

Mathematics lessons for Grade 2

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Using these lesson plans

These sample lessons for Grade 2 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 2. 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 may decide to 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 may wish 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 2, you will need to provide this, since homework is an important part of a lesson.

Each lesson plan has sufficient material to support about 45 minutes of teaching. You may need to supplement the activities with additional 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. Alternatively, you could split the lesson and make it into two lessons, adding some extra material of your own. For example, you might choose to do this with lessons 2.1 and 2.2.

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

2.1

Adding whole numbers

Objectives

- Know by heart addition and subtraction facts to 20.
- Use and explain mental methods, supported at first by a model such as a number line or 100-square, to add a two-digit number and ones, and a two-digit number and tens.
- Use and explain written column methods to add whole numbers with two digits.

Starter

Vocabulary

add
subtract
plus
minus
sum
difference
total
altogether
how many more?
how many less?

Resources

None

Ask four or five quick questions, differently worded, about number facts in the range 0 to 10, such as:

Q What must be added to 4 to make 10?

Q What is 2 plus 8? 10 minus 3?

Q Subtract 5 from 8.

Q How many more than 3 is 9?

Q What is the total of 2 and 6?

Q What is the difference between 7 and 4?

Expect students to answer quickly. Vary the vocabulary as much as possible.

Write on the board a fact that crosses 10, such as $8 + 7$.

Q Imagine that you have a friend who has forgotten the answer to this sum. How could your friend work out the answer?

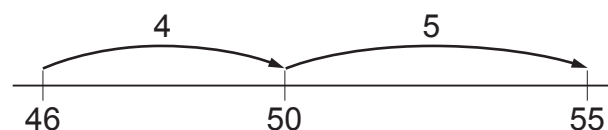
Acknowledge students' suggestions. If they don't suggest strategies based on doubling, such as $8 + 7$ is double 8 minus 1, or double 7 plus 1, remind them of these. Draw out that, if there is no quick method, the answer can be worked out in two steps by bridging through 10. First work out how much of the 7 must be added to the 8 to make 10, then add on the remaining amount. Illustrate with an empty number line.



Q How could you work out the answer to $6 + 7$ if you had forgotten it?

Explain that, when adding, it is usually easier to put the larger number first. Write $7 + 6$ on the board. Invite a student to the board to explain how to work out the answer by bridging through 10. Repeat with $4 + 8$.

Write $46 + 9$ on the board. Explain that the same method can be used, this time bridging through the tens number after 46.



Repeat with $34 + 8$. Now ask students to work out the answer to $68 + 5$, this time by imagining the number line. Repeat with $79 + 6$.

Give students a few examples to practise on their own. Write on the board three examples for them to do: $35 + 9$, $28 + 8$, $47 + 5$.

Main activity

Vocabulary

addition

Resources

Mini-whiteboards

Write 80 on the board. Count on from 80 in tens around the class to 230. Then begin at 500, and count back in tens to 380. Ask:

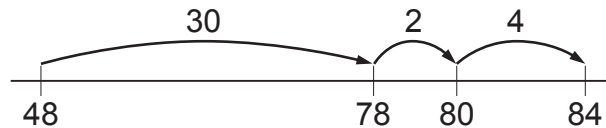
Q What is 30 plus 50? 90 take away 40? How did you know the answer?

Q Add 700 to 200. How did you work it out?

Subtract 500 from 800. Explain how you did it.

Now write 76 on the board. Count in tens together as a whole class from 76 to 226. Point to different students and ask them to count on thirty, or three tens, from the number that you give them. For example, 'Noor, count on 30 from 43. Sara, count on 30 from 93.' Repeat, with different students, this time counting on 50. Repeat again, counting on 40.

Write $48 + 36$ on the board. Show the class how to do the addition, using a number line to explain the method.



Repeat with $57 + 26$. Give students one or two examples to work on independently.

Say that there is another way to work out additions. Show the class how to set out the numbers in columns and to add first the ones, then the tens, in expanded form. Stress the importance of lining up the columns to help avoid errors.

$$\begin{array}{r} 48 \\ + 36 \\ \hline 14 \\ \hline 70 \\ \hline 84 \end{array}$$

Repeat with another example, such as $57 + 26$. Again, invite a student to the board to do the addition and explain the method.

If and only if students are ready to move beyond this stage, show them how to carry out column addition in a contracted form, with carrying figures below the total. If they make persistent errors with this method, revert to the expanded form above, asking them to explain the steps in their calculations.

Other tasks

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

Consolidation

Resources

OHT 2.1a

Show the addition table on **OHT 2.1a**. Fill in the 'doubles' across the diagonal, asking students to call them out for you. Invite students to fill in some of the other facts, making sure that they recognise that they can fill in $8 + 6$ at the same time as they fill in $6 + 8$.

Summarise the lesson for students.

Summary for students

- It can help to bridge through 10 when adding pairs of single-digit numbers.
- When adding numbers mentally, it is usually easier to start with the larger number.
- An empty number line can be used to support mental calculations or to explain working.
- To add two-digit numbers, you can use a number line or 100-square, or you can write the numbers in columns.

2.2

Subtracting whole numbers

Objectives

- Know by heart addition and subtraction facts to 20.
- Use and explain mental methods, supported at first by a model such as a number line or 100-square, to subtract ones or tens from a two-digit number.
- Use written column methods to subtract whole numbers with two digits.

Starter

Vocabulary

sign
plus sign
add
sum
total
minus sign
subtract
take away
difference
how many more?
how many less?
what must be added to?

Resources

Mini-whiteboards

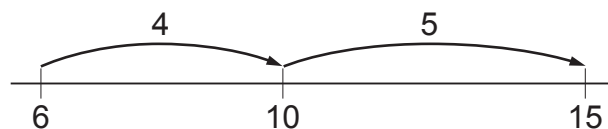
Start by asking students quickly to suggest pairs of numbers with a total of 10.

Write a plus sign (+) on the board. Remind the class that it is a *plus sign*, which tells them to *add* two numbers together. When they add one number to another, they are finding the *sum* or the *total*.

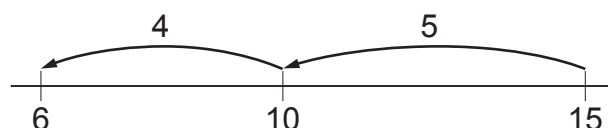
Write a minus sign (–) on the board, and tell the class that it is a *minus sign*.

Explain that this sign tells them to *subtract* or *take away* one number from another. When they subtract one number from another, they are finding the *difference*, or *how many more* or *how many less* one number is than the other. When they hear a question about finding a difference, or how many more, or how many less, they should subtract or take away the smaller number from the larger.

Remind them that when they are subtracting, or finding a difference, they can count up from the smaller number to the larger number.



Alternatively, they can ‘take away’ by counting back from the larger number to the smaller number. The answer will be the same.



In either case, they can bridge through 10.

Revise subtraction facts in the range 0 to 20 by asking questions such as:

Q What is the difference between 13 and 7?

Q Subtract 6 from 14.

Q What number is 3 less than 11?

Q How many more than 9 is 17?

Q What must I add to 11 to make 17?

Encourage students to sketch number lines on their whiteboards if it would help.

Remind students that when they count up from a smaller to a larger number they can bridge through 10 if they don’t know a fact immediately.

Main activity

Vocabulary

minus sign
subtract
take away
difference
how many more
how many less
what must be added to?

Resources

Mini-whiteboards
100-square or
OHT 2.2a

Show **OHT 2.2a**, a 100-square. Ask a series of questions for students to answer on their whiteboards. Start by subtracting 6 from different multiples of 10. Illustrate how to find the answers by referring to the 100-square. For example, point to 90, and count back 6, landing on 84.

Q What is 10 take away 6? 20 take away 6? 90 take away 6? 50 take away 6?

Now subtract 16 from different multiples of 10. To do $30 - 16$, point to 30, subtract 10 to reach 20, subtract 6 to reach 14.

Q What is 30 minus 16? What is 70 minus 16? How did you work that out?

Now subtract 26 from different multiples of 10. This time establish that you want to take away 20, then 6 more. Point to 50, subtract 20 to reach 30, then subtract 6 to reach 24.

Q Subtract 26 from 50. Subtract 26 from 80. How did you work that out?

Then ask:

Q What do you notice about the answers to all these questions? (the units digit of the answer is always 4) **Why?** (because 10 take away 6 is 4)

Now remove the 100-square. Ask similar questions using a different units digit.

Q What is 10 minus 3? 40 minus 3? 80 minus 3? What will the units digit of the answer be if we do 60 minus 3?

Repeat by subtracting 13 from multiples of 10, then 23. If students have difficulty with the answers, put back the 100-square and demonstrate.

Explain that there are other ways of doing subtraction calculations. Write on the board:

$$\begin{array}{r} 84 \\ - 59 \\ \hline \end{array}$$

Invite students to come to the board to tackle the subtraction. They may already use a method accurately and reasonably quickly. If there is no clearly established approach, you could introduce complementary addition, which relates closely to the counting-up method on the number line.

$$\begin{array}{r} 84 \\ - 59 \\ \hline 1 \quad \text{to make 60} \\ 20 \quad \text{to make 80} \\ \hline 4 \quad \text{to make 84} \\ 25 \end{array}$$

Students may be able to shorten this to:

$$\begin{array}{r} 84 \\ - 59 \\ \hline 1 \quad \text{to make 60} \\ \hline 24 \quad \text{to make 84} \\ 25 \end{array}$$

If students have made sound progress with mental methods of subtraction, and are confident with addition and subtraction facts to 20, introduce them to a standard written method such as decomposition, first in an expanded form.

$$\begin{array}{r}
 84 \\
 - 59 \\
 \hline
 \end{array}
 =
 \begin{array}{r}
 80 + 4 \\
 - 50 + 9 \\
 \hline
 \end{array}
 =
 \begin{array}{r}
 70 + 14 \\
 - 50 + 9 \\
 \hline
 20 + 5 \\
 = 25
 \end{array}$$

In this method, one ten is 'exchanged' for ten ones.

With either method, draw attention to the tens and units columns and the need to keep digits in their correct columns. With decomposition, stress that the calculation begins with the ones or units column on the right.

Demonstrate two more examples, then ask students to try some for themselves.

Other tasks

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

Consolidation

Write a set of subtractions on the board, or prepare an OHT. For example:

$$\begin{array}{l}
 60 - 24 \\
 13 - 8 \\
 55 - 19 \\
 81 - 21 \\
 93 - 70 \\
 100 - 89
 \end{array}$$

Discuss which of these questions can be done entirely mentally, which can be done mentally with some jottings, and which might need a written method in columns. Work through each calculation, inviting a student to explain their method to the class. Stress that the second example, in particular, is one that can be done mentally.

Summarise the lesson for students.

Summary for students

- To subtract two-digit numbers, you can use a number line or 100-square, or you can write the numbers in columns.
- Look at the numbers carefully before deciding which way to do a subtraction.

2.3

Identifying shapes

Objectives

- Identify and name the cube, cuboid, sphere, cylinder, cone and pyramid, and the pentagon, hexagon and octagon; describe simple properties of these shapes using everyday language.
- Identify straight and curved lines and flat and curved surfaces.
- Explain a simple line of reasoning.

Starter

Vocabulary

square
cube
cuboid
sphere
cone
square-based pyramid
three-dimensional (3-D)
faces
edges
vertices
straight
curved
flat

Resources

3-D shapes, including
cone, sphere, cuboid,
cylinder, square-based
pyramid
Thin plastic square
Thin plastic circle
Small drawstring bag
Mini-whiteboards

Have ready a square made from thin plastic, some three-dimensional shapes (a cube, cuboid, sphere, cylinder, cone and square-based pyramid), and a small cloth drawstring bag.

Hold up the cube and the square. Explain that the square is flat and is two-dimensional and that the cube has thickness and is three-dimensional.

- Q What makes a shape three-dimensional?** (it has thickness as well as length and width – it extends in three directions)
- Q What do you notice about the faces of this cube?** (they are all square)
- Q How many square faces are there?** (6)
- Q What do you notice about the edges of the cube?** (they are all straight)
- Q How many edges are there?** (12)
- Q How many vertices does the cube have?** (8)
- Q What words can we use to describe shapes?** (e.g. the number of faces, edges, corners or vertices, the shapes of faces, whether sides or edges are straight or curved, and so on)

List the words *faces*, *edges* and *vertices* on the board to reinforce vocabulary.

Hold up each of the other three-dimensional shapes in turn. Tell the class the name of the shape and write the name on the board. Point out simple properties of the shape:

*'This cone has one flat face and one curved face.
It has just one vertex.
The flat face is a circle.'*

*'This sphere has no vertices and no edges.
It has just one curved face.'*

*'This cuboid has six flat faces. Some of the faces are rectangles.
The cuboid has eight vertices and 12 straight edges.'*

*'This cylinder has three faces.
Two of the faces are flat. These faces are circles.
The other face is curved.'*

*'This square-based pyramid has five faces. All the faces are flat.
Four of the faces are triangles.
One face is a square.'*

'The pyramid has five vertices or corners, and eight straight edges.'

Choose a student to come to the front. Ask the student to close his or her eyes.

Secretly put one of the shapes into the bag and give it to the student. Ask the student to feel the bag, on the outside only, and to describe the shape that is inside. The student should not use the name of the shape, if he or she knows it, but should describe properties of the shape, such as the number of edges, whether they are straight or curved, the number of vertices, the number of faces, whether the faces are flat or curved, the shape of any flat faces.

Ask the other students to guess the name of the shape from the description, and to write the name on their mini-whiteboards.

Repeat with the other four three-dimensional shapes.

Hold up a square.

Q What three-dimensional shape has a face that is this shape? (e.g. a cube, cuboid, square-based pyramid)

Hold up a circle.

Q What three-dimensional shape has a face that is this shape? (e.g. a cone, a cylinder)

Main activity

Vocabulary

square
circle
triangle
rectangle
pentagon
hexagon
heptagon
octagon
regular
irregular
polygon

Resources

Thin plastic 2-D shapes
Mini-whiteboards
Resource 2.3a
Rulers

Hold up different two-dimensional shapes, and get the class to say their names. Include a pentagon, hexagon and octagon.

Ask students to draw a five-sided shape on their mini-whiteboards.

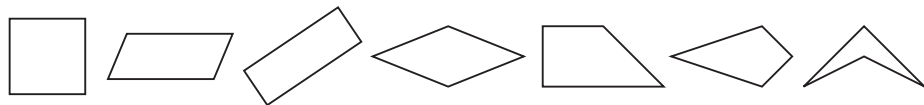
Explain that a *polygon* is a closed shape with straight sides.

Q Has everyone drawn a polygon?

Choose individual students' polygons to show to the rest of the class. Check whether they are polygons.

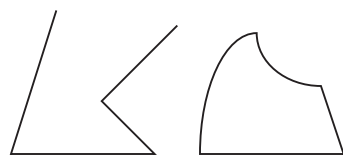
Say that the special name for a five-sided polygon is 'pentagon'. Write *pentagon* on the board.

Ask students to draw a four-sided polygon on their whiteboards. Choose a variety to show the whole class. (If all students draw squares or rectangles, draw your own examples on the board.) Stress that what all the shapes have in common is that they are all closed shapes with four straight sides.



Say that there is a special name for four-sided polygons. They are all quadrilaterals. Write *quadrilateral* on the board.

Ask students to draw on their mini-whiteboards a four-sided shape that is **not** a polygon. Look for at least one curved side and/or open shapes. Draw your own examples on the board.



Q Why are my shapes not polygons?

Q What is the special name that we give to a three-sided polygon? (triangle)

Add *triangle* to the list on the board.

Now ask students to draw a seven-sided polygon. Show the class some of the students' examples.

Q What do we call a seven-sided shape? (a heptagon)

Ask students to draw a six-sided polygon. Draw your own examples on the board.



Q Does anyone know the name for a six-sided polygon? (hexagon) An eight-sided polygon? (octagon)

Add *hexagon* and *octagon* to the list on the board.

Give out copies of **Resource 2.3a**. Ask students to use a ruler and to join the dots to draw the required shapes.

Other tasks

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

Consolidation

Bring the whole class together. Do a visualisation activity. Say to the students:

'Imagine you have a paper square and a pair of scissors.

Imagine cutting off the corner of the square in one straight cut.

What sort of polygon is the shape you cut off? Write its name.

What sort of polygon is the shape you have left? Write its name.'

Summarise the lesson for students.

Summary for students

- A polygon with:
 - 3 sides is called a triangle
 - 4 sides is called a quadrilateral
 - 5 sides is called a pentagon
 - 6 sides is called a hexagon
 - 7 sides is called a heptagon
 - 8 sides is called an octagon.

2.4

Pictograms

Objectives

- Multiply and divide within the multiplication tables for 2, 5 and 10.
- Represent a given set of data in a pictogram using a symbol representing 2, 5 or 10 units.
- Read and interpret pictograms where the symbol represents 2, 5 or 10 units.
- Solve problems by using data from simple graphs and tables.

Starter

Vocabulary

multiply
divide

Resources

Counting stick

Using a counting stick, get the students to count forwards from 0 in steps of 5 to 50: *zero, five, ten, fifteen, twenty, ..., fifty*. Point to the divisions on the stick as they count. Then count back again to 0.



Point to different positions on the stick, e.g. 15.

Q How many fives in 15? (3)

Point out the three intervals on the stick up to 15, so that 15 is three lots of 5.

Q What multiplication facts involving 5 and 15 can you tell me?

Collect and record $5 \times 3 = 15$ and $3 \times 5 = 15$.

Repeat with other points, e.g. 40.

Q How many fives in 40? (8)

Q What multiplication facts involving 5 and 40 can you tell me?

Collect and record $5 \times 8 = 40$ and $8 \times 5 = 40$.

Now get students to count in twos along the stick, and back again to zero, pointing to divisions on the stick as they count.

Point at random to positions on the stick (e.g. 12).

Q How many twos in 12? (6) How do you know? (6 lots of 2 make 12)

Repeat with other positions.

Main activity

Vocabulary

table
title
information
survey
pictogram
key
picture symbol

Resources

Mini-whiteboards
OHTs 2.4a and 2.4b
Resource 2.4c

Draw on the board a table like the one below.

Fruit	
Orange	12
Apple	4
Banana	10
Grapes	5

Ask students to discuss the answers to your questions in pairs. Then ask, taking feedback after each question:

Q What could this table be about?

Q What could its title be?

Q Who might need this information?

Say that the table shows information collected in a survey in which children in a Grade 2 class were asked which fruit they liked best. The school wanted to know so that they could make sure that popular fruit was available for snacks.

Q What other questions could we ask about this information?

Take feedback. Suggest the following questions if students do not.

Q Which fruit do the children like best?

Q Which fruit do the children like least?

Q Which are more popular, bananas or oranges? How do you know?

Q How many children altogether took part in the survey?

Tell the class that one way of showing this information would be using a pictogram. In this example, a picture symbol could represent each child who chose that fruit.

Discuss how the picture symbol could represent 1 child choosing the fruit or 2 children choosing that fruit. Discuss how to represent 12, 4 and 10 if the picture symbol represents 2 children. Discuss what to do about 5 children choosing the grapes (e.g. use two whole picture symbols and half the picture symbol).

Show students how to draw the pictogram using picture symbols. Make sure that the graph has a title, and that both axes are labelled. Include a key to the graph to explain what the picture symbol means.

Show **OHT 2.4a**. Clarify what the pictogram is about.

Q What picture symbol has been used? What does it represent?

Q Is this a good way to present this information? Why?

Complete the questions on the OHT with the students. Discuss the questions that they think of and the answers to them.

Repeat with **OHT 2.4b**.

Give out copies of **Resource 2.4c**, one per student. Ask the students to complete it.

Other tasks

If necessary, choose further related activities or exercises from available textbooks or your own materials. For example, write a list of animals on the board, e.g.

camel

lion

dolphin

elephant

snake

Pose the question:

Q Which of these is your favourite animal?

Ask the class to vote. Say they can each have 2 votes. Work out how many votes there should be altogether. Collect the results, making a table.

Discuss what symbol will represent the number of children voting for each animal and how many children the symbol represents.

Ask students to draw the pictogram and to write one question that they could ask about it.

Consolidation

Bring the whole class together.

Refer to students' work on **Resource 2.4c**. Take feedback on the questions that students have written down, and what the answers to the questions would be.

Q Why do we use a pictogram to represent information?

Establish that it makes it very easy to compare results, for example, after a survey, to see what the most common and least common answers were.

Q What makes a good choice for a pictogram symbol?

Take feedback. Establish that a clear, simple picture that can easily be divided makes a good choice.

Summarise the key points of the lesson for students.

Summary for students

- A pictogram is a way of representing information using picture symbols.
- The picture symbol in a pictogram can represent one object, or more than one object.
- A good symbol for a pictogram is a simple one that can easily be divided.