SPRINGBOARD 6 LESSON 2
MULTIPLICATION AND DIVISION 1

TOTAL TIME

30 MINUTES

Objective:

☐ Identify and use the inverse relationship between multiplication and division

Vocabulary:

☐ inverse

☐ product

☐ factors

☐ multiple

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

☐ write down the family of facts when given one fact;

☐ solve $17.4 \times \square = 40.02$ by calculating $40.02 \div 17.4$

Resources:

☐ whiteboards and pens

☐ calculators

☐ OHP calculator

☐ OHTs 2.1 and 2.2

ORAL AND MENTAL STARTER

5 MINUTES

Write $8 \times 5 = \square$ on the board.

Establish that the answer is 40 and place it in the box.
Explain that this number sentence is part of a family of four.

Q: What are the other associated number sentences?

Collect the other three number sentences:

$$5 \times 8 = 40$$
$$40 \div 8 = 5$$
$$40 \div 5 = 8.$$

Reinforce that for each number sentence there are usually three others. Work through $5 \times 5 = 25$ to show that in this case there is only one associated number sentence.

Remind the children that 40 is a multiple of 8 and a multiple of 5, and that 8 and 5 are factors of 40.

Write $9 \times 4 = \square$ on the board. Children use whiteboards to show an associated number sentence. Check for all possibilities from the responses.

Write $42 \div 6 = 7$ on the board and obtain the other three number sentences from the children.

Q: What is the product of 6 and 7?

Draw out the meaning of the word 'product'.

Q: How can we describe the connection between 6, 7 and 42 using the words multiple and factors?
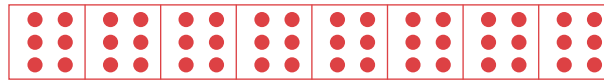
Highlight that 6 is a factor of 42 and 42 is a multiple of 7.

When discussing these, refer to the appropriate number sentence and emphasise the vocabulary being used.

MAIN TEACHING ACTIVITY

Show OHT 2.1.

Q: How many counters are there in each cell?

Q: How many cells are there?

Q: How many counters are there altogether?

Q: How can we represent this as a number statement?

Collect responses and write $6 \times 8 = 48$ on the board. Remind the children that each number sentence is usually a member of a family of 4.

Write $\square \div 8 = 6$ on the board, and ask the children for the other three number sentences.
$6 \times 8 = \square \qquad 8 \times 6 = \square \qquad \square \div 6 = 8$

Q: Which number sentences can you complete?

Reinforce that knowing 6 multiplied by 8 is 48, means we know that 48 divided by 8 must be 6. Ensure the children can complete all the sentences.
Show OHT 2.2 and ask the 4 questions listed above.

Write $\square \div 4 = 8$ on the board.

Q: What number goes in the empty box?

Using OHT 2.2, emphasise that there are 8 fours, and 8 × 4 = 32. So 32 must go in the box. Quickly ask the children to record the other three number sentences on their whiteboards using the empty box as before. Write on the board:

4 × 8 = ☐   8 × 4 = ☐   ☐ ÷ 8 = 4

Q: Which number sentences can we complete?

Establish that knowing the multiplication fact 8 × 4 = 32 or 4 × 8 = 32 is enough. We can use this fact to fill in all the boxes. Say multiplication and division are inverse operations. The inverse operation for division is multiplication, and the inverse operation for multiplication is division.

Write a ☐ ÷ 6.3 = 4 on the board.

Q: What number goes in the empty box?

Emphasise that there are 4, so 6.3 × 4 must go in the box. Work this out using 6 × 4 = 24 and 0.3 × 4 = 1.2 so 6.3 × 4 = 25.2.

PLENARY

10 MINUTES

Write Question 1, 2.8 × ☐ = 10.36 on the board. Ask the children to write down the other three number sentences using the empty box notation.

Q: Which number sentence can we complete to help us find the number in the box?

Children use a calculator to work out 10.36 ÷ 2.8.

Ask children to work out 17.4 × ☐ = 40.02. Discuss their strategies.

Write Question 2, ☐ ÷ 2.5 = 5.4 on the board. Establish that this can be worked out by calculating 5.4 × 2.5. Relate this to earlier examples.

Ask children to work out ☐ ÷ 3.8 = 7.6. Discuss their strategies.

Q: How can we check our answer?

Establish that we can check the answer to Question 1 by putting the answer into the original number sentence. The calculation would be 2.8 × **3.7**. For Question 2 the check calculation is **13.5** ÷ 2.5. For the other calculations the check calculations are 17.4 × **2.3** and **28.88** ÷ 3.8.

Remember:

When finding a missing number, it is helpful to write down the other three number sentences and then decide which one to use to find the missing number.

Always put your answer back in the question and check that it works.

**LESSON 2 RELATED TEST QUESTION
1999 TEST B (CALCULATOR PAPER)**

17   Write in the missing number.

$$950.4 \div \boxed{} = 49.5$$

1 mark

MARK SCHEME

19.2

ANALYSIS OF CHILDREN'S ANSWERS

On other questions children responded well to subtraction as an inverse of addition. They found the inverses of multiplication and division more difficult at all levels. More children had difficulty with recognising that the inverse of division is multiplication.

For children who understand inverses, this was a simple question to answer using a calculator. Children who answered the question using trial and improvement methods made more errors than when a single calculation had been used.

IMPLICATIONS FOR PLANNING

To help children understand inverses, it is useful to introduce simpler cases such as $12 \div \square = 3$ and get children to describe this statement in their own words and identify the family of equivalents such as: $12 = 3 \times \square$.

During a topic on multiplication and division inverses need to be an integral part of the teaching programme.

Children need to be taught that when using a calculator it is useful to check answers by using the inverse of the operation in the question.