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## Multiplying and dividing by powers of 10

### Mathematical goals

This session is designed to help learners to:

- verbalise decimals correctly;
- begin to explore the effects of multiplying and dividing decimal numbers by powers of 10.

It is advisable to complete Session 18 – *Using zero as a place-holder* before attempting this session with your learners unless you are sure they have mastered the ideas in that session.

### Materials required

- Sheet 3 – *Place value chart* (for OHP or other display).

For each pair or small group of learners you will need:

- Sheet 1 – *Multiplying and dividing by powers of 10*;
- Sheet 2 – *Template: multiplying and dividing by powers of 10*;
- calculator.

For each learner you will need:

- mini-whiteboard, marker and cloth.

Optional:

- Sheet 3 – *Place value chart*.

### Notes

## Suggested approach **Beginning the session**

Display *Sheet 3 – Place value chart* using the overhead projector, whiteboard or similar, and ask a variety of questions such as:

What can I do to the number 5 to get 500?

What can I do to the number 70 to get 0.07?

Some learners may benefit from having their own copy of *Sheet 3 – Place value chart* at this stage.

Ask learners to display their answers using their mini-whiteboards.

Write the following numbers on the overhead projector, whiteboard or similar and ask learners what you must do to the first number to get the second number. Then what you must do to the second number to get the third number, and so on.

**759.3      75.93      75 930      ...**

## **Working in groups**

Ask learners to sit in pairs or groups of three. Give each group *Sheet 1 – Multiplying and dividing by powers of 10*. Each group of learners should have a calculator available. Learners should take turns to tell their group what they think the next question mark stands for and should give a reason. After they have done this, they can use a calculator to check their answer. Correct answers should be written on the sheet.

Learners who finish quickly could make up a task for a different group to solve using *Sheet 2 – Template: Multiplying and dividing by powers of 10*.

As you move round the room, listen to learners' explanations. Note any obvious misconceptions that emerge, for whole group discussion.

## **Reviewing the learning**

Hold a whole group discussion about what has been learned, drawing out any common misconceptions and discussing them explicitly.

One of the most common misconceptions is that 'the decimal point moves' when multiplying and dividing by powers of 10. Make sure that learners understand that the decimal point

remains static and that the digits move relative to it when they are multiplied or divided by powers of 10, so that they occupy positions with the correct place value.

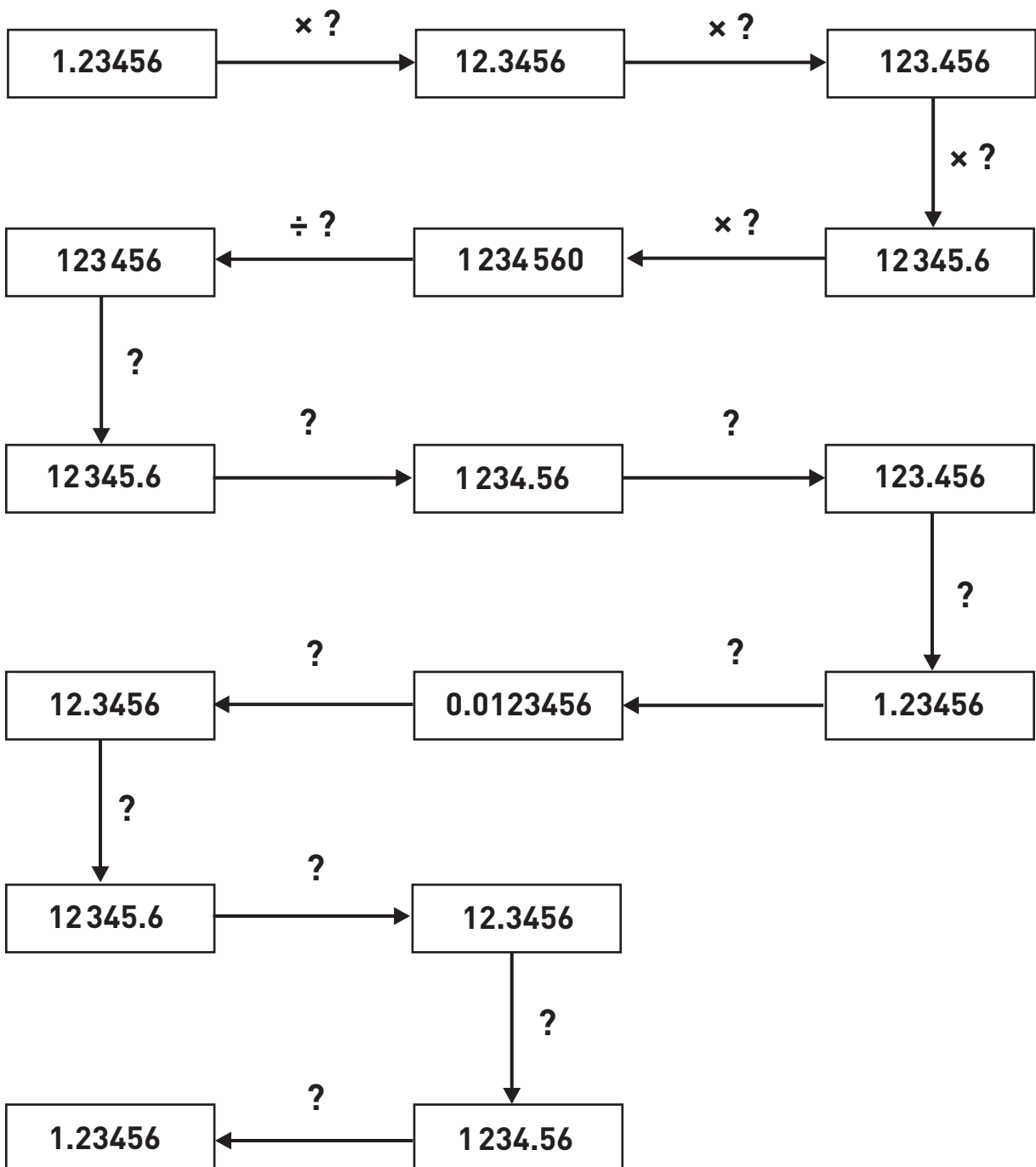


## Sheet 1 – Multiplying and dividing by powers of 10

The first number in the chain is 1.23456. One member of your pair or group should work out the number you need to multiply by to change this to the next number (12.3456) and explain the answer to the group. Use the calculator to check your answer and write it on the sheet.

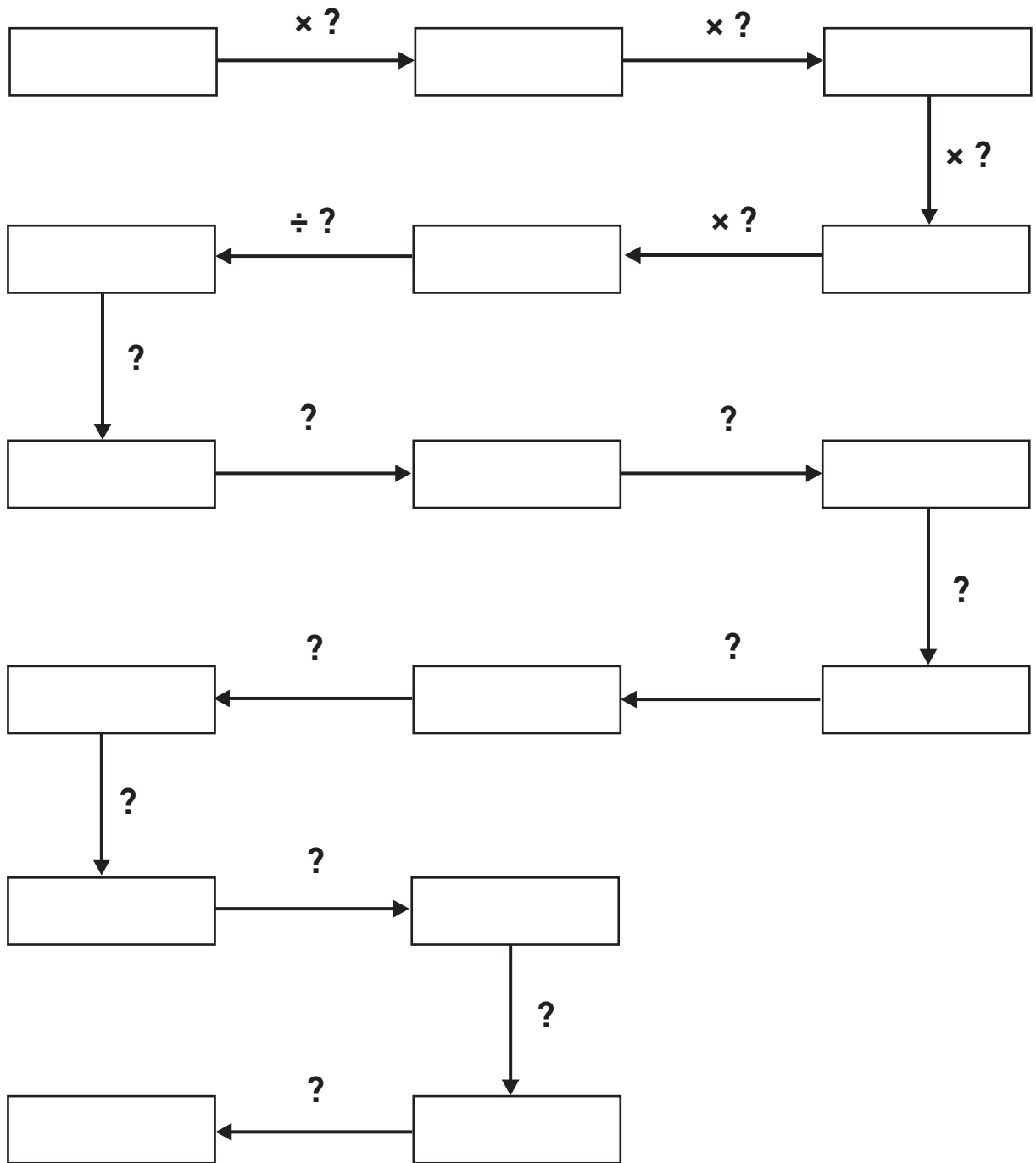
Carry on like this, taking turns to multiply or divide, and writing in the correct answers.

Can you make it all the way along the chain without making any mistakes?





Sheet 2 – Template: Multiplying and dividing by powers of 10







Sheet 3 – Place value chart

<b>0.001</b>	<b>0.002</b>	<b>0.003</b>	<b>0.004</b>	<b>0.005</b>	<b>0.006</b>	<b>0.007</b>	<b>0.008</b>	<b>0.009</b>
<b>0.01</b>	<b>0.02</b>	<b>0.03</b>	<b>0.04</b>	<b>0.05</b>	<b>0.06</b>	<b>0.07</b>	<b>0.08</b>	<b>0.09</b>
<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>0.4</b>	<b>0.5</b>	<b>0.6</b>	<b>0.7</b>	<b>0.8</b>	<b>0.9</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>90</b>
<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>	<b>800</b>	<b>900</b>
<b>1000</b>	<b>2000</b>	<b>3000</b>	<b>4000</b>	<b>5000</b>	<b>6000</b>	<b>7000</b>	<b>8000</b>	<b>9000</b>