Unit 2
Multiplication and division 1

National Numeracy Strategy

Year 5
Autumn Term **Five Daily Lessons**

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

UNIT OBJECTIVES

Year 5

- Understand the effect of and relationships between the four operations, and the principles (not the names) of the arithmetic laws as they apply to multiplication. — Pages 53-55
- Use doubling or halving, starting from known facts. For example: double/halve any two-digit number by doubling/ halving the tens first; double one number and halve the other; to multiply by 25, multiply by 100 then divide by 4; find the 16 times table facts by doubling the 8 times table; find sixths by halving thirds. — Page 61
- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications and divisions. **Extend written methods to short multiplication of HTU** or U.t **by U.** — Pages 67-69

Link Objectives

Year 4

- Extend understanding of the operations of multiplication and division and their relationship to each other and addition and subtraction.
- Use doubling or halving starting from known facts. For example: double/halve two-digit numbers by doubling/halving the tens first; to multiply by 4, double, then double again; to multiply by 5, multiply by 10 then halve; to multiply by 20, multiply by 10 then double; find the 8 times table by doubling the 4 times table; find quarters by halving halves.
- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications.

Year 6

- Understand and use the relationships between the four operations and principles (not the names) of the arithmetic laws.
- Use related facts and doubling or halving. For examples double or halve the most significant digit first; to multiply by 25, multiply be 100 then divide by 4; double one number and halve the other; find the x24 table by doubling the x6 table twice.
- Approximate first. Use informal pencil and paper methods to support, record or explain multiplications. Extend written methods to; **short multiplication of numbers involving decimals.**

(Key objectives in bold)

Resources needed to teach this unit:

- OHT 2.1
- Whiteboards
- Counting stick
- Interlocking cubes

department for education and skills

Planning sheet	Day One	Unit 2 *Multiplication and division 1*	Term: *Autumn*	Year Group: *5*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Recall multiplication facts. VOCABULARY multiple multiplied by times groups of product RESOURCES Whiteboards	• Ask the class to count in multiples of different numbers (times tables), from zero to the tenth multiple and back, ending with the eight times table. • Point out that 8 x 6 and 8 x 7 can be difficult to remember. **Q** What is 8 x 5? So what is 8 x 6? Suggest that one way to remember 8 x 7 is 56 = 7 x 8 i.e. 5, 6, 7 and 8. • Ask children table facts from the 8times table which they need to practise. Vary the vocabulary to revise the words listed. Ask them to display their answers on whiteboards.

Main Teaching

Objectives and Vocabulary	Teaching Activities
Use doubling or halving, starting from known facts. For example: double one number and halve the other; to multiply by 25, multiply by 100 then divide by 4; find the 16 times table facts by doubling the 8 times table. Understand and use the principle of the associative law. VOCABULARY double halve multiply strategy jottings RESOURCES Whiteboards Interlocking cubes	**Q** What is 32 x 100? How could we use this to find 32 x 50? Discuss and establish that 32 x 50 is half of 32 x 100. **Q** How would you calculate 32 x 25? Collect children's responses and discuss their strategies. Provide further questions for children to answer using whiteboards. • Remind children how they learned the 8 times facts by doubling 4 facts. **Q** What is 8 x 6? How could we work out 16 x 6? • Discuss and establish doubling x8 to find x16. Write on the board; 1 x 8 = 1 x 16 = 2 x 8 = 2 x 16 = Ask children to supply the answers, emphasising that the 16 times table can be found by doubling the 8 times table. Ask the children to copy and complete the two tables. • Show the children two sticks of twelve interlocking cubes. Record this as 12 x 2 = 24 on the board. Break each stick in half and ask the children how they would record this. Agree that this can be recorded as 6 x 4 = 24. Point out that 12 x 2 and 6 x 4 have the same answer. **Q** If we break the sticks in half again, what would the number sentence be? What has happened to the number of sticks? • Reinforce that 12 x 2, 6 x 4 and 3 x 8 all have an answer of 24. Ask how the children calculated 5 x 16 earlier. Establish this is double (5 x 8). **Q** How else could we have calculated 5 x 16? Establish 5 x 16 is the same as 10 x 8 etc. Provide examples for practice e.g. 15 x 12, 35 x 6, 13 x 8. Write 7 x 17 on the board. Discuss the difficulties they find applying the halving and doubling strategy to these numbers. **Q** What makes using the halving and doubling strategy difficult?

Plenary

Teaching Activities/Focus Questions

• Collect children's answers and correct any errors or misunderstandings.

• Write 1¼ x 12 on the board. Ask children to work in pairs.

Q How would you work out the answer to this calculation?

• Suggest to the children that the method they have worked with during the lesson can help with their calculation. Show;
1 ¼ x 12 is equivalent to
2 ½ x 6
2 ½ x 6 is equivalent to
5 x 3
So 1¼ x 12 = 5 x 3 = 15.

Ask children to use this strategy to find 1½ x 6, 2½ x 8, 3½ x 14 and 1¼ x 16.

• Write 5 x 18, 9 x 14 and 15 x 12 on the board. Children to discuss which questions they would calculate using doubling/ halving. Take feedback.

HOMEWORK
• Give children a list of calculations, some that are suited to doubling/halving and others that are not, to work out at home.

By the end of this lesson, children should be able to:
- **Use strategies for mental multiplication which involve doubling or halving.**
- **Understand the principle of the associative law.**

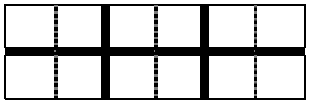
(Refer to supplement of examples, section 6, pages 53, 61.)

Planning sheet	Day Two	Unit 2 *Multiplication and division 1*	Term: *Autumn*	Year Group: *5*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Derive quickly doubles of any whole number to 100. VOCABULARY double halve RESOURCES Whiteboards	• Ask children for a few examples of calculations suited/not suited to the doubling/ halving strategy from their homework. Try a few out. • Ask the class to double numbers such as 34, 62, 73, 87, 95 and show answers on whiteboards together on a given signal. • Ask children to share their strategies including the use of jottings. • Ask them to start at 3 and repeatedly double to a set rhythm. • Repeat again and point out improvement.

Main Teaching

Objectives and Vocabulary	Teaching Activities
Use doubling or halving, starting from known facts. For example find sixths by halving thirds, or twentieths by halving tenths. VOCABULARY names of fractions double halve inverse operation RESOURCES Whiteboards	• Write the doubling sequence on the board: 3 6 12 24 48 96 **Q** What is half of 48? How do you know? Draw out that halving is the inverse of doubling. **Q** What is half of 96? Is halving 96 easier or harder than halving 48? Why? Draw out that halving a number with an odd number of tens is a little more difficult but the same strategy of halving the tens and units separately and then regrouping can be used; ½ of 90 = 45; ½ of 6 = 3; 45 + 3 = 48; so ½ of 96 = 48. • Give the children some numbers to practise this strategy and ask them to record their jottings in their books, e.g. 38, 56, 74, 92, 144, 154. • Revise why $^1/_8$ of half is ¼ e.g. draw a square covering 8 small squares on the board or OHT. Divide it into halves then quarters and establish that $^1/_8$ is half of ½. Revise finding quarters and eighths by halving. **Q** What is half of 60? **Q** What is ¼ of 60? **Q** How did you work it out? Explain the process; ½ of 60 = 30; ¼ of 60 = ½ of 30; Practise with other examples. • Draw a rectangle covering 12 small squares (6x2). Divide it into thirds then sixths:  **Q** How many sixths make one third? **Q** What is half of one third? **Q** How could we use halving to find $^1/_6$ of 300? Discuss how children find $^1/_3$ of a number – divide by 3 e.g. 300 ÷ 3 = 100. Establish finding $^1/_3$ then halving the result = $^1/_6$. Provide a few examples such as $^1/_6$ of: 150, 450, 90 for children to work in pairs recording their jottings in their books. • Bring group back together and check for understanding. **Q** Why were these numbers chosen? Would we use the same strategy for finding $^1/_6$ of 60? $^1/_6$ of 660? $^1/_6$ of 97?

Plenary

Teaching Activities/Focus Questions
• Write $^1/_6$ of 936 = 624. **Q** Is this correct? Why not? Ask children to discuss the following in pairs: **Q** What error might have been made? Take feedback. Establish that $^1/_3$ of 936 = 312, which has been doubled instead of halved, so the answer should be 156 rather than 624. **By the end of this lesson, children should be able to:** • **Find sixths by halving thirds, or twentieths by halving tenths.** (refer to supplement of examples, section 6, page 61.)

Planning sheet	**Day Three**	**Unit 2** ***Multiplication and division 1***	**Term:** ***Autumn***	**Year Group:** ***5***

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Estimate by approximating (round to the nearest 10 or 100). VOCABULARY rounding RESOURCES Whiteboards OHT 2.1	**Q** What is the rule for rounding numbers to the nearest 10? **Q** What is the rule for rounding numbers to the nearest 100? • Use OHT 2.1. Tell the children that they have to round 4 numbers from the OHT to the nearest 10, so that when they add those 4 numbers together, the answer is 770 (519, 27, 121, 99). The children can work in pairs using whiteboards to do this activity. **Q** What strategies did you use to solve this problem? • Ask children to round each three-digit number on the OHT to the nearest hundred and then add them together (3500).

Main Teaching

Objectives and Vocabulary	Teaching Activities
Use informal pencil and paper methods to support, record or explain multiplications. Approximate first. VOCABULARY multiplied by inverse grid method operation calculation approximate partitioning	**Q** How would you double 36, 47, 64, 76, 123? • Reinforce partitioning, doubling and then recombining. • Write 23 x 3 on the board. **Q** What will the answer be approximately? How might we calculate 23 x 3? 57 x 3? Discuss suggestions, then repeat with 57 x 3. Reinforce; 23 x 3 = (20 x 3) + (3 x 3) = 60 + 9 = 69 57 x 3 = (50 x 3) + (7 x 3) = 150 + 21 = 171 • Ask children to work in pairs to calculate questions such as the following, recording jottings in books. Ask them to tell their partner the approximate answer first; 64 x 3, 64 x 7, 24 x 5, 34 x 7. • Discuss answers and methods used, then, focus on 64 x 7 = 448. Demonstrate the use of a grid as taught in Y4: X | 60 | 4 7 | 420 | 28 = 448 Ask children to explain where each part of the answer comes from. Ask them to choose one of their calculations to present on a grid. Develop to HTU x U calculations e.g. 124 x 8. Approximate first. Show how the grid is extended: X | 100 | 20 | 4 8 | 800 | 160 | 32 = 992 Ask the children where each part of the answer comes from. Ask children to help model another example. • Provide further examples of HTU x U for children to work on and discuss in pairs e.g. 162 x 3, 154 x 4, 6 x 276, 6 x 343, 7 x 126, 4 x 268. Remind them to approximate first. Discuss the reasons for the large difference between the approximations and the answers.

Plenary

Teaching Activities/Focus Questions
Q How could we check the answers? • Discuss and try out suggestions. Include using the inverse operation, and doing an equivalent calculation, e.g. for 162 x 3 use (162 x 2) + 162. • Look at the problem: There are 168 hours in a week. How many hours are there in 8 weeks? **Q** How could we work this out? Discuss children's methods and solutions. Include and model a grid method: x | 100 | 60 | 8 | 8 | 800 | 480 | 64 | = 1344 **By the end of the lesson, children should be able to:** • **Use a grid method for HTU x U calculations;** • **Approximate first and check results.** • **Explain how the method works.** (Refer to supplement of examples, section 6, page 67.)

Planning sheet	Day Four	Unit 2 *Multiplication and division 1*	Term: *Autumn*	Year Group: *5*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Count on or back in steps of 0.1, 0.2, 0.3 … Use known facts and place value to multiply mentally. VOCABULARY multiplied by one decimal place RESOURCES Counting stick	• Use the counting stick to practise counting in steps of 0.6 (0.6, 1.2, 1.8…). **Q** What is 0.6 x 5? 0.6 x 9? • Repeat counting on and back this time in steps of 0.7, then 0.8 and then 0.9. Ask similar questions.

Main Teaching

Objectives and Vocabulary	Teaching Activities
Extend written methods to multiplication of U.t x U. Approximate first. VOCABULARY approximate approximation rounding	**Q** How would you calculate 57 x 6? **Q** How might you calculate 5.7 x 6? • Collect children's responses and short strategies. **Q.** How would you approximate the answer? • Demonstrate laying the calculation out in a grid:

X	5	0.7	
6	30	4.2	34.2

If the children are unsure about how to calculate 0.7 x 6, suggest they count in 0.7s and conclude that the answer is one tenth of 7 x 6. Compare the answer with the approximation.

• Give the children several similar questions to work on in pairs and record in their books. Remind them to approximate first.

• Ask the children the following problem to discuss in pairs: If 26 children each have a ruler measuring 30cm and they are arranged end to end to form a line, how long would the line of rulers be? Take feedback from the children and agree that the calculation needed would be 30cm x 26 and that this could also be written as 0.3m x 26.
These numbers allow the calculation to be done mentally. i.e.
3 x 26 and make it 10 times bigger for 30cm → 780cm.
3 x 26 and make it 10 times smaller for 0.3 → 7.8m

Q Ask children to calculate the problem if the rulers measured 32cm.

Ask half the class to calculate the answer in cm, and the other half to convert 30cm to m and calculate the answer in metres.

Q Are our answers the same?

Encourage children to use the mental strategy to approximate and the approximation to check their answers to the calculation.

Plenary

Teaching Activities/ Focus Questions
• Write 6.3 x 7 = 42.21 on the board. Ask the children to discuss in pairs. **Q** Is the answer right? What has gone wrong? Why? • Write 6.5 x 4 on the board. **Q** How would you work out the answer? Is there an easier way? Ensure that the children see this as a special case that can easily be done mentally and remind them to look for these. **By the end of the lesson, children should be able to:** • **Approximate first;** • **Multiply a simple decimal with one decimal place by a single digit.** (Refer to supplement of examples, section 6, page 67.)

Planning sheet	**Day Five**	**Unit 2** ***Multiplication and division 1***	**Term:** ***Autumn***	**Year Group:** ***5***

Oral and Mental

Objectives and Vocabulary	**Teaching Activities**
Use known facts and place value to multiply and divide mentally. VOCABULARY multiplied by divided by inverse RESOURCES Counting stick	• Revise counting on and back in 0.6s using the counting stick. Record: 0.6 x 1 = 0.6 0.6 x 2 = 1.2 0.6 x 3 = 1.8 Relate this to 6 x 1 = 6 6 x 2 = 12 6 x 3 = 18 Recognise that 0.6 is ten times smaller than 6. **Q** What is 0.6 x 9? Relate this to ten times smaller than 6 x 9. Ask children a selection of quick fire calculations in pairs e.g. 6 x 8 = 48 0.6 x 8 = 4.8 etc. Extend to division facts e.g. 48 ÷ 6 = 8 48 ÷ 0.6 = 80

Main Teaching

Objectives and Vocabulary	**Teaching Activities**
Extend written methods to multiplication of HTU x U and U.t x U. Approximate first. VOCABULARY approximate rounding	• Write on the board: 258 x 9. **Q** How can we estimate the answer? Ask a child who feels confident to demonstrate using the grid method, to find the precise answer. **Q** How does the answer compare with our estimate? Point out that although 258 x 10 = 2580 is a sensible estimate, the true answer will be 'out' by 258. Say that as we multiply, the amounts we round the estimates by are often not as close as those we make when adding or subtracting. **Q** If 258 x 10 = 2580, how else could we have calculated 258 x 9? Discuss and try out suggestions. • Write the following on the board: 258 x 9 1800 450 72 2322 **Q** Where do you think 1800, 450, 72 and 2322 have come from? Talk through the calculation showing where each step occurs in the grid method written earlier. Repeat the whole process with another example. • Give the children other HTU x U questions. Ask them to use both layouts to work through the first three and then to choose their preferred layout for the others. Remind them to approximate first.

Plenary

Teaching Activities/ Focus Questions

• Write the following on the board:

258
x 9
18
45
72
135

Q Can the answer possibly be right? What is wrong?

Discuss and establish the importance of place value.

• Remind the children of a calculation they did yesterday: 5.7 x 6.

Q How could we lay this out vertically as we did for some of our calculations today?

5.7
x 6
30
4.2
34.2

Point out the importance of aligning the decimal point in this layout.

By the end of the lesson, children should be able to:

- **Develop an efficient standard method that can be applied generally, approximating first.**

(Refer to supplement of examples, section 6, page 67).

276	59	121	355	81
99	434	519	38	786
101	27	76	919	19