

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example
1	When multiplying a number by 0, the answer is always 0.	$435 \times 0 = 0$
2	When multiplying a number by 1, the answer is always itself.	$6,756 \times 1 = 6,756$
3	When dividing a number by 1, the answer is always itself.	$729 \div 1 = 729$
4	To add fractions with the same denominator, simply add the numerators and leave the denominator.	$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$
5	To subtract fractions with the same denominator, simply subtract the numerators and leave the denominator.	$\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$
6	To multiply two fractions, multiply the numerators and multiply the denominators. Then simplify.	$\frac{7}{9} \times \frac{3}{4} = \frac{21}{36} = \frac{7}{12}$
7	To divide two fractions, turn the second fraction upside down (it becomes a reciprocal) and change the operation to multiply. Multiply the numerators. Multiply the denominators. Then simplify.	$\frac{1}{2} \div \frac{1}{6}$ becomes $\frac{1}{2} \times \frac{6}{1}$ $\frac{1}{2} \times \frac{6}{1} = \frac{6}{2} = 3$
8	To multiply a fraction by a whole number, write your whole number as a fraction over 1. Multiply the numerators and multiply the denominators. Then simplify.	$\frac{2}{4} \times 5 = \frac{2}{4} \times \frac{5}{1}$ $\frac{2}{4} \times \frac{5}{1} = \frac{10}{4} = 2\frac{1}{2}$
9	To divide a fraction by a whole number, multiply the denominator by the whole number. Leave the numerator. Simplify if necessary.	$\frac{1}{2} \div 3 = \frac{1}{2 \times 3} = \frac{1}{6}$
10	To find a fraction of an amount, divide the whole number by the denominator, then multiply by the numerator.	$\frac{2}{5}$ of 2,200 = 880 $2,200 \div 5 = 440$ $440 \times 2 = 880$
11	A square number is the result of multiplying a number by itself.	$5^2 = 5 \times 5 = 25$
12	A cube number is the result of multiplying a number by itself and then by itself again.	$5^3 = 5 \times 5 \times 5 = 125$
13	To solve mixed operation equations, use BIDMAS to decide on the order.  Brackets Indices Division Multiplication Addition Subtraction	$5^2 - 6 \times 4 = 1$ B: no brackets to solve I: do $5^2$ first = 25 The calculation becomes: $25 - 6 \times 4 =$ D: no division to solve M: solve $6 \times 4 = 24$ The calculation becomes: $25 - 24 =$ A: no addition S: do $5^2 - 24 = 1$

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example																														
14	To multiply a number by 10, 100 or 1,000, move the digits 1, 2 or 3 places to the left. Use placeholders (0) to fill empty columns.	$2.3 \times 100 = 230$ $2.3$ $23.0$ (one place to the left) $230.0$ (two places to the left) Tip: the decimal point must not move.																														
15	To divide a number by 10, 100 or 1,000, move the digits 1, 2 or 3 places to the right. Use placeholders (0) to fill empty columns.	$14 \div 1,000 = 0.014$ $14.0$ (write the whole number with a decimal point and placeholder) $1.4$ (one place to the right) $0.14$ (two places to the right) $0.014$ (three places to the right) Tip: the decimal point must not move.																														
16	When adding using the column method, ensure the digits are lined up in the correct place value column. Start adding from the right.	$19,245 + 2,347 = 21,592$ <table><tr><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td>1</td><td>9</td><td>2</td><td>4</td><td>5</td></tr><tr><td></td><td>2</td><td>3</td><td>4</td><td>7</td></tr><tr><td colspan="5">+</td></tr><tr><td>2</td><td>1</td><td>5</td><td>9</td><td>2</td></tr><tr><td>4</td><td></td><td></td><td>4</td><td></td></tr></table> (5+7=12, so 2 stays in the ones column and the 1 ten moves to the tens column)	TTh	Th	H	T	O	1	9	2	4	5		2	3	4	7	+					2	1	5	9	2	4			4	
TTh	Th	H	T	O																												
1	9	2	4	5																												
	2	3	4	7																												
+																																
2	1	5	9	2																												
4			4																													
17	When subtracting using the column method, ensure the digits are lined up in the correct place value column. Start subtracting from the right.	$24,861 - 2,189 = 22,672$ <table><tr><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td></td><td>7</td><td>15</td><td>1</td></tr><tr><td>2</td><td>4</td><td>8</td><td>6</td><td>1</td></tr><tr><td></td><td>2</td><td>1</td><td>8</td><td>9</td></tr><tr><td colspan="5">-</td></tr><tr><td>2</td><td>2</td><td>6</td><td>7</td><td>2</td></tr></table> (1-9 is not possible, so regroup from the column next door)	TTh	Th	H	T	O			7	15	1	2	4	8	6	1		2	1	8	9	-					2	2	6	7	2
TTh	Th	H	T	O																												
		7	15	1																												
2	4	8	6	1																												
	2	1	8	9																												
-																																
2	2	6	7	2																												
18	When solving missing number equations involving addition, take the result and subtract (inverse) the value you have. Check that your answer completes the equation correctly.	<div></div> + 50 = 643 $643 - 50 = 593$ (use column method if necessary) Check: $593 + 50 = 643 \checkmark$																														
19	When solving missing number equations involving subtraction where the missing value is the first number, take the result and add (inverse) the value you have. Check that your answer completes the equation correctly.	<div></div> - 567 = 243 $243 + 567 = 810$ (use column method if necessary) Check: $810 - 567 = 243 \checkmark$																														
20	When solving missing number equations involving subtraction where the missing value is the second number, take the first number and subtract the result. Check that your answer completes the equation correctly.	$4,492 - \div = 2,350$ $4,492 - 2,350 = 2,142$ (use column method if necessary) Check: $4,492 - 2,142 = 2,350 \checkmark$																														

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example
21	When solving equations where the missing answer comes before the equals sign, do exactly as you would normally! It doesn't matter where the equals sign comes, as long as what's on either side are equal!	$\square = 3,990 + 258$ $3,990 + 258 = 4,248$ (use column method if necessary)
22	To complete equations involving partitioning, label the place value of each digit. Tick the values that have already been included in the equation. Write the missing value in the equation.	$8,030,040 = 8,000,000 + \square + 40$ <div> M HTh TTh Th H T O  8 0 3 0 0 4 0  ✓ <span style="margin-left: 100px;">✓</span>  Missing value: 30,000 </div>
23	When adding or subtracting decimal numbers, ensure the digits are lined up in the correct place value column. With numbers written to different decimal places, fill in any gaps with placeholders. Add/subtract each digit, starting from the right.	$12.45 + 3.672 = 15.122$ <div> <math>12.450</math> (fill in any gaps with placeholders)  <math>03.672 +</math> (the decimal points must line up)  <math>16.122</math>  4 4 </div>
24	When adding or subtracting a whole number and a decimal number, first write the whole number with a decimal point and placeholder(s). Add/subtract each digit, starting from the right.	$15 - 2.46 = 12.54$ <div> 4 94 1  <math>15.00</math>  <math>02.46 -</math>  <math>12.54</math>  (0-6 is not possible, so regroup from the column next door. As there are 0 tenths, regroup from the next column along)  (fill in any gaps with placeholders)  (the decimal points must line up) </div>
25	To add/subtract fractions with different denominators, first make the denominators the same. This can be done by multiplying them together. Whatever you do to the denominators, you must then do to the numerators. Then, add/subtract the numerators, leaving the denominators the same. Simplify if necessary.	$\frac{3}{7} + \frac{5}{9} =$ (multiply 7 and 9) $\frac{63}{63} + \frac{63}{63} =$ <div> (As you multiplied the denominator by 9 (7x9=63), you must multiply the numerator by 9 (3x9=27))  <math>\frac{27}{63} + \frac{35}{63} = \frac{62}{63}</math>  (As you multiplied the denominator by 7 (9x7=63), you must multiply the numerator by 7 (5x7=35)) </div>

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example
26	When adding/subtracting mixed numbers and fractions with different denominators, convert the mixed number into an improper fraction first. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then make the denominators the same. This can be done by multiplying them together. Whatever you do to the denominators, you must then do to the numerators. Then, add/subtract the numerators, leaving the denominators the same. Simplify if necessary.	$3\frac{1}{12} + \frac{2}{4} =$ $12 \times 3 = 36$ $36 + 1 = 37$ <p>So the calculation becomes:</p> $\frac{37}{12} + \frac{2}{4} =$ <p>(multiply 12 and 4)</p> $\frac{\quad}{48} + \frac{\quad}{48} =$ <p>(As you multiplied the denominator by 4 (12x4=48), you must multiply the numerator by 4 (37x4=148))</p> $\frac{148}{48} + \frac{24}{48} =$ <p>(As you multiplied the denominator by 12 (4x12=48), you must multiply the numerator by 12 (2x12=24))</p> $\frac{148}{48} + \frac{24}{48} = \frac{172}{48} = 3\frac{7}{12}$
27	To multiply a mixed number by a fraction, first convert the mixed number into an improper fraction. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then, multiply the numerators and multiply the denominators. Then simplify.	$2\frac{1}{12} \times \frac{2}{3} =$ $12 \times 2 = 24$ $24 + 1 = 25$ <p>So the calculation becomes:</p> $\frac{25}{12} \times \frac{2}{3} = \frac{50}{36} = 1\frac{7}{18}$
28	To multiply a mixed number by a whole number, first convert the mixed number into an improper fraction. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then, write your whole number as a fraction over 1. Multiply the numerators and multiply the denominators. Then simplify.	$2\frac{1}{12} \times 4 =$ $12 \times 2 = 24$ $24 + 1 = 25$ <p>So the calculation becomes:</p> $\frac{25}{12} \times 4 = \frac{25}{12} \times \frac{4}{1}$ $\frac{25}{12} \times \frac{4}{1} = \frac{100}{12} = 8\frac{1}{3}$
29	When multiplying multiples of 10, make the numbers 10, 100 or 1,000 times smaller so they are single digits. Multiply the single digits together. Then make the answer 10, 100, 1,000 times larger (the reverse of when you made the numbers smaller).	$50 \times 700 =$ <p>10 times smaller = 5    100 times smaller = 7</p> $5 \times 7 = 35$ <p>10 times larger = 350</p> <p>100 times larger = 35,000</p> <p>So <math>50 \times 700 = 35,000</math></p>

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example
30	When multiplying three numbers, multiply the first two, then multiply this answer by the last number.	$4 \times 5 \times 30 =$ $(4 \times 5) \times 30 =$ $20 \times 30 = 600$
31	To multiply a number by a single digit, set out the single digit below the number. Multiply the single digit by the digit in the ones column, then the tens column, and so on.	$346 \times 7 = 2,422$ <div>Th H T O</div> $\begin{array}{r} 346 \\ \times 7 \\ \hline 2422 \\ \text{2 3 4} \end{array}$
32	To multiply a number by a two-digit number, set out the two-digit number below the number. Multiply by the digit in the ones column by each digit of the top number. Add a placeholder (0) to the line below to hold the 10s value. Multiply the digit in the tens column by each digit of the top number. Add your two answers together to get your final answer.	$469 \times 32 = 15,008$ $\begin{array}{r} 469 \\ \times 32 \\ \hline 938 \\ \text{+ +} \\ 14070 \\ \text{+ 2 2} \\ \hline 15008 \\ \text{+ +} \end{array}$
33	To multiply a decimal number by a whole number, multiply the two numbers exactly as you would if they were both whole numbers. Add the decimal point to your answer ensuring it is vertically in line with where it appears in the decimal number in the question.	$4.2 \times 34 = 142.8$ $\begin{array}{r} 4.2 \\ \times 34 \\ \hline 168 \\ \text{+} \\ 1260 \\ \text{+} \\ \hline 142.8 \\ \text{+} \end{array}$
34	To multiply two decimal numbers, multiply the numbers as if they were whole numbers. Line up the numbers on the right - do not align the decimal points. Starting on the right, multiply each digit in the top number by each digit in the bottom number, just as with whole numbers. Add the products.  Place the decimal point in the answer by starting at the right and moving a number of places equal to the sum of the decimal places in both numbers multiplied.	$2.13 \times 2.4 = 5.112$ $\begin{array}{r} 2.13 \text{ (two decimal places)} \\ \times 2.4 \text{ (one decimal place)} \\ \hline 852 \\ \text{+} \\ 4260 \\ \hline 5112 \text{ (three decimal places)} \\ \text{+ +} \end{array}$

# Arithmetic Knowledge Organiser (Year 6)

No.	Topic	Example
35	<p>To calculate a percentage of an amount, <b>divide the number by 100</b>, then <b>multiply by the percentage</b>.</p> <p><b>Remember:</b> 'x' is the same as 'of', so 24% of 3,600 is the same as 24% x 3,600</p>	<p>24% of 3,600 = 864</p> <p><math>3,600 \div 100 = 36</math> (you've found 1%)  <math>36 \times 24 = 864</math></p>
36	<p>To calculate familiar percentages of an amount, do the following:</p> <ul style="list-style-type: none"> <li>- To find 50%, divide the number by 2</li> <li>- To find 25%, divide the number by 4</li> <li>To find 10%, divide the number by 10</li> </ul>	<p>50% of 640 = <math>640 \div 2 = 320</math>  25% of 640 = <math>640 \div 4 = 160</math>  10% of 640 = <math>640 \div 10 = 64</math></p>
37	<p>To calculate 99% of an amount, <b>divide the number by 100 (to find 1%)</b>, then <b>take this amount away</b>.</p>	<p>99% of 650 = 643.5</p> <p><math>650 \div 100 = 6.5</math> (you've found 1%)  <math>650 - 6.5 = 643.5</math> (this is 99%)</p>
38	<p>To divide a number by a single digit, set out using the 'bus stop' method.</p>	<p><math>256 \div 8 = 32</math></p> $\begin{array}{r} 0 \ 3 \ 2 \\ 8 \overline{) 2 \ 5 \ 6} \\ \underline{16} \phantom{0} \\ 9 \phantom{0} \\ \underline{24} \phantom{0} \\ 16 \\ \underline{16} \\ 0 \end{array}$ <p>8 doesn't go into 2, so carry the 2 over. 8 goes into 25 three times (<math>8 \times 3 = 24</math> with 1 left over). Carry the 1 over to the 6. 8 goes into 16 twice.</p>
39	<p>To divide a number by a two-digit number, set out using the 'bus stop' method. Write out the times tables of the divisor as jottings to help you.</p>	<p><math>1,968 \div 16 = 123</math></p> $\begin{array}{r} 0 \ 1 \ 2 \ 3 \\ 16 \overline{) 1 \ 9 \ 6 \ 8} \\ \underline{16} \phantom{00} \\ 19 \phantom{0} \\ \underline{16} \phantom{0} \\ 36 \phantom{0} \\ \underline{32} \phantom{0} \\ 48 \\ \underline{48} \\ 0 \end{array}$ <p>16 doesn't go into 1, so carry the 1 over. 16 goes into 19 once (<math>16 \times 1 = 16</math> with 3 left over). Carry the 3 over to the 6. 16 goes into 36 twice (<math>16 \times 2 = 32</math>) with 4 left over. Carry the 4 over to the 8. 16 goes into 48 three times.</p> <p> <math>1 \times 16 = 16</math>  <math>2 \times 16 = 32</math>  <math>3 \times 16 = 48</math>  <math>4 \times 16 = 64</math>  <math>5 \times 16 = 80</math> </p>