Multiplying decimals by a two-digit number using the expanded written method

National Curriculum attainment targets

- Multiply numbers with up to two decimal places by two-digit whole numbers
- Use estimation to check answers to calculations

Lesson objectives

- Multiply one-digit numbers with up to two decimal places by two-digit whole numbers, e.g. 7·56 × 34, using the expanded written method by converting decimals to whole numbers before calculating and then converting the answer back to decimals
- Estimate and check the answer to a calculation

Previous related lesson

Unit 10, Week 1, Lesson 1

Prerequisites for learning

Pupils need to:

- recall the multiplication tables up to 10 × 10
- understand the effect of multiplying a number by a multiple of ten and one hundred including decimals
- partition numbers into hundreds, tens and ones
- add a series of numbers using the column method of addition

Vocabulary

multiple, multiplied by, multiplication, estimate, approximate, partition, ten thousand, thousand, hundred, ten, one, equivalent

Future related lessons

Unit 10, Week 1, Lesson 3; Unit 10, Week 1, Lesson 4; Unit 12, Week 1, Lesson 3

Success criteria

Pupils can:

- make a reasonable estimate for the answer to a calculation
- convert whole numbers into decimals and vice versa
- multiply a three-digit by a two digit number using the expanded written method
- multiply a one-digit number with up to two decimal places by a two-digit number using the expanded written method

Getting Started

- Choose an activity from Number – Multiplication and division.
- Choose a game or activity from *Fluency in Number Facts: Y5/Y6* – Multiplication and division.

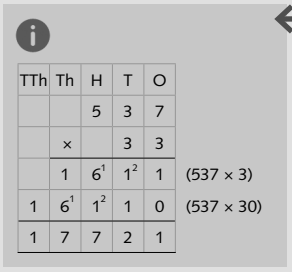
Collins Connect
Year 6, Unit 10, Week 1

Teach

Resources

mini whiteboard, pen and eraser (per child)

- Write a multiplication number sentence on the board, e.g. 537 × 33 =
- Ask: **What would the approximate answer to this calculation be?** (500 × 30 = 15 000)
- Review how to use the expanded written method to calculate 537 × 33.
- Say: **We start by multiplying 537 by 3**. Write (537 × 3) on the right-hand side of the answer section to aid calculation of the answer. Ask: **What is 7 multiplied by 3?** (21) Say: **21 is 2 tens and 1 one. We write the 1 in the ones column and add the 20, or 2 tens, after we have calculated 30 multiplied by 3. To remind us to add the 2 tens we "carry" the 2 tens into the tens column by writing a small 2 in the tens column.**
- Ask: **What is 30 multiplied by 3?** (90) Say: **90 add the 20 from the previous calculation gives a total of 110.** Write the 10, or 1 ten in the tens column and carry the 1 hundred into the hundreds column by writing a small 1 in the hundreds column.
- Ask: **What is 500 multiplied by 3?** (1500) Say: **1500 add the 1 hundred from the previous calculation gives a total of 1600**. Write this in the correct position giving a total of 1611.
- Say: **Next, we multiply 537 by 30**. Write (537 × 30) on the right hand side of the answer section to aid calculation of the answer. Say: **First, we multiply 7 by 30.** Ask: **What is 7 multiplied by 30?** (210) Say: **210 is 2 hundreds and 1 ten. We write zero in the ones column to hold the place, 1 in the tens column and carry the two hundred by writing a small 2 in the hundreds column.**



TTh	Th	H	T	O	
		5	3	7	
	×		3	3	
	1	6^{1}	1^{2}	1	(537 × 3)
1	6^{1}	1^{2}	1	0	(537 × 30)
1	7	7	2	1	

In this example 33 is partitioned into 30 and 3 and the least significant digit is multiplied first, i.e. 3. If you choose to multiply the most significant digit first the answer will remain the same but the order of calculations will change. Please ensure you are consistent across methods so that children do not become confused.

537 × 33 with the most significant digit being multiplied first.

TTh	Th	H	T	O	
		5	3	7	
	×		3	3	
1	6^{1}	1^{2}	1	0	(537 × 30)
	1	6^{1}	1^{2}	1	(537 × 3)
1	7	7	2	1	

- Ask: **What is 30 multiplied by 30?** (900) Say**: 900 add the 200 (2 hundreds) from the previous calculation, gives a total of 1100.** Write the 100, or 1 hundred in the hundreds column and carry the 1 thousand into the thousands column by writing a small 1 in the thousands column.
- Ask: **What is 500 multiplied by 30?** (15 000) Say: **15 000 add the 1 thousand from the previous calculation gives a total of 16 000**. Write this in the correct position giving a total of 16 110.
- Add the answers together using the formal written method. Compare the answer (17 721) with the estimate. Write 5·37 × 33 = on the board alongside the previous calculation.
- Ask: **What do you notice about this calculation?** (they are the same except there is a decimal)
- Ask: **How does the decimal change the value of the calculation?** (it makes it 100 times smaller)
- Say: **5·37 × 33 is equivalent to 537 × 33 ÷ 100. This equals 17 721 ÷ 100, which is 177·21. Therefore when we are multiplying a decimal number we can convert it into a whole number to carry out the calculation and then convert it back to a decimal once we have found the answer. This makes the calculation a lot easier to perform.**
- Ask: **How do we convert 26·54 into a whole number? What is the answer to 567 ÷ 100?**
- Continue with other examples using the expanded written method until you feel the majority of the children have understood the method, e.g. 6·74 × 26; 3·74 × 34; 7·8 × 35; 2·78 × 56.

Individualised Learning

Refer to Activities 1, 2, 3 and 4 from the Learning activities on pages 392–393.

Pupil Book 6C – Page 30: Multiplying decimals by a 2-digit number using the expanded written method

Progress Guide 6 – Support, Year 6, Unit 10, Week 1, Lesson 2: Multiplying decimals by a 2-digit number using the expanded written method

– Extension, Year 6, Unit 10, Week 1, Lesson 2: Multiplying decimals by a 2-digit number using the expanded written method

Resources: 12 counters (per pair); two 0–9 dice (per pair); calculator (per pair), pencil and paper

Plenary

Resources

mini whiteboard, pen and eraser (per child)

- Reinforce the expanded written method of multiplication taught in the lesson. Write various calculations on the board and ask children to write the approximate answer on their mini whiteboard, e.g. 2·17 × 53 (100); 1·32 × 65 (65); 5·24 × 82 (400).Invite children to display their answers.
- Ask: **How did you work out the approximate answer?** Choose one of the calculations for children to find the answer.
- Say: **Explain to your partner how you would work out the answer to this question using the expanded written method on your mini whiteboard.** Ask: **Can you explain your method of working out the answer to the class?** Repeat with other examples.

Homework Guide 6

Year 6, Unit 10, Week 1, Lesson 2: Multiplying decimals by a 2-digit number using the expanded written method

Overcoming Barriers

- Some children may become confused with the number of different methods there are to work out the answer to calculations involving decimals. You may prefer to teach one method only or allow children to choose the method they find the easiest.
- It is important that children understand what decimals are and recognise the value of decimal numbers and do not just complete calculations as procedures.