

Multiplying by Tens

Overview

The shortcuts of adding or removing zeros when multiplying and dividing by 10, 100 and 1,000 are extremely important in a society that uses decimal (10-based) systems of currency and measurement. They are also very useful for approximation of calculations, whether for making predictions or estimates, or for checking results given by spread sheets and calculators. These are skills that are often taken for granted in our society but which may need specific attention for adult numeracy students.

This activity introduces these important skills for multiplication in gradual steps using an approach that allows adult students to recognise the patterns then apply the shortcuts to a range of whole number calculations.

It also extends the skills to multiplication by numbers such as 20, 30, 50 ... and 200, 300, 500 ...

Skills and Knowledge

Shortcut multiplication by:

- 10
- 100
- 20, 30 ...
- 200, 300 ...

Preparation and Materials

Photocopy Practice Sheets 1 & 2
(1 per student)

Set of basic calculators

Suggested Procedure

Introducing the x 10 pattern

To set these multiplications in some context, ask:

- *Drinks are \$4 a glass at a fundraising BBQ*
- *How much will 10 glasses cost?*

Allow students time to work this out using their own strategies. Then discuss different methods by they arrived at their answers.

These could include:

- $4 + 4 + 4 \dots$
- Use of a written multiplication table
- Use of a calculator
- Adding a zero

Record on the board: $10 \times \$4 = \40



Similarly for the next few questions – discuss the method then record the answers.

- *Hamburgers sell at \$6. How much will 10 cost?*
- *A vegetable curry is \$9. How much for 10?*

You will have now recorded: $10 \times 4 = \$40$
 $10 \times 6 = \$60$
 $10 \times 9 = \$90$

Ask:

- *Do you see a pattern here?*
- *Without working out can you predict the answers to:*
 - $10 \times 3?$
 - $10 \times 5?$
 - $10 \times 8?$

Extending the shortcut to larger numbers

Discuss with students whether they think this shortcut will work for bigger numbers, with more digits, for example 45, or numbers with more zeros, such as 400.

Ask:

- *Use the shortcut to do these calculations*
- *Test your answer using a calculator:*
 - 20×10
 - 35×10
 - 300×10
 - 704×10
 - $6,080 \times 10$

Keep going until students are confident that the shortcut works for any whole numbers.

Practice Sheet 1 Contains sets of short questions to help students gain confidence with these skills. Set 1 focuses on multiplication by 10.

Extending to x 100

Once multiplying by 10 is established move on to discuss the following sequence of questions. Encourage students to use calculators in addition to any other methods they might choose for these calculations.

Ask:

What if 100 of everything is sold?

- *100 drinks at \$4*
- *100 hamburgers at \$6?*
- *100 vegetable curries at \$9?*



Record: $100 \times 4 = 400$
 $100 \times 6 = 600$
 $100 \times 9 = 900$

Again ask:

- *Can you see a pattern?*
- *Can you predict the answers to these:*
 - $100 \times 3 = ?$
 - $100 \times 7 = ?$
 - $100 \times 8 = ?$

Continue until the rule of adding two zeros is established.

Extending the shortcut to other numbers

As with multiplication by 10, get students to test the shortcut with a variety of whole numbers and to check what they get with a calculator to be sure for themselves that the shortcut does work.

Examples could include:

- 100×30
- 52×100
- 100×360
- $4,000 \times 100$
- $6,721 \times 100$

Practice Sheet 1 Contains sets of short questions to help students gain confidence with these skills. Set 2 focuses on multiplication by 100.

Extending to $\times 20, 30 \dots$ or $200, 300 \dots$

These calculations are straightforward once students are aware that the multiplication can be done in two simple steps.

For example, since:

- $20 = 2 \times 10$, multiplying by 20 is the same as first multiplying by 2, then by 10 or vice versa.
- $300 = 3 \times 100$ multiplying by 300 is the same as first multiplying by 100, then by 3.

Again it is a matter of letting students experiment by trying out the possible shortcut then checking that it works with a calculator.

You may wish to set it in a context to begin the discussion and show the steps in way which will possibly be instinctive to students.

Ask:

- *Drinks at a concert cost \$4 each*
- *I sold 20 drinks in the first few minutes*
- *How much money should I have?*



Encourage students to try their own methods then discuss the possibility of looking at 10 drinks at a time:

- *1 drink costs \$4*
- *10 drinks costs $\$4 \times 10 = \40*
- *20 drinks is double 10 or (2×10)*
- *So double $\$40 = \80 or $(2 \times \$40 = \$80)$*

Get students to check $\$4 \times 20$ using calculators to see that it gives the same result as the two stage process.

Try a few more similar questions with say, 30 drinks, then similar multiples of other items with single digit prices. Include quantities such as 200, 400 in the investigations.

Practice Sheet 1 Contains sets of short questions to help students gain confidence with these skills. Set 3 focuses on multiplication by multiples of 10s and 100s.

Practice Sheet 2 Contains questions that involve using all of these shortcut multiplication skills applied to realistic situations.

Further Practice

Sets of *Quick Questions* at the beginning of following sessions would be a good way to keep reinforcing these skills.

Possible extension

The same technique, of recognising a pattern emerging after several calculations with a calculator, can be used to extend these shortcut techniques to situations which involve decimals, particularly prices with dollars and cents.



Set 1

Write answers to these using shortcuts only. When you have finished check answers with a calculator.

1. 9×10

6. 10×90

11. 10×91

2. 15×10

7. 970×10

12. 702×10

3. 10×27

8. 30×10

13. 10×35

4. 36×10

9. 101×10

14. 10×305

5. 45×10

10. 10×200

15. 17×10

Set 2

Write answers to these using shortcuts only. When you have finished check answers with a calculator.

1. 2×100

6. 450×100

2. 5×100

7. 100×720

3. 100×7

8. $3,000 \times 100$

4. 62×100

9. 90×100

5. 101×100

10. $100 \times 5,020$

Set 3

Write answers to these using shortcuts only. When you have finished check answers with a calculator.

1. 50×30

6. 100×40

11. 600×90

2. 40×20

7. 300×40

12. $1,200 \times 20$

3. 30×90

8. 200×20

13. 110×40

4. 50×40

9. 70×50

14. 30×500

5. 60×50

10. 400×60

15. 700×30



Write answers to these problems.

1. Sam's trip from home to work is 4km. How far would he travel if he did the trip:

- 10 times?
- 20 times?



2. There are 8 muesli bars in a packet. Sonya bought 20 packets for a children's picnic?

- How many muesli bars did she get?

3. It takes Rosa 2 minutes to address one envelope. How many minutes will she take to address:

- 10 envelopes?
- 30 envelopes?
- 100 envelopes?

4. There are 30 Vitamin C tablets in a bottle.
If you buy 4 bottles, how many tablets will there be?

5. Maria types 60 words a minute. How many words will she have typed after typing for:

- 100 minutes?
- One hour?



6. A ream (packet) of paper contains 500 sheets. How many sheets in:

- 6 reams?
- 10 reams?

7. Janine earns \$20 an hour as a waitress. How much would she earn after:

- 10 hours?
- 20 hours?

