div 1$</p> <p>$99 \div 11$ $120 \div 12$</p> <p><u>Unitising</u> Use of unitising language $180 \div 3$ (18 tens \div 3 = 6 tens). Use tens counters to <u>share</u>). $270 \div 3$ $72 \div 9$ $720 \div 9$ $5400 \div 9$</p> <p><u>Grouping/Sharing</u> Make decision about whether to share or group. $60 \div 15 =$ (by grouping)</p>  <p>$100 \div 25$ $200 \div 25$</p> | <p>Divide by 4 by halving and halving again: $96 \div 4 =$ $96 \div 2 \div 2$ (half and half again).</p> <table border="1" data-bbox="459 391 743 478"> <tr><td colspan="4">328</td></tr> <tr><td colspan="2">164</td><td colspan="2">164</td></tr> <tr><td>82</td><td>82</td><td>82</td><td>82</td></tr> </table> | 328 | | | | 164 | | 164 | | 82 | 82 | 82 | 82 | <p>$91 \div 7 =$</p>  <p>$70 \div 7 = 10$ $21 \div 7 = 3$</p> <p>$95 \div 5$ $96 \div 8$ $96 \div 4$</p> <p>$483 \div 3 =$</p>  <p>$300 \div 3 = 100$ $180 \div 3 = 60$ $3 \div 3 = 1$</p> <p>$1,210 \div 11 =$</p>  <p>$1100 \div 11 = 100$ $110 \div 11 = 10$</p> <p><u>Compensation</u> $95 \div 5 =$ $100 \div 5 = 20 - (1 \times 5)$, so 19 lots of 5 in 95.</p> | <p><i>Divide by 10 or 100 etc, Make 10 times smaller/10 times as small.</i></p> <p>$60 \div 10$</p> <p>$486 \div 10$</p> <p>Divide by 100 by dividing by 10 and 10 again. Show on place value chart (once covered decimals)</p> <p>$58 \div 10$ $58 \div 100$ $0.9 \div 10$</p> <p>Include links to fractions/decimals 0.5×28 (Half \times 28 or half of 28).</p> <p>$1.5 \times 28.$</p>  <p>$1 \times 28 + \text{half of } 28$</p> | <p><u>Divide by 5</u> by dividing by 10 and doubling.</p> <p><u>Divide by 8</u> by dividing by 4 and halving.</p> <p><u>Divide by 6</u> by dividing by 3 and halving.</p> <p><u>Divide by 20</u> by dividing by 10 and halving</p> <p>Show on number lines, arrays and bar models.</p> <p>$545 \div 5$ Show on bar model, divide by 10 and double.</p>  | <p>$486 \div 3$</p> <p>$288 \div 8$</p> <p>$581 \div 7$</p> <p>Use alongside partitioning methods to develop conceptual understanding.</p> |
| 328 | | | | | | | | | | | | | | | | | |
| 164 | | 164 | | | | | | | | | | | | | | | |
| 82 | 82 | 82 | 82 | | | | | | | | | | | | | | |

Fraction Strategies

Known Facts and Complements to 1

Revise known facts:
 $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{5}, \frac{1}{8}$ of 100 with links to 1000 and 1 (decimals).

$$\frac{2}{10} + \frac{5}{10} + \frac{1}{10} = 1$$

$$\frac{9}{11} - \frac{4}{11} =$$

$$- + - = -$$

$$1 - - = -$$

$$\frac{4}{6} + \frac{3}{6} =$$

Going Over 1 Whole

| | |
|---------------------------------|--------------------------------|
| $2\frac{1}{6} + \frac{5}{6} =$ | $1\frac{1}{3} - \frac{1}{3} =$ |
| $1\frac{4}{5} + \frac{3}{5} =$ | $1\frac{5}{8} - \frac{2}{8} =$ |
| $1\frac{1}{5} + 2\frac{1}{5} =$ | $1\frac{5}{8} - \frac{6}{8} =$ |

Ordering/Comparing

$$\frac{1}{5}, \frac{1}{10}, \frac{1}{100}$$

$$\frac{2}{5}, \frac{2}{10}, \frac{2}{100}$$

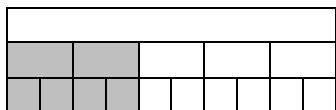
Write the fraction which is closest to 1?

$$\frac{99}{100}, \frac{49}{50}, \frac{19}{20}$$

Visual Representations

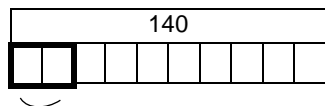
$$\frac{2}{5} = \frac{\quad}{10}$$

Draw bar model to find out



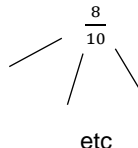
$$\frac{2}{5} \times 140$$

Show on bar model, divide by 10 and double.



Partitioning

How many ways can you partition $\frac{8}{10}$?



Bar Model.

$$\frac{4}{7} + \frac{5}{7} =$$

$$1\frac{3}{4} \times 10$$

Scaling and Associated Language

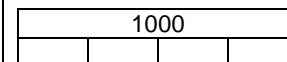
$$\frac{1}{4} \text{ of } 100 =$$

$$\frac{3}{4} \text{ of } 100 =$$

$$\frac{1}{4} \text{ of } 1000 =$$

$$\frac{3}{4} \text{ of } 1000 =$$

Relate to all powers ten and scale up to 200, 300 etc.



$$\frac{1}{2} \times 40 =$$

$$1\frac{1}{2} \times 28 =$$

$$1\frac{1}{2} \times 28$$

$$\frac{1}{5} \times 25 =$$

$$1\frac{3}{4} \times 10 =$$

Written Methods

Make use of doubling, halving and visuals alongside these.

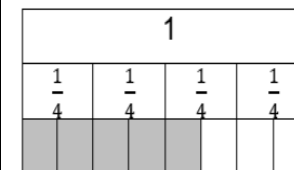
$$\frac{3}{10} - \frac{1}{20} =$$

$$\frac{3}{10} - \frac{1}{20} =$$

$$\frac{2}{5} \text{ of } 140 =$$

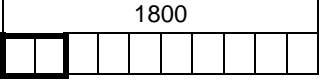
Show addition and subtraction of fractions with denominators which are multiples of the same numbers on bar models.

$$\frac{1}{4} + \frac{3}{8}$$



Percentages Strategies
 Teaching note – use x as well as ‘of’.

Number Talk Strategies Year 5

| Known facts/Scaling | Visual representations | Partitioning | Compensation/adjustment | | | | | | | | | | | | |
|--|--|---|-------------------------|--|--|--|-----|--|-----|--|-----|-----|-----|-----|--|
| <p>Know 25%, 50%,75% are equivalent to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$.</p> <p>Know 25%, 50%,75% of 100,1000 and 1 (decimal equivalents). Use of halving and halving again strategy. Link to 10,000, 100,000 etc.</p> | <p>20% of 1800 Show on bar model, divide by 10 and double.</p>  | <p>Find 25%, 50% and 75% of whole numbers (using knowledge for halving/quartering by halving and halving again etc).</p> <p>E.g. 75% x 500</p> <table border="1" data-bbox="1120 352 1473 467"> <tr><td colspan="4">500</td></tr> <tr><td colspan="2">250</td><td colspan="2">250</td></tr> <tr><td>125</td><td>125</td><td>125</td><td>125</td></tr> </table> <p>Use of 10% to find percentages which are multiples of 10.</p> <p>Use of 10% and doubling to find 20%, 40%, 80% through use of 10% and doubling or through finding $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$.</p> | 500 | | | | 250 | | 250 | | 125 | 125 | 125 | 125 | <p>90% of 200 Find 10% and subtract.</p> <p>40% of 460. Find 50% then take away 10%.</p> <p>60% x 900, find half and then 10%.</p> |
| 500 | | | | | | | | | | | | | | | |
| 250 | | 250 | | | | | | | | | | | | | |
| 125 | 125 | 125 | 125 | | | | | | | | | | | | |

