

Unit 3 Multiplication and division 2

Five daily lessons

National
Numeracy Strategy

Year 5
Autumn term

Unit Objectives Year 5

- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications and divisions. Extend written methods to short division of HTU by U.
- Develop calculator skills and use a calculator effectively.
- Check with the inverse operation when using a calculator.
- Estimate by approximating (round to nearest 10 or 100), then check result.
- **Use all four operations to solve simple word problems involving numbers and quantities based on money.**
- Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, calculator.

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This Unit Plan is designed to guide your teaching. You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Resource sheet 3.1
- Resource sheet 3.2
- Activity sheet 3.1
- OHT 3.1
- Whiteboards
- Calculators
- OHP calculator

Year 4

Link Objectives

Year 6

- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications and divisions. Develop and refine written methods for $TU \times U$, $TU \div U$.
- Check with the inverse operation.
- Estimate and check by approximating (round to nearest 10 or 100).
- Use all four operations to solve word problems involving numbers in 'real life', money and measures (including time), using one or more steps, including converting pounds to pence and metres to centimetres and vice versa.
- **Choose and use appropriate number operations and appropriate ways of calculating (mental, mental with jottings, pencil and paper) to solve problems.**

(Key objectives in bold)

- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications and divisions. **Extend written methods to:** multiplication of ThHTUxU (short multiplication); **short multiplication of numbers involving decimals.**
- Develop calculator skills and use a calculator effectively.
- Check with the inverse operation when using a calculator.
- Estimate by approximating (round to the nearest 10, 100 or 1000), then check result.
- **Identify and use appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities based on 'real life', money or measures (including time), using one or more steps, including converting pounds to foreign currency, or vice versa, and calculating percentages such as VAT.**
- Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, and calculator.

Planning sheet	Day One	Unit 3 <i>Multiplication and division 2</i>	Term: <i>Autumn</i>	Year Group: 5
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<p>Derive quickly division facts corresponding to tables up to 10 x 10.</p> <p>VOCABULARY divided by multiple</p> <p>RESOURCES Whiteboards</p>	<ul style="list-style-type: none"> Using a counting stick, ask children to count in 3s from 0 to 30 as you indicate consecutive divisions on the stick. Point to divisions at random, asking questions such as: How many 3s make 24? What is 18 divided by 3? Repeat with multiples of other numbers. Ask 'quick fire' questions involving division corresponding to tables up to 10 x 10 children to answer using whiteboards. 	<p>Use informal pencil and paper methods to divide, TU by U and HTU by U.</p> <p>VOCABULARY chunking grouping inverse</p>	<ul style="list-style-type: none"> Tell the children that they are going to learn more about written methods for division. Present the problem: 78 children need to be placed in teams of 6. How many teams will there be? <div>Q What calculation do we need to solve this problem?</div> <p>Establish that division is needed and that the calculation is $78 \div 6$. Remind the class that they used the chunking method in Year 4 to divide two-digit numbers by units. Ask them to work out the answer, then discuss methods used. Demonstrate the written method.</p> $\begin{array}{r} 78 \\ - 60 \\ \hline 18 \\ - 18 \\ \hline 0 \end{array} \quad \begin{array}{l} (10 \times 6) \\ (3 \times 6) \end{array}$ <div>Q How many 6s have subtracted?</div> <p>Establish that 10 + 3 sixes have been subtracted. Record $78 \div 6 = 13$ and establish that the answer to the problem is 13 teams.</p> <div>Q What would be the answer if there had been 80 children?</div> <p>Establish that $80 \div 6 = 13$ remainder 2, so there would be 13 teams with 2 children unplaced. Model how this is recorded using the written method above to show that the same numbers are subtracted, but 2 is recorded as the final difference.</p> <ul style="list-style-type: none"> Provide a similar example for children to work through in pairs. Take feedback and model the solution. Write $175 \div 7$ on the board. Ask children to discuss how this could be calculated in pairs. Take feedback allowing children to explain their different approaches, then model the use of the written method: $\begin{array}{r} 175 \\ - 70 \\ \hline 105 \\ - 70 \\ \hline 35 \\ - 35 \\ \hline 0 \end{array} \quad \begin{array}{l} (10 \times 7) \\ (10 \times 7) \\ (5 \times 7) \end{array}$ <ul style="list-style-type: none"> Repeat with another example which leaves a remainder, then ask children to try a similar example in pairs. Take feedback and model the solution. Provide 2 or 3 further examples for children to try independently. 	<ul style="list-style-type: none"> Model the problems given to the children for them to check their solutions. Clarify any misconceptions as you do so. <div>Q What is a quick way to check whether the answer to a division is correct?</div> <ul style="list-style-type: none"> Discuss suggestions and establish the use of the inverse operation. Write $57 \div 3 = 19$ on the board. <div>Q Which two numbers should we multiply to check whether this is correct?</div> <p>Establish that 19 should be multiplied by 3 and ask children to check the answer.</p> <ul style="list-style-type: none"> Indicate one of the division calculations modelled on the board and repeat. <div>By the end of this lesson children should be able to:</div> <ul style="list-style-type: none"> Use multiples of the divisor for $TU \div U$ and $HTU \div U$ calculations; Check with the inverse operation. <p>(Refer to supplement of examples, section 6, pages 69.)</p>

Planning sheet		Day Two	Unit 3 <i>Multiplication and division 2</i>	Term: <i>Autumn</i>	Year Group: 5
Oral and Mental			Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
<p>Use known facts and place value to multiply and divide mentally.</p> <p>VOCABULARY lots of groups of product multiplied by lines</p> <p>RESOURCES: Whiteboards</p>	<ul style="list-style-type: none"> Provide quick fire questions involving multiplying by multiples of 10 for children to answer using whiteboards. e.g. <div>Q What are 10 lots of 6? What is 20 times 6? How do you know?</div> <p>Establish that 20 is double 10, so $20 \times 6 = \text{double } 60$.</p> <div>Q What is the product of 30 and 6? What is 50 multiplied by 6? How do you know?</div> <p>Establish that $30 \times 6 = 3 \times (10 \times 6)$.</p> <ul style="list-style-type: none"> Continue with questions involving dividing multiples of 10, e.g.: <div>Q How many 6s are there in 120? How do you know?</div> <p>Establish that 120 is 12×10, so $120 \div 6$ is $(12 \div 6) \times 10$. Repeat with questions such as: $180 \div 6$, $240 \div 6$, $300 \div 6$ etc.</p> <ul style="list-style-type: none"> Repeat with questions involving dividing multiples of 10 by other single digit numbers. 	<p>Approximate first.</p> <p>Extend written methods to short division of HTU by U.</p> <p>Estimate by approximating then check results.</p> <p>VOCABULARY division divisor multiple estimate approximate short division lies between</p>	<ul style="list-style-type: none"> Explain that children will use a shorter written method for division today. Write $183 \div 5$ on the board. <div>Q Approximately how many fives are there in 183?</div> <p>Discuss then establish that $30 \times 5 = 150$, $40 \times 5 = 200$, so the answer lies between 30 and 40.</p> <ul style="list-style-type: none"> Demonstrate how the method used on day 1 can be shortened by using the lower estimate as the starting point: $\begin{array}{r} 183 \\ - \quad (30 \times 5) \\ \hline 150 \\ - \quad 33 \\ \hline 30 \\ - \quad (6 \times 5) \\ \hline 3 \end{array}$ <p>Answer: 36 R 3</p> <div>Q Is 36 R 3 likely to be correct? How do you know?</div> <p>Establish that it is a reasonable answer in light of the approximation. Provide a similar example for children to try with a partner. Remind them to approximate the answer first by finding two multiples of ten that it lies between, then compare the answer with the approximation to check whether it is reasonable.</p> <ul style="list-style-type: none"> Take feedback and model the solution on the board. Provide another example for children to try individually, then compare and discuss their results with those of a partner. Check for misconceptions and model if necessary. Explain that there is a similar method called short division. Demonstrate, recording alongside one of the examples on the board and using the same calculation, so that the two methods can be compared, e.g. $\begin{array}{r} 36 \quad \text{R } 3 \\ 5 \overline{) 183} \\ - 150 \quad (30 \times 5) \\ \hline 33 \\ - 30 \quad (6 \times 5) \\ \hline 3 \end{array}$ <p>Discuss the similarities and differences between the two ways of recording.</p> <ul style="list-style-type: none"> Provide examples of $\text{HTU} \div \text{U}$ calculations for children to solve using short division. Remind them to approximate the answers first then use the lower multiple of the divisor as the first subtraction. 	<ul style="list-style-type: none"> Discuss solutions to the division calculations. <div>Q Do the answers seem to be correct compared with your approximations?</div> <p>Ask children to check through any of their calculations in which the answer did not fall within the range of the approximations to identify where errors have been made.</p> <div>By the end of the lesson, children should be able to:</div> <ul style="list-style-type: none"> Use short division to divide HTU by U; Approximate results first and use the approximation to check whether results are reasonable. <p>(Refer to supplement of examples, section 6, page 69.)</p>	

Planning sheet		Day Four	Unit 3 <i>Multiplication and division 2</i>	Term: <i>Autumn</i>	Year Group: 5
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
<p>Check with the inverse operation when using a calculator.</p> <p>Develop calculator skills and use a calculator effectively.</p> <p>VOCABULARY inverse operation</p> <p>RESOURCES Calculators OHP calculators</p>	<ul style="list-style-type: none"> Write on the board: $21247 + 43578$ $56372 - 8657$ 387×257 $5952 \div 372$ Ask children to work these out on a calculator and record the answers. <div>Q How could you use the calculator to check the answers?</div> <p>Establish the use of the inverse operation.</p> <ul style="list-style-type: none"> Discuss the calculations needed for checking the first answer and ask a child to carry it out on the OHP calculator. Repeat with the other calculations. Write a few complete calculations for children to check in pairs on a calculator, e.g. $3496 \times 27 = 90896$ 	<p>Develop calculator skills and use a calculator effectively.</p> <p>Choose and use appropriate number operations to solve work problems.</p> <p>Check with the inverse operation when using a calculator.</p> <p>VOCABULARY display key enter clear</p> <p>RESOURCES Resource sheet 3.2 OHP calculator Class set of calculations</p>	<ul style="list-style-type: none"> Using OHP calculator, select keys and ask children what they are called and what they do. Correct any mistakes or misconceptions. <p>Establish on OHP calculator how to clear the display and clear the last entry.</p> <p>Allow children to try this on their calculator.</p> <ul style="list-style-type: none"> Display a money question such as $\pounds 4.35 + \pounds 3.85$ that the children can answer easily. <p>Ask children to key $\pounds 4.35 + \pounds 3.85 =$ into their calculator while doing the same on the OHP calculator. Establish that the calculator is now displaying 8.2</p> <div>Q What is the answer to the question?</div> <p>Establish that 8.2 is $\pounds 8.20$ in the context of the problem.</p> <div>Q How would we enter $\pounds 6.30$? and 85p? Q How would we enter six pounds and five pence? Is it $\pounds 6.5$?</div> <p>Establish the correct key sequences. Emphasise that mixed units cannot be used in the same calculations, i.e. that $\pounds 6.30 + 85p$ must be entered as $6.30 + 0.85$.</p> <div>Q How can we check that $\pounds 8.20$ is correct? Confirm the use of the inverse operation. Ask children to check using their calculators. Q What calculation did you do to check? Confirm that either $8.2 - 4.35$ or $8.2 - 3.85$ could be used.</div> <p>Give the children a selection of money problems, using all 4 operations to solve using a calculator, ensuring that they include amounts with zeros in various places. Ask children to check each answer by using the inverse operation. (Resource Sheet 3.2 contains some examples of problems).</p>	<ul style="list-style-type: none"> Ask children to explain what they did when their checking showed a wrong answer. Address any misconceptions. <div>Q Which was the trickiest question? Why?</div> <ul style="list-style-type: none"> Write the following on the board: $\pounds 3.95 + 75p + 95p = \pounds 173.95$. <div>Q Can this answer be right? What might have gone wrong?</div> <p>Discuss and try out suggestions.</p> <div>By the end of this lesson children should be able to:</div> <ul style="list-style-type: none"> Clear the display before entering a calculation; Use the [+], [-], [x] and [÷] keys, the [=] key and decimal point to calculate; Change an accidental wrong entry by using the [clear entry] key; Key in and interpret money calculations; Have a feel for the approximate size of an answer, and check it by performing the inverse calculation. <p>(Refer to supplement of examples, section 6, page 71)</p>	

Planning sheet		Day Five	Unit 3 <i>Multiplication and division 2</i>	Term: <i>Autumn</i>	Year Group: 5
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities/Focus Questions
<p>Recall facts in 2, 3, 4, 5, 6, 10 x table.</p> <p>Begin to recall facts in 7, 8, 9 x tables, squares to 10 x 10.</p> <p>Recognise square numbers.</p>	<ul style="list-style-type: none"> Play 'Guess my Number'. The teacher says, 'I am thinking about a number between 1 and 100. You can ask me questions to which I can only reply yes or no. How quickly can you guess what my number is?'. This can be played with the whole class altogether with the children putting their hands up. Encourage children to use the correct mathematical vocabulary and to ask questions such as: Is it greater/less than...? Is it a square number...? Is it an odd/even number? Is it a multiple of...? Is it divisible by.....? etc. 	<p>Use all four operations to solve simple word problems involving numbers and quantities.</p> <p>Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, and calculator.</p> <p>Develop calculator skills and use a calculator effectively.</p>	<ul style="list-style-type: none"> Give out calculators. Remind children about different ways of calculating. (mental, using jottings, written methods and using a calculator). Explain that they will be solving puzzles using whatever calculating method they think is appropriate. Continue with the starter idea, say 'I think of a number and then subtract 56, the answer is 126. What was my number? Ask the children to work in pairs using whiteboards to work out the answer. <p>Q How did you work it out?</p> <p>Discuss and compare methods, draw out mental (including jottings), written and calculator methods. Show children the calculation on a number line if they are unsure how to solve it.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> $\begin{array}{c} \text{---}56\text{---} \\ \diagup \quad \diagdown \\ 126 \quad \quad ? \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{c} \text{---}+56\text{---} \\ \diagup \quad \diagdown \\ 126 \quad \quad ? \end{array}$ </div> </div> <p>Give the children another problem 'I think of a number and then divide it by 20, the answer is 1000. What number did I start with? Encourage the children to write this as a number sentence, i.e. $? \div 20 = 1000$</p> <p>Q How did you work it out?</p> <p>Compare children's methods then pose a further problem, 'I think of a number and then I subtract 60 and divide by 8. The answer is 1000. What was my starting number? Discuss children's methods</p> <p>Q Which is the most efficient method to use? Why?</p> <p>Pose the problem, 'I think of a number and multiply it by 14 and then subtract 66. The answer is 62 318'. What was my starting number?</p> <p>Q How did you work this out?</p> <p>Draw out methods.</p> <p>Q Which is the most appropriate method and why?</p> <ul style="list-style-type: none"> Establish that in this instance, using a calculator would be an appropriate method. Give children a set of similar problems, tell the children they should decide with their partner on the most appropriate method to use before they work out the answers. 		<ul style="list-style-type: none"> Discuss with the children the term 'appropriate' in relation to calculations. Stress the need for efficiency in calculations. Give the children a range of problems like those below. They have to point to head, hold up a pencil or a calculator to show how they would solve the problem. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Q 20 x 3 103 x 10 284 x 8 250 x 20 4521 x 987</p> </div> <p>HOMEWORK</p> <ul style="list-style-type: none"> Ask children to make up a set of 3 problems, one which could be answered with a mental calculation, one, which might require jottings, and one which they think would require the use of a calculator. <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Choose the appropriate operation(s) to solve word problems and puzzles; Decide whether calculations can be done mentally or with pencil and paper or a calculator; Begin to select the correct key sequence to carry out calculations involving more than one step. <p>(Refer to supplement of examples, section 6, page 71 and 75)</p> </div>
<p>VOCABULARY multiple of divisible by square number odd even greater than less than prime</p>		<p>VOCABULARY appropriate efficient inverse</p> <p>RESOURCES Whiteboards Calculators</p>			

Find $\frac{1}{2}$ of

Find $\frac{1}{4}$ of

24

36

48

56

72

76

84

92

96

Calculator Problems

1. A man spends 75p on bus fares to get to work and back each day.
He works for 235 days a year.
How much are his bus fares for a year?

2. The total cost for a class trip is £204.40.
Twenty-eight children are going on the trip.
How much will it cost for each child?

3. Mrs Patel has £8476.32 in the bank.
She pays in to the bank a cheque for £128.75 and £457.68 in cash. How
much does she have in the bank now?

4. A holiday costs £1655.26 for the flight and hotel for a family of four.
The flight tickets cost £756.64 altogether.
What is the cost of the hotel?

12	24	9	46	12	42
48	19	14	18	21	9
28	6	36	24	23	18
18	21	46	18	48	12
24	12	38	19	28	24
14	36	42	6	23	38

Which shape of table can be used for 392 chairs to be placed around them so that all the tables are full with no chairs left over?

How many of each table will be needed?

Record any written calculations on this sheet.

