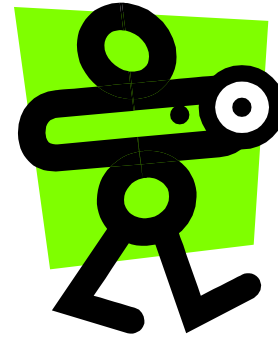


Grades 4 and 5

Division Strategies

Partial Quotients/Repeated Subtraction



MACCSS Standards Being Addressed:

4.NBT.6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Rationale:

Students gain a better understanding of the process of division. They experiment with place value and use that understanding. Students reason with the idea that situations that require division involve finding how many groups or the size of the group.

- This method is based on subtracting multiples of the divisor from the number to be divided, the dividend. - As you record the division, ask: 'How many nines in 90?' or 'What is 90 divided by 9?' - This method, often referred to as 'chunking', is based on subtracting multiples of the divisor, or 'chunks'. Initially children subtract several chunks, but with practice they should look for the biggest multiples of the divisor that they can find to subtract. - Chunking is useful for reminding children of the link between division and repeated subtraction. - However, children need to recognise that chunking is inefficient if too many subtractions have to be carried out. Encourage them to reduce the number of steps and move them on quickly to finding the largest possible multiples.	97 ÷ 9 $\begin{array}{r} 9 \overline{)97} \\ - 90 \quad \times 10 \\ \hline 7 \end{array}$ Answer: 10 r 7 $\begin{array}{r} 6 \overline{)196} \\ - 60 \quad \times 10 \\ \hline 136 \\ - 60 \quad \times 10 \\ \hline 76 \\ - 60 \quad \times 10 \\ \hline 16 \\ - 12 \quad \times 2 \\ \hline 4 \end{array}$ Answer: 32 r 4
- The key to the efficiency of chunking lies in the estimate that is made before the chunking starts. Estimating involves multiplying the divisor by multiples of 10 to find the two multiples that 'trap' the dividend. - Estimating has two purposes when doing division: - to help to choose a starting point for the division; - to check the answer after the calculation. - Children who have a secure knowledge of multiplication facts and place value should be able to move on quickly to the more efficient recording on the right.	To find $196 \div 6$, we start by multiplying 6 by 10, 20, 30, to find that $6 \times 30 = 180$ and $6 \times 40 = 240$. The multiples of 180 and 240 trap the number 196. This tells us that the answer to $196 \div 6$ is between 30 and 40. Start the division by first subtracting 180, leaving 16, and then subtracting the largest possible multiple of 6, which is 12, leaving 4. $\begin{array}{r} 6 \overline{)196} \\ - 180 \quad \times 30 \\ \hline 16 \\ - 12 \quad \times 2 \\ \hline 4 \end{array}$ Answer: 32 r 4 The quotient 32 (with a remainder of 4) lies between 30 and 40, as predicted.

Adapted from allesley.moodledo.co.uk/mod/resource/view.php?id=419