OXFORD

Mathematics

Grade 1–7

Teaching Mathematics for better ANA results in Grades 1 to 7

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Contents

Introduction: THE ANNUAL NATIONAL ASSESSMENT

The main purpose of the Annual National Assessment (ANA) is to inform all levels of the education system of specific areas of Language and Mathematics knowledge and skills which learners find challenging, and to identify where interventions are required.

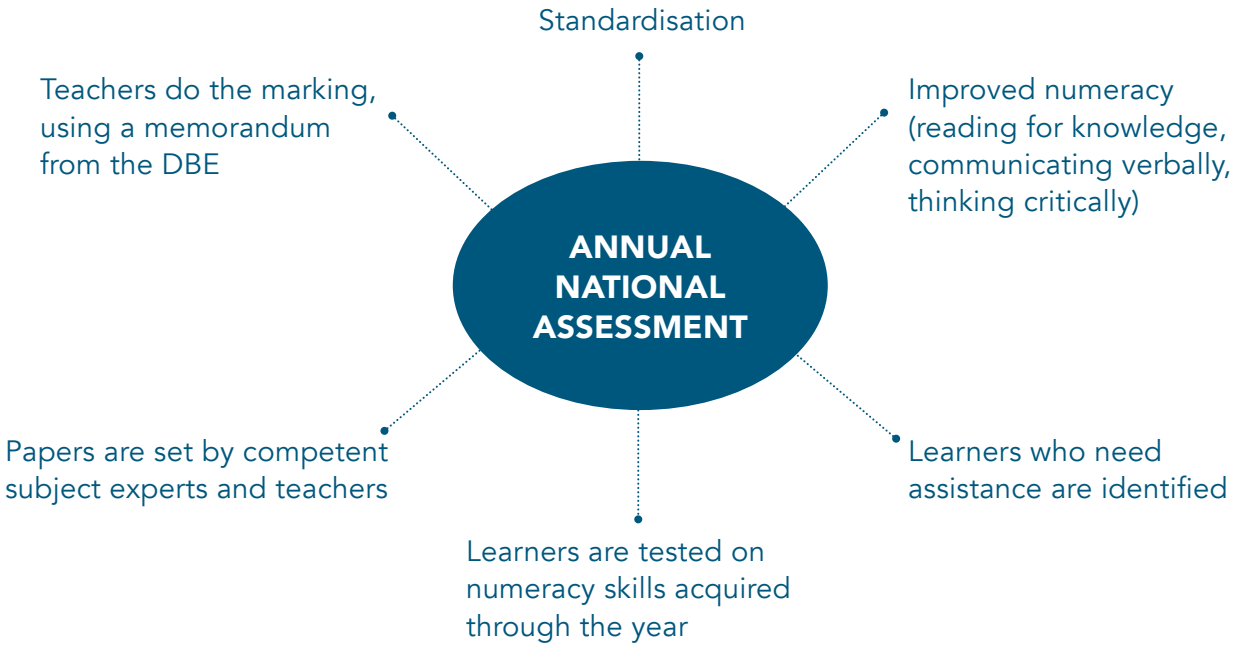
This booklet is based on the findings of the ANA and our aim is to assist you, the teacher, by providing practical activities, exercises and checklists which can be used throughout the year. Oxford University Press wants to support the DBE to improve Mathematics in South Africa and we believe that regular assessments will ensure that both teachers and learners stay on track and become better equipped to meet the daily challenges involved in teaching and learning. In so doing, our hope is that their ANA results will improve as well.

Key words that are included in a word list at the end of the guide are highlighted where they appear in the units.

The role of the Annual National Assessment

The ANA is South African education's measure of standardisation and it identifies learners who will need extra assistance to rise to the expected level. We all know that without assessment, teaching has no value. When we assess the experiences in our classrooms, we assess our own teaching to identify gaps in our delivery and, at the same time, we assess the learners' progress and identify gaps in their understanding.

The diagram below illustrates the role of the ANA in our education system.



To achieve the appropriate standard of education in our schools, it is very important that we teach every lesson with the aim of covering the year's curriculum and developing a wide variety of skills. Through our daily teaching and class activities, we should be preparing learners and giving them opportunities to practise skills, not just for ANA success, but for wider success at school and in other areas of their lives too.

The activities in this book refer to various Oxford resources. It will therefore be helpful if you have some of those resources with you as you work through the activities provided. Make sure you understand how to apply and teach a newly learnt skill before you go on to the next one, because each skill builds on and uses the ones previously learnt.

- UNIT NUMBER -

ONE

Key issues in Mathematics teaching

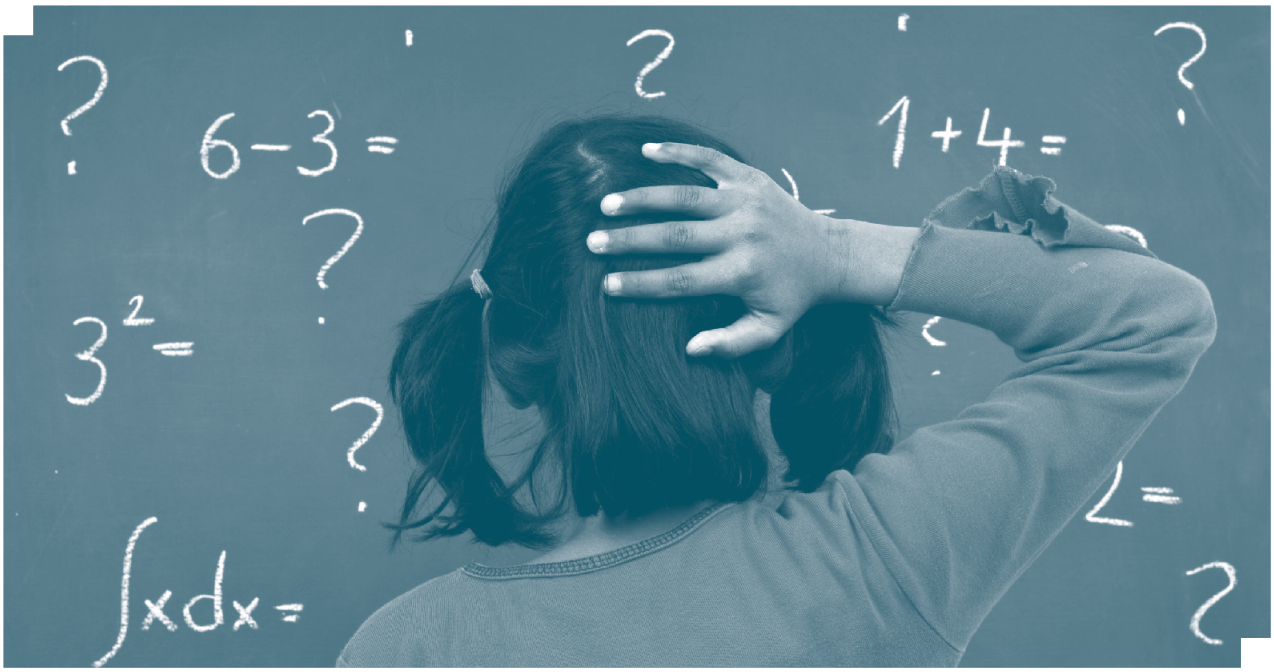
Several key issues in the teaching of Mathematics were identified by the Annual National Assessment 2013 Diagnostic Report and the 2014 Framework for Improvement.

In the Foundation Phase, challenges include learners':

- inability to complete numeric patterns or count in given intervals
- inability to write number names and symbols for two- and three-digit numbers
- lack of understanding of place value
- inability to compare and order whole numbers from biggest to smallest and smallest to biggest
- inability to recognise fractions in diagrams and fraction names
- inability to compare unitary fractions and order them from smallest to biggest
- difficulty in identifying 2D and 3D shapes
- inability to read and interpret information on pictographs and bar graphs
- lack of competency to add, subtract, multiply and divide involving word problems.

In the Intermediate Phase, issues are often similar to those in the Foundation Phase and include learners':

- poor understanding of place value
- inability to complete numeric patterns or count in given intervals
- use of the wrong strategies when dealing with fractions (e.g. applying incorrect mathematical rules to manipulate the denominators and numerators)
- use of drawings, repeated addition and repeated subtraction for multiplication and division respectively, even when working with large numbers
- limited response to simple number patterns, only recognising those involving constant difference, not those based on constant ratio or intervals that are not multiples of a constant difference
- inability to identify the number of faces, vertices and edges of shapes
- poor visual perceptive skills when viewing objects from different perspectives
- inability to relate metres to centimetres, minutes to hours and litres to millilitres
- lack of understanding of all the concepts that were assessed in data
- handling, including pictographs, bar graphs, median and mode.



- UNIT NUMBER -
TWO

Teaching and learning Mathematics effectively

Effective Mathematics teachers

Mathematics is a language that makes use of symbols and notations, and it is a human activity that involves observing and representing patterns and quantitative relationships in a physical and social phenomena.

The things that you, the teacher, know and believe and your professional involvements beyond the classroom all affect what you do in your classroom. It is the principles or beliefs that underlie your particular practices that determine their effectiveness.

The six principles of effective numeracy teaching:

These principles are the foundation for effective teaching. Decide that, in your classroom, you will:

- make connections: make Mathematics accessible, understandable and meaningful for learners using real-life contexts
- challenge all learners: have high expectations and have an attitude of "everyone can do Maths"
- teach for conceptual understanding
- encourage purposeful discussions
- focus on Mathematics
- model positive attitudes.

The four cognitive levels in CAPS

The mathematical thinking in the curriculum is organised around four cognitive levels.

1 Knowledge:

Knowledge includes:

- estimation
- rounding off
- straight recall
- identification and direct use of formulae, mathematical facts and vocabulary.

EXAMPLES:
Grade 1: Write down the next three numbers: 1; 2; 3; …; …;…; 7; 8
Grade 4: Write down the next three numbers in the sequence: 103; 105; 107; …; …; …;
Grade 6: Write down the prime numbers that are factors of 36.

2 Routine procedures:

- Routine procedures include all common procedures, ample applications and calculations.
- They may involve many steps, which begin from given information and require the use of correct formulae.

EXAMPLE: Grade 4: Determine the value of x if $x + 4 = 10$.

3 Complex procedures:

Complex procedures refer to problems based on real-world scenarios and include:

- solving problems that involve complex calculations and higher order reasoning
- investigations
- rules and relationships where there is no obvious way to solve a problem.

EXAMPLE:
Grade 4: Peggy is 4 years old and Jock is 8 years old. Determine the ratio between their ages. Write the ratio in its simplest **fractional form**.

4 Problem solving:

Problem solving includes:

- non-routine problems
- higher-order understanding
- the ability to break a problem down into its component parts.

EXAMPLES:
Grade 4: The **sum** of three **consecutive** whole numbers is 27. Find the three numbers.
Grade 6: Busi has a bag containing 6 coloured balls. 1 blue, 2 red and 3 yellow. She puts her hand in the bag and draws a ball. What is the chance that she will draw a red ball? Write the answer in its simplest fractional form.

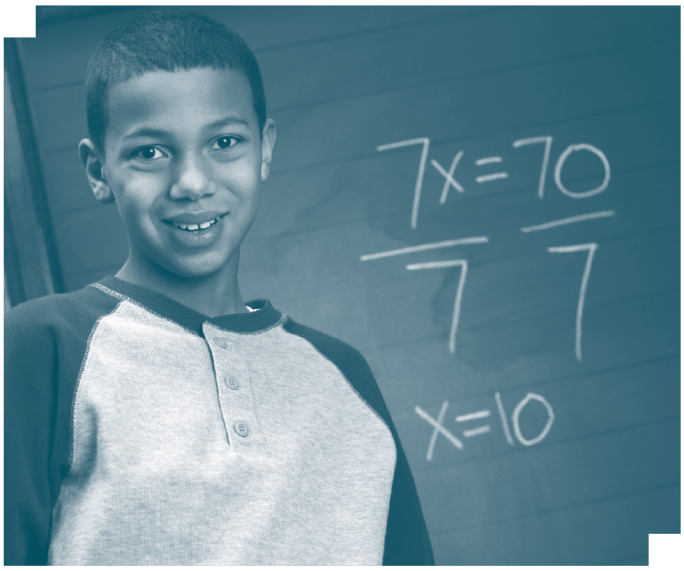
The five content areas of Mathematics

Each content area contributes to the acquisition of specific skills.

- Numbers, Operations and Relationships (most of the CAPS time allocation)
- Patters, Functions and Algebra
- Space and Shape
- Measurement
- Data Handling (least of the CAPS time allocation)

The importance of mental Mathematics

- Mental Mathematics forms an integral part of the Number, Operations and Relationships content area and should form part of your daily teaching activities.
- The calculations should not be random, but should focus on either:
  - linking existing calculating strategies with concepts and skills to be developed in the main part of the next lesson, or
  - revising and reinforcing calculating strategies developed in the main part of a previous lesson.
- Three aspects of learners' knowledge should be addressed in the Mental Mathematics programme:
  - number facts
  - calculation strategies
  - number concept
- Learners are supposed to know their number bonds and multiplication table facts and recall them fairly quickly. Daily practice will improve their confidence and accuracy.
- Mental Mathematics is used extensively to explore higher number ranges through skip counting and by doing activities up and down the number ladder. These kinds of activities help learners to construct a mental number line.



WEEK
3

Task 1

Fill in the missing numbers.
Example: Double 1 = 2 Double 10 = 20

Double 3 = ____ so double 30 = ____
Double 2 = ____ so double 20 = ____
Double 8 = ____ so double 80 = ____

Score

Task 2

Example: Double 15 = double 10 + double 5
= 20 + 10
= 30
And half of 30 = 15

Double 25 = double 20 + double 5
= _____ + _____
= _____
Therefore half of ☐ = 25

Double 21 = double ____ + double ____
= _____ + _____
= _____
Therefore half of ☐ = 21

Score

Taken from Oxford Blitz Maths *Grade 2*

EXAMPLE:
Grade 3: Give the following chained instructions: "Start with 106 and make it 7 more. Yes, that makes 113. Make it 5 less. Yes, that makes 109. Make that 10 more … Add 2 more … Add 100 … Subtract 50 from that ..."

- In the Intermediate and Senior Phases, Mental Mathematics should be developed systematically over the year in the same way as calculating techniques are developed in the main part of the lesson.
- Mental Mathematics should systematically develop three aspects of learners' number knowledge:
  - number facts
  - number bonds: addition and subtraction facts for units, multiples of 10
  - times tables involving multiplication of whole number to at least 10 x 10.

EXAMPLE:
The number fact for 20 can be taught by using the following diagram:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Pick any number at the top, say 13. The number at the bottom (7) tells you what to:
- add to 13 to get 20: 13 + 7 = 20
- subtract from 20 to get 13: 20 – 7 = 13

Tip: By inserting one, two or three noughts at the end of each number, the diagram above can easily be adapted to cover addition and subtraction facts for multiples of 10, 100 and 1 000.

Times tables

- Times tables up to 10 x 10 can be taught in a structured way by using a multiplication table like the one on the next page.
- Usually the numbers at the top of the multiplication table represent input values and those on the left represent the rules.

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Calculation techniques/strategies:

These strategies include:

- doubling and halving
- using multiplication to do division
- multiplying by 10 and 100
- multiplying by multiples of 10 and 100
- dividing by 10, 100 and 1 000
- rounding off to the nearest 10 and compensating
- building up and breaking down numbers
- adding and subtracting units, multiples of 10 and multiples of 100 to/from any three-digit number
- using the inverse relationship between addition and subtraction.

Number concepts:

Number concepts include:

- counting forwards and backwards in 2s, 3s, 5s, 10s, 25s and 50s between 0 and at least 500.
- counting forwards and backwards in 100s between 0 and at least 1 000.
- ordering and comparing up to three-digit numbers
- place value of up to three-digit numbers
- odd and even numbers
- multiples.

EXAMPLES:

Teach counting verbally and buy or make apparatus such as line counters, counting beads, number grids, number lines (structured, semi-structured and empty), pictures of large numbers of objects, arrays, diagrams, Dienes cubes and/or an abacus.

Start counting patterns at different numbers, e.g. to practise counting in 4s, follow these steps:

- Step 1: Count from the first multiple of 4, which is 4.
- Step 2: Count from any other multiples of 4, such as 8, 56 or 808.
- Step 3: Count from any other number between multiples of 4, such as 6, 98 or 998 (even numbers), or 7, 91 or 781 (odd numbers).

Point out patterns within patterns, using tables, number lines and number grids, e.g. when you count in 2s, numbers are either consecutive even or consecutive odd numbers; when you count in 4s, either every second number is even or every second number is odd; when you count in 100s, only the hundreds digit changes, by 1.

Times table posters:

In addition to displaying the times tables themselves around the classroom, put up posters showing various extracts from the table below. This will help learners to see patterns within counting patterns.

	Possible pattern	Pattern	Pattern inside the pattern
2s	56; 58; 60; 62; 64; 66; 68; 70; ...	all even	end in 0; 2; 4; 6; 8
2s	585; 587; 589; 591; 593; 595; ...	all odd	end in 1; 3; 5; 7; 9
4s	58; 62; 66; 70; 74; 78; 82; ...	all even	take every second even number
4s	585; 589; 593; 597; 601; 605; ...	all odd	take every second odd number
8s	54; 62; 70; 78; 86; 94; 102; ...	all even	if ascending: add 10, subtract 2
8s	585; 593; 601; 609; 617; 625; ...	all odd	if descending: subtract 10, add 2
5s	56; 61; 66; 71; 76; 81; 86; 91; ... 773; 778; 783; 788; 793; 798; ...	alternate	every second number changes by 10; units alternate between two digits
10s	86; 96; 106; 116; 126; 136; ...	all even	tens change by 1, units stay the same
10s	749; 759; 769; 779; 789; 799; ...	all odd	tens change by 1, units stay the same
20s	34; 54; 74; 94; 114; 134; 154; ... 437; 457; 477; 497; 517; 537; ...	all even	tens change by 2; units stay the same
100s	124; 224; 324; 424; 524; 624; ... 273; 373; 473; 573; 673; 773; ...	all even	hundreds digit change by 1; other digits stay the same
50s	40; 45; 50; 55; 60; 65; 70; 75; ... 617; 667; 717; 767; 817; 867; ...	all even all odd	40 = 4 tens, 70 = 7 tens; tens change by 5; units stay the same
25s	392; 417; 442; 467; 492; 517; ... 549; 574; 599; 624; 649; 674; ...	alternate alternate	tens change by 2, then 3, then 2, then 3; units alternate between two digits
3s	56; 59; 62; 65; 71; 74; 77; 81; ... 623; 626; 629; 632; 635; 638; ...	alternate	consider all whole numbers; take 1; skip 2; take 1; skip 2; etc.
6s	44; 50; 56; 62; 68; 74; 80; 86; ...	all even	take every third even number
6s	807; 813; 819; 825; 831; 837; ...	all odd	take every third odd number
9s	84; 93; 102; 111; 120; 129; 138; ...	alternate	if ascending: add 10, subtract 1 if descending: subtract 10, add 1
7s	624; 631; 638; 645; 652; 659; ...	alternate	if ascending: add 10, subtract 3
7s	485; 492; 499; 506; 513; 520; ...	alternate	if descending: subtract 10, add 3

For more information, refer to page 32 of the Oxford Successful Mathematics Grade 5 Teacher's Guide.

- UNIT NUMBER -

THREE

Numeric patterns and counting in intervals

Foundation Phase

By the end of Grade 3, it is essential that learners have mastered:

- estimating and counting concrete objects
- counting forwards and backwards in specified intervals
- recognising, identifying and reading numbers.

To master these skills, learners need lots of practice in activities like the one below.

Number patterns

Copy and complete.

1	130	140	?	160	170	180	?	?
2	170	165	160	?	?	?	?	?
3	100	200	300	?	?	?	?	?
4	168	170	172	?	?	?	?	?

5 What is the pattern of each sequence?

For more information, refer to page 7 of the Oxford Headstart Mathematics Grade 3 Learner's Book.

Intermediate Phase

The emphasis for numeric patterns in the Intermediate Phase is on:

- investigating and extending numeric patterns
- geometric patterns
- the introduction to number sentences. This is important because it is an introduction to Algebraic Expressions.

Number sentences

1 See how quickly you can complete these number sentences.

a 462 – 462 = ___ b 116 + 4 – 4 = ___ c 103 – ___ = 0

d 307 + 10 – ___ = 307 e 199 – ___ = 199 f 16 ÷ 2 × 2 = ___

g 48 + 62 = (40 + 60) + (8 + 2) = ___ h 14 × 12 = (14 × 10) + (14 × 2) = ___

i 24 + 16 = 16 + ___ j (6 + 2) + 4 = 6 + 4 + ___ k 13 × 10 = 10 × ___

l 41 + 12 + 19 = 41 + 19 + ___ m (65 + 16) + 9 = (65 + 9) + ___

n 1 478 × 0 = 3 456 × ___ o 113 × 2 × 3 = 113 × 3 × ___

For more information and to practise, refer to page 7 of the Oxford Let's Practise Mathematics Grade 4 Practice Book.

To support numeric patterns skills in Grades 5 to 7, the Grade 4 activity below can be used with more appropriate numbers.

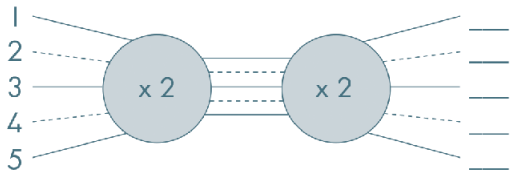
Numeric patterns

An easy way to multiply by 6 is to multiply by 3 and then by 2.
8 × 6 = 8 × 3 × 2
= 24 × 2
= (20 + 4) × 2
= (20 × 2) + (4 × 2)
= 40 + 8
= 48

Look at these examples.
Example: 4 × 30 = 4 × 3 × 10 = 120
Example: 6 × 500 = 6 × 5 × 100 = 3 000

1 Complete the flow diagrams and the matching tables.

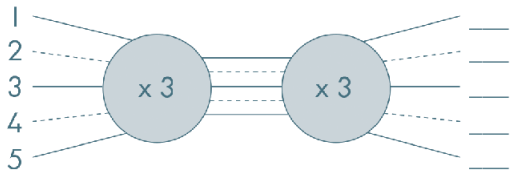
a



a

Rule	1	2	3	4	5
× 2					
× 4					

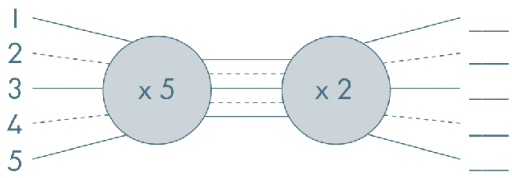
b



b

Rule	1	2	3	4	5
× 3					
× 9					

c



c

Rule	1	2	3	4	5
× 5					
× 10					

3 Complete.

a 5 × 40 = _____

b 6 × 30 = _____

4 Complete.

a 4 × 700 = _____

b 7 × 400 = _____

5 Draw your own flow diagram to show × 30 (× 10 × 3).

For more information and to practise, refer to page 10 of the Oxford Let's Practise Mathematics Grade 4 Practice Book.

- UNIT NUMBER -
FOUR

Place value

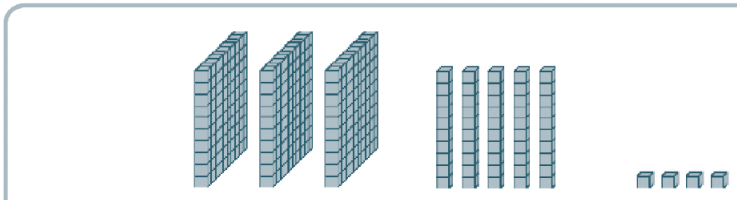
Foundation Phase

By the end of Grade 3, learners have to:

- recognise the place value of three-digit numbers to 999
- break three-digit numbers up into multiples of 10 and ones/units
- identify and state the value of each digit in a three-digit number.

To master these skills, learners need lots of practice in activities like the one below.

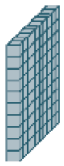
Place value, order and compare



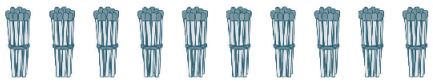
354 = 3 0 0 + 5 0 + 4

354 = 3 hundreds + 5 tens + 4 ones

1 Which picture represents 100?

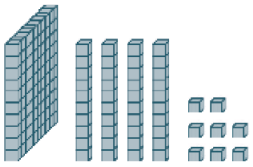


Or



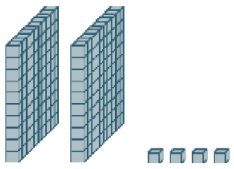
2 How many tens in 100?

Build, copy and complete.



3 148 = 100 + 40 + ☐

148 = 1 hundred + ☐ tens and ☐ ones



4 204 = 200 + 0 + ☐

204 = 2 hundreds + ☐ and 4 ☐

5 Build and write number sentences for: 467; 500; 301; 240

For more information, refer to page 29 of the Oxford Headstart Mathematics Grade 3 Learner's Book.

Intermediate Phase

Beyond the Foundation Phase, learners should be able to break up numbers into hundreds, tens and unites by using:

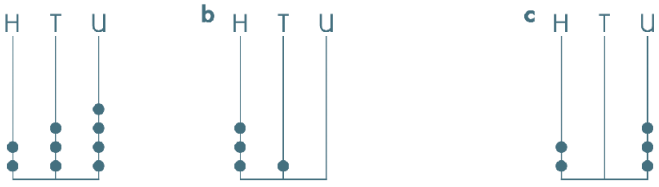
- the number names (number words)
- place value or flash cards (Dienes blocks are also useful apparatus)
- expanded notation.

To master these skills, learners need lots of practice in activities like those below.

3-digit numbers

1 Write the values and the number shown on each abacus.

a H T U **b** H T U **c** H T U



200 + 30 + 4 = ____ ____ + ____ + ____ = ____ ____ + ____ = ____

2 Fill in the answers.

a 200 + 70 + 4 = _____ **b** 500 + 7 = _____

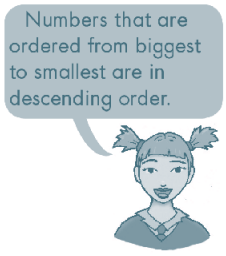
3 Write the numbers below in expanded notation.

a 634 = 600 + _____ + _____ **b** 970 = _____ + _____

4 How many groups of ten are there in 96? _____ groups of ten

5 How many groups of a hundred are there in 707? _____ groups of a hundred

6 Write these numbers in words.



432 _____

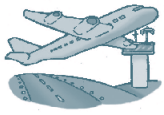
803 _____

qqq_____

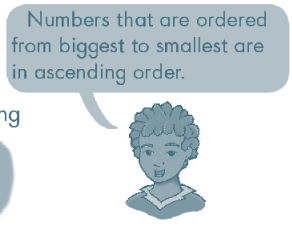
7 Write the numbers in ascending order. Start at the bottom of the staircase.

403 340 304 430

Ascending



Descending



For more information and to practise, refer to page 32 of the Oxford Let's Practise Mathematics Grade 4 Practice Book.

- UNIT NUMBER -

FIVE

Space and shape

Foundation Phase

The main challenge for learners in the content area of Space and Shape is describing the position of one object in relation to another.

Before you start the lesson, teach learners new vocabulary and make sure that they can read and write all the words too:

- *on top of*
- *in front of*
- *behind*
- *left*
- *right*
- *up*
- *down*
- *next to.*

Learners also need to be able to match different views of the same object to reading and following direction on informal maps.

Position

☆ Where are the rabbits?

1 The grey rabbit is ☐ the rock.
2 The black rabbit is jumping ☐ from the rock.
3 The brown rabbit is on the ☐ of the tree.
4 What else is on the right of the tree?
5 Where is the other rabbit?

➧ *For more information, refer to page 29 of the* Oxford Headstart Mathematics Grade 2 Learner's Book.

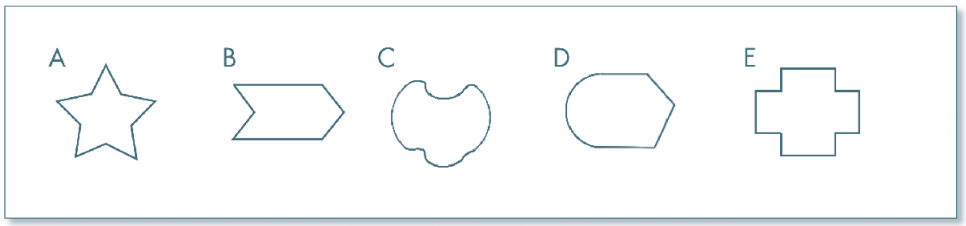
Intermediate and Senior Phase

In the Intermediate and Senior Phase, the learners' experiences of space and shape moves from recognition and simple description to classification and more detailed description of the characteristics and properties of 2D and 3D shapes.

Learners should be given plenty of opportunities to:

- draw 2D shapes
- make models of 3D objects
- describe location, transformations and symmetry.

2D Shapes



1. Study the 2D shapes and write the letter of each under the correct heading:

Shape with straight sides only	Shape with curved and straight sides	Shape with curved sides only

For more information and to practise, refer to page 17 of the Oxford Let's Practise Mathematics Grade 5 Practice Book.

- UNIT NUMBER -

SIX

Graphs

A graph is a diagram that shows the relationship between variables. These variables could be amounts or sets of numbers. There are lots of different types of graphs and learners often struggle to understand the information that they contain.

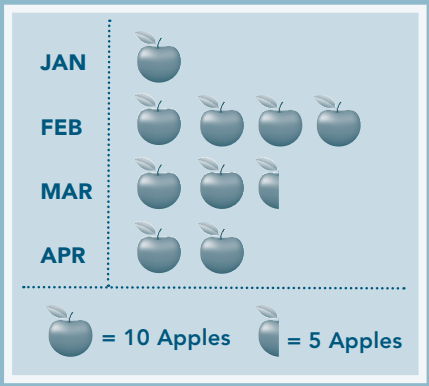
Line or linear graphs are straight lines. Non-linear graphs are curved lines or are made up of a collection of points, like scatter plots.

Pictographs

Pictographs are charts or graphs which show numerical information by using pictures or icons to represent the data sets. It is a fun and interesting way of showing data.

EXAMPLE:

Below is a pictograph of how many apples were sold at a shop during the first four months of 2014. Each picture of an apple means 10 apples. Half the apple picture means 5 apples.



Apples sold at a shop from January to April 2014.

1. How many apples were sold in January?.....
2. How many apples were sold in February?.....
3. How many apples were sold in March?.....
4. How many apples were sold in April?.....
5. How many apples were sold all together from January to April?.....
6. In which month were the most apples sold?.....
7. In which month were the least apples sold?.....
8. Double the amount of apples sold in April. .....
9. Halve the amount of apples sold in February. .....
10. What is the difference between the amount of apples sold in January and February? .....

Learners can make their own pictographs. Here are a few ideas for questions which they can ask their classmates or family members:

- How many hours of television do you watch every week?
- How much of your pocket money can you save each week for 4 weeks?
- How much exercise do you do each day?

Interpreting graphs

When learners interpret or analyse a graph they need to:

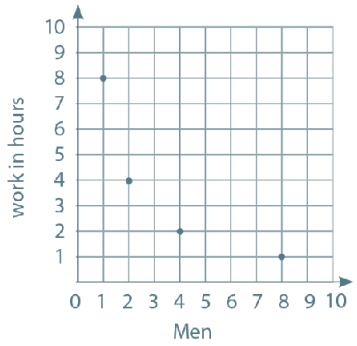
- read and understand its caption
- remember that graphs have two axes: a horizontal axis and a vertical axis
- remember that the horizontal axis (x-axis) shows the input value, or the independent variable
- remember that the vertical axis (y-axis) shows the output value, or the dependent variable
- read the labels on the horizontal axis (x-axis)
- read the labels on the vertical axis (y-axis)
- read the key if there is one
- answer the questions by using the all the information that they have read from the graph.

Ensure your learners understand what *interpret* means.

Graphs

Analyse and interpret more global graphs

1. The following graph shows the time taken by men to complete a job. These men work at the same rate.



a) Complete the following table.

No. of men	1	2	4	8
Time (hours)	8			

b) Is this graph increasing or decreasing?

c) Is this graph a linear or non-linear graph?

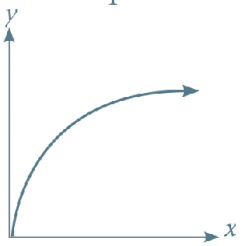
d) Identify the dependent variable.

e) Why is that variable a dependent variable?

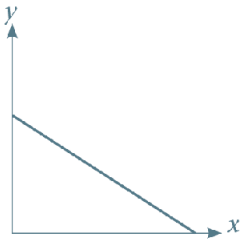
f) What is the relationship between the number of men and time?

2. Indicate whether the following graphs represent a linear, non-linear or decreasing relationship.

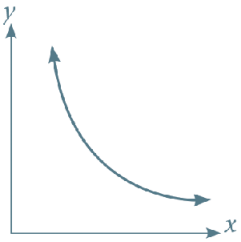
a)



b)



c)



For more information and to practise, refer to page 61 of the Oxford Let's Practise Mathematics Grade 7 Practice Book.

- UNIT NUMBER -
SEVEN

Word problems

Foundation Phase

Learners struggle to develp calculation strategies when word problems are involved. It is important to teach them the following calculation techniques in the Foundation Phase:

Grade 1	Grade 2	Grade 3
• use drawings or concrete apparatus, e.g. counters • build up and break down numbers • use doubling and halving • use number lines supported by concrete apparatus	• use drawings or concrete apparatus, e.g. counters • build up and break down numbers • use doubling and halving • use number lines	• build up and break down numbers • use doubling and halving • use number lines • round off in tens

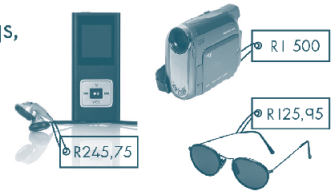
Solve and then check your answer.

1 Thombi gave R135 to a friend. She has R137 left. How much money did she have in the beginning?

2 A sweets factory adds 138 ℓ more milk to their chocolate container. Now there is 400 ℓ of milk. How much milk was there to start with?

3 Jamie has R500. Which 3 items can he buy? How much change will Jamie get?

4 Adam makes milkshake. He uses 2 eggs, 250 ml of milk and 60 ml of berries. If he doubles the recipe, how much of each ingredient will he need?



For more information, refer to page 49 of the Oxford Headstart Mathematics Grade 3 Learner's Book.

Intermediate Phase

In the Intermediate Phase, learners should be able to use a range of techniques to perform and check written and mental calculations of whole numbers. These should include the following:

Grade 4	Grade 5	Grade 6
• use estimation • build up and break down numbers • round off and compensate • use doubling and halving • use a number line • use addition and subtraction as inverse operations	• use estimation • add and subtract in columns • build up and break down numbers • use a number line • round off and compensate • use doubling and halving • use addition and subtraction as inverse operations • use multiplication and division as inverse operations	• use estimation • add, subtract and multiply in columns • round off and compensate • use addition and subtraction as inverse operations • use multiplication and division as inverse operations

5. Solve the following word problems

   a. At the end of the year, a delivery company recorded the following kilometers of two of their trucks: One truck has travelled 123 567 km and the other truck 207 980 km. What is the difference between these two recordings?

   b. Mr. Howard has spent R101 450,45 on building materials. Mr. Edwards has spent double that amount. How much money did Mr. Edward spend?

   c. Mr. Simon earns R355 990 per year. His wife earns R147 000 less than him. How much money does his wife earn per year?

   d. The total mass of all the grocery bags is 15 796 grams. Katlego and his sister have to carry it. The bags Katlego took had a total mass of 11,93 kg. How heavy were the bags his sister had to carry? (Give answer in kg and g. Round off to one decimal)

   e. A total of 251 389 animals were counted in the zoo. If 189 450 animals have a body mass of less than 20 kg, how many animals weigh more than 20 kg?

For more information and to practise, refer to page 47 of the Oxford Let's Practise Mathematics Grade 6 Learner's Book.

- UNIT NUMBER -
EIGHT

Fractions

Children often say, "That's not fair, you've got more than me!". Our earliest understanding of fractions is based on our idea of fairness and sharing in equal parts of a whole, for example, a bar of chocolate or a packet of sweets.

Fractions are not only about equal sharing, but can also be used to:
- measure
- indicate ratios
- show the result of division.

Fractions occur in a wide range of contexts, some more obvious than others. They can also be interpreted and applied in different ways in different contexts:
- Jan opened the carton of eggs and found that 2 eggs were cracked.
- Grace had 24 marbles, $\frac{3}{4}$ of which were glass.
- Will had 36 cards of South African and international soccer players. He had twice as many South African cards as international ones.
- It takes Nkateko $3\frac{1}{4}$ hours to travel to her parents' home by train.
- At the end of their cooking class, Kate was asked to share 20 pancakes equally between herself and 7 friends.
- In making up cool drink for the school camp, Elly used 2 cups of concentrate to 5 cups of water.
- Three friends shared 2 pizzas equally.
- By the end of the summer, the city's water storage was $\frac{1}{4}$ of what it had been at the end of the winter.
- The muffin recipe called for $\frac{1}{2}$ a cup of milk.

Foundation Phase

- Provide experiences for children to share realistic quantities equally, for example, coloured pencils among a table group or 3 pizzas among 4 people.
- Contrast situations where the parts are equal with situations where they are not equal, for example, cut up a plasticine 'sausage' or 'pizza' into 5 unequal parts. Make sure that learners recognise and apply the term *fraction* only to equal shares/parts.
- Use photographs of equal and unequal shares to make cards that learners can sort into *fractions* (fair share) and *not fractions* (unequal shares). In each case, it is important that learners see the parts in relation to the whole.
- Use the fraction cards to introduce the relationship between the number of equal parts and names of the parts (e.g. 6 parts = sixths; 8 parts = eighths).
- Ask learners to suggest an alternative name for the quarter's base, using the pattern above (4 parts = fourths).
- Make sure learners understand the difference between **numerator** and **denominator**.
  - Numerators count and denominators indicate what is being counted, for example, $\frac{3}{4}$ can be seen as a count of three quarters.
  - Denominators can be viewed as division, for example, $\frac{3}{4}$ can be seen as dividing 3 objects amongst 4 people.

Intermediate and Senior Phases

The activities below focus on the concepts of numerator and denominator as they are presented in Grades 4, 6 and 7.

Fractions

$\frac{3}{7}$ **Numerator** **(N for North) ↑**
Denominator **(D for Down) ↓**

1 Look at the shape on the right.

a Into how many equal parts is the shape divided? ____

b What fraction is shaded? ____

c Circle the equivalent fraction of the answer in question **1b**: $\frac{4}{7}$ or $\frac{2}{8}$ or $\frac{1}{2}$

For more information and to practise, refer to page 24 of the Oxford Let's Practise Mathematics Grade 4 Practice Book.

1. Types of fractions

$\frac{3}{5}$ $\frac{4}{7}$ $\frac{11}{2}$ $\frac{14}{8}$ $\frac{6}{5}$ $9\frac{9}{10}$

Use the fractions above to complete the table.

PROPER	
IMPROPER	
MIXED	

2. The grid below has fractions that are equivalent. Match the fractions which are equivalent to each other by colouring them the same colour.

$\frac{3}{9}$	$\frac{4}{10}$	$\frac{2}{3}$
$\frac{2}{5}$	$\frac{8}{12}$	$\frac{1}{3}$

3. Complete the gaps by finding the equivalent fractions.

a. $\frac{5}{8} = \frac{\square}{16}$ b. $\frac{9}{10} = \frac{90}{\square}$ c. $\frac{9}{12} = \frac{\square}{24}$

d. $\frac{2}{\square} = \frac{6}{15}$ e. $\frac{1}{\square} = \frac{3}{33}$ f. $\frac{\square}{5} = \frac{16}{20}$

For more information and to practise, refer to page 66 of the Oxford Let's Practise Mathematics Grade 6 Practice Book.

1. Fill in <, > or = in the spaces provided to make the following mathematical statements true.

a) $\frac{2}{3} \square \frac{1}{6}$ **b)** $\frac{1}{2} \square \frac{3}{4}$
c) $\frac{1}{5} \square \frac{3}{10}$ **d)** $\frac{1}{10} \square \frac{3}{20}$
e) $\frac{4}{5} \square \frac{8}{10}$ **f)** $\frac{21}{100} \square \frac{7}{10}$
g) $\frac{10}{100} \square \frac{1}{10}$ **h)** $\frac{3}{7} \square \frac{6}{28}$

Reminder

When we compare two fractions with the same denominator it is easy to see that the fraction with the bigger numerator is the one that is bigger. If the denominators are not the same we have to change these fractions so that they have the same denominator. We can use our knowledge of equivalent fractions to do this.

2. Fill in <, > or = in the spaces provided to make the following mathematical statements true.

a) $\frac{2}{3} \square \frac{1}{7}$ **b)** $\frac{5}{6} \square \frac{3}{5}$ **c)** $\frac{7}{8} \square \frac{4}{7}$ **d)** $\frac{5}{12} \square \frac{1}{9}$
e) $\frac{7}{11} \square \frac{2}{3}$ **f)** $2 \square \frac{1}{3}$ **g)** $4 \square \frac{1}{5}$ **h)** $5 \square \frac{20}{4}$

For more information and to practise, refer to page 35 of the Oxford Let's Practise Mathematics Grade 7 Practice Book.

- UNIT NUMBER -

NINE

Problem solving

The solving of mathematical problems needs to happen in context. It is important that, in all grades, learners are able to pose and solve problems. At the same time, you need to build awareness of the important role that Mathematics plays in real-life situations, including the personal development of learners.

Foundation Phase

When learners move from Grade R to Grade 1, they should be able to apply various problem-solving techniques up to the number 10, using concrete apparatus, e.g. counters, and the physical number ladder.

EXAMPLES:

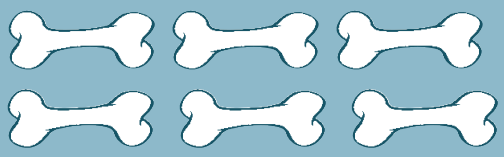
Grouping:

Here are 8 sweets (lay out 8 counters or show a picture of 8 sweets).

Teddy gets 2 sweets every day. For how many days can he get sweets?

Sharing:

There are 6 bones (lay out 6 counters or show a picture of 6 bones).



The 3 dogs must share the bones so that they all get the same number of bones. How many bones can each dog have?

Addition, subtraction, repeated addition

How many eyes do 2 children have?
How many ears do 4 children have?
How many fingers on one hand?
How many fingers on 2 hands?
Linda has 6 apples. She gives 2 apples to Ben. How many apples does she have now?

Teaching Tip

If you are a Grade 1 teacher, it is important to use questions like the ones on the right for baseline assessments at the beginning of the year so that you know which learners need extra assistance with problem solving before starting with Grade 1 work. It is vital that the learners start on a solid foundation and that there are no gaps in their early understanding of problem solving.

In Grades 1 to 3, teach the following techniques to learners to use when they explain solutions to problems:

Grade 1	Grade 2	Grade 3
• draw or use concrete apparatus, e.g. counters • use pictures to draw the story sum • build up and break down numbers • use doubling and halving • use number lines supported by concrete apparatus	• drawing or use concrete apparatus, e.g. counters • build up and break down numbers • use doubling and halving • use number lines	• build up and break down numbers • use doubling and halving • use number lines • round off in tens

In higher grades, use the table above as a baseline assessment checklist to ensure that learners have mastered the required techniques.

Preparing for the ANA

There are specific problem types that learners should master before they write the ANA each year, with the move from Grade 3 to Grade 4 being a particularly significant milestone:

- grouping discarding the remainder
- grouping incorporating the remainder
- sharing
- repeated addition
- addition and subtraction (there are at least three basic types of addition and subtraction problems).

Refer to page 45 of the CAPS document for Mathematics for more examples.

As the teacher, remember:

- to present these types of problems repeatedly, combining them in different ways
- to ask questions orally. When learners can read, you can give them a written version of the problem as well, but it is important that you always pose problems orally initially
- that problems in context can be included in worksheets, but should be short, straightforward and familiar. Ensure that all the learners understand them.

Grade 1:

Give learners lots of practice with problem situations with different functional relationships.

EXAMPLE:

Heila sells hotdogs at R4 each. Make a table to help her know how much to charge for large orders.

Number of hotdogs	1	2	3	4	5	10	20
Cost in R	4	8					

For Grade 2 and Grade 3 examples of this type of problem, refer to the CAPS Mathematics document pages 62 and 81 respectively.)

Grades 2 and 3:

EXAMPLE:
Sedick babysits. He charges R20 for travel costs and then R5 per hour for babysitting. Complete this table for him.

Number of hours	1	2	3	4	5	10	20
Cost in R	25	30					

Grade 6:

Problem solving

1. Mr. Johnson travels 65 550 m to work every morning. Mrs. Johnson travels 21, 45 km further. How many km does Mrs. Johnson travel to work every morning? (Round off to 2 decimals)

2. Suzie`s mass is equal to 35 564 grams. Her brother is 1kg and 750 gram heavier than her.
   a. What is Suzie`s brother`s mass? Give your answer in kg and grams.

   b. What is Suzie's and her brother's mass together?

3. A cell phone network had a total of 1 628 432 subscribers. This number dropped by 299 406 after a new cell phone network was launched. How many subscribers stayed loyal to the first network?

4. The selling price of a fast food franchise dropped by R175 000 after it had been in the market for several months. It sold for R 3 450 999. What was the original selling price?

5. If the moon is 380 760 km from the earth, and Mars is 100 times further from the earth, calculate the distance between the moon and Mars.

6. A large grocery chain recorded a turnover of R 48 765 453 for a week in June. If their costs were R30 675 342, calculate their profit or loss for that week.

For more information and to practise, refer to page 47 of the Oxford Let's Practise Mathematics Grade 6 Practice Book.

By the end of Grade 6, learners should have mastered the following problem types:

Technique	Action required	Example
Summation	A sum	A shopkeeper buys a specific brand of DVD player to stock in all of his stores. He buys 126 789 black, 341 567 white and 344 533 silver DVD players. How many DVD players does he buy altogether?
Increase and decrease	Calculate the change	A clothing factory generated R864 328 during November. During December the amount decreased to R367 435. How much less money did the factory generate during December than in November?
Grouping	Group problems in an array form. These problems can be solved using division/repeated subtraction or multiplication/repeated addition	A farmer wants to plant 6 708 apple trees. He wants to plant the same number of trees in each of his 156 rows. How many apple trees must he plant in each row?
Sharing	Sharing problems can be solved using division/ repeated subtraction. Smaller groups of equal size are formed from a given quantity or number	A man owns 346 shops. He buys 8 654 radios and shares them equally between these shops. How many radios does each shop get?

Data handling

It is important to explain what this concept means before you expect your learners to understand and work with data.

Vocabulary

Data is information or facts you find out or which are given to you. Data can be words or numbers or a mixture of both. When young learners are presented with pictographs they are more likely to respond to the images than to the data unless they are prompted.

Measures of central tendency are used to measure the middle values in a set of data.

- Mean is the average value
- Mode is the value that occurs most often
- Median is the middle value of a sorted data set
- Range is the difference between the highest and the lowest data score.

The data cycle

Remind learners at all times of the complete data cycle, which consists of:

- asking a question
- collecting data
- organising data
- representing data
- analysing and interpreting data
- reporting on the data.

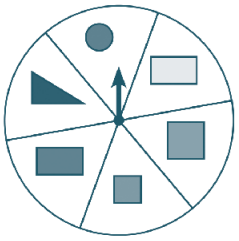
Relate all activities to the data cycle and have learners identify where in the data cycle the activity that they are busy with falls.

One of the ways to engage learners in the data cycle is to let them work with topics that are relevant to them, for example, their favourite sport, movies, music, TV programmes, clothes, etc. These activities can lead to interesting discussion, and learners should be challenged to make posters that include graphs for the classroom.

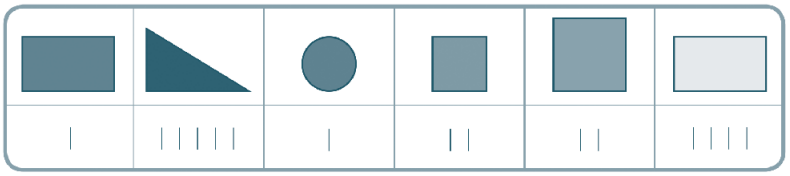
Data

☆ Make this spinner.

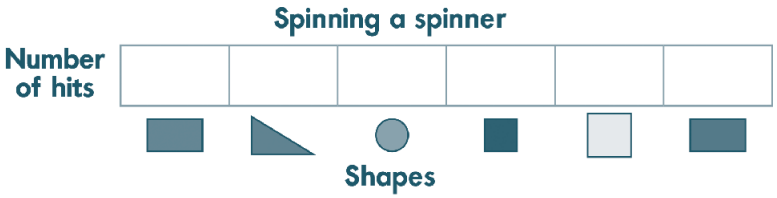
Step 1: Flick the arrow 10 times.
Step 2: Write down the shape you hit each time.



Each time Megan hit a shape, she drew a line under it like this.



☆ Copy and complete the pictograph in your book. Draw shapes to show the number of hits.



☆ Answer the questions.

1 Which shape was hit the most?
2 ☐ and ☐ were hit only once.
3 ☐ was hit 1 more than ☐
4 ☐ was hit 2 less than ☐
5 What is the total number of hits?

For more information, refer to page 66 of the Oxford Headstart Mathematics Grade 2 Learner's Book.

Data Handling

The box includes the different mass readings of learners in grade 5M:

Boys: 31 kg; 27 kg; 21 kg; 28kg; $26\frac{1}{2}$ kg; 24 kg; 31 kg; $25\frac{3}{4}$ kg; 26 kg; $27\frac{1}{4}$ kg; 22 kg; $25\frac{1}{2}$ kg; 31 kg; 25 kg

Girls: 23 kg; 22 kg; 26 kg; 23 kg; 27 kg; $24\frac{1}{2}$ kg; 26 kg; 23 kg; 24 kg; 26 kg; 32 kg; $25\frac{1}{2}$ kg

1. The information given is raw data. Find the mode of the ungrouped numerical data for girls and boys separate:

Boys:	Girls:
Mode:	Mode:

For more information and to practise, refer to page 54 of the Oxford Let's Practise Mathematics Grade 5 Practice Book.

- UNIT NUMBER -
ELEVEN

End-of-year targets

Grade 3

By the end of Grade 3, learners should be able to do the following:

Content area	Topic	Criteria
Numbers, Operations and Relationships		
Number concept	Count forwards in 5s, 50s and 25s between 0 and 1 000	
Solve problems	Solve word problems in context involving repeated addition leading to multiplication with answers up to 50 using one of the following: • apparatus • drawing • building up and breaking down of numbers • number lines • doubling and halving and explain solutions to problems.	
Calculations	Can multiply by 3 up to 99 using one of the following: • apparatus • drawing • building up and breaking down of numbers • number lines • doubling. Writes a number sentence using x =	
Patterns, Functions and Algebra		
Number patterns	Completes number sequences: • counting in 5s between 0 and 1 000 e.g. 1 000; 995; 990; 985; __; __; __; 965; __; __; 950 • counting in 50s between 0 and 1 000 e.g.600; 650; 700; __; __; 850; __; __; __ • counting in 25s between 0 and 1 000 e.g.1 000; 975; 950; __; __; 875; __; __; __; 775	
Space and Shape (Geometry)		
3D	Recognises and names: • ball shapes (spheres) • box shapes (prisms) • cylinders • pyramids • cones. Sorts objects into those with flat and those with curved surfaces. Identifies the 2D shapes that make up the flat surfaces of the 3D objects mentioned above.	
Measurement		
Capacity and volume	Reads volume in litres and millilitres from pictures of measuring jugs.	

Grade 7

Year Revision

Paper 1

1. Find the following whole numbers.

a) A whole number which is three-fifths between 5 and 50

b) The HCF of 15, 20 and 35

c) An even prime number

d) A whole number between $\sqrt{50} + 3$ and $\sqrt{10} + 8$

e) Two composite numbers between 1 and 10 which are multiples of 4

2. Write 40 000 in the following forms.

a) Expanded notation:

b) Exponential form:

3. A school has 405 learners where the ratio of girls to boys is 4 : 5.

a) How many boys are there?

b) How many girls are there?

4. Work out the following.

a) $\frac{1}{4} + \frac{4}{5} - \frac{3}{5}$

b) $3\frac{2}{3} \times \frac{1}{5}$

c) $0{,}25 \times 0{,}2 + 0{,}5 \div 0{,}25$

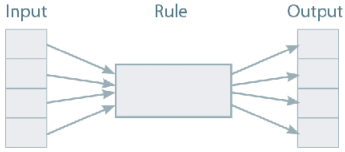
5. You are given the pattern 1; 8; 15; 22.

a) Write down the rule describing the pattern as a number sentence.

b) Describe the pattern in words.

c) Create a table for the pattern using {1; 2; 3; 4; 5} as input values.

d) Create a flow diagram for the pattern with {2; 5; 10; 20} as input values.



For more information and to practise, refer to pages 93 and 94 of the Oxford Let's Practise Mathematics Grade 7 Practice Book.

6. You are given the pattern 0; $\frac{1}{2}$; 1; $1\frac{1}{2}$; 2.

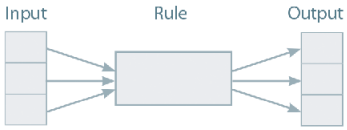
a) Write the rule describing the pattern in words.

b) Write the rule describing the pattern as a number sentence.

c) Use the pattern to complete the table with the input values of 1; 2; 10; 20.

Input				
Output				

d) Use a flow diagram to represent the above pattern where the output values are $4\frac{1}{2}$; $19\frac{1}{2}$; $29\frac{1}{2}$.



7. Solve the following number sentences by inspection.

a) $3n - 2 = 13$

b) $\frac{3}{4}n - \frac{1}{4} = \frac{1}{2}$

c) $n^2 - \frac{1}{4} = 0$

d) $\frac{1}{3}n + \frac{2}{3} = 1$

8. A car travels from Johannesburg to Durban with a full tank of petrol. The capacity of the petrol tank is 60 ℓ. The distance from Johannesburg to Durban is 600 km. The car uses 1 ℓ petrol per 5 km.

Distance (km)	5	50			600
Amount of petrol (ℓ)			60	80	

a) Complete the table alongside.

b) Will the car reach Durban on one tank of petrol?

c) How many litres of petrol are needed for the car to reach Durban?

d) After how many kilometres will the tank be empty?

For more information and to practise, refer to pages 93 and 94 of the Oxford Let's Practise Mathematics Grade 7 Practice Book.

- UNIT NUMBER -
TWELVE

Top tips for successful Annual National Assessments

Ensure that your learners excel in the Annual National Assessments:

- Teach every day and make sure that you fully cover the CAPS curriculum.
- Plan carefully and make the most of your teaching time.
- Make sure that when you or one of the learners is absent you have a plan in place to catch up the lesson that has been missed.
- Practise answering the different kinds of questions with your learners daily, especially those that require higher-order thinking. This will improve learners' comprehension and ensure that they understand the different kinds of questioning they will face in the ANA.
- Remember that learners learn to read best by reading. Give your learners ample opportunities to read every day.
- Make sure that you teach new words, both in reading lessons and content subjects like Mathematics, before you start your lessons in these areas. If learners understand the words, the concept will follow.
- It is very important that, from Grade 3, learners are able to read questions and understand the instructions clearly.
- Informally assess your learners regularly to provide you with feedback on your teaching and on the learners' progress. You will be able to identify the gaps immediately, before they become too big to fill.
- Choose Oxford books for excellence and success with the Annual National Assessment. Good textbooks do most of the planning and preparation for you so that all that remains for you to do is what you do best – teach.

- UNIT NUMBER -
THIRTEEN

Glossary of terms

Learners need to know and understand these key words and terms because they are used in test and exam questions as well as in the ANA papers. Encourage learners to use them in their answers in the classroom as well.

addition: to add the numbers together (+)
consecutive: following one after another without interruption or break
compare: see which number has the biggest/smallest value, whether two numbers are equal
denominator: in the fraction , $\frac{3}{4}$ 4 is the denominator; the number of equal parts into which the whole is divided to obtain fractional parts
describe: give an account of something by giving details of its characteristics
determine: find out or discover something, usually after investigation
division: separating or splitting into equal parts
equal: to have the same value
estimation: the process of arriving at an inexact result on the basis of general consideration of the numbers and operations involved rather than a consequence of a precise mathematical procedure
fractional form: in the form of a fraction
investigate: find out more
mean: the average, determined by dividing the total of the quantities by the number of quantities in the data set
median: the middle value in a set of numerically ordered data
mode: the quantity or number that occurs most often in the data set
number bonds: the different combinations that total the given number
numerator: in the fraction $\frac{3}{4}$, 3 is the numerator
place value: a system of assigning values to digits based on their position in a number
problem solving: a view of Mathematics as a dynamic and creative human invention; a process rather than a product
ratio: a way of comparing one quantity with another quantity of the same units
sum: the result of addition
techniques: the way that we do things, also called methods or strategies

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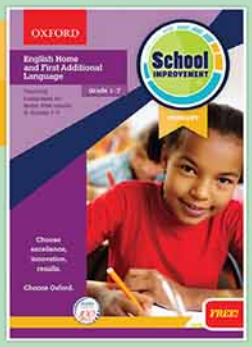

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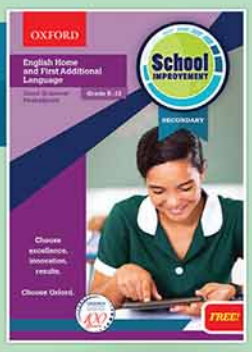

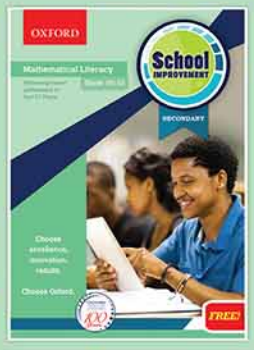

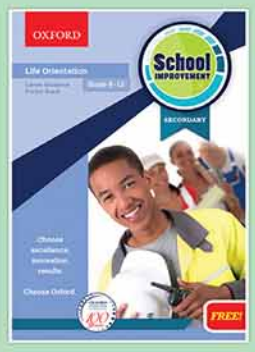

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