

Mathematics lessons for Grade 3

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Using these lesson plans

These sample lessons for Grade 3 are suitable for use with a whole class. The lessons are single examples to illustrate different teaching and learning activities. They are not intended to be taught as a sequence. They are drawn from different topics and points in the teaching year to show spread rather than sequence.

The objectives for the lessons are drawn from the standards for Grade 3. Occasionally, a standard from an earlier grade is revised. The relevant standards are shown in the lesson plans.

The lessons are organised in three parts: a starter to introduce the lesson, a main activity, and a final phase to help students to reflect on the lesson and consolidate their learning. Before the starter, you should outline the purpose of the lesson, drawing out for students what they will learn and how this builds on previous work. In the final part of the lesson, you will need to establish the key learning points, what students need to remember and what they will go on to learn next. There is no expectation that students should copy out the key learning points in their exercise books.

The lesson plans do not include homework tasks because the lessons are single examples taken out of sequence. If your school's policy is to provide homework for Grade 3, you will need to provide this, since homework is an important part of a lesson.

Each lesson plan has enough material to support about 45 minutes of teaching. You may need to supplement the activities with simpler or more challenging tasks if the students in your class have a range of attainment. You could choose from activities in textbooks or from your own resources. If you wish, different tasks can be given to different groups of students, according to their needs.

There may be too much material in the lesson plan for 45 minutes, since this will depend on the class. In this case, you could designate one of the activities in the lesson as homework, or carry it forward to the next lesson. Be selective about

which activity to cut – it does not have to be the last one merely because it comes at the end.

Answers to questions are provided to help you to correct students' responses and give feedback. Sometimes, alternative answers are possible that are equally correct.

3.1

Inverse operations: addition and subtraction

Objectives

- Solve problems in which a symbol represents an unknown number, including problems involving inverse operations.
- Solve word problems involving whole numbers, measurements or money using addition and subtraction (up to two steps).

Starter

Vocabulary

what must be added to?

Resources

One set of large cards showing the digits 0 to 9

Hold up the digit 6 and ask the class to tell you what must be added to the number to make 10. Write on the board: $6 + \square = 10$. Confirm that the answer is 4, and write it in the box. Repeat with other examples.

Now choose a digit card so that the class cannot see it, and put it face down on a table. Point to the card and ask:

Q When I add 7 to that number, I get 10. What is the number?

Write on the board: $\square + 7 = 10$. Confirm that the answer is 3, and write it in the box. Repeat with other examples.

Using an 'empty box' format, practise examples of multiples of 10 that total 100, such as $20 + \square = 100$, then pairs of whole numbers that total 100, such as $41 + \square = 100$ and $\square + 36 = 100$. Each time ask questions such as:

Q What must we add to ... to make 100?

Q We add 36 to a number, and get an answer of 100. What number did we start with?

Then ask:

Q How did you work out your answer?

Q Is there another strategy that you could use to decide what goes in the empty box?

Q How could you check your answer?

Main activity

Vocabulary

equation
number sentence
more than
less than
difference
plus
minus
total
sum
inverse

Resources

Mini-whiteboards
Calculators
OHT 3.1a

Write $14 + 18 = \square$ on the board, with a box large enough to write in.

Establish that the answer is 32 and write it in the box. Explain that this number sentence or equation is part of a family of four.

Q What are the other sentences or equations in the family?

Collect the other three: $18 + 14 = 32$

$$32 - 14 = 18$$

$$32 - 18 = 14$$

Emphasise that for each equation of this type there are usually three others. Work through $17 + 17 = 34$ to show that in this case there is only one associated equation: $34 - 17 = 17$.

Write $23 + 64 = \square$ on the board. Establish that the answer is 87. Ask students to use their whiteboards to write an associated number sentence or equation. Check for all possibilities from the responses.

Write $58 - 16 = 42$ on the board and obtain the other three number sentences or equations from the students.

Q How can we describe the relationship between 58, 16 and 42?

Encourage students to use phrases such as ‘58 is 16 more than 42’, ‘16 is 42 less than 58’, ‘the difference between 58 and 16 is 42’, ‘the sum of (or total of) 16 and 42 is 58’.

Write $\square - 23 = 45$ on the board. Ask students for the other three number equations.

$$\square - 45 = 23 \quad 23 + 45 = \square \quad 45 + 23 = \square$$

Q Which of these equations can you complete?

Reinforce that knowing that 45 plus 23 equals 68 means that we know that 68 minus 23 equals 45, and that 68 minus 45 equals 23. Knowing that $45 + 23 = 68$ is enough. This fact can be used to fill in the other boxes.

Say that addition and subtraction are *inverse* operations. Addition is the inverse of subtraction and subtraction is the inverse of addition.

Ask students to work in pairs. Each student writes down one addition and one subtraction calculation involving two- or three-digit numbers, and finds the answer. For example:

$$17 + 68 = 85$$

$$82 - 54 = 28$$

They then write out their calculations again on a separate slip of paper, this time replacing one of the first two numbers with an empty box.

$$17 + \square = 85$$

$$\square - 54 = 28$$

They then swap these with their partner, who works out the answers. Remind them to make use of the other three number sentences. The pair then checks each other’s calculations.

Tell the class that the same strategies can be used to solve problems involving money. Give the class a problem.

The watch that Sara wants to buy costs QR 92.

Sara has saved QR 47 towards the cost.

How much more must Sara save?

Show students how to write an equation to model the problem.

$$47 + \square = 92$$

Ask students for the other three number equations.

$$\square + 47 = 92 \quad 92 - 47 = \square \quad 92 - \square = 47$$

Ask students to work out the answer to the problem by completing one of the equations.

Q How can we check the answer?

Establish that the answer can be checked by putting it back into the original equation: $47 + \square = 92$.

Write a different problem on the board.

*Ali thinks of a number. He says:
'If I subtract 14 from it, I get 29.'
What is Ali's number?*

Tell students to work in pairs and to discuss the answer. Ask different pairs to describe to the rest of the class how they worked out their answer.

Show **OHT 3.1a**, a set of 'I am thinking of a number' problems. Work through the problems, asking students to explain how they worked out the answers. Each time, write an equation to represent the problem and solve it by using an inverse operation.

Other tasks

If necessary, choose further related activities or exercises from available textbooks or your own materials.

Consolidation

Resources

OHT 3.1b

Show **OHT 3.1b** and point to one of the questions. Ask students to complete it and to write the answer on their mini-whiteboards. Choose a student who has answered correctly and ask them to explain to the whole class how they worked out the answer.

Q Did anyone do it differently?

Repeat with the other questions then summarise the lesson for students.

Summary for students

- Addition and subtraction are the inverse of each other (one 'undoes' or 'reverses' the other).
- When finding a missing number, write down the other three number sentences and then decide which one to use to find the missing number.

3.2

Multiplying and dividing by 10 and 100

Objectives

- Read and write whole numbers up to 10 000 in numerals and words.
- Represent the place value for whole numbers with up to four digits (thousands, hundreds, tens, ones) using models and expanded notation.
- Count on or back from a given four-digit number in 1s, 10s, 100s, 1000s.
- Multiply or divide whole numbers by 10 or 100 (whole-number answers for division).
- Convert metres to centimetres and centimetres to metres, expressing the result in mixed units where appropriate.

Starter

Vocabulary

digit
value
write in figures

Resources

Mini-whiteboards

Write 4357 on the board. Ask the class to read the number aloud in words. Talk through writing 4357 in an expanded form.

$$4357 = 4000 + 300 + 50 + 7$$

Discuss the values of the different digits in 4357.

Q What is the value of the digit 7? Of the 4?

Write 7041 on the board. Ask the class to read the number aloud in words. Talk through writing 7041 in an expanded form.

$$7041 = 7000 + 40 + 1$$

Q What is the value of the digit 7? Of the 4?

Q Why is there a zero in the hundreds place?

Explain that the zero is used to mark an empty place – there are no hundreds.

Q What number is 10 more than 7041? 10 less than 7041?

Q What number is 100 more than 7041? 100 less than 7041?

Ask students to write these numbers in figures on their whiteboards:

- four thousand two hundred;
- five thousand and ninety;
- two thousand and seven.

Check and correct any errors by writing numbers in an expanded form.

Write 97 on the board. Ask students to add 10 and write the answer on their whiteboards. Count on in tens round the class from 107 to 227.

Write 1012 on the board. Ask students to subtract 10 and to write the answer (1002). Ask them to subtract 10 again and to write the answer (992). Check the answers and, if necessary, use a number line to confirm that $1002 - 10 = 992$.

Write 6530 on the board. As a class, count back in hundreds to 6130. Ask a student to write six thousand one hundred and thirty in figures on the board.

Q What number is 100 less than 6130? (6030)

Ask the class to subtract 100 again, and to write the new answer (5930) on their whiteboards. Check the answers and, if necessary, use a number line to confirm that $6030 - 100 = 5930$.

Main activity

Vocabulary

multiply
divide
ten times larger
ten times smaller
inverse
convert

Resources

OHT 3.2a
OHP calculator

As a class, chant the 10 times table, forwards then backwards:

*one ten is ten,
two tens are twenty,
three tens are thirty,* and so on.

Write on the board: $6 \times 10 = 60$.

Explain that each individual unit in the six ones has been multiplied by 10, or made 10 times larger, so each one becomes ten. Use the place value grid on **OHT 3.2a** to show how the six ones or units have become six tens, and the digit 6 has moved one place to the left.

Now write on the board: $40 \times 10 = 400$.

Explain that this time each individual ten has been multiplied by 10, or made ten times larger. Demonstrate, using hundreds, tens and units boxes, how the four tens have become four hundreds, and the digit 4 has moved one place to the left.

Write on the board: 46×10 . Ask:

Q What do you think the answer will be? How did you work it out?

Establish that each of the digits has moved one place to the left and that 0 has been put in the ones place as a place holder. Explain that ‘add a 0’ is not acceptable (it does not work with decimals). Repeat for one or two more two-digit numbers.

Use the OHP calculator, and multiply whole numbers under 100 by 10. Each time ask the class to predict the answer before you display it. Ask:

Q What will happen if I now divide the answer by 10?

Establish the generalisation that dividing by 10 makes the number ten times smaller and that each of its digits moves one place to the right.

Draw out, through a few different examples, that multiplying by 10 and dividing by 10 are inverse operations (one undoes the effect of the other).

Write on the board: $61 \times 100 = 6100$.

Read the equation aloud together. Explain that each individual unit has been multiplied by 100, or made 100 times larger. Demonstrate on the board using thousands, hundreds, tens and units boxes, how each has moved two places to the left, or use a second copy of **OHT 3.2a**.

Write on the board: 205×100 . Ask:

Q What do you think the answer will be? How did you work it out?

Establish again that each digit has moved two places to the left. Repeat for one or two more two- or three-digit numbers.

Using the OHP calculator, multiply some two-digit numbers by 100, e.g. 37×100 . Each time ask the class to predict the answer. Then ask:

Q What will happen if I now divide the answer by 100?

Establish the generalisation that dividing by 100 makes the number one hundred times smaller and that each digit has moved two places to the right.

Draw out, through more examples, that dividing by 100 and multiplying by 100 are inverse operations.

Other tasks

If necessary, choose further related activities or exercises from available textbooks or your own materials.

Consolidation

Remind the class that there are 100 centimetres in 1 metre. To change or convert metres to centimetres they must multiply by 100, and to change centimetres to metres they must divide by 100. Ask:

Q A table is two hundred centimetres long. How many metres is that?

Q Change nine hundred centimetres into metres.

Repeat with other examples, including changing dirhams to riyals.

If time allows, and students are familiar with remainders, finish with some examples of conversions where the answer needs to be expressed in mixed units.

For example:

Q What is 458 centimetres in metres? (4 m 58 cm)

Q Change 650 dirhams to riyals. (6 riyals 50 dirhams)

Summarise the lesson for students.

Summary for students

- Multiplying a number by 10 makes it ten times larger; the digits move one place to the left. Dividing a number by 10 makes it ten times smaller; the digits move one place to the right.
- Multiplying a number by 100 makes it one hundred times larger; the digits move two places to the left. Dividing a number by 100 makes it one hundred times smaller; the digits move two places to the right.

3.3

Multiplication and division facts and $TU \times U$

Objectives

- Derive and learn by heart multiplication facts to 10×10 .
- Use and explain mental methods to multiply and divide a two-digit number by a one-digit number in simple cases, supported where necessary by models.
- Use written methods to multiply and divide two-digit numbers by a one-digit number.

Starter

Vocabulary

multiplied by
divided by
product
multiple
remainder

Resources

Counting stick

As a class, recite the 4 times table, forwards and backwards. Ask a few random questions, varying the wording.

Q What is 32 divided by 4?

Q What is the product of 4 and 6?

Q What is the next multiple of 4 after 20?

Q How many fours make 28?

Q What is the remainder when 25 is divided by 4?

Explain that 32 is a *multiple* of 4, because it divides exactly by 4 with no remainder. Invite the class to tell you some other multiples of 4.

Explain that 32 is the *product* of 4 and 8, or 4×8 .

Q What is the product of 4 and 9? Tell me two other ways of saying this.
(4 multiplied by 9 and 4 times 9)

Use a counting stick.



Tell students that one end is nought or zero. Count along the stick and back again in fours. Point randomly at divisions on the stick, saying:

Q What is this number? How do you know?

Encourage students to use ‘multiplied by’ and ‘divided by’ in their answers. Point out that they can use the mid-point of the stick as a reference point, for example: ‘I know that halfway is 4 multiplied by 5, or 20, and the next point is 4 more, or 24.’

Say that this is a good way to remember awkward facts. To remember 10 times a number is always easy. To find 5 times a number is also easy, as it is half of 10 times the number. For example, 10 times 4 is 40, so 5 times 4 is half of 40, or 20.

Main activity

Vocabulary

double
halve
commutative

Resources

None

Practise doubling some numbers up to 10: double 3, double 9, double 7. Remind students that doubling is the same as multiplying by 2.

Explain that to double 40, they need to double 4 tens, so the answer is 8 tens, or 80. To double 70, they must double 7 tens, which is 14 tens, or 140. Practise a few more examples, such as double 30, double 80, double 50 and double 90.

Write on the board a selection of whole numbers under 50:

17 19 21 24 28 32 35 38 43 46

Ask students if they can double any of the numbers straight away (e.g. 21, 32). Cross out these numbers and record on the board, for example,

$$21 \times 2 = 42, 32 \times 2 = 64.$$

Ask students to use their exercise books to double the remaining numbers. Allow a couple of minutes, then go through the numbers one by one, inviting students to the board to explain their method to the class. Look for these methods:

- splitting the number into tens and ones or units, e.g. 28×2 is double 20 + double 8;
- splitting the number in other ways, e.g. 38×2 is double 35 plus double 3;
- using known facts, e.g. 19×2 is 2 less than double 20.

Use a diagram to show students how they can always double a two-digit number by doubling the tens and doubling the ones or units.

$$\begin{array}{r}
 47 \\
 40 + 7 \\
 \downarrow \quad \downarrow \\
 80 + 14 = 94
 \end{array}$$

Ask students to use this method to double 28, then 36, doing as much as possible mentally.

Remind students of the commutative law of multiplication: seven twos are the same as two sevens. (There is no need to teach them the name of the law.) Remind them that if they know a fact one way round, they know it the other way round as well.

Write $7 \times 53 = 53 \times 7$ on the board.

Q What is an estimate of the answer?

Establish that the answer will lie between $7 \times 50 = 7 \times 5 \times 10 = 350$ and $7 \times 60 = 7 \times 6 \times 10 = 420$. It will be closer to 350 than to 420, since 53 is closer to 50 than to 60.

Point out that 53 can be written as $50 + 3$. Draw a grid on the board.

×	50	3
7		

×	50	3
7	350	21

Work through the left-hand grid with the class to get the right-hand grid. Ask:

Q How can we get the answer to 53×7 from the grid?

Add 350 and 21 mentally to get the answer 371. Work through one or two more examples, e.g. 37×4 , 72×6 . Explain that the grid can be used as a jotting to support or explain a mental calculation.

Say that they may be able to do simple examples mentally without writing anything. Try 13×4 and 16×6 as mental calculations.

Other tasks

If necessary, choose further related activities or exercises from available textbooks or your own materials.

Consolidation

Resources

Mini-whiteboards
OHT 3.3a

Use a counting stick and count along it and back again in multiples of 3. Then chant the 3 times table forwards and backwards: ‘one three is three, two threes are six, three threes are nine, ...’.

Show students how they can use doubling to work out the 6 times table from the 3 times table by completing **OHT 3.3a**, working across the rows. Ask questions such as:

Q What is 3 multiplied by 5? What is 6 multiplied by 5?

Q How many threes make 24? How many sixes make 24?

Do this first with the OHT in place. Use the counting stick to practise counting along it and back again in multiples of 6. Remove the OHT and continue the questioning. Remind students to use their knowledge of the 3 times table and doubling strategies if they cannot remember a fact in the 6 times table.

Summarise the lesson for students.

Summary for students

- To find the product of some numbers, you multiply them together.
- To double a two-digit number in your head, you can double the tens, and double the ones, then add the two parts together.
- Use multiplication facts that you know to work out other multiplication facts: for example, to multiply a number by 6, you can multiply it by 3 and then double the answer.

3.4

Tally charts and bar charts

Objectives

- Collect and record data systematically, keeping track of what has been counted (e.g. in a tally chart).
- Represent and interpret data in a bar chart with a scale numbered in intervals of 2, 4, 5 or 10; label the axes and give the graph a title.
- Ask and answer questions related to data in tables and bar charts.

Starter

As a whole class, count aloud in fives from 0 to 50, and back again to 0.

Show the class a tally chart like the one below.

Colour	
Red	
Silver	
Green	
Black	

Vocabulary

data
tally mark
tally chart
represent
table
title
frequency table
pictogram

Resources

None

Tell the class that a chart like this is called a *tally chart*. Ask:

Q What do we mean by ‘tally’? (it is a way of counting by making marks)

Explain that a group of four vertical marks, with one diagonal mark across them, represents a count of 5.

Get the students to discuss in pairs what they think the chart represents. Agree that this tally chart could show the colour of cars that passed the school between 8:00 and 8:15 last night. Write ‘Number of cars’ at the top of the right-hand column.

Q What could the title of the chart be? (e.g. colour of cars)

Q How many of each colour are there? (17, 2, 10, 6)

Q Who might need this information? (e.g. a car manufacturer who wanted to know which colours people like best for their cars, or which colour for a car shows up best in the dark)

On the board, draw another table.

Animal	Number of votes
Elephant	
Giraffe	
Tiger	
Gorilla	

Ask the students to vote for the animal that they like best, choosing from an elephant, a giraffe, a tiger and a gorilla. Ask students to put up a hand to vote as you say the name of each animal in turn. Count the number of hands up and enter it onto the chart on the board using tally marks.

Explain that tally marks can be replaced by numbers and that the table is then called a *frequency table*. Erase the tally marks in the chart on the board and replace them with numbers.

Main activity

Vocabulary

bar chart
label
title
horizontal axis
vertical axis
most common

Resources

OHT 3.4a
Resources 3.4b and 3.4c

Show the class the frequency table on **OHT 3.4a**. Say that this table shows the number of orange drinks sold to a Grade 3 class in one school week.

Day of week	No. of drinks
Sunday	15
Monday	21
Tuesday	19
Wednesday	9
Thursday	5

Say that you are going to represent this information on a bar chart. Draw two axes on the board, and tell the class that they are called *axes*. Point out that one axis is horizontal, and one is vertical. Ask:

- Q What title shall we give the bar chart?** (e.g. ‘Orange drinks sold in one week’)
- Q Where do we put ‘Days of the week’?** (as a label for the horizontal axis)
- Q Where do we put ‘Number of drinks sold’?** (as a label for the vertical axis)
- Q Where do we put ‘Sunday, Monday’, and so on?** (along the horizontal axis as labels for each bar)

Give the class some possible scales for numbering the vertical axis: in ones, in twos, in fives or in tens.

A	B	C	D
5	10	25	50
4	8	20	40
3	6	15	30
2	4	10	20
1	2	5	10
0	0	0	0

Ask which of these scales should be used on the vertical axis, and why.

Emphasise that the best way to choose is to look at the biggest/greatest frequency or the most common. Since this is 21, the scale for the axis must be C or D, but D is too large. Explain that scale C would fit the numbers in the table best.

With the students, construct the bar chart on the board. Label the vertical scale in fives from 0 to 25. Label where the bars will go on the horizontal axis: Sun, Mon, Tue, Wed, Thu. Draw the bars, leaving small gaps between them (as the data is discrete, the bars have no relationship to each other).

Ask the students to interpret the resulting chart. Ask them to discuss the two questions below with a partner before answering.

- Q Why do you think fewer orange drinks were sold on Wednesday and Thursday?** (e.g. perhaps the weather was not so hot or it rained)

Q This information was collected in January. What might the graph look like if it were June? (e.g. more drinks would be sold and each bar would be taller)

Give out **Resources 3.4b and 3.4c**, one of each for each student. With the class, complete the work on Resource 3.4b, referring them again to the scales A, B, C and D on the board.

Then ask students to choose one table and complete the following task on Resource 3.4c:

- construct a bar chart;
- think of a title;
- write two statements about the information.

Other tasks

If necessary, choose further related activities or exercises from available textbooks or your own materials. For example, students could make tally charts corresponding to the three tables on **Resource 3.4b**.

Consolidation

Resources

Mini-whiteboards
Resource 3.4d

Give out **Resource 3.4d**. Explain that this shows which school day all the Grade 3 children in a school liked best. Working with the whole class, ask:

Q What size are the steps on the vertical scale?

Show the students how to read off the numbers from the first two bars for Sunday and Monday. Get them to write these numbers in the table. Now ask students to complete the rest of the table independently.

When they have finished, ask them to think about the bar chart and the table.

Q What statements could you make about the bar chart?

Round off the lesson by asking:

Q What do you need to think about when you draw a bar chart?

Take feedback to establish that scale, labels for the axes and bars, and a title are key features. Highlight that there are small gaps between the bars.

Summary for students

- A tally chart uses tally marks to keep track of the count, usually grouping in fives.
- A frequency table corresponds to a tally chart but has numbers instead of tally marks.
- A bar chart can be used to represent the information in a frequency table or tally chart.
- A bar chart should have a title, labels for the axes, and labels for the bars. One of the axes, usually the vertical axis, has a scale.
- The scale is chosen so that the tallest bar will just fit on the bar chart.