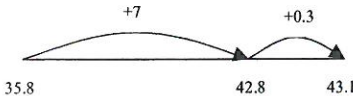
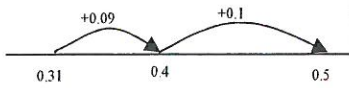


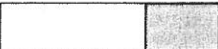


Stockport Academy Calculations Policy

| Addition | Subtraction | Multiplication | Division | Order of operations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|----------|---------------------|----|---|------|----|------|------|----|------|---|------|-----|---|----|--|--|--|--|---|--|--|--|--|-------------|--|---|---------|--|--|-----|--|--|-------|--|--|-----|--|--|-------|---|--|----|--|--|------|--|--|---|--|--|---|---|
| <p>Mental Methods <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>$35.8 \qquad \qquad \qquad 42.8 \qquad \qquad \qquad 43.1$</p> <p>Add the nearest multiple of 0.1/1/10/100/ 1000/etc. then adjust E.g.1. Add 9 or 11 by adding 10 and adjusting by 1. $35 + 9 = 35 + 10 - 1 = 44$ E.g.2. Add 0.39 by adding 0.4 and adjusting by 0.01. $2.73 + 0.39 = 2.73 + 0.4 - 0.01 = 3.12$</p> <p>Pencil and paper procedures Use column method to add numbers with any number of digits and can include decimals with at least 2 decimal places.</p> <p>$124.9 + 117.25 = 242.15$</p> $\begin{array}{r} 124.9 \\ + 117.25 \\ \hline 242.15 \\ \hline \end{array}$ <p>Extend to decimals (either one or two decimal places).</p> | <p>Mental Methods <u>Subtraction by counting up</u> Find a difference by counting up e.g. $8006 - 2993 = 5013$ Including decimals e.g. $0.5 - 0.31 = 0.19$</p> <p>This can be modelled on an empty number line if necessary. (See complementary addition below).</p>  <p>$0.31 \qquad \qquad \qquad 0.4 \qquad \qquad \qquad 0.5$</p> <p>Subtract the nearest multiple of 10, 100 or 1000, then adjust E.g.1. Take 9 or 11 by taking 10 and adjusting by 1. $35 - 9 = 35 - 10 + 1 = 26$ E.g.2. Take 0.39 by taking 0.4 and adjusting by 0.01. $2.73 - 0.39 = 2.73 - 0.4 + 0.01 = 2.34$</p> <p>Pencil and paper procedures Use of column method and borrowing from the next column where necessary. Complete with any number of digits up to and including 2 decimal places</p> <p>E.g. $607 - 238 = 369$</p> $\begin{array}{r} 5 \ 9 \ 1 \\ \cancel{6} \ \cancel{0} \ 7 \\ \underline{2 \ 3 \ 8} \\ 3 \ 6 \ 9 \end{array}$ | <p>Mental Methods <u>Times tables</u> Students to recall all times tables from 1-10. Stretching to students remembering square numbers up to 20^2 and cubes up to 10^3.</p> <p>Partitioning for larger multiplying e.g. $87 \times 6 = 522$</p> <p>$87 \times 6 = (80 \times 6) + (7 \times 6)$ $= (480) + (42)$ $= 522$</p> <p>Pencil and paper procedures <u>Grid method</u> Partition numbers and multiply together for each separate box. Add all boxes together.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: none;">x</td> <td style="border: 1px solid black; padding: 2px;">300</td> <td style="border: 1px solid black; padding: 2px;">70</td> <td style="border: 1px solid black; padding: 2px;">2</td> <td style="border: none;">1400</td> </tr> <tr> <td style="border: none;">20</td> <td style="border: 1px solid black; padding: 2px;">6000</td> <td style="border: 1px solid black; padding: 2px;">1400</td> <td style="border: 1px solid black; padding: 2px;">40</td> <td style="border: none;">1200</td> </tr> <tr> <td style="border: none;">4</td> <td style="border: 1px solid black; padding: 2px;">1200</td> <td style="border: 1px solid black; padding: 2px;">280</td> <td style="border: 1px solid black; padding: 2px;">8</td> <td style="border: none;">40</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;">8</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"><u>8928</u></td> </tr> </table> <p>Extend to decimals with up to two decimal places. Decimal calculations to be completed by multiplying by power of 10 at the beginning and dividing by the same power of 10 at the end of the calculations.</p> <p>Check using estimation. Especially for decimal calculations E.g. 372×24 is approximately $400 \times 20 = 8000$</p> | x | 300 | 70 | 2 | 1400 | 20 | 6000 | 1400 | 40 | 1200 | 4 | 1200 | 280 | 8 | 40 | | | | | 8 | | | | | <u>8928</u> | <p>Mental Methods Students to use recollection of times tables from 1-10 to complete division of whole numbers. Sharing and grouping Continue to understand division as both sharing and the opposite of multiplication.</p> <p>Students to learn about divisibility tests. E.g. If a number ends in a 5 or 0 implies it is divisible by 5.</p> <p>Pencil and paper procedures</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: none;">5</td> <td style="border: none;">156 r 4</td> <td style="border: none;">Use of bus stop method for all division including long division.</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">784</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">- 500</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">284</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">- 250</td> <td style="border: none;">Can use the written column subtraction method to carry remainders if necessary (as to</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">34</td> <td style="border: none;">the left here) or just calculate mentally if possible.</td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">- 30</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">4</td> <td style="border: none;"></td> </tr> </table> <p>Remainders Remainders can be used lower down the school but should develop into using addition decimal places where needed to create a fuller answer. Students can develop the use of fractions to represent recurring decimals where needed or in place of a decimal answer.</p> | 5 | 156 r 4 | Use of bus stop method for all division including long division. | | 784 | | | - 500 | | | 284 | | | - 250 | Can use the written column subtraction method to carry remainders if necessary (as to | | 34 | the left here) or just calculate mentally if possible. | | - 30 | | | 4 | | <p>BIDMAS (also known as BODMAS) is the order in which operations (i.e. +, -, x, ÷, etc) should be completed in a mathematical sum, expression or formula.</p> <p>BIDMAS stands for: Brackets Indices Division Multiplication Addition Subtraction</p> <p>The earlier through the acronym, the sooner that operation should be done. I.e. when completing any calculations, the part inside the brackets should be calculated first, then any indices calculated, followed by any multiplications and division (which are completed together from left to right) and finally any addition or subtraction (again, completed together from left to right).</p> <table style="width: 100%;"> <tr> <td style="vertical-align: top;"> E.g.1 $(7 + 14) - 3^2$ $= 21 - 3^2$ $= 21 - 9$ $= 12$ </td> <td style="vertical-align: top;"> E.g.2 $= (12 - 6)^2 + 3 \times 2$ $= 6^2 + 3 \times 2$ $= 36 + 3 \times 2$ $= 36 + 6$ $= 42$ </td> </tr> </table> | E.g.1 $(7 + 14) - 3^2$ $= 21 - 3^2$ $= 21 - 9$ $= 12$ | E.g.2 $= (12 - 6)^2 + 3 \times 2$ $= 6^2 + 3 \times 2$ $= 36 + 3 \times 2$ $= 36 + 6$ $= 42$ |
| x | 300 | 70 | 2 | 1400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 6000 | 1400 | 40 | 1200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1200 | 280 | 8 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <u>8928</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 156 r 4 | Use of bus stop method for all division including long division. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 784 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 284 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - 250 | Can use the written column subtraction method to carry remainders if necessary (as to | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 34 | the left here) or just calculate mentally if possible. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E.g.1 $(7 + 14) - 3^2$ $= 21 - 3^2$ $= 21 - 9$ $= 12$ | E.g.2 $= (12 - 6)^2 + 3 \times 2$ $= 6^2 + 3 \times 2$ $= 36 + 3 \times 2$ $= 36 + 6$ $= 42$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Stockport Academy Calculations Policy

| Fractions | Fractions | Percentages | Inequality Signs |
|---|---|---|--|
| <p>Finding and using fractions Students should recognise that you can write a diagram as a fraction when an object has been split into equal parts. E.g.</p>  2/5 has been shaded  2/8 = 1/4 has been shaded  Can write as a fraction as not divide equally | <p>Dividing fractions When dividing fractions students should flip the second fraction. Once flip, students should multiply the numerator by numerator and denominator by denominator for the resultant fractions. E.g. $\frac{5}{8} \div \frac{3}{4} = \frac{5}{8} \times \frac{4}{3} = \frac{20}{24}$ </p> <p>Adding and subtracting fractions with the same denominator Adding or subtracting fractions that already have the same denominator is just a case of adding or subtracting the numerator of the fractions. E.g. $\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$ $\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$ </p> <p>Adding and subtracting fractions with different denominators Adding or subtracting fractions that have different denominators first requires to use equivalent fraction to find matching denominators. Once changed, students just need to add or subtract the numerator of the fractions. E.g. $\frac{1}{6} + \frac{2}{6} = \frac{1}{6} + \frac{4}{6} = \frac{5}{6}$ $\frac{4}{5} - \frac{3}{8} = \frac{32}{40} - \frac{15}{40} = \frac{17}{40}$ </p> <p>Converting improper fractions/mixed numbers Converting a mixed number to an improper fraction requires the whole number to be written as a series of 'whole' fractions and then the numerators can be added E.g. $2 \frac{5}{6} = \frac{6}{6} + \frac{6}{6} + \frac{5}{6} = \frac{17}{6}$ </p> <p>To convert back from improper fractions to mixed numbers, students must divide the numerator by the denominator and leave the remainder over the original denominator. E.g. $\frac{16}{5} \rightarrow 16 \div 5 = 3r1 \rightarrow 3 \frac{1}{5}$ </p> | <p>Writing one number as a percentage of another To write 'x' out of 'y' as a percentage, divide 'x' by 'y' and multiply by 100. E.g. Write 37 out of 42 as a percentage $37 \div 42 = 0.880952\dots$ $0.880952\dots \times 100 = 88\%$ </p> <p>Finding a percentage of an amount Without a calculator students should look to find 'building block' percentages using simple calculations and add them to find required percentage. I.e. 50% - half the original amount 25% - half of 50% 10% - divide the original amount by 10 5% - half of 10% 1% - either divide the original amount by 100 or divide 10% by 10. E.g. Find 36% of 400 50% = 200 25% = 100 10% = 40 1% = 4 36% = 25% + 10% + 1% 36% = 100 + 40 + 4 = 144 </p> <p>With a calculator students should find 1% by dividing by 100 and then multiplying by the required percentage. E.g. Find 16.4% of 237 $237 \div 100 = 2.37$ $2.37 \times 16.4 = 38.868$ </p> <p>Increasing or decreasing by a percentage Find the required percentage of the amount using either of the two above methods. Add (if increasing) or take (if decreasing) this amount from the original amount.</p> | <p>a < b a ≤ b When the point or the small part of the inequality sign is on the left (as above) this implies that 'a' is less than 'b'. If the inequality includes an extra line (similar to an underline) this implies that 'a' is less than or equal to 'b'. E.g. $y < 8$ means y is less than 8 $x \leq 3$ means x is less than or equal to 3 </p> <p>a > b a ≥ b When the point or the small part of the inequality sign is on the right (as above) this implies that 'a' is greater than 'b'. If the inequality includes an extra line (similar to an underline) this implies that 'a' is greater than or equal to 'b'. E.g. $x > 5$ means the x is greater than 5 $y \geq -2$ means y is greater than or equal to -2 </p> |
| | | | <p>Substitution</p> <p>Substitution is the replacement of a variable (usually a letter) in a term, expression, equation or formula with a number. Any calculations created by the substitution are then completed.</p> <p>E.g.1 Given that $y = 3$, calculate the value of $2y + 5y^2$ $2 \times 3 + 5 \times 3^2$ $= 2 \times 3 + 5 \times 9$ $= 6 + 45$ $= 51$ </p> <p>E.g.2 Given that $a = 4$ and $b = 8$. Find c if $c = (a - 2) - 4 + 6 \times 8$ $c = (4 - 2) - 4 + 6 \times 8$ $c = 2 - 4 + 6 \times 8$ $c = 2 - 4 + 48$ $c = 46$ </p> |