



Calculation Policy

Approved by Directors: December 2018

Review Date: December 2020

Written Methods of Calculation

The new National Programme of study indicates that there is a larger emphasis on traditional methods of calculation in Mathematics and these skills will be assessed explicitly at all Key Stages and in specific at KS1 and KS2 in arithmetic papers.

Addition

Traditional methods of column addition should be used as a preferred method as shown below.

A handwritten column addition problem on grid paper. The numbers 346 and 287 are stacked vertically, with a plus sign to the left of 287. A horizontal line is drawn under 287. Below the line, the sum 633 is written. Small vertical tick marks are placed under the 6 and 3 in the sum. An arrow points from the text below to the first carry mark.

$$\begin{array}{r} 346 \\ + 287 \\ \hline 633 \\ \begin{array}{l} | \\ | \end{array} \end{array}$$

When carrying emphasise that it is a 10 or 100 not 'a 1'

Please note that there should be an emphasis on stating the correct column value when referring to carrying. I.e. carry 10, 100, 1000 etc not "carry the 1". The individual steps should also be spoken about using the correct numerical values instead of 2 digit and single digit numbers.

Other methods such as partitioning and number lines can be used but will not be given credit in specific questions on the arithmetic paper.

Subtraction

Traditional methods of column subtraction should be used as a preferred method as shown below.

The image shows a handwritten subtraction problem on grid paper. The problem is $183 - 149$. The result is 34 . The borrowing process is shown with a '2' written above the '8' in the tens column and a '1' written above the '3' in the ones column. An arrow points from the text 'when borrowing emphasise that it is 10 or 100 not 'a 1'' to the '2' written above the '8'.

$$\begin{array}{r} 183 \\ - 149 \\ \hline 34 \end{array}$$

when borrowing emphasise that it is 10 or 100 not 'a 1'

Please note that there should be an emphasis on stating the correct value of anything 'borrowed' from a preceding column. I.e. borrow 10, 100, 1000 etc, not "borrow 1". The individual steps should also be spoken about using the correct numerical values instead of 2 digit and single digit numbers.

Other methods such as number lines can be used but will not be given credit in specific questions on the arithmetic paper.

Multiplication

Formal methods of multiplication should be used as a preferred method as shown below.

The image shows a handwritten multiplication problem on grid paper. The problem is $24 \times 33 = 792$. The calculation is written in a formal columnar format:

$$\begin{array}{r} 24 \\ \times 33 \\ \hline 72 \\ 720 \\ \hline 792 \end{array}$$

Two arrows point to the work with handwritten annotations:

- An arrow points to the 72 in the first partial product with the text: "Complete the calculation of 24×3 first."
- An arrow points to the 720 in the second partial product with the text: "Put in place holding 0 to complete calculation of 24×30 "

Other methods such as grid method and repeated addition can be used but will not be given credit in specific questions on the arithmetic paper.

Division

Formal methods of long or short division should be used as a preferred method as shown below.

		3475	
① How many 25's in	86 = 3	25 86894	- 75
away	3 × 25 = 75, take the	118	- 100
	How many 25's in	175	
②	118 = 4	144	
This away	4 × 25 = 100, take	125	- 19
	How many 25's in		
③	189 = 7		
This away	7 × 25 = 175, take		
	How many 25's in		
④	144 = 5		
This away	5 × 25 = 125, take		
	remainder 19	3475	Answer is

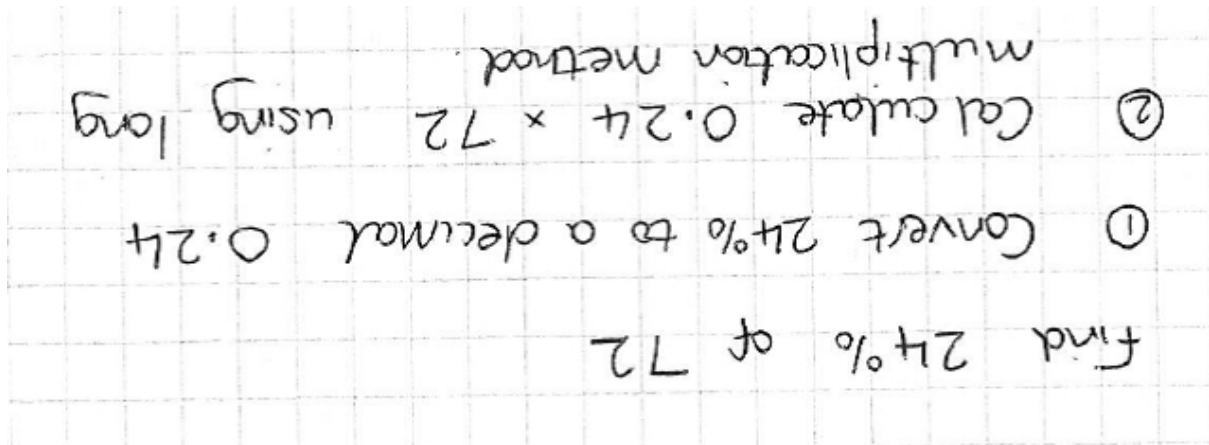
$$\begin{array}{r} 92 \\ 7 \overline{) 644} \end{array}$$

- ① How many 700's in 600? (none)
- ② Carry 600 across to make 640 in tens column
- ③ How many 70's in 640?
- ④ 90 with 10 left over
- ⑤ How many 7's in 14

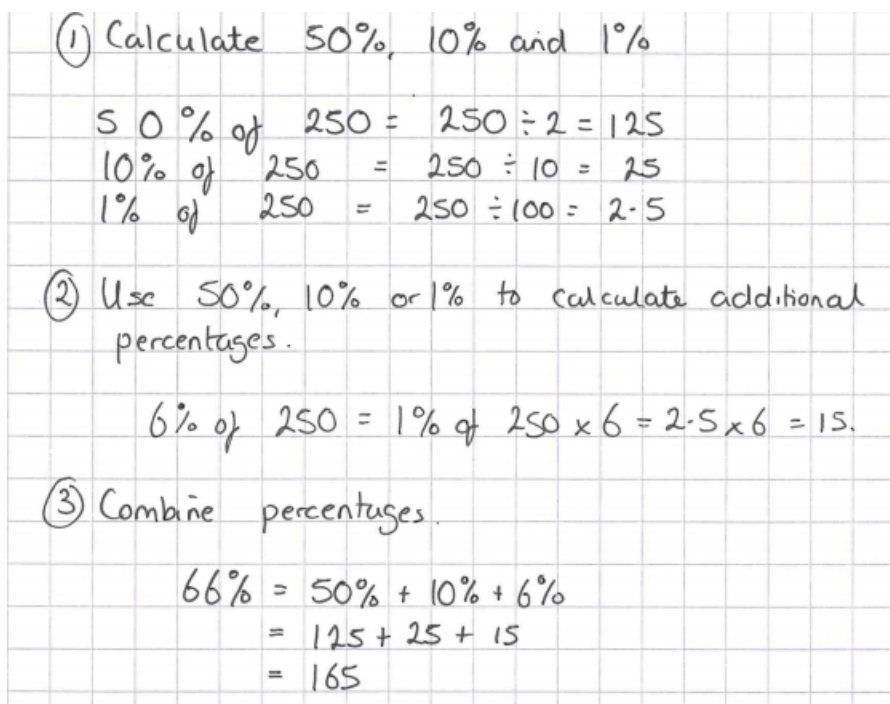
Other methods of division such as chunking or repeated subtraction can be used but will not be given credit in specific questions on the arithmetic paper.

Calculation of percentages of an amount without a calculator

Method 1: Convert the percentage to its decimal by dividing by 100. Then complete long multiplication with the decimal equivalent and the number you are calculating the percentage of.



Method 2: Calculate 10%, 1% and 50% by dividing by 10, 100 and 2 respectively. Then use these percentages to calculate all other percentages.



Calculation of a fraction of an amount

Divide the amount by the denominator of the fraction by using a division method.

Multiply the result by the numerator.

Handwritten notes on grid paper showing the steps to calculate $\frac{7}{4}$ of 42:

- Calculate $\frac{7}{4}$ of 42
- ① Divide 42 by the denominator
 $42 \div 7 = 6$
- ② Multiply the result by the numerator
 $6 \times 4 = 24$
- 24 is $\frac{7}{4}$ of 42

Sharing an amount into a given ratio

Calculate the total number of parts by adding each part of the ratio. Divide the amount to be shared

by the total number of parts. Multiply each part of the ratio by the value for each part.

Share 320 in the ratio 7:3.

① Calculate the number of parts.

$$7 + 3 = 10 \text{ parts.}$$

② Calculate what each part is worth.

$$320 \div 10 = 32 \quad (\text{Each part is worth } 32)$$

③ Multiply the ratio by the value for each part.

$$7 \times 32 = 224$$

$$3 \times 32 = 96.$$

$$\underline{\underline{224:96}}$$