

Grade 7 Mathematics 3-in-1 (Part 1)

CLASS TEXT & STUDY GUIDE

This Class Text & Study Guide places a strong emphasis on concept development and deep understanding across all five CAPS modules, enabling learners to master essential and fundamental mathematical skills. It is designed to develop deep mathematical thinking, and is guaranteed to thoroughly prepare a learner for high school Mathematics.

The essence of its content is to provide learners with a solid foundation and grounding, together with extended thinking in this critical year as they enter the Senior Phase. This comprehensive and learner-friendly study guide will give a learner the best chance of continuing with Mathematics right through to Grade 12.

This publication aims to:

- Ensure mastery of fundamental knowledge and skills aligned to the Senior Phase curriculum
- Focus on critical concepts that underpin the year ahead
- Strengthen typical problem areas
- Encourage understanding over rote learning
- Prepare learners to enter high school Maths with clarity and confidence.

Key features:

- Rich, accessible explanations and teaching tips
- Continuous reinforcement of concepts across topics
- CAPS-aligned Exam Papers with detailed memos
- 'Take Note' boxes to highlight important insights
- Summaries, Reminders, and Hints
- Fun and engaging elements like Investigations, Fun Facts, Challenges and Crossword Puzzles.

This easy-to-use classroom and study companion empowers learners to take ownership of their Maths learning journey while building curiosity and confidence in a subject that is both essential and demanding.



GRADE

7

CAPS

3-in-1

Mathematics

Part 1

Jenny Campbell & Gretel Lampe

THIS CLASS TEXT & STUDY GUIDE INCLUDES

- 1 Notes and Worked Examples
- 2 Questions per Topic
- 3 Detailed Answers (in separate book)

eBook
available 



PART 1 & PART 2 OVERVIEW



Part 1

1 NUMBERS, OPERATIONS & RELATIONSHIPS 1



Part 2

2 PATTERNS, FUNCTIONS & ALGEBRA 1

3 SPACE & SHAPE (GEOMETRY) 74

4 MEASUREMENT 130

5 DATA HANDLING 162



EXAM PAPERS

Exam A – set according to the 2025 ATP

Exam P1 E1

Exam P2 E6

Exam B – set according to the full CAPS curriculum

Exam P1 E13

Exam P2 E18

Grade 7 Summary of Acceptable Reasons for Geometry



Answer Book

Answers to all modules and exam papers in separate book

Cognitive Levels for Assessment



Cognitive level		Description of skills to be demonstrated
LEVEL 1	Knowledge 25%	<ul style="list-style-type: none"> • Estimation and appropriate rounding of numbers • Straight recall • Identification and direct use of correct formula • Use of mathematical facts • Appropriate use of mathematical vocabulary
	Routine procedures 45%	<ul style="list-style-type: none"> • Perform well-known procedures • Simple applications and calculations which might involve many steps • Derivation from given information may be involved • Identification and use (after changing the subject) of correct formula • Generally similar to those encountered in class
LEVEL 3	Complex procedures 20%	<ul style="list-style-type: none"> • Problems involving complex calculations and/or higher order reasoning • Investigate elementary axioms to generalize them into proofs for straight line geometry, congruence and similarity • No obvious route to the solution • Problems not necessarily based on real world contexts • Making significant connections between different representations • Require conceptual understanding
	Problem Solving 10%	<ul style="list-style-type: none"> • Unseen, non-routine problems (which are not necessarily difficult) • Higher order understanding and processes are often involved • Might require the ability to break the problem down into its constituent parts



Senior Phase Maths Community



This page is a resource rich hub for both teachers & learners.

For **TEACHERS**, find



- Webinar recordings
- ATPs
- Curriculum documents
- Assessment information
- Acceptable reasons for Euclidean Geometry

For **LEARNERS**, find



- Fantastic problem solving



Printable Resources

The icon alongside appears at particular exercises throughout the book.

This icon indicates that there is a printable version of the question available.

These can be printed for use in the classroom or at home.

Printable Resources



Scan here

Please note: These resources may not be used for resale.



Thinking Steps & Explanations



Our step-by-step solutions to the Worked Examples include thinking steps where helpful, always in grey text, as well as extra explanations along the way.

Mental Maths



Do you have good methods for doing sums without using a calculator?



Did you Know?

Adding can be done in any order.

Addition

The worked examples below show different approaches to adding.

Worked Example 1

$$\begin{aligned} &154 + 35 + 5 \\ &= 154 + \underbrace{35 + 5} \\ &= 154 + 40 \\ &= 194 \end{aligned}$$

Hint

Look for an easy way of combining (or grouping) the numbers, focusing on bonds of 10 where possible.

1 and 9 ; 2 and 8 ; 3 and 7 ;
4 and 6 ; 5 and 5



Addition can be done in any order. This is known as the **associative property**.



See page 24 for more information about the **associative property**.

Worked Example 2

$$\begin{aligned} &315 + 42 + 8 \\ &= 300 + 10 + 5 + 40 + 2 + 8 \\ &= 300 + 50 + 15 \\ &= 365 \end{aligned}$$

Did you Know?

You can break numbers up into

- hundreds
- tens
- units



then add the hundreds, then the tens and then the units and then combine the results.

Exercise 5



Solutions on p. A7

Simplify the following in your head, showing working if you need more than one step.

Try different methods until you find one that works best for you.

1. $12 + 8 + 5$
2. $14 + 16 + 8$
3. $23 + 27 + 15$
4. $37 + 63 + 41$
5. $26 + 40 + 160$
6. $130 + 370 + 5$
7. $321 + 242 + 108$
8. $623 + 125 + 27$

Hint

Take time to figure out which method you prefer by trying each sum using different methods.



Multiplication

Worked Example 1 (2 digits by 2 digits)

Estimate and calculate the value of 29×54 .

Answer

Estimate: $30 \times 50 = 15 \times 100 = 1\,500$

Actual value

Method 1 (tens and units)

- Break each number up into tens and units
 $29 = 20 + 9$
 $54 = 50 + 4$
- multiply both parts of 29 by both parts of 54
- add the answers

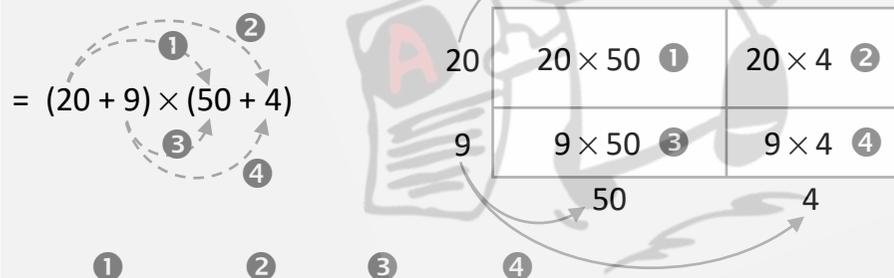


Did you Know?

You can make your estimate too large if you round both numbers up, or too small if you round both numbers down.



$$29 \times 54$$



$$\begin{aligned}
 &= (20 + 9) \times (50 + 4) \\
 &= (20 \times 50) + (20 \times 4) + (9 \times 50) + (9 \times 4) \\
 &= 1\,000 + 80 + 450 + 36 \\
 &= 1\,000 + 80 + 400 + 50 + 30 + 6 \\
 &= 1\,000 + 400 + 160 + 6 \\
 &= 1\,566
 \end{aligned}$$

Method 2 (long multiplication)

$$\begin{array}{r}
 29 \\
 \times 54 \\
 \hline
 116 \\
 1450 \\
 \hline
 1566
 \end{array}$$

$$\Rightarrow 4 \times 29 = 116$$

$$\Rightarrow 50 \times 29 = 1\,450$$

$$\Rightarrow 116 + 1\,450 = 1\,566$$



Exercise 19



Solutions on p. A19

Using both methods shown in the worked example, estimate and then calculate the actual value of each product.

- 25×17
- 34×78
- 56×96
- 82×39

Reminder

For multiplication, it is usually best to round one of the numbers up and one of the numbers down.

Halving one number and doubling the other often eases the calculation of the estimate.



Exercise 20



Solutions on p. A20

Using the method you prefer, estimate, and then calculate the actual value of each product.

- 19×83
- 26×49
- 92×31
- 74×63
- 52×99
- 99×99

Challenge (Q5 & Q6)

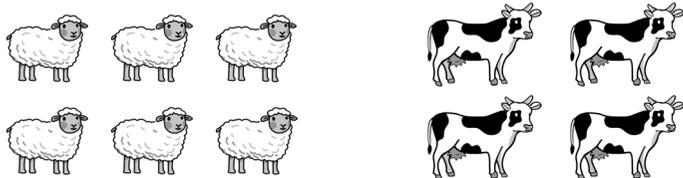
99 is close to a 100.
Can you find a special method for the last two products?



Ratio



Ratio is about comparing things.



The ratio of **sheep** to **cows** is **6 : 4**

The ratio of **cows** to **sheep** is **4 : 6**

The numbers must be placed on the correct sides of the ':' sign!

Ratios can look different but be the same.

Can you see that for every 3 sheep there are 2 cows?

The ratio 6 : 4 can be changed to 3 : 2 by dividing both 6 and 4 by 2.

Exercise 43

Solutions on p. A48

Fill in the number needed to keep each pair of ratios the same.

- The ratio of 12 : 4 is the same as the ratio of 3 : ____.
- The ratio of 12 : 15 is the same as the ratio of 4 : ____.
- The ratio of 35 : 49 is the same as the ratio of 5 : ____.
- The ratio of 5 : 2 is the same as the ratio of 15 : ____.
- The ratio of 4 : 3 is the same as the ratio of 32 : ____.

Take Note

In the same way that $\frac{6}{4}$ and $\frac{3}{2}$ are equivalent fractions, so too are 6 : 4 and 3 : 2 equivalent ratios.



Exercise 44

Solutions on p. A49

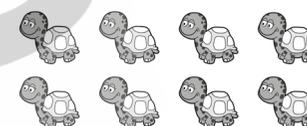
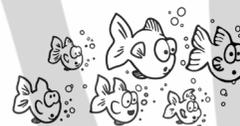


Complete each statement by filling in the missing values.

- The ratio of pizzas to cupcakes is ____ : ____.
- The ratio of cupcakes to pizzas is ____ : ____.
- Altogether, the total number of pizzas and cupcakes is ____.
- If you double both the number of pizzas and the number of cupcakes:
 - The ratio of pizzas to cupcakes can be written as 10 : ____ or ____ : 7.
 - ____ Grade 7s will be able to eat either a pizza or a cupcake.

Exercise 45

Solutions on p. A49



Complete the statements below by filling in the missing values.

- There are ____ living things.
- The ratio of the fish to the birds to the tortoises is
6 : ____ : ____ = 3 : ____ : ____
- The ratio of the tortoises to the fish to the birds is
____ : 6 : ____ = ____ : 3 : ____
- If half of each group dies, the ratio of fish to birds to tortoises can be written as ____ : 2 : ____.
- How does this ratio compare with the simplified ratio found in 2? Explain your answer.

Take Note

15 : 10 : 5
is simplified to
3 : 2 : 1
by dividing each
number by 5.



8. $(3 + 2)^3$

9. $5^2 + 5 \times (2^3 + 2) \times 2^2$

10. $7^2 + (5 \times 2)^3 \div 2 - 5^2$

11. $12 \div 3 \times 2^3$

12. $2^6 \div 2^3$

13. $3^1 + 3^2 + 3^3$

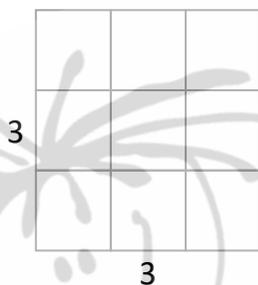
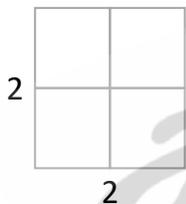
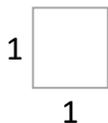
14. $7^2 - 4^2 - 3^2$

15. $48 \div 2^3 \times 9 - 3^2 \times 2$

Squares & Square Roots



Squares



$1 \times 1 = 1 = 1^2$

$2 \times 2 = 4 = 2^2$

$3 \times 3 = 9 = 3^2$

Square numbers get their name from the fact that it is possible to represent these numbers

- as a product of two identical numbers
- in the form of a square

When a number is multiplied by itself, the result is a square number.

Square roots

The **square root** of a number is the number that, when multiplied by itself, will give the original number.

- $\sqrt{36} = 6$ because $6 \times 6 = 36$



Exponents and roots are inverse operations

Squares

$4 \times 4 = 16$

$4 \times 4 = 4^2$

$5 \times 5 = 25$

$5 \times 5 = 5^2$

Square roots

$\therefore \sqrt{16} = 4$

$\therefore \sqrt{4^2} = 4$

$\therefore \sqrt{25} = 5$

$\therefore \sqrt{5^2} = 5$



Worked Example

Write down the value that makes the statement true.

1. $\sqrt{81} = \underline{\quad}$ $\therefore \sqrt{9^2} = \underline{\quad}$

2. $12^2 = \underline{\quad}$ $\therefore \sqrt{12^2} = \underline{\quad}$

3. $0 \times 0 = \underline{\quad}$ $\therefore \sqrt{0^2} = \underline{\quad}$

4. $1^2 = \underline{\quad}$ $\therefore \sqrt{1^2} = \underline{\quad}$

Answer

1. $\sqrt{81} = \underline{9}$ $\therefore \sqrt{9^2} = \underline{9}$

2. $12^2 = \underline{144}$ $\therefore \sqrt{12^2} = \underline{12}$

3. $0 \times 0 = \underline{0}$ $\therefore \sqrt{0^2} = \underline{0}$

4. $1^2 = \underline{1}$ $\therefore \sqrt{1^2} = \underline{1}$

Worked Example 1 (square root)

Using prime factors, determine $\sqrt{225}$.

Answer

3	225
3	75
5	25
5	5
	1



$$\therefore \sqrt{225} = 3 \times 5 = 15$$

Exercise 13

Using prime factors, determine:

1. $\sqrt{784}$
2. $\sqrt{1\,764}$
3. $\sqrt{2\,025}$
4. $\sqrt{27\,225}$



Solutions on p. A86

Now let's use the prime factors of 5 832 to find its cube root.

2	5 832
2	2 916
2	1 458
3	729
3	243
3	81
3	27
3	9
3	3
	1

Steps

- ① find the prime factors
- ② group repeated factors into 3s
- ③ write down one factor from each group
- ④ multiply the selected factors
- ⑤ write down the answer

$$\therefore \sqrt[3]{5\,832} = 2 \times 3 \times 3 = 18$$

**Reminder**

Cubes and cube roots are inverse operations.

$$\sqrt[3]{5\,832} = 18$$

and

$$18^3 = 18 \times 18 \times 18 = 5\,832$$

Exercise 1

Solutions on p. A94

1. 2; -5; -1; 3; -12; -19

1.1 Which integer in the list above has the largest value?

1.2 Arrange the integers in descending order.

2. Arrange the integers: 5; -7; 2; -8; -14; 10 in ascending order.



3. The number line below has been divided into equal parts.

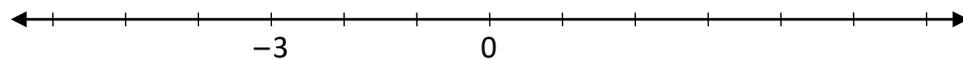


The missing integer at A is 15.

3.1 Write down the missing integers at B, C, D, E, F, G and H.

3.2 Rearrange the integers that are represented by A, B, C, D, E, F, G and H in ascending order.

4. Redraw the number line below and arrange the integers 4; -2; 1; 6; -4; 3; -5 on the number line.



Comparing Integers

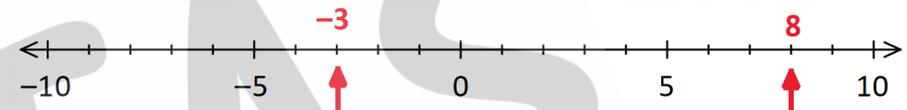


If in doubt, use a number line to order or compare integers.

On all number lines values increase from left to right.

When comparing two integers on a number line, the integer on the left is smaller than the integer on the right.

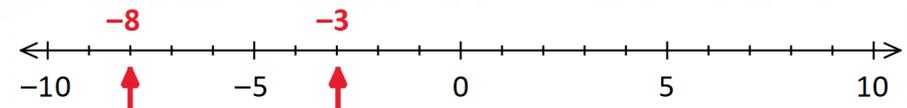
Let's compare 8 and -3:



We can say that:

- $-3 < 8$ (-3 is less than 8)
- $8 > -3$ (8 is greater than -3)

Now let's compare -3 and -8:



We can say that:

- $-3 > -8$ (-3 is greater than -8)
- $-8 < -3$ (-8 is less than -3)

