

PlusOne

Mathematics



Grade
6

PlusOne

Mathematics

Teacher's Guide



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Tel: +263 242 771 406 | +263 242 753 201
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Website: www.secondarybookpress.co.zw

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Editor-in-Chief: Munyaradzi Gunduza
Development Editor: Edwin Muzanenhamo
Design and text layout: Nesbert T. Gotekote

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Introduction

The PlusOne Mathematics Teacher's Guide is a detailed book that complements the teaching of Mathematics in Zimbabwean primary schools. This book offers valuable guidelines on how to deliver effective lessons using the HBC PlusOne Mathematics Grade 6 Learner's Book.

The subject, Mathematics, aims at producing a morally upright Zimbabwean, who is responsible and capable of maintaining a socially sound lifestyle. It seeks to explore social, cultural, geographical and technological space to develop the cognitive, affective and psychomotor domains of the learner. As a foundational tool for logic and arrangement, Mathematics assists in the teaching and learning of other learning areas across the curriculum. Broadly, the syllabus aims to produce learners who can:

- apply Mathematical concepts and skills in relevant life situations.
- solve problems using a variety of Mathematical strategies.
- communicate Mathematical ideas clearly and confidently.
- utilise ICT tools in Mathematical investigations and operations.
- demonstrate an understanding of Zimbabwean heritage through ethno-Mathematics.
- develop mental agility and logical reasoning skills.
- apply measurement, estimation, and data handling skills in daily activities.
- demonstrate accuracy and efficiency in number operations.
- appreciate the beauty and utility of Mathematics in the environment.
- comment meaningfully on data to develop skills such as critical thinking, problem solving, team building and tolerance.
- use appropriate Mathematical language in line with our cultural values.

Topics/Skills

The learning and teaching of Mathematics will focus on the following topics:

- Number
- Operations
- Measures
- Relationships

The objective of this Grade 6 Teacher's Guide is to make teaching and learning more interactive, practical and useful and to bring out the ingenuity of teacher professionalism in the teacher to produce well-equipped learners for national development.

Philosophy of teaching Mathematics

Mathematics provides opportunity for teachers to adopt cross-cutting and creative pedagogic approaches such as talk for learning, project-based learning, games, modelling, questioning, songs, storytelling and role-play necessary for achieving a conducive learning environment and developing learners into creative, honest and responsible citizens.

The Mathematics classrooms should be learning-centred where the teacher, acting as a facilitator, introduces the topics for the day and assists learners to describe and analyse issues raised.

In addition, the teacher helps learners to interact and share ideas among themselves based on their knowledge of Zimbabwe and the world. The class will be encouraged to explore topics through enquiry-based questions. The teacher should emphasise these important areas in day-to-day learning as they are aimed at promoting higher order thinking among learners.

Philosophy of learning Mathematics

Through the learning of Mathematics, learners will specifically acquire:

- critical thinking and problem-solving skills to be able to compare, analyse, evaluate and apply Mathematical knowledge with little or no supervision.
- creative thinking skills to be able to reconstruct important information confidently.
- digital literacy skills to be able to use IT tools and resources (such as calculators and software) efficiently for investigations and project works.
- effective communication skills to be able to share Mathematical information at various levels of interaction.
- values to live as global citizens capable of learning about other peoples and cultures of the world.
- leadership skills to be able to effectively build a team and influence others to accomplish a common task.

Subject specific aims

The syllabus should enable learners to:

- develop a positive attitude towards Mathematics.
- foster problem-solving skills into learners.
- communicate Mathematical information to develop critical thinking and logical reasoning.
- develop Mathematical concepts and skills for use in entrepreneurship and other facets of life.
- develop psycho-social skills such as self-control and free expression of emotions which contribute to the development of the learner.
- develop an awareness of national heritage in the learning of Mathematics.
- promote an awareness of IKS in the teaching and learning of Mathematics.

Instructional expectations

Mathematics provides opportunity for teachers to:

- adopt thematic and creative pedagogic approaches such as the concrete-pictorial-abstract approach, project-based learning, games and modelling.
- nurture and develop learners into creative, honest and responsible citizens.

- adopt collaborative approaches to lesson preparation within and across disciplines and grade levels to develop communities of Mathematics learners.
- use multiple methods to systematically gather data about learners' understanding and ability to guide the teaching and learning of Mathematics.
- put necessary arrangements in place to provide feedback to both learners and parents.

Interpretation of key words in the syllabus

Topics are the broad areas of the Mathematics curriculum. Units are larger groups of related objectives. Content objectives indicate what all learners should know, understand and be able to do. Objectives are clear statements of specific things learners should know and be able to do within each unit.

Class management

Most teachers in Zimbabwe teach large classes. The teachers, based on their professional experience over the years, have developed skills in classroom methodology. Here are a few reminders about the whole class, group, pair and individual work that could be helpful with large classes.

Whole class teaching

Much of your teaching, especially when your class is large, will involve you standing at the front of the class explaining and listening to your learners. You can set out facts and concepts which everyone can understand. However, your class will vary in ability. More able learners should be given additional tasks to stretch their capabilities while those who find understanding more difficult should be given the time and attention they need.

When you introduce a topic make sure you use learners' existing knowledge and build upon it. The basic information for your lesson is in the text. Work out during your lesson planning which concepts will be difficult for them to understand and explain these first. Make sure that all your learners have understood your explanation and give time to those having difficulty.

1. Group work

Class teaching is large group work but sometimes there are advantages in working in pairs or groups of four to six learners. Some children make more progress when working in a group of the same ability. On other occasions, more able learners can help those who are not quite so quick at understanding.

There are many advantages in allowing several children to consider a Mathematical problem, work jointly and bring their findings back to the whole class: each group will think in a slightly different way and have different experiences to share. Individual groups can study a diagram together, solve a complex operation, or discuss a topic like budgeting in their community.

2. Pair work

Learners are often instructed to work in pairs – either with their desk mate or with a partner. This is an ideal opportunity for learners to assist each other, and for them to assess each other. Working with a deskmate offers the least classroom disturbance.

They ask and answer questions during "shape talk" and they discuss the steps of a calculation before they solve individual exercises.

3. Learner self-study

There will be times when you want the class to work as individuals to allow them to become familiar with material you have given them and to allow you to work with learners of different abilities. It is essential that the material they use is understandable to them. Use additional material at different levels to ensure that some learners do not finish more quickly than others.

Teaching tip

One of the most important skills in classroom management is the ability to ensure your learners are occupied for the whole lesson. If a group has finished its task and has nothing else to do it is likely to become disruptive. Break up your lesson and make sure it has several different parts:

- full class work,
- individual work,
- practical activities (measuring, drawing, weighing).

The syllabus emphasises the:

- creation of learning-centred classrooms using creative approaches to ensure learner empowerment.
- positioning of inclusion and equity at the centre of quality teaching.
- use of Information and Communications Technology (ICT) as a pedagogical tool.
- integration of assessment as learning, for learning and of learning.

Learning-centred pedagogy

The learner is at the centre of learning. At the heart of the national curriculum for change and sustainable development is the learning progression and improvement of learning outcomes for Zimbabwe's young people. It is expected that at each curriculum phase, learners would be offered the essential learning experiences to progress seamlessly to the next phase. Where there are indications that a learner is not sufficiently ready for the next phase, a compensatory provision through differentiation should be provided to ensure that such a learner is ready to progress with his/her cohort.

The syllabus encourages the creation of a learning centred classroom with the opportunity for learners to engage in meaningful "hands-on" activities that bring home to the learner what they are learning in school and what they know from outside of school. The learning centred classroom is a place for the learners to discuss ideas through the inspiration of the teacher.

The learners then become actively engaged in looking for answers, working in groups to solve problems. They also research information, analyse and evaluate information. The aim of the learning-centred classroom is to enable learners to take ownership of their learning. It provides the opportunity for deep and profound learning to take place.

The teacher as a facilitator needs to create a learning environment that:

- makes learners feel safe and accepted.
- helps learners to interact with varied sources of information in a variety of ways.
- helps learners to identify a problem suitable for investigation through project work.
- connects the problem with the context of the learners' world so that it presents realistic opportunities for learning.
- organises the subject matter around the problem, not the subject.
- gives learners responsibility for defining their learning experience and planning to solve the problem.
- encourages learners to collaborate in learning.
- expects all learners to demonstrate the results of their learning through a product or performance.

It is more productive for learners to find answers to their own questions rather than teachers providing the answers and their opinions in a learning-centred classroom. The content with reference to learner's activities in class and outside classroom focusses on learner-centred pedagogy, which emphasises active participation in class activities, making teaching and learning more practical and toward achieving positive learning outcomes that largely benefit the learner.

Pedagogical approaches

Effective teaching and learning in Mathematics depend upon the use of active participatory methods including the following:

- Demonstration
- Mathematical games
- Individual and group presentations
- Modelling (making 3D shapes)
- Educational tours/Excursions (visiting a bank or market)
- E-Learning
- Case studies (financial literacy)
- Problem-based learning
- Scenes/Models/Resource persons (for example, inviting an engineer or accountant)

Inclusion

Inclusion is ensuring access and learning for all learners especially those disadvantaged. Planning, delivery and reflection on daily learning experiences should take these differences into consideration, ensuring learners with visual or learning impairments are supported with appropriate media (for example, Braille or tactile models).

Differentiation and scaffolding

Differentiation is a process by which differences (learning styles, interest and readiness to learn) between learners are accommodated so that all learners in a group have the best possible chance of learning. Differentiation could be by task, support and outcome.

Differentiation as a way of ensuring each learner benefits adequately from the delivery of the curriculum can be achieved in the classroom through:

- task,
- one-on-one support,
- learning outcomes.

Differentiation by task: Setting different Mathematical problems for learners of different abilities.

Differentiation by support: Giving one-on-one help to learners struggling with specific operations.

Differentiation by outcome: Allowing learners to respond at different levels of complexity.

Scaffolding in education refers to the use of variety of instructional techniques aimed at moving learners progressively towards stronger understanding and ultimately greater independence in the learning process. It involves breaking up a complex Mathematical task into smaller steps. Common strategies include:

- giving learners a simplified version of a problem.
- illustrating a concept (like fractions) in multiple ways (diagrams, physical objects).
- giving learners a model of an assignment they will be asked to complete.

Learner activities

The types of activities used to ensure multi-ability learning include:

- practical measuring and weighing
- geometric drawing
- role-play (buying and selling)
- Mathematical songs and games
- crosswords and number puzzles
- matching activities (shapes to names)
- case studies and interviews

Core competencies

Activities in the text serve to:

- break up the lesson to aid concentration.
- extend the knowledge gained from the text.
- develop academic skills such as calculation, data interpretation, and spatial awareness.
- develop communication skills: discussing strategies and reporting findings.

In later primary years the activities should also help learners to look beyond the material easily available to them by encouraging them to ask other adults, visit libraries (if there are any) and use the internet if it is available.

The Learner's Book aims to use a variety of approaches to offer as many ways of learning as possible. No one way suits every learner. As an example, there are many ways to teach reading. The best teachers use every method they know to suit everyone in their class.

Some people learn quickly by reading with understanding. Others need to learn through practical experience. You will have all types of learners in your class.

You will need additional activities to broaden the learning experience, some tailored to the needs of able learners and others to add variety and depth to various topics.

Practical activities

In Mathematics, these cover all activities which include a practical skill. The obvious ones are drawing and measuring, but equally valuable is making a model of a house or using local market scenarios to understand profit and loss. Learning needs to be made enjoyable to encourage lifelong interest.

Practising skills

Acquisition of study skills and knowledge has, by and large, been through practical lessons. Oral lessons cannot necessarily and abundantly give the learner the required skills and knowledge.

Learners need to practise:

- **Calculation:** Developing speed and accuracy in operations.
- **Measurement:** Using SI units correctly in real-world contexts.
- **Logical reasoning:** Practising concentration and step-by-step thinking.
- **Research skills:** Looking for Mathematical patterns in the environment. Research skills are important too. You can encourage learners to go beyond the Learner's Book in these later years of their primary schooling to look for additional materials and to store only those facts which will be of long-term use and lifelong learning.

Use of ICT

Some schools in urban areas have access to computers in school or in libraries. Rural areas will become linked in the future. You should learn how to use a computer as soon as you are able. They open the world as your resource. The internet can provide as much additional material as you will ever need.

Once your learners have the chance to use a computer, they too will have access to a world of information. Effective use of ICT in Mathematics includes:

- Calculators
- Laptops/Tablets for graphing or coding (Scratch Jr).
- Projectors for visualising geometric transformations.
- Spreadsheets (Microsoft Excel) for data handling.

The teacher should try as much as possible use whatever technological resources available such as any of those stated above to assist in teaching and learning. The use of ICTs in teaching and learning activities promotes a paradigm shift to learner-centred environment. Here are some useful ideas on how to go about this:

- Integrate ICT's in the learning process, as a key competence and contributing to the acquisition of skills and knowledge;
- Use ICT's in the classroom to work on information processing, authentic communication, and on the learner autonomy, as the builder of his or her own learning process;
- Give ICT's a role to help young people be able to arrange, evaluate, synthesise, analyse and decide on the information that comes to them;
- Learners with different types of supports and formats and, therefore, a great variety of activities in which they pass from receivers to makers;
- Attend to the diversity or learning needs of learners, using the copious offer of interactive exercises available on the web.

Making sure that learners have absorbed the lessons taught and not just had fun through the entire lesson is equally important. There are assessments at the end of each lesson in the Learner's Book that are useful tools for reinforcement of lessons taught.

You can also adopt other forms of assessment during the lessons to ensure learners are on the same level of understanding. Some of these assessments include the following:

Diagnostic assessment

Examining prior knowledge to establish links to new lessons. This examines learners' prior knowledge and is used to establish links to the new lesson. Test learners' prior knowledge by asking them to respond to key words, names and dates related to the next topic. Ask learners to define key words and terms.

Formative assessment

Formative assessment is the methods that teachers use to evaluate and assess a learner's ability to understand and apply what they have learnt during a lesson.

Topic 1

Number

Unit 1: Whole numbers

Unit objectives

By the end of this unit, learners should be able to:

- a read/sign numbers in words and numerals.
- b write numbers in words and numerals.
- c express numbers in expanded notation/form.
- d count in ascending and descending order.
- e arrange numbers in order of magnitude.
- f give values of digits in a number.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 1–16.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 1.1

- a Learners read the numbers from 100 000 to 1 000 000 on **page 2** of the Learner's Book.
- b Learners read the numbers the numbers backwards, from 1 000 to 100 000.

Exercise 1.1

- 1
 - a 722 000, 724 000
 - b 868 000, 869 000
 - c 989 000, 988 000
 - d 497 000, 496 000
- 2
 - a 300 000, 500 000
 - b 600 000, 700 000
 - c 800 000, 700 000
 - d 500 000, 400 000

- 3 a 600 000, 1 000 000
b 700 000, 900 000
c 800 000, 600 000
d 500 000, 300 000

Exercise 1.2

- 1 600 000 bags
2 854 000 kg
3 After 1st: Z\$426 000; 2nd: Z\$427 000; 3rd: Z\$428 000
4 800 000 tourists
5 1 300 000 shares
6 225 000 plants

Activity 1.2

- a 100 000
b Hundred thousand

Exercise 1.3

- 1 a HTh 2, TTh 3, Th 4, H 6, T 5, U 8
b HTh 8, TTh 6, Th 7, H 8, T 1, U 4
c Th 9, H 7, T 3
d TTh 5, Th 6, H 9, T 8, U 4
e HTh 1, TTh 2, Th 6, H 3, U 8
2 a 4
b 7
c 6
d 6
3 a 8 = Thousands
b 7 = Ten thousands
c 6 = Tens
d 8 = Units

Exercise 1.4

- 1 Hundreds of thousands
2 Hundreds
3 Ten thousands
4 Ten thousands
5 Hundreds of thousands

Activity 1.3

1 Place value charts

a

Ten thousands	Thousands	Hundreds	Tens	Units
5	3	6	4	7

b

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units
9	8	2	5	4	6

2 **a** 53 647

- $5 \times 10\,000 = 50\,000$
- $3 \times 1\,000 = 3\,000$
- $6 \times 100 = 600$
- $4 \times 10 = 40$
- $7 \times 1 = 7$

b 982 546

- $9 \times 100\,000 = 900\,000$
- $8 \times 10\,000 = 80\,000$
- $2 \times 1\,000 = 2\,000$
- $5 \times 100 = 500$
- $4 \times 10 = 40$
- $6 \times 1 = 6$

3 **a** 53 647

Digit	Place value	Value
5	Ten thousands	50 000
3	Thousands	3 000
6	Hundreds	600
4	Tens	40
7	Units	7

b 982 546

Digit	Place value	Value
9	Hundred thousands	900 000
8	Ten thousands	80 000
2	Thousands	2 000
5	Hundreds	500
4	Tens	40
6	Units	6

Exercise 1.5

- 1 900 000; 80 000; 2 000; 300; 70; 4
- 2
 - a 50
 - b 5 000
 - c 5 000
 - d 500
- 3
 - a $6 = 6\ 000$; $5 = 5$
 - b $6 = 600$
 - c $6 = 600\ 000$
 - d $5 = 500$
 - e $5 = 500\ 000$; $6 = 60\ 000$

Exercise 1.6

- 1 300 000
- 2 80 000
- 3 600 000
- 4 9 000
- 5 700 000

Activity 1.4

- 1
 - a $800\ 000 + 50\ 000 + 6\ 000 + 200 + 40 + 3$
 - b $300\ 000 + 10\ 000 + 2\ 000 + 800 + 50 + 7$

Exercise 1.7

- 1
 - a $70\ 000 + 3\ 000 + 200 + 80 + 4$
 - b $500\ 000 + 10\ 000 + 6\ 000 + 400 + 9$
 - c $30\ 000 + 8\ 000 + 600 + 7$
 - d $200\ 000 + 90\ 000 + 4\ 000 + 100 + 50 + 8$
 - e $600\ 000 + 7\ 000 + 300 + 20 + 1$
 - f $800\ 000 + 40\ 000 + 2\ 000 + 100 + 50 + 6$
 - g $10\ 000 + 9\ 000 + 400 + 30$
 - h $200\ 000 + 30\ 000 + 5\ 000 + 600 + 7$
- 2
 - a 65 324
 - b 419 567
 - c 38 459
 - d 247 826
 - e 562 318
 - f 756 432
 - g 129 521
 - h 432 358

- 3 $40\ 000 + 8\ 000 + 200 + 60 + 5$
- 4 $200\ 000 + 30\ 000 + 6\ 000 + 400 + 7$
- 5 $500\ 000 + 10\ 000 + 2\ 000 + 300 + 9$

Activity 1.5

- a Eight hundred and forty-five thousand two hundred and thirty
- b Nine hundred and ninety-nine thousand nine hundred and ninety-nine
- c Seven hundred and three thousand and eighteen
- d Four hundred and fifty-six thousand seven hundred

Exercise 1.8

- 1 Nine hundred thousand
- 2 Eight hundred and four thousand two hundred and thirty-four
- 3 Four hundred and thirty-two thousand six hundred and fifty-seven
- 4 Eight hundred and seventeen thousand nine hundred and five
- 5 Seven hundred and sixty-five thousand and twenty-three
- 6 Eight hundred thousand and eight

Exercise 1.9

- 1 Five hundred and forty-five thousand nine hundred and seventy-five
- 2 Eight hundred and seventy-five thousand two hundred and forty-three
- 3 Five hundred and seventy-one thousand and sixty-five
- 4 Six hundred and thirteen thousand four hundred and twenty-five

Activity 1.6

- 1 Write the following numbers in figures
 - Ninety five $\rightarrow 95$
 - Sixty seven $\rightarrow 67$
 - Twenty three $\rightarrow 23$
 - Seventy one $\rightarrow 71$

Learners should write these numbers clearly on cardboard.

- 2 Learners compare answers. When comparing:
 - Check that digits are correct and in the right order.
 - Ensure there are no missing or extra digits.
 - All learners should have the same figures: 95, 67, 23, 71

Exercise 1.10

- | | |
|-----------|-----------|
| 1 999 999 | 3 754 951 |
| 2 450 210 | 4 863 289 |

Exercise 1.11

- | | | | |
|---|---------|---|---------|
| 1 | 720 000 | 3 | 762 150 |
| 2 | 645 000 | 4 | 935 481 |

Activity 1.7

- 1 Number cards
The numbers written on the cards are:
234 569, 891 250, 544 389, 598 004, 762 863
- 2 Arrange from smallest to largest
Compare the hundred-thousands first:
 - 234 569
 - 544 389
 - 598 004
 - 762 863
 - 891 250Smallest → Largest:
234 569, 544 389, 598 004, 762 863, 891 250
- 3 Arrange from largest to smallest
Reverse the order:
Largest → Smallest:
891 250, 762 863, 598 004, 544 389, 234 569

Exercise 1.12

- 1
 - a 434 488, 518 186, 579 798, 610 101, 686 856
 - b 566 669, 570 707, 754 546, 786 869, 819 192
 - c 511 853, 512 527, 514 144, 615 169, 689 924
 - d 583 333, 585 876, 586 640, 594 436, 610 746
- 2
 - a 281 616, 495 959, 587 373, 756 568, 860 605
 - b 540 808, 551 517, 712 122, 845 455, 854 545
 - c 163 323, 203 387, 219 944, 225 511, 242 219
 - d 600 066, 606 606, 660 006, 666 606, 666 660
 - e 370 007, 370 707, 370 777, 377 077, 377 707

Exercise 1.13

- 1
 - a Gweru
 - b 763 638, 871 712, 880 805, 985 853
- 2 86 644, 86 464, 84 664, 84 646, 84 446
- 3 234 567, 321 654, 456 789, 543 210, 654 321
- 4 876 543, 765 432, 654 321, 543 210, 432 109

- 5 Matabeleland North, Masvingo, Midlands, Mashonaland Central, Manicaland
- 6 567 890, 456 789, 345 678, 234 567, 123 456
- 7 432 109, 543 210, 654 321, 765 432, 876 543

Activity 1.8

- 1 Divisors of numbers 1 to 10:

Number	Divisors
1	1
2	1, 2
3	1, 3
4	1, 2, 4
5	1, 5
6	1, 2, 3, 6
7	1, 7
8	1, 2, 4, 8
9	1, 3, 9
10	1, 2, 5, 10

- 2 Numbers with only two divisors: 2, 3, 5, 7
- 3 They are called prime numbers.

Exercise 1.14

- 1
 - a 2, 3, 11, 17, 19
 - b 23, 47
 - c 37, 41
 - d 43, 47
- 2 77
- 3 All other even numbers have more than two divisors.
- 4 47

Exercise 1.15

- 1 37, 41, 43, 47
- 2 83
- 3 60

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 C | 4 C |
| 2 C | 5 B |
| 3 B | 6 D |

7 A

8 A

9 B

10 C

Structured questions answers

11 Six million four thousand and fifty

12 $4800320 < 4803200$

13 Total oranges harvested: 56 100

Unit 2: Approximation and estimation

Unit objective

By the end of this unit, learners should be able to:

a round off numbers to the nearest 10, 100, 1 000, 10 000 and 100 000.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 16–21.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 2.1

1 Closer to 80.

2 80

Exercise 2.1

1 a 45 640

b 92 750

c 67 920

d 83 490

e 120 500

f 354 870

2 45 640

Activity 2.2

1 Closer to 300.

2 300

Exercise 2.2

- 1
 - a 62 700
 - b 89 600
 - c 47 100
 - d 153 500
 - e 277 000
 - f 804 300
- 2 128 500

Activity 2.3

- a Learners draw a number line as guided on **page 18**.
- b Closer to 13 000
- c 13 000

Exercise 2.3

- 1
 - a 56 000
 - b 73 000
 - c 89 000
 - d 105 000
 - e 346 000
 - f 478 000
- 2 235 000
- 3 235 000

Activity 2.4

- a Closer to 50 000.
- b 50 000

Exercise 2.4

- 1
 - a 50 000
 - b 100 000
 - c 150 000
 - d 280 000
 - e 440 000
 - f 600 000
- 2 190 000

Exercise 2.5

- 1
 - a 500 000
 - b 800 000

- c 200 000
- d 300 000
- e 700 000
- f 900 000

2 500 000

Unit revision exercises

Multiple choice answers

- 1 A
- 2 A
- 3 A
- 4 C
- 5 B
- 6 A
- 7 B

Structured questions answers

- | | |
|------------|------------|
| 8 47 640 | 12 190 000 |
| 9 92 800 | 13 800 000 |
| 10 105 000 | 14 500 000 |
| 11 280 000 | |

Unit 3: Ordinal numbers

Unit objectives

By the end of this unit, learners should be able to:

- a write ordinal numbers up to the hundredth.
- b use ordinal numbers in ranking and positioning.
- c write ordinal numbers in words and numerals.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 22–26.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 3.1

First – Monday
Second – Tuesday
Third – Wednesday
Fourth – Thursday
Fifth – Friday
Sixth – Saturday
Seventh – Sunday

Exercise 3.1

- | | | | |
|---|--------------|---|------------------|
| 1 | Twenty-fifth | 4 | Third |
| | Fiftieth | 5 | Eighth |
| | Thirty-third | 6 | 29 th |
| | Sixty-sixth | 7 | 45 th |
| 2 | First | 8 | 70 th |
| 3 | Twelfth | 9 | 90 th |

Activity 3.2

- | | | | |
|---|--------------|---|--------------|
| a | less than | d | less than |
| b | greater than | e | greater than |
| c | less than | | |

Exercise 3.2

- | | | | |
|---|---|----|---|
| 1 | < | 6 | > |
| 2 | > | 7 | = |
| 3 | < | 8 | = |
| 4 | > | 9 | < |
| 5 | > | 10 | > |

Unit revision exercises

Multiple choice answers

- | | | | |
|---|---|---|---|
| 1 | B | 5 | C |
| 2 | C | 6 | B |
| 3 | C | 7 | B |
| 4 | B | | |

Structured questions answers

- 8 **a** $14\,275 > 14\,257$
 b $0,82 < 0,823$
- 9 $876 > 865$
- 10 **a** $0,75 = 0,75$
 b $0,7 > 0,69$
- 11 **a** $180 > 40$
 b $145 > 144$
- 12 $14,5\text{ kg} > 14,05\text{ kg}$

Unit 4: Numeration systems

Unit objectives

By the end of this unit, learners should be able to:

- a** read/sign into Roman numerals.
b convert Roman numerals to Arabic numerals within the range and vice versa.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 27–31.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 4.1

- 1 Learners study the two clock faces 1 2 3 4 5 6 7 8 9 10 11 12 on **page 29** for the numbers:
- I II III IV V VI VII VIII IX X XI XII
- 2 I II III IV V VI VII VIII IX X
- 3 Learners share their findings with the class.

Exercise 4.1

- 1 **a** XVIII
 b XXV
 c XXXVII
 d XLIX
- 2 **a** 16
 b 30

- c 42
- d 9
- 3 a XII, XV, XVIII, XX
- b XXV, XXXV, XL, L
- c IX, XIV, XX, XXXI
- 4 a XXX, XX, XIII, IV
- b L, XLIX, XXV, XV
- c XL, XXXV, XXVIII, XIX
- 5 XXV
- 6 10 o'clock

Activity 4.2

Completed table

Hindu–Arabic	Roman
41	XLI
44	XLIV
26	XXVI
39	XXXIX
40	XL
50	L

Unit revision exercises

Multiple choice answers

- 1 B
- 2 B
- 3 B
- 4 C
- 5 B
- 6 B
- 7 C

Structured questions answers

- 8 14 – XIV
- 22 – XXII
- 33 – XXXIII
- 46 – XLVI
- 50 – L
- 9 XIX – 19
- XXVIII – 28
- XXXIX – 39
- XLIV – 44
- XLVII – 47
- 10 IX, XII, XV, XX, XXX
- 11 XLVIII, XL, XXXV, XXV
- 12 XXXVII
- 13 VII, XII, XV, XIX, XXIV
- 14 8 o'clock

Unit 5: Proper fractions

Unit objectives

By the end of this unit, learners should be able to:

- a identify proper fractions with denominators in the given range.
- b read/sign fractions with denominators in the given range.
- c write fractions with denominators in the given range.
- d compare fractions.
- e arrange fractions in order of size.
- f write fractions in their equivalent forms.
- g reduce fractions to their lowest terms.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 32–47.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 5.1

- 1 Learners make circular cutouts guided on [page 34](#).
- 2 Learners fold the cut outs in equal parts.

3	Number of equal parts	Parts shaded	Fraction shaded
	3	1	$\frac{1}{3}$
	4	3	$\frac{3}{4}$
	7	6	$\frac{6}{7}$
	10	7	$\frac{7}{10}$
	11	6	$\frac{6}{11}$
	30	5	$\frac{5}{30}$

Exercise 5.1

- 1
 - a $\frac{3}{10}$
 - b $\frac{4}{8}$
 - c $\frac{1}{2}$

2 $\frac{5}{8}$, $\frac{3}{6}$ and $\frac{2}{4}$

3 Learners draw and shade the fractions shown:

a $\frac{3}{5}$

b $\frac{7}{8}$

c $\frac{8}{10}$

d $\frac{9}{10}$

e $\frac{5}{9}$

Activity 5.2

- 1 Learners should follow the instructions on [page 35](#) to create fraction cards.
- 2 Learners take turns to pick cards.
- 3 They read fractions in words.
- 4 They repeat until all cards have been finished.

Exercise 5.2

A.

- 1 Two-thirds
- 2 Five eighths
- 3 Seven tenths
- 4 Nine twentieths
- 5 Eleven fiftieths

B.

- 6 $\frac{3}{4}$
- 7 $\frac{2}{5}$
- 8 $\frac{7}{9}$
- 9 $\frac{13}{20}$
- 10 $\frac{19}{50}$

C.

- 11 Three quarters
- 12 $\frac{7}{20}$
- 13 Eleven fiftieths
- 14 $\frac{9}{25}$
- 15 Five eighths

Activity 5.3

- 1 Learners should follow the instructions on **page 38** to shade the fractions shown.
- 2 $\frac{1}{4}$ is greater than $\frac{1}{8}$

Exercise 5.3

- 1
 - a $\frac{9}{12}$
 - b $\frac{14}{25}$
 - c $\frac{6}{8}$
 - d $\frac{13}{20}$
 - e $\frac{25}{30}$
- 2
 - a $\frac{5}{8}$
 - b $\frac{7}{9}$
 - c $\frac{4}{8}$
 - d $\frac{6}{7}$
 - e $\frac{9}{30}$

Activity 5.4

- 1 $\frac{8}{14} > \frac{6}{14}$
- 2 $\frac{8}{14}$
- 3 Equivalent fractions

Exercise 5.4

- 1
 - a Yes
 - b Yes
 - c Yes
 - d Yes
 - e Yes
- 2
 - a $\frac{4}{6}, \frac{6}{9}, \frac{8}{12}$
 - b $\frac{4}{10}, \frac{6}{15}, \frac{8}{20}$
 - c $\frac{6}{14}, \frac{9}{21}, \frac{12}{28}$
 - d $\frac{14}{20}, \frac{21}{30}, \frac{28}{40}$
- 3
 - a $\frac{12}{15}$
 - b $\frac{4}{12}$
 - c $\frac{6}{45}$

Activity 5.5

- 1 Learners should follow the instructions on **page 42** to make strips.
- 2 Learners shade: $\frac{1}{4}, \frac{3}{8}, \frac{2}{5}, \frac{2}{3}$

Exercise 5.5

- 1
 - a $\frac{3}{5}, \frac{2}{3}, \frac{3}{4}$
 - b $\frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{3}{4}$
 - c $\frac{1}{6}, \frac{1}{4}, \frac{2}{3}, \frac{5}{6}$
 - d $\frac{1}{3}, \frac{5}{8}, \frac{2}{3}, \frac{4}{5}$
- 2
 - a $\frac{4}{8}, \frac{2}{5}, \frac{1}{3}$
 - b $\frac{5}{6}, \frac{3}{4}, \frac{2}{3}, \frac{4}{9}$
 - c $\frac{5}{6}, \frac{3}{4}, \frac{3}{5}, \frac{1}{8}$
 - d $\frac{4}{5}, \frac{7}{20}, \frac{3}{10}, \frac{3}{25}$
- 3 $\frac{3}{10}, \frac{2}{5}, \frac{1}{2}, \frac{4}{5}$
- 4 $\frac{7}{10}, \frac{2}{3}, \frac{3}{8}, \frac{7}{20}$
- 5 $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$
- 6 $\frac{3}{4}, \frac{7}{10}, \frac{9}{20}, \frac{2}{5}$
- 7 $\frac{5}{9}, \frac{3}{5}, \frac{7}{12}, \frac{22}{30}$

Activity 5.6

We simplify: $\frac{48}{64}$

Step 1: Find the Highest Common Factor (HCF)

Factors of 48:

1, 2, 3, 4, 6, 8, 12, 16, 24, 48

Factors of 64:

1, 2, 4, 8, 16, 32, 64

HCF = 16

Step 2: Divide numerator and denominator by 16: $\frac{(48 \div 16)}{(64 \div 16)} = \frac{3}{4}$

Step 3: Compare answers

- Ann chose $\frac{3}{4}$
- Joe chose $\frac{6}{8}$

But: $\frac{6}{8} = \frac{3}{4}$

Although $\frac{6}{8}$ equals $\frac{3}{4}$, $\frac{6}{8}$ is not in its simplest form because it can still be divided by 2.

Final answer: Ann picked the correct answer because $\frac{3}{4}$ is the fraction in its lowest terms.

Exercise 5.6

1 $\frac{1}{3}$

2 $\frac{2}{3}$

3 $\frac{5}{6}$

4 $\frac{7}{10}$

5 $\frac{5}{8}$

6 $\frac{18}{25}$

7 $\frac{45}{49}$

8 $\frac{8}{15}$

Unit revision exercises

Multiple choice answers

1 C

2 C

3 B

4 A

5 D

6 B

7 B

8 B

9 B

10 B

11 B

12 D

13 A

14 A

15 A

Structured questions answers

16 a $\frac{2}{5}$

b $\frac{9}{10}$

17 a Seven eighths

b Eleven twentieths

c Thirteen fiftieths

18 a $\frac{3}{5}$

b $\frac{7}{12}$

c $\frac{19}{20}$

19 a $\frac{6}{8} < \frac{7}{8}$

b $\frac{4}{5} > \frac{3}{5}$

c $\frac{5}{9} > \frac{5}{11}$

20 $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$

21 $\frac{4}{5}, \frac{7}{10}, \frac{3}{5}, \frac{9}{20}$

22 a $\frac{4}{6}, \frac{6}{9}, \frac{8}{12}$

b $\frac{10}{16}, \frac{15}{24}, \frac{20}{32}$

23 a 9

b 3

c 12

24 a $\frac{2}{3}$

b $\frac{4}{5}$

c $\frac{3}{4}$

25 $\frac{3}{4}$

26 $\frac{3}{4}$

27 Tariro

28 $\frac{7}{10}$

29 Tino

30 $\frac{3}{5}$ or three-fifths

Unit 6: Mixed numbers

Unit objectives

By the end of this unit, learners should be able to:

- a read/sign mixed numbers with denominators 2 to 10.
- b write mixed numbers.
- c convert mixed numbers to improper fractions and vice versa.
- d compare mixed numbers.
- e solve problems involving mixed numbers.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 48–58.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 6.1

- | | |
|---------------------------|-----------------------------|
| 1 Two and three-fifths | 5 Five and two-sevenths |
| 2 Three and four-sevenths | 6 Nine and three-eighths |
| 3 Seven and nine-tenths | 7 Fifteen and four-fifths |
| 4 Two and one-ninth | 8 Thirteen and seven-tenths |

9 Eighteen and two-ninths

Activity 6.1

- 1** Learners cut three oranges, into four equal parts each.
- 2** They follow the instructions on **page 50** of the Learner's Book.
- 3** $2\frac{1}{4}$

Exercise 6.2

- | | |
|-------------------------|--------------------------|
| 1 $3\frac{3}{4}$ | 5 $1\frac{2}{3}$ |
| 2 $1\frac{2}{4}$ | 6 $1\frac{2}{10}$ |
| 3 $2\frac{1}{2}$ | 7 $1\frac{1}{8}$ |
| 4 $2\frac{3}{5}$ | 8 $2\frac{2}{5}$ |

Activity 6.2

- | | |
|-------------------------|-------------------------|
| a $2\frac{1}{4}$ | c $1\frac{3}{8}$ |
| b $3\frac{1}{5}$ | d $3\frac{1}{2}$ |

Exercise 6.3

Learners draw diagrams to show the following fractions.

- | | |
|-------------------------|-------------------------|
| 1 $2\frac{1}{2}$ | 6 $7\frac{4}{5}$ |
| 2 $3\frac{2}{5}$ | 7 $8\frac{1}{4}$ |
| 3 $3\frac{1}{3}$ | 8 $9\frac{1}{2}$ |
| 4 $1\frac{1}{3}$ | 9 $2\frac{1}{7}$ |
| 5 $6\frac{1}{3}$ | |

Activity 6.3

- 1** Learners shade the indicated fractions on **page 53** of the Learner's Book.
- 2** $2\frac{1}{4}$ is greater than $1\frac{1}{8}$.

Exercise 6.4

- | | |
|--|--|
| 1 $2\frac{1}{3} < 4\frac{1}{3}$ | 6 $1\frac{6}{8} < 2\frac{2}{3}$ |
| 2 $3\frac{2}{5} > 2\frac{1}{5}$ | 7 $3\frac{1}{8} > 2\frac{2}{5}$ |
| 3 $5\frac{3}{4} > 2\frac{1}{2}$ | 8 $3\frac{5}{8} > 3\frac{1}{3}$ |
| 4 $1\frac{5}{6} < 2\frac{1}{4}$ | 9 $3\frac{8}{10} > 3\frac{7}{10}$ |
| 5 $2\frac{1}{5} < 2\frac{3}{5}$ | 10 $4\frac{1}{2} > 4\frac{2}{5}$ |

Activity 6.4

- 1 a $3\frac{1}{2}$
b 7 halves
- 2 $\frac{7}{2}$

Exercise 6.5

- 1 a $\frac{8}{5}$
b $\frac{27}{10}$
c $\frac{34}{9}$
d $\frac{61}{7}$
e $\frac{249}{20}$
- 2 a $2\frac{1}{6}$
b $1\frac{3}{4}$
c $2\frac{3}{6}$
d $2\frac{1}{2}$
e $2\frac{5}{8}$

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 C | 6 A |
| 2 D | 7 B |
| 3 C | 8 C |
| 4 C | 9 A |
| 5 D | 10 D |

Structured questions answers

- | | | | |
|---|---------------------------------------|--------------------------------------|------------------|
| 11 a $2\frac{8}{24}$
e 3 | b $2\frac{6}{16}$
f $3\frac{2}{9}$ | c $5\frac{1}{4}$
g $2\frac{1}{3}$ | d $3\frac{3}{9}$ |
| 12 a $\frac{7}{2}$
d $\frac{45}{7}$ | b $\frac{7}{4}$
e $\frac{22}{7}$ | c $\frac{16}{3}$
f $\frac{57}{8}$ | |
| 13 a $3\frac{5}{7}$
d $4\frac{2}{4}$ | b $4\frac{3}{4}$
e $3\frac{1}{9}$ | c $5\frac{1}{2}$
f $6\frac{4}{5}$ | |

- 14 a $2\frac{5}{8} > 2\frac{1}{2}$
b $1\frac{3}{8} < 4\frac{5}{6}$
c $1\frac{5}{8} < 1\frac{3}{4}$
d $1\frac{6}{8} < 2\frac{2}{8}$
e $2\frac{7}{10} < 4\frac{3}{9}$
f $8\frac{5}{7} < 9\frac{5}{6}$

- 15 Diagrams correctly drawn for each mixed fraction for (a) to (c).

Unit 7: Decimals

Unit objectives

By the end of this unit, learners should be able to:

- a identify decimal numbers up to three decimal places.
- b read/sign decimal numbers.
- c write decimals.
- d find the value of a digit in a decimal.
- e compare decimal numbers.
- f arrange decimal numbers in order of size.
- g round off decimal numbers to a degree of accuracy.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 59–71.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 7.1

- 1 Learners study the given table.
- 2 a Eighty-seven point six three five
b Two hundred and sixty-three point eight three six
c Five hundred and forty-three point zero four five

Exercise 7.1

- 1 a Three point three six seven
b Forty-five point two one
c Five hundred and sixty-seven point two
d Nine hundred and eighty-seven point eight seven one

- 2 a 5,9
b 32,03
c 5,108
- 3 a One point three six three
b Ninety-eight point nine three five
c Eight point three five nine
d Eleven point zero three seven
- 4 0,045

Activity 7.2

- 1 a 12,837 → Tens: 1, Ones: 2, Tenths: 8, Hundredths: 3, Thousandths: 7
b 7,026 → Ones: 7, Tenths: 0, Hundredths: 2, Thousandths: 6
c 25,7 → Tens: 2, Ones: 5, Tenths: 7
d 4,982 → Ones: 4, Tenths: 9, Hundredths: 8, Thousandths: 2

Exercise 7.2

1

Number	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
a. 23,546	0	2	3	5	4	6
b. 864,134	8	6	4	1	3	4
c. 18,75	0	1	8	7	5	0
d. 61,876	0	6	1	8	7	6
e. 0,862	0	0	0	8	6	2

- 2 a 6 → Tenths
b 2 → Tens
c 8 → Tens
d 3 → Tenths
- 3 8 – ten thousand, 9 – thousands, 3 – hundreds, 8 – tens, 3 – ones, 8 – tenths, 5 – hundredths, 6 – thousandths

Activity 7.3

- 1 $40 + 0,1$
2 $1 + 0,009$
3 $0,1 + 0,02 + 0,003$
- 4 $40 + 1 + 0,001$
5 $100 + 1 + 0,001$
6 $1 + 0,002$

Exercise 7.3

- 1 103,21
2 20,948
3 901,31
- 4 3,021
5 0,101
6 500,052

Exercise 7.4

- 1
 - a $42,07 < 42,7$
 - b $9,305 < 9,35$
 - c $18,04 > 18,004$
 - d $0,506 < 0,560$
- 2 Tendai
- 3 Nyasha
- 4 Tatenda
- 5 Simba
- 6 Farai

Activity 7.4

- 2 Tom
- 3 Alice
- 4 7,035, 7,867, 8,236, 8,783
- 5 8,783, 8,236, 7,867, 7,035

Exercise 7.5

- 1
 - a 24,37, 24,763, 25,736, 25,763
 - b 8,011, 8,101, 8,110, 8,111
 - c 85,558, 85,58, 85,585, 85,855
 - d 0,067, 0,0677, 0,0767, 0,0776
- 2
 - a 0,369, 0,368, 0,364, 0,361
 - b 0,451, 0,443, 0,438, 0,424
 - c 0,078, 0,075, 0,068, 0,056
 - d 0,077, 0,071, 0,062, 0,056
 - e 69,989, 69,945, 69,936, 69,919
- 3 3,426, 3,452, 3,48, 3,5
- 4 12,4, 12,38, 12,308, 12,305
- 5 45,7, 45,705, 45,72, 45,725

Activity 7.5

Follow the instructions on **page 68** of the Learner's Book and work with flash cards.

Exercise 7.6

- 1
 - a 23,7
 - b 23,75
 - c 23,745

- 2 a 1,8
b 1,85
c 1,846
- 3 a 456,3
b 456,30
c 456,303
- 4 a 0,2
b 0,23
c 0,235
- 5 a 12,1
b 12,10
c 12,100

Unit revision exercises

Multiple choice answers

- | | | | |
|-----|-----|------|------|
| 1 A | 5 C | 9 A | 13 B |
| 2 B | 6 A | 10 B | 14 C |
| 3 C | 7 B | 11 B | 15 C |
| 4 C | 8 B | 12 B | |

Structured questions answers

- 16 a Hundredths
b Tenths
c Units
- 17 a Eighteen point two zero five
b Zero point zero three six
c Forty-five point seven
- 18 a 7,46
b 2,008
c 25,3
- 19 $9 + 0,4 + 0,008$
- 20 a $3,406 < 3,46$
b $7,509 < 7,59$
c $0,307 < 0,370$
- 21 4,38, 4,803, 4,83, 4,835
- 22 0,982, 0,928, 0,892, 0,829
- 23 a 16
b 28

- c 10
- 24 a 6,79
b 4,21
c 14,00
- 25 a 0,1
b 0,08
c 0,076
- 26 Jane
- 27 3,726 kg
- 28 Nyasha
- 29 5,036, 5,063, 5,36
- 30 3 – hundreds, 4 – tens, 9 – ones, 7 – tenths, 2 – hundredths, 8 – thousandths

Unit 8: Percentages

Unit objectives

By the end of this unit, learners should be able to:

- a express fractions as percentages and vice versa.
b represent percentages on diagrams.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 72–80.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 8.1

- 1 60
 $142\frac{6}{7}$
225
820
- 2 60%
142,07%
25%
220%
- 3 35%

Exercise 8.1

- 1
 - a 15%
 - b 25%
 - c 45%
 - d 70%
 - e 550%
 - f 45%
 - g 25%
 - h 460%
 - i 80%
 - j 78%
- 2 40%

Activity 8.2

- 1 Learners make the cards as per instructions in the Learner's Book **page 74**.
- 2 $40\% = \frac{2}{5}$
 $5\% = \frac{1}{20}$
 $4\% = \frac{1}{25}$
 $50\% = \frac{1}{2}$
- 3 Divide the percentage by 100 and simplify.

Exercise 8.2

- | | |
|-------------------|-------------------|
| 1 $\frac{1}{5}$ | 6 $\frac{3}{2}$ |
| 2 $\frac{11}{20}$ | 7 $\frac{16}{25}$ |
| 3 $\frac{4}{5}$ | 8 $\frac{23}{20}$ |
| 4 $\frac{3}{20}$ | 9 $\frac{12}{5}$ |
| 5 $\frac{12}{25}$ | 10 $\frac{5}{4}$ |

Activity 8.3

- 1 Follow the instructions on **page 68** of the Learner's Book.
- 2 100
- 3 Learners shade 40 squares.
- 4 40%

Exercise 8.3

- 1
 - a 25%
 - b 50%
 - c 75%
- 2 60%
- 3
 - a 80%
 - b 54%

Activity 8.4

Follow the instructions on **page 77** of the Learner's Book.

Exercise 8.4

- 1 \$1 350
- 2 \$1 200
- 3 480 boys
- 4 9 goals
- 5 57 kg
- 6 \$76
- 7 \$750
- 8
 - a Salt
 - b Mealie meal and cooking oil
 - c Rice
 - d Bread
 - e \$5.10

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 C | 6 C |
| 2 D | 7 A |
| 3 B | 8 C |
| 4 A | 9 A |
| 5 B | 10 C |

Structured questions answers

- 11
 - a 50%
 - b 75%
- 12 a $\frac{9}{25}$

b $\frac{2}{5}$

- 13 Learners draw a correct diagram showing 37 shaded parts out of 100.
- 14 \$690
- 15 24 girls
- 16 75%
- 17 30 shaded squares out of 100.
- 18 Correct diagram showing 75% shaded.
- 19 550%
- 20 \$1 350
- 21 \$1 200
- 22 9 matches
- 23 480 boys
- 24 \$750

Topic 2

Operations (0–1 000 000)

Unit 9: Addition of whole numbers

Unit objectives

By the end of this unit, learners should be able to:

- a add whole numbers whose sum is less than or equal to 1 000 000.
- b apply associative and commutative laws to the addition of whole numbers.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 81–90.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 9.1

- | | |
|----------|-----------|
| 1 7 974 | 7 7 563 |
| 2 6 864 | 8 8 572 |
| 3 7 793 | 9 9 563 |
| 4 9 556 | 10 13 577 |
| 5 9 535 | 11 12 221 |
| 6 12 524 | 12 10 431 |

Exercise 9.2

- | | |
|----------|-----------|
| 1 18 344 | 9 14 520 |
| 2 18 344 | 10 9 277 |
| 3 18 344 | 11 15 733 |
| 4 15 677 | 12 16 777 |
| 5 16 826 | 13 14 551 |
| 6 13 323 | 14 15 533 |
| 7 18 560 | 15 10 936 |
| 8 14 534 | |

- 16 a 79 121
 b 35 981
 c 98 333
 d 84 378
 e 84 113
 f 97 082
 g 40 068
 h 92 143

Activity 9.1

Learners work in groups to come up within 79 778.

Exercise 9.3

- | | |
|-----------|-----------|
| 1 678 377 | 6 914 795 |
| 2 468 648 | 7 597 759 |
| 3 948 569 | 8 401 396 |
| 4 678 999 | 9 385 677 |
| 5 127 759 | |

Activity 9.2

856 572 eggs

Exercise 9.4

- | | |
|-------------|---------------|
| 1 777 370 | 6 258 916 |
| 2 826 839 | 7 995 - - 977 |
| 3 1 288 457 | 8 700 096 |
| 4 986 837 | 9 370 055 |
| 5 1 000 000 | |

Exercise 9.5

- | | |
|-----------------------|-------|
| 1 $10 + 14 = 14 + 10$ | 6 10 |
| 2 $15 + 3 = 3 + 15$ | 7 12 |
| 3 $37 + 3 = 3 + 37$ | 8 1 |
| 4 $14 + 20 = 20 + 14$ | 9 8 |
| 5 $19 + 14 = 14 + 19$ | 10 12 |

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 A | 3 C |
| 2 B | 4 A |

- 5 C
- 6 D
- 7 C

- 8 D
- 9 A
- 10 A

Structured questions answers

- 11 346 031
- 12 36 857
- 13 \$8.30
- 14 508 pages
- 15 1 209 motorists
- 16 100,999
- 17 78,134 tins
- 18 580,356
- 19 100,110 bags
- 20 444,690 pencils

Unit 10: Subtraction of whole numbers

Unit objective

By the end of this unit, learners should be able to:

- a subtract whole numbers involving one to three equal additions.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 91–100.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 10.1

- 1 5 442
- 2 5 110
- 3 5 222
- 4 2 216
- 5 3 251
- 6 1 847
- 7 4 155 books.
- 8 5 031 toys.
- 9 2 652 visitors.
- 10 2 744 apples.
- 11 3 813 pencils.

Exercise 10.2

- 1 43 210
- 2 46 220
- 3 51 300
- 4 41 433
- 5 65 500
- 6 25 549
- 7 21 628
- 8 23 049
- 9 28 654
- 10 26 339

- 11 41 335 learners.
- 12 46 265 books.
- 13 43 624 packs.

Activity 10.1

232 323 people

Exercise 10.3

- 1 906 212
- 2 712 222
- 3 881 183
- 4 324 115

Exercise 10.4

- 1 1 022 514
- 2 214 382
- 3 571 810
- 4 323 312

Exercise 10.5

- 1 97 learners.
- 2 66 346
- 3 45 980
- 4 51 746 teachers.
- 5 490 546 km

- 14 14 113 runners.
- 15 36 266 ears of corn.

- 5 679 235 females.
- 6 122 143 people.
- 7 532 184 people.

- 5 142 212 crates.
- 6 125 298 people.
- 7 248 511 bags.

- 6 46
- 7 \$47 000
- 8 \$328
- 9 26 816 litres.
- 10 1

Unit revision exercises

Multiple choice answers

- 1 A
- 2 A
- 3 A
- 4 A
- 5 A
- 6 A
- 7 A
- 8 A
- 9 C
- 10 A

Structured questions answers

- 11 74 667
- 12 113 417
- 13 640 754
- 14 465 325
- 15 337 655 bags.
- 16 204 333 oranges.

17 408 643 adults.

18 213 333 books.

19 466 667 kg

20 264 556 dollars.

Unit 11: Highest common factor and lowest common multiples

Unit objectives

By the end of this unit, learners should be able to:

- a find the HCF of two numbers where the HCF is less than 10.
- b calculate LCM of two numbers where the LCM is less than 100.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 101–109.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 11.1

- 1 a $1 \times 48 = 48$
 $2 \times 24 = 48$
 $3 \times 16 = 48$
 $4 \times 12 = 48$
 $6 \times 8 = 48$
- 2 b $1 \times 112 = 112$
 $2 \times 56 = 112$
 $4 \times 28 = 112$
 $7 \times 16 = 112$
 $8 \times 14 = 112$

Exercise 11.1

- 1 a 48 b 12 c 24 d 8 e 16
- 2 a 1, 2, 3, 6, 9, 18
b 1, 2, 3, 4, 6, 8, 12, 24
c 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96
d 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120
e 1, 2, 4, 37, 74, 148
f 1, 2, 5, 10, 17, 34, 85, 170
- 3 a 3
b 9
c 12

- d 12
- e 9
- f 8

Activity 11.2

- a 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72
144: 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144
- b 1, 2, 3, 4, 6, 9, 12, 18, 36

Exercise 11.2

- 1 1, 2, 4
- 2 1, 3
- 3 1, 5, 10
- 4 1, 5
- 5 1, 2, 3, 6
- 6 1, 3, 5, 15

Exercise 11.3

- 1 6
- 2 16
- 3 28
- 4 7
- 5 9
- 6 30
- 7 27

Activity 11.4

Follow the instructions in the Learner's Book, [page 105](#).

- 1 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48
- 2 0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48

Exercise 11.4

- 1
 - a 0, 7, 14, 21, 28
 - b 0, 12, 24, 36, 48
 - c 0, 20, 40, 60, 80
 - d 0, 87, 174, 261, 348
 - e 0, 115, 230, 345, 460
- 2
 - a 0, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40
 - b 18, 27, 36, 45, 54
 - c 0, 12, 24, 36, 48, 60, 72, 84, 96
- 3
 - a 42, 49, 56, 63
 - b 105, 112, 119, 126

Activity 11.5

- a** Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40
 - b** Multiples of 5: 5, 10, 15, 20, 25, 30, 35, 40
- Common multiples: 20, 40

Exercise 11.5

- 1**
 - a** 18
 - b** 24
 - c** 33
 - d** 50
- 2**
 - a** 28, 56, 84
 - b** 30, 60, 90
 - c** 24, 48, 72
 - d** 60, 120, 180
- 3**
 - a** 24, 48, 72, 96
 - b** 24, 48, 72, 96

Exercise 11.6

- | | | | | |
|----------|-------------|--------------|-------------|--------------|
| 1 | a 9 | b 72 | c 60 | d 100 |
| 2 | a 60 | b 54 | c 90 | d 80 |
| 3 | a 45 | b 120 | c 90 | d 60 |

Unit revision exercises

Multiple choice answers

- | | |
|------------|-------------|
| 1 B | 6 C |
| 2 A | 7 B |
| 3 B | 8 C |
| 4 B | 9 C |
| 5 B | 10 B |

Structured questions answers

- 11**
 - a** 1, 2, 3, 6, 9, 18
 - b** 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72
 - c** 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
- 12**
 - a** $2 \times 3 \times 5$
 - b** 5×13
 - c** $2 \times 2 \times 3 \times 7$
- 13** 60, 75, 90

- 14 a LCM = 120, HCF = 12
 b LCM = 100, HCF = 10
 c LCM = 60, HCF = 3
- 15 16
- 16 23, 29, 31, 37
- 17 24
- 18 0, 12, 24, 36, 48, 60
- 19 $48 = 2^2 \times 3$
 $60 = 2^2 \times 3 \times 5$
 HCF = 12
- 20 30

Unit 12: Addition of fractions

Unit objectives

By the end of this unit, learners should be able to:

- a add proper fractions with the same denominators.
 b add proper fractions with different denominators.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 110–115.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 12.1

$$\frac{7}{10}$$

Exercise 12.1

- 1 $\frac{4}{7}$
 2 $\frac{5}{8}$
 3 $\frac{12}{20}$
 4 $\frac{19}{30}$
 5 $\frac{7}{9}$

- 6 $\frac{5}{8}$
 7 $\frac{31}{40}$
 8 $\frac{3}{5}$
 9 $\frac{68}{80}$
 10 $\frac{43}{60}$

Activity 12.2

- 1 a $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$

- 2 **b** $\frac{2}{3} = \frac{4}{6} = \frac{8}{12}$
 a $\frac{7}{8}$
 b $\frac{13}{12}$

Exercise 12.2

- | | |
|-----------------|------------------|
| 1 $\frac{3}{4}$ | 4 $\frac{3}{14}$ |
| 2 $\frac{1}{2}$ | 5 $\frac{5}{15}$ |
| 3 $\frac{7}{8}$ | 6 $\frac{8}{9}$ |

Exercise 12.3

- | | |
|-------------------|-----------------|
| 1 $\frac{4}{5}$ | 4 $\frac{7}{8}$ |
| 2 $\frac{41}{50}$ | 5 $\frac{8}{8}$ |
| 3 $\frac{5}{10}$ | 6 $\frac{3}{5}$ |

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 B | 5 B |
| 2 C | 6 D |
| 3 A | 7 B |
| 4 B | |

Structured questions answers

- 8 $\frac{5}{7}$
 9 $\frac{3}{9}$
 10 LCM = 12
 $\frac{5}{12}$
 11 $\frac{5}{5}$
 12 $\frac{5}{6}$

Unit 13: Subtraction of proper fractions

Unit objectives

By the end of this unit, learners should be able to:

- a** subtract proper fractions with same denominators of 2 to 10 and multiples of 5 up to 50.
- b** subtract proper fractions with different denominators of 2 to 10 and multiples of 5 up to 50.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 116–121.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030, Grade 3–7.

Suggested answers

Activity 13.1

$$\frac{3}{6}$$

Exercise 13.1

- 1 $\frac{2}{4}$
- 2 $\frac{2}{7}$
- 3 $\frac{2}{8}$
- 4 $\frac{3}{11}$

- 5 $\frac{3}{15}$
- 6 $\frac{4}{20}$
- 7 $\frac{4}{7}$

Activity 13.1

- 1
 - a $\frac{1}{2}$
 - b $\frac{10}{15}$

Exercise 13.2

- 1 $\frac{7}{10}$
- 2 $\frac{1}{8}$
- 3 $\frac{7}{14}$

- 4 $\frac{5}{10}$
- 5 $\frac{1}{200}$
- 6 $\frac{3}{10}$

Exercise 13.3

- 1 $\frac{5}{9}$
- 2 $\frac{3}{40}$
- 3 $\frac{14}{20}$

- 4 $\frac{9}{70}$
- 5 $\frac{15}{40}$
- 6 $\frac{16}{20}$

Exercise 13.4

- 1 $\frac{15}{20}$
- 2 $\frac{2}{17}$
- 3 $\frac{7}{17}$
- 4 $\frac{9}{30}$

- 5 $\frac{6}{8}$
- 6 $\frac{3}{5}$
- 7 $\frac{5}{7}$
- 8 $\frac{1}{4}$

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 A | 5 D |
| 2 B | 6 B |
| 3 C | 7 C |
| 4 B | 8 B |

Structured questions answers

- | | |
|-------------------|------------------|
| 9 $\frac{4}{8}$ | 12 $\frac{3}{7}$ |
| 10 $\frac{1}{2}$ | 13 $\frac{5}{8}$ |
| 11 $\frac{3}{10}$ | |

Unit 14: Addition of decimals

Unit objectives

By the end of this unit, learners should be able to:

- a add decimals up to 3 decimal places.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 122–125.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 14.1

Follow the instructions in the Learner's Book page 123. Answers vary (correctly added decimal numbers with aligned decimal points)

Exercise 14.1

- | | |
|-----------|-------------|
| 1 774,768 | 3 922,983 |
| 2 844,466 | 4 5 856,968 |

Exercise 14.2

- 1 16,643 kg
- 2 68,383 litres
- 3 38,018 litres

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 A | 6 A |
| 2 B | 7 C |
| 3 C | 8 B |
| 4 B | 9 C |
| 5 B | 10 A |

Structured questions answers

- 11 555,134
- 12 47,250
- 13 20,000
- 14 101,000
- 15 2 122,000
- 16 6,450
- 17 \$243,975
- 18 358,221 km
- 19 27 778,665 kg
- 20 \$6 913,125

Unit 15: Subtraction of decimals

Unit objective

By the end of this unit, learners should be able to:

- a subtract decimals up to three decimal places.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 126–129.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 15.1

- 1 $965,745 - 347,453 = 618,292$
 $965,745 - 234,414 = 731,331$
 $965,745 - 764,693 = 210,052$
- 2 Learners compare answers with friends. Answers should match.

Activity 15.2

The missing number is 28,7.

Exercise 15.1

- | | |
|-----------|-----------|
| 1 122,223 | 5 112,198 |
| 2 219,071 | 6 512,706 |
| 3 94,800 | 7 277,889 |
| 4 181,705 | |

Exercise 15.2

- | | |
|------------|-------------|
| 1 5,862 m | 3 15,883 kg |
| 2 2,595 kg | 4 109,25 ml |

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 A | 6 B |
| 2 A | 7 A |
| 3 A | 8 C |
| 4 A | 9 B |
| 5 A | 10 B |

Structured questions answers

- | | |
|--------------|-------------------|
| 11 642,222 | 16 368,650 kg |
| 12 358,444 | 17 778,625 litres |
| 13 358,024 | 18 111,309 km |
| 14 55,912 | 19 3 087,309 kg |
| 15 2 469,135 | 20 2 221,375 |

Unit 16: Multiplication of whole numbers

Unit objectives

By the end of this unit, learners should be able to:

- a demonstrate an understanding of basic multiplication facts.
- b multiply numbers by up to two-digit numbers.
- c illustrate multiplication using the short and long method.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 130–137.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 16.1

Follow the given instructions on **page 131** of the Learner's Book. Answers depend on the numbers chosen from the table.

Exercise 16.1

- | | |
|-------|-------|
| 1 72 | 6 25 |
| 2 0 | 7 36 |
| 3 48 | 8 49 |
| 4 120 | 9 22 |
| 5 66 | 10 96 |

Exercise 16.2

- | | |
|------------------|----------------|
| 1 84 passengers. | 4 72 packets. |
| 2 180 eggs. | 5 120 bottles. |
| 3 88 players. | |

Exercise 16.3

- | | |
|---------------------|---|
| 1 $6 \times 4 = 24$ | 4 To multiply means adding equal groups together. |
| 2 7 and 5 | 5 $5 + 5 + 5 + 5$ |
| 3 27 | |

Activity 16.2

Follow the given instructions on **page 133** of the Learner's Book. Answers depend on the numbers chosen from the table.

Exercise 16.4

- | | |
|-------|------------------|
| 1 282 | 5 1 688 kg |
| 2 966 | 6 1 505 sachets. |
| 3 972 | 7 1 260 trees. |
| 4 488 | 8 1 920 books. |

Activity 16.3

Learners follow the given instructions on **page 134** of the Learner's Book. Answers depend on the numbers chosen from the table.

Exercise 16.5

- | | |
|----------|----------|
| 1 6 886 | 6 23 345 |
| 2 2 568 | 7 15 120 |
| 3 31 320 | 8 14 070 |
| 4 9 460 | 9 54 008 |
| 5 11 050 | |

Exercise 16.6

- | | |
|---------------|---------------------|
| 1 22 440 eggs | 3 21 421 passengers |
| 2 \$47 141 | 4 30 600 books |

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 D | 6 A |
| 2 C | 7 C |
| 3 B | 8 D |
| 4 C | 9 C |
| 5 B | 10 B |

Structured questions answers

- | | |
|----------------------|----------------------|
| 11 948 | 16 7 488 |
| 12 2 436 | 17 136 875 loaves. |
| 13 6 000 oranges. | 18 13 888 |
| 14 \$36 720 | 19 \$95 550 |
| 15 3 120 passengers. | 20 4 920 passengers. |

Unit 17: Division of whole numbers by two-digit numbers

Unit objectives

By the end of this unit, learners should be able to:

- a demonstrate division using the long method.
- b carry out division by a two-digit divisor with or without remainders.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 138–144.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 17.1

Follow the given instructions on **page 140** of the Learner's Book. Answers depend on the numbers chosen from the table. Answers depend on the number of cards chosen. Correct answers will vary.

Exercise 17.1

- | | | | |
|---|-----|---|----|
| 1 | 72 | 5 | 84 |
| 2 | 121 | 6 | 96 |
| 3 | 85 | 7 | 96 |
| 4 | 67 | 8 | 88 |

Exercise 17.2

- | | | | |
|---|-----|---|----------------|
| 1 | 175 | 5 | 84 |
| 2 | 231 | 6 | 77 |
| 3 | 58 | 7 | 116 days. |
| 4 | 89 | 8 | 140 seedlings. |

Activity 17.2

- a 38 full crates.
- b 1 bottle

Exercise 17.3

- | | | | |
|---|----|----|-----------------|
| 1 | 58 | 7 | 40 remainder 5 |
| 2 | 44 | 8 | 26 remainder 23 |
| 3 | 42 | 9 | 31 remainder 21 |
| 4 | 31 | 10 | 18 remainder 27 |
| 5 | 17 | 11 | 14 remainder 10 |
| 6 | 13 | 12 | 13 remainder 16 |

Exercise 17.4

- 1 44 rows.
- 2 12 packets.
- 3 30 rooms.
- 4 a 30 sacks.
b 17 kg
- 5 26 learners.

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 B | 6 B |
| 2 C | 7 C |
| 3 B | 8 C |
| 4 D | 9 A |
| 5 C | 10 D |

Structured questions answers

- 1 126
- 2 132
- 3 160
- 4 83 remainder 0
- 5 193
- 6 182 bags.
- 7 24 vans.
- 8 48 groups.
- 9 174 brochures remainder 15.
- 10 111 health workers.

Unit 18: Multiplication of proper fractions

Unit objectives

By the end of this unit, learners should be able to:

- a multiply proper fractions by up to 4-digit whole numbers.
- b conduct multiplication of a proper fraction by a proper fraction.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 145–150.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 18.1

- 1
 - a 2
 - b 3
 - c $2\frac{1}{2}$

- d 4
 2 a 2
 b $2\frac{1}{2}$
 c 3
 d 4

Exercise 18.1

- 1 a $\frac{4}{7}$
 b $\frac{3}{2}$
 c $90\frac{1}{6}$
 d 64
 e 70
 f 140
 g 2 108
 h 6
 2 34
 3 9 tablets
 4 180 boys

Activity 18.2

Follow the given instructions on **page 148** of the Learner's Book.

Exercise 18.2

- 1 a $\frac{2}{15}$
 b $\frac{3}{14}$
 c $\frac{1}{12}$
 d $\frac{15}{52}$
 2 $\frac{1}{12}$
 3 $\frac{5}{32}$
 4 $\frac{4}{15}$

Unit revision exercises

Multiple choice answers

- 1 D
 2 B
 3 C
 4 A

- 5 D
6 A
7 C

- 8 B
9 A
10 C

Structured questions answers

- 1 a $\frac{4}{7}$
b $\frac{3}{2}$
2 a $90\frac{1}{6}$
b 70
3 a $\frac{2}{15}$
b $\frac{3}{14}$
4 $\frac{4}{15}$
5 $\frac{6}{25}$
6 180 boys.
7 $\frac{5}{32}$
8 a 140
b 6
9 $\frac{27}{40}$

Unit 19: Multiplication of decimal numbers

Unit objective

By the end of this unit, learners should be able to:

- a multiply decimal numbers by decimal numbers up to 2 decimal places.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 151–155.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 19.1

- a 2,808
b 1,288

- c 14,625
- d 5,664

Exercise 19.1

- 1 3,30
- 2 8,82
- 3 17,64
- 4 31,941
- 5 8,262
- 6 61,875
- 7 14,28
- 8 15,12

Activity 19.2

- a \$8.625
- b \$9.792
- c \$108.375

Exercise 19.2

- 1 62 bottles.
- 2 8 pieces.
- 3 26,03 km per litre.
- 4 35 bags.
- 5 33 litres.
- 6 12 containers.
- 7 8 cycles.
- 8 53 bottles.
- 9 64 rolls.
- 10 50 servings.

Unit revision exercises

Multiple choice answers

- 1 B
- 2 B
- 3 A
- 4 B
- 5 B
- 6 D
- 7 A
- 8 A
- 9 B
- 10 A
- 11 B
- 12 A
- 13 A

Structured questions answers

- 14 2,808
- 15 8,008
- 16 8,262
- 17 14,28
- 18 61,875
- 19 17,64
- 20 3,30
- 21 8,82
- 22 \$8,82
- 23 \$108.375

24 8,008 km

25 8,262 kg

26 \$14.28

27 \$61.875

28 17,64 litres

Unit 20: Division of decimal numbers

Unit objective

By the end of this unit, learners should be able to:

- a divide decimal numbers by decimal numbers up to 2 decimal places.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 156–160.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 20.1

1 9

2 14

3 10,5

4 36

Exercise 20.2

1 12

2 3,5

3 13

4 17

5 11,9

6 30

7 21

8 107

Exercise 20.3

1 20,23 km per litre.

2 63 pieces.

3 38 containers.

Unit revision exercises

Multiple choice answers

1 B

2 B

3 A

4 C

5 C

6 C

7 B

8 B

9 A

10 B

11 A

12 B

13 A

14 C

15 C

Structured questions answers

16 42

17 19,6

18 7,8

19 17

20 21

21 11,9

22 30

23 13

24 60 bottles.

25 20,23 km per litre.

26 36 bags.

27 38 jugs.

28 63 bags.

29 30 km/h.

30 107 packets.

Unit 21: Combined operations

Unit objective

By the end of this unit, learners should be able to:

- a work out Mathematical problems involving two operations.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 161–166.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 21.1

a 2 975

b 1 000

Exercise 21.1

1 68

2 36

3 80

4 36

5 14

6 140

7 93

8 45

9 169

10 50

Exercise 21.2

1 80

2 108

- 3 6
- 4 260
- 5 30
- 6 31

- 7 4
- 8 82.5
- 9 162
- 10 3

Activity 21.2

- 1 $1\frac{19}{60}$
- 2 $1\frac{11}{18}$

- 3 $1\frac{1}{3}$
- 4 $\frac{4}{125}$

Exercise 21.3

- 1 $\frac{7}{12}$
- 2 $\frac{3}{20}$
- 3 $\frac{7}{15}$
- 4 $\frac{1}{10}$
- 5 40 kg

Unit revision exercises

Multiple choice answers

- 1 D
- 2 B
- 3 A
- 4 Correct answer: 63
- 5 D
- 6 A

- 7 C
- 8 D
- 9 B
- 10 D
- 11 A

Structured questions answers

- 12 73
- 13 25
- 14 6
- 15 $\frac{19}{42}$
- 16 $\frac{89}{126}$
- 17 $\frac{7}{20}$
- 18 $\frac{5}{12}$
- 19 42 kg

Examination 1

Paper 1

Section A: Multiple choice answers

- | | | | |
|------|------|------|------|
| 1 B | 11 C | 21 C | 31 A |
| 2 C | 12 C | 22 B | 32 C |
| 3 A | 13 A | 23 C | 33 A |
| 4 B | 14 B | 24 D | 34 C |
| 5 D | 15 A | 25 C | 35 B |
| 6 A | 16 D | 26 D | 36 A |
| 7 C | 17 D | 27 C | 37 B |
| 8 A | 18 D | 28 C | 38 C |
| 9 D | 19 A | 29 A | 39 C |
| 10 A | 20 D | 30 A | 40 A |

Paper 2

Section B: Structured questions answers

- 1 $\frac{7}{20}$
- 2
 - a $5\frac{9}{20}$ kg
 - b $1\frac{1}{20}$ kg
- 3 $\frac{1}{4}$
- 4 180
- 5
 - a 12
 - b $2\frac{1}{2}$
- 6 $\frac{5}{7}$
- 7 11,8 kg
- 8
 - a 8
 - b 3
- 9 21 km
- 10
 - a 57
 - b $\frac{8}{15}$
 - c $\frac{7}{12}$
- 11 $14\frac{3}{4}$

- 12 a 4 cm
b 1 : 3
- 13 a 1 : 2 : 3
b $\frac{3}{10}$
- 14 a 7
b 8
- 15 a 136,7 g
b 10,31 KB

Topic 3

Measures

Unit 22: Money

Unit objectives

By the end of this unit, learners should be able to:

- a work out change.
- b prepare invoices correctly.
- c calculate profit or loss.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 174–186.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 22.1

- 1 120 cents
- 2 \$8.50
- 3 \$2, \$5, \$10, \$20 and \$50
- 4 \$2.00
- 5 \$33.00

Activity 22.1

Follow instructions on **page 177** of the Learner's Book. Since it is a practical activity, answers vary.

Exercise 22.2

- 1 \$57.01
- 2 \$17.14
- 3 \$12.50
- 4 \$11.75
- 5 \$53.00

Money given	Price of bought items	Change given
\$50.00	\$27.75	\$22.25

Money given	Price of bought items	Change given
\$500.00	\$471.00	\$29.00
\$350.00	\$275.40	\$74.60
\$900.00	\$827.00	\$73.00
\$540.00	\$539.00	\$1.00

Activity 22.2

Follow instructions on **page 179** of the Learner's Book. Since it is a practical activity, answers vary.

Exercise 22.3

- 1 C
- 2 B
- 3 Invoice total: \$43.60
- 4 Invoice total: \$168.50
- 5 Invoice total: \$86.60
- 6 Invoice total: \$141.80
- 7 Invoice total: \$176.40

Activity 22.3

Follow instructions on **page 182** of the Learner's Book. Since it is a practical activity, answers vary.

Exercise 22.4

- 1 B
- 2 B
- 3 C
- 4 C
- 5 C
- 6 \$81.00
- 7 \$160.00
- 8 \$97.50 loss
- 9

Item	Profit/Loss	Amount
Books	Loss	\$2.00
Vegetables	Profit	\$11.00
Onion	Profit	\$11.00
Oranges	Loss	\$12.00
Mangoes	Profit	\$6.00

- 10
 - a \$100.00
 - b \$140.00
 - c \$40.00
 - d \$2.00

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 B | 6 B |
| 2 B | 7 B |
| 3 C | 8 C |
| 4 C | 9 C |
| 5 B | 10 B |

Structured questions answers

- 11 a \$7.25
b $50.00 - 42.75 = 7.25$
- 12 a \$20.00
b \$5.00
- 13 Invoice total: \$27.50
- 14 a \$140.00
b \$180.00
c \$40.00
- 15 a \$480.00
b \$420.00
c \$60.00
- 16 Invoice total: \$28.00
- 17 a Profit
b \$30.00
- 18 a \$30.00
b \$20.00
- 19 a \$600.00
b \$750.00
c \$150.00
- 20 Invoice total: \$74.20
- 21 a \$300.00
b \$420.00
c \$120.00
d \$8.00
- 22 a \$100.00
b \$140.00
c \$40.00
d \$2.00

Unit 23: Time

Unit objectives

By the end of this unit, learners should be able to:

- a tell time.
- b convert time.
- c estimate time taken.
- d calculate time taken.
- e write time in 12-hour and 24-hour notation.
- f express date in SI notation.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 18–204.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 23.1

Follow instructions on **page 189** of the Learner's Book. Since it is a practical activity, answers vary.

Exercise 23.1

- | | |
|-------------|------------------|
| 1 4:10 a.m. | 5 5 to 4 p.m. |
| 2 7:05 a.m. | 6 5 past 11 p.m. |
| 3 9:00 a.m. | 7 25 past 1 p.m. |
| 4 8:25 a.m. | 8 5 past 7 p.m. |

Exercise 23.2

Learners follow instructions on **page 189** of the Learner's Book. They draw the hour and minute hands as indicated.

Exercise 23.3

- | | |
|-----------|------------|
| 1 360 s | 6 10 min |
| 2 720 s | 7 2.5 min |
| 3 1 200 s | 8 40 min |
| 4 2 700 s | 9 60 min |
| 5 90 s | 10 150 min |

Exercise 23.4

- | | |
|----------|----------------|
| 1 1 h | 6 120 minutes |
| 2 3 h | 7 270 minutes |
| 3 4 h | 8 420 minutes |
| 4 1,5 h | 9 75 minutes |
| 5 6,25 h | 10 600 minutes |

Exercise 23.5

- | | |
|-------------|----------|
| 1 1 day | 6 120 h |
| 2 3 days | 7 240 h |
| 3 5 days | 8 60 h |
| 4 10 days | 9 360 h |
| 5 41,7 days | 10 720 h |

Exercise 23.6

- | | |
|------|-------|
| 1 1 | 6 14 |
| 2 2 | 7 42 |
| 3 4 | 8 56 |
| 4 7 | 9 70 |
| 5 10 | 10 84 |

Exercise 23.7

- | | |
|-----|-------|
| 1 1 | 6 8 |
| 2 2 | 7 12 |
| 3 4 | 8 24 |
| 4 5 | 9 36 |
| 5 9 | 10 48 |

Exercise 23.8

- | | |
|------------|---------------|
| 1 1 year | 6 24 months |
| 2 3 years | 7 48 months |
| 3 4 years | 8 72 months |
| 4 5 years | 9 96 months |
| 5 10 years | 10 120 months |

Exercise 23.9

- | | |
|-----------|-----------|
| 1 300 sec | 3 3 days |
| 2 1 h | 4 3 weeks |

- 5 35 days
- 6 4 years
- 7 24 months
- 8 336 h

- 9 90 min
- 10 172 800 s
- 11 2 decades
- 12 1 century and 20 years

Exercise 23.10

- 1 03:20
- 2 11:45
- 3 16:10
- 4 21:05
- 5 00:30
- 6 12:45 a.m.
- 7 6:25 a.m.
- 8 1:50 p.m.
- 9 6:15 p.m.
- 10 11:40 p.m.

Exercise 23.11

- 1 1 second
- 2 2 minutes
- 3 15 minutes
- 4 20 minutes
- 5 2 hours
- 6 40 minutes
- 7 1 hour
- 8 45 minutes
- 9 2 weeks
- 10 7:00 p.m.

Exercise 23.12

- 1 1 h 45 min
- 2 4 h 25 min
- 3 7 h 30 min
- 4 1 h 45 min
- 5 2 h 40 min
- 6 30 minutes
- 7 1 h 45 min
- 8 2 h 45 min
- 9 45 minutes
- 10 45 minutes

Activity 23.2

Learners follow instructions on [page 200](#) of the Learner's Book with the teacher's assistance.

Exercise 23.13

- 1 31
- 2 30
- 3 28
- 4 29
- 5 30
- 6 30
- 7 31
- 8 31
- 9 31
- 10 31

Exercise 23.14

- 1 2025/03/07
- 2 2028/06/21
- 3 2032/11/09
- 4 2027/01/01
- 5 2024/09/30
- 6 2026/02/14

7 2031/08/05

8 2029/10/12

9 2030/12/25

10 2023/07/02

Unit revision exercises

Multiple choice answers

1 A

2 A

3 C

4 B

5 C

6 B

7 B

8 B

9 C

10 B

11 A

12 C

13 B

14 C

15 B

Structured questions answers

16 2,5 minutes

17 270 minutes

18 6 hours

19 10 days

20 3 weeks

21 9 months

22 1,5 years

23 24 months

24 4 minutes

25 1 hour 40 minutes

26 23:15

27 2:45 p.m.

28 February = 28 (29 leap year)

June = 30

September = 30

December = 31

29 2029/01/01

30 45 minutes

Unit 24: Mass

Unit objectives

By the end of this unit, learners should be able to:

- a measure mass.
- b calculate gross, net and tare mass.
- c convert grammes to kilogrammes and vice versa.

- d compare mass of objects.
- e approximate mass up to 1 000 kg.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 205–217.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 24.1

Learners follow instructions on **page 206** of the Learner's Book with the teacher's assistance.

Activity 24.2

Learners follow instructions on **page 207** of the Learner's Book with the teacher's assistance.

Exercise 24.1

- | | |
|-----|-----------|
| 1 A | 6 800 g |
| 2 B | 7 600 g |
| 3 C | 8 1,5 kg |
| 4 C | 9 1 500 g |
| 5 B | 10 4,5 kg |

Exercise 24.2

- | | |
|-----|-----------|
| 1 B | 6 3,2 kg |
| 2 C | 7 750 g |
| 3 B | 8 5 500 g |
| 4 B | 9 2,45 kg |
| 5 A | 10 680 g |

Exercise 24.3

- 1 B
- 2 C
- 3 B
- 4 B
- 5 C
- 6 Heavier: 820 kg, Lighter: 670 kg
- 7 150 kg, 430 kg, 600 kg, 980 kg
- 8 60 kg
- 9 Heaviest: beans (800 kg), Lightest: rice (615 kg)
- 10 50 kg

Exercise 24.4

- 1 >
- 2 =
- 3 <
- 4 <
- 5 =
- 6 >
- 7 <
- 8 <
- 9 =
- 10 <
- 11 710 kg > 650 kg
- 12 420 kg = 420 kg
- 13 980 kg > 920 kg
- 14 300 kg < 450 kg
- 15 870 kg = 870 kg
- 16 Ordering from lightest to heaviest: 400 kg, 500 kg, 620 kg, 750 kg
Writing comparisons using <:
400 kg < 500 kg < 620 kg < 750 kg
- 17 Ordering from lightest to heaviest: 680 kg, 850 kg, 920 kg, 1000 kg
Writing comparisons using <:
680 kg < 850 kg < 920 kg < 1000 kg

Exercise 24.5

- 1 850 kg; 800 kg
- 2 590 kg; 600 kg
- 3 1 000 kg; 1 000 kg
- 4 680 kg; 700 kg
- 5 920 kg; 900 kg

Activity 24.3

Learners follow instructions on **page 214** of the Learner's Book with the teacher's assistance.

Exercise 24.6

- 1 A
- 2 A
- 3 B
- 4 C
- 5 B

Unit revision exercises

Multiple choice answers

- 1 B
- 2 A
- 3 C
- 4 A
- 5 B
- 6 B
- 7 B
- 8 A
- 9 A
- 10 B

Structured questions answers

- 11 **a** 350 g
b 500 g
- 12 1,25 kg

- 13 2 750 g
14 650 g; 700 g
15 $850 \text{ kg} < 920 \text{ kg}$
16 430, 600, 750, 980
17 Maize by 170 kg.
18 800 g
19 1,5 kg
20 a 800 kg
b 200 kg
21 a 550 kg
b 130 kg
22 a 730 kg
b Timber
23 550 g
24 9,5 kg; 9 500 g
25 250 kg

Unit 25: Length

Unit objectives

By the end of this unit, learners should be able to:

- a estimate length using non-standard units.
- b measure length using standard units.
- c perform operations involving length.

Teaching and learning materials

- PlusOne Grade Mathematics 6 Learner's Book pages 218–225.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 25.1

Learners follow instructions on **page 219** of the Learner's Book with the teacher's assistance.
Answers vary.

Exercise 25.1

Learners follow instructions on **page 219** of the Learner's Book with the teacher's assistance.
Answers vary depending on the school.

Activity 25.2

Learners follow instructions on **page 220** of the Learner's Book with the teacher's assistance.

Exercise 25.2

- 1 30 cm
- 2 45 cm
- 3 15 cm
- 4 45 cm
- 5 75 cm

- 6 60 cm
- 7 45 cm
- 8 15 cm
- 9 45 cm

Exercise 25.3

- 1 1,62 m
- 2 28,8 m
- 3 1,92 m
- 4 24 m
- 5 2,1 m

- 6 38 m
- 7 1,36 m
- 8 30,8 m
- 9 1,5 m
- 10 52,5 m

Exercise 25.4

- 1 7 m
- 2 5 m
- 3 100 m
- 4 45 m
- 5 30 m

- 6 4 m
- 7 7 m
- 8 18 m
- 9 25 m

Exercise 25.5

- 1 1,2 m
- 2 180 mm
- 3 56 m
- 4 900 m
- 5 2 000 m

- 6 120 cm
- 7 2.5 m
- 8 200 cm
- 9 4 strings.
- 10 0 km 850 m

Unit revision exercises

Multiple choice answers

- 1 C
- 2 C
- 3 C
- 4 C
- 5 C

- 6 D
- 7 B
- 8 C
- 9 C
- 10 B

Structured questions answers

- | | | | |
|----|---------|----|------------|
| 11 | 1,5 m | 16 | 2,5 m |
| 12 | 40 m | 17 | 200 cm |
| 13 | 120 mm | 18 | 1 000 m |
| 14 | 1 000 m | 19 | 4 ropes. |
| 15 | 40 cm | 20 | 0 km 850 m |

Unit 26: Shapes

Unit objectives

By the end of this unit, learners should be able to:

- a determine lines of symmetry.
- b draw lines of symmetry.
- c state lines of symmetry.
- d state parts of a circle.
- e name polygons up to 10 sides.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 226–233.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 26.1

Learners follow instructions on **page 228** of the Learner's Book with the teacher's assistance.

Exercise 26.1

- 1 Learners follow instructions on **page 228** of the Learner's Book with the teacher's assistance.
- 2
 - a 2
 - b 2
 - c 3
 - d 1

Exercise 26.2

- | | | | |
|---|---------------|---|-------------|
| 1 | Radius | 4 | Tangent |
| 2 | Diameter | 5 | Semi-circle |
| 3 | Circumference | 6 | Radius |

Exercise 26.3

- 1 Quadrilateral
- 2 Heptagon
- 3 Decagon
- 4 9

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 C | 6 B |
| 2 C | 7 B |
| 3 C | 8 C |
| 4 A | 9 C |
| 5 C | |

Structured questions answers

- 10 Radius
- 11 Nonagon
- 12 Circumference
- 13
 - a Triangle
 - b Heptagon
 - c Octagon
- 14 12 cm
- 15 Learners draw a correct diagram.
- 16 Circle symmetry is infinite.
- 17 Triangle, Octagon, Hexagon
- 18 Diametre passes through the centre.
- 19 10 lines
- 20 It has unequal sides.

Unit 27: Perimeter

Unit objectives

By the end of this unit, learners should be able to:

- a measure the distance around a shape.
- b calculate the perimeter of shapes

Teaching and learning materials

- PlusOne Grade Mathematics 6 Learner's Book pages 234–241.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 27.1

Learners follow instructions on **page 234** of the Learner's Book with the teacher's assistance.

Exercise 27.1

- | | |
|--------|---------|
| 1 15 m | 6 14 m |
| 2 26 m | 7 20 m |
| 3 22 m | 8 17 m |
| 4 15 m | 9 16 m |
| 5 24 m | 10 22 m |

Exercise 27.2

- | | |
|---------|---------|
| 1 38 cm | 4 40 cm |
| 2 40 cm | 5 99 cm |
| 3 36 cm | |

Exercise 27.3

- | | |
|----------|---------|
| 1 24 m | 6 3 m |
| 2 180 cm | 7 12 m |
| 3 48 m | 8 10 m |
| 4 3,2 m | 9 3.6 m |
| 5 16 m | 10 80 m |

Exercise 27.4

- | | |
|-----------------------------|---------|
| 1 Length 25 m, Width 12,5 m | 4 15 cm |
| 2 20 cm | 5 15 m |
| 3 20 m | 6 9 cm |

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 C | 4 B |
| 2 D | 5 C |
| 3 C | 6 B |

7 C

8 C

9 D

10 C

Structured questions answers

11 74 m

12 160 m

13 42 cm

14 120 m

15 240 m

16 150 m

17 75 m

18 112 cm

19 81 m

20 25 m

21 10 cm

22 40 m

23 20 cm

24 50 m

25 20 cm

Unit 28: Rate

Unit objectives

By the end of this unit, learners should be able to:

- a identify measurements of rate.
- b calculate different types of rates.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 242–249.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 28.1

- 1 \$60
- 2 100 litres
- 3 50 minutes
- 4 1 hour

Exercise 28.1

- 1 C
- 2 B
- 3 C
- 4 D
- 5 12 days.
- 6 2 months.
- 7 15 minutes.
- 8 \$5 per litre.
- 9 5 000 fruits.
- 10 \$19.00

11 2 bags

12 2,5 litres.

13 9 times.

14 60 litres.

Activity 28.2

Learners follow instructions on **page 246** of the Learner's Book with the teacher's assistance.

Answers vary

Exercise 28.2

1 C

2 D

3 C

4 C

5 B

6 a 30 km/h b 8.3 m/s

7 3 600 m

8 3 hours

9 a 18 km/h b 5 m/s

10 54 km/h

Unit revision exercises

Multiple choice answers

1 C

2 A

3 B

4 B

5 B

6 C

7 C

8 C

9 B

10 A

11 C

12 B

13 B

14 C

15 C

Structured questions answers

16 45 km/h; 12,5 m/s

17 8 m/s; 28,8 km/h

18 300 km

19 9 000 m

20 50 km/h; 13,9 m/s

21 15 km/h; 4,2 m/s

22 2,5 hours

23 90 km/h; 25 m/s

24 300 m

25 12 km/h; 3,3 m/s

26 6 hours

- 27 36 km/h
- 28 20 m/s
- 29 \$4 per kg
- 30 30 wpm
- 31 500 per year
- 32 4 km/h ; 1,1 m/s
- 33 90 bpm
- 34 75 km/h
- 35 5 days
- 36 \$35
- 37 560 km
- 38 490 pages.
- 39 5 km/h
- 40 a 50 km/h b 13,9 m/s

Unit 29: Area

Unit objectives

By the end of this unit, learners should be able to:

- a estimate the area of a square, rectangle, triangle and composite shapes.
- b calculate area of a square, rectangle, composite shapes and a triangle using formulae.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 250–263.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Exercise 29.1

Learners follow instructions by counting the square units on page 253 of the Learner's Book. Steps to find area on a grid:

- 1 Count all complete (full) squares inside the figure.
- 2 Count partial squares:
 - Combine two half-squares to make one full square.
 - Combine smaller parts where possible.
- 3 Add them together.
Area = Number of full squares + Combined partial squares

Exercise 29.2

- 1
 - a 16 cm^2
 - b 36 cm^2
 - c 64 cm^2
 - d 25 m^2
 - e 49 m^2
- 2 225 m^2
- 3 900 m^2
- 4 900 cm^2
- 5 200 cm^2
- 6 400 m^2
- 7
 - a 25 m^2
 - b 25 m^2
- 8
 - a $6,25 \text{ m}^2$
 - b $1,25 \text{ litres}$
- 9
 - a 900 cm^2
 - b $0,09 \text{ m}^2$
- 10
 - a $1,44 \text{ m}^2$
 - b $14,4 \text{ m}^2$

Activity 29.1

- 1 Square: Formula for area of a square:
Area = side $\times$ side
Side = 5 cm ($5 \times 5 = 25$)
Area = 25 cm^2
- 2 Rectangle: Formula for the area of a rectangle:
Area = Length $\times$ Breadth
Length = 9 cm
Breadth = 6 cm ($9 \times 6 = 54$)
Area = 54 cm^2

Exercise 29.3

- 1
 - a 35 cm^2
 - b 60 cm^2
 - c 18 cm^2
 - d 63 cm^2
- 2 35 cm^2
- 3 15 cm^2
- 4 $4\,050 \text{ m}^2$
- 5 160 m^2
- 6 5 m
- 7 $9\,000 \text{ m}^2$

- | | | | | |
|----|---|-------------------|---|-----------|
| 8 | a | 48 m ² | b | 96 litres |
| 9 | a | 60 m ² | b | \$180 |
| 10 | a | 28 m ² | b | 3 litres |

Exercise 29.4

- 1
 - a 9 cm²
 - b 12 cm²
 - c 20 cm²
 - d 24.5 cm²
 - e 24 cm²
- 2 18 cm²
- 3 300 m²
- 4 50 cm²
- 5 40 cm²
- 6 100 cm²
- 7

a 20 m ²	b \$40
---------------------	--------
- 8

a 12 m ²	b 1,2 litres
---------------------	--------------
- 9

a 3 m ²	b \$45
--------------------	--------
- 10

a 0,9 m ²	b \$22,50
----------------------	-----------

Activity 29.2

1 Describing the composite shapes

Learners should describe them using correct mathematical vocabulary.

When describing, include:

- The simple shapes that make up the figure (for example, “This shape is made of two rectangles.”)
- The number of sides
- Whether any sides are equal
- Whether angles are right angles
- How the shapes are joined (side-by-side, on top, L-shape, among others)

Example descriptions:

- a “The figure is made of a rectangle, and a square joined along one side.”
- b “The figure is made of two rectangles joined together to form an L-shape.”

2 How to find the area of composite figures

Method 1: Divide into simple shapes.

- a Split the composite shape into rectangles, squares, or triangles.

- b** Find the area of each simple shape.
- c** Add the areas together.

$$\text{Total Area} = \text{Area}_1 + \text{Area}_2 + \dots$$

Method 2: Subtract a missing part

- a** Find the area of a large rectangle that surrounds the shape.
- b** Subtract the area of the missing section. $\text{Total Area} = \text{Large Area} - \text{Missing Area}$

Exercise 29.5

Learners follow instructions on **pages 260 to 261** of the Learner's Book with the teacher's assistance, using the provided shapes.

Unit revision exercises

Multiple choice answers

- | | |
|------------|-------------|
| 1 D | 6 C |
| 2 A | 7 C |
| 3 D | 8 C |
| 4 B | 9 D |
| 5 C | 10 A |

Structured questions answers

- 11** 25 cm²
- 12** 50 cm²
- 13** 27 cm²
- 14** 136 cm²
- 15** 165 m²
- 16** 49 cm²
- 17** 40 square units and 104 square units, respectively.
- 18**

a 3 cm	b 5 cm	c 3 cm	d 8 cm
e 8 cm	f 7 cm	g 7 cm	h 8 cm

Unit 30: Volume and capacity

Unit objectives

By the end of this unit, learners should be able to:

- a** calculate volume of regular objects.
- b** determine volume of irregular objects by displacement.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 264–271.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 30.1

Learners follow the instructions on **page 266** of the Learner's Book.

Exercise 30.1

- 1 125 cm^3
- 2 $1\,000 \text{ cm}^3$
- 3 $10\,000 \text{ cm}^3$
- 4 36 cm^3
- 5 $1\,728 \text{ cm}^3$
- 6 **a** 8 cm^3 **b** 64 cm^3 **c** 216 cm^3
- 7 343 cm^3
- 8 4 cm

Exercise 30.2

- 1 1 litre
- 2 1 litre
- 3 3,375 litres
- 4 30 litres
- 5 125 ml
- 6 **a** 3 m^3 **b** 3 000 litres

Activity 30.2

Learners follow the instructions on **page 269** of the Learner's Book.

Exercise 30.3

- 1 150 ml
- 2 220 ml
- 3 350 ml
- 4 1 500 ml
- 5 **a** 0,45 litres **b** 450 ml

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 B | 6 A |
| 2 B | 7 B |
| 3 A | 8 C |
| 4 C | 9 D |
| 5 C | 10 D |

Structured questions answers

- | | |
|---|-----------------------|
| 11 512 cm ³ ; 512 ml | |
| 12 600 cm ³ ; 0,6 litres | |
| 13 9 cm | |
| 14 20 cm | |
| 15 216 cm ³ | |
| 16 3 500 litres | |
| 17 3 375 cm ³ ; 3,375 litres | |
| 18 1 m ³ ; 1 000 litres | |
| 19 250 ml | |
| 20 5 litres | |
| 21 a 3 m ³ | b 3 000 litres |
| 22 a 5 cm | b 125 cm ³ |
| 23 a 450 ml | b 450 cm ³ |
| 24 a 144 m ³ | b 144 000 litres |
| 25 a 12 m ³ | b 600 buckets |

Unit 31: Direction, angles and lines

Unit objectives

By the end of this unit, learners should be able to:

- a identify the eight cardinal points.
- b locate positions using cardinal points.
- c identify horizontal, vertical and/ perpendicular lines.
- d illustrate quarter, half, three-quarters and complete revolution using a circle.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 272–279.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 31.1

Learners follow the instructions on **page 274** of the Learner's Book.

Exercise 31.1

- | | |
|--------------|---------------|
| 1 East | 6 West |
| 2 South | 7 South |
| 3 North West | 8 West |
| 4 West | 9 North West |
| 5 East | 10 North West |

Activity 31.2

Learners follow the instructions on **page 275** of the Learner's Book.

Exercise 31.2

- 1 Vertical line
- 2 Horizontal line
- 3 Perpendicular line
- 4 Learners draw a correct diagram of a right-angled triangle.
- 5 Learners draw a correct diagram of an isosceles triangle.

Exercise 31.3

- | | |
|----------------------------|-----------------------------|
| 1 Quarter turn, East | 6 180°, half turn |
| 2 Half turn, West | 7 West |
| 3 Three-quarter turn, West | 8 Same direction |
| 4 Complete revolution | 9 East |
| 5 Quarter turn, North | 10 Three-quarter turn, West |

Activity 31.3

Learners follow the instructions on **page 278** of the Learner's Book to make revolutions.

Unit revision exercises

Multiple choice answers

- | | |
|-----|-----|
| 1 C | 5 B |
| 2 B | 6 A |
| 3 C | 7 C |
| 4 D | 8 B |

Structured questions answers

- 9 Learners draw and label the eight cardinal points

The eight cardinal (compass) points are:

- North (N)
- North-East (NE)
- East (E)
- South-East (SE)
- South (S)
- South-West (SW)
- West (W)
- North-West (NW)

They are arranged clockwise on a compass.

- 10
- a Dombo from Sipepa → South
 - b Mazibisa from Sipepa → East
 - c Godzo from Sipepa → North

- 11 Example description:

- Learners draw a horizontal line AB.
- Learners draw a vertical line CD crossing AB at 90° .

- 12 East

- 13 Quarter turn vs half turn (clock example):

- A quarter turn = 90°
Example: From 12 to 3 on a clock.
- A half turn = 180°
Example: From 12 to 6 on a clock.

A half turn is twice a quarter turn.

- 14 Learners draw a circle and indicate:

- Quarter turn = 90°
- Half turn = 180°
- Three-quarter turn = 270°
- Complete revolution = 360°

- 15** **a** Fili from Nhlamba → East (approximately East-South-East depending on position, but generally East)
- b** Nhlamba from Fili → West (approximately West-North-West)
- 16** Examples:
- a** Horizontal lines (run left to right)
- The top edge of a book
 - The horizon
- b** Vertical lines (run up and down)
- A flagpole
 - A wall corner
- c** Perpendicular lines (meet at 90°)
- Walls meeting at a room corner
 - The edges of a square
- 17** Knowing cardinal points helps to:
- Give clear and accurate directions.
 - Read maps correctly.
 - Navigate safely.
 - Describe locations precisely.
 - Avoid confusion when travelling.

Unit 32: Data handling

Unit objectives

By the end of this unit, learners should be able to:

- a** collect statistical data
- b** read and interpret statistical data on ready reckoners, such as:
- tables
 - bar graphs
 - column graphs
 - pie charts
 - pictographs
- c** solve problems on measures using different graphs.

Teaching and learning materials

- PlusOne Mathematics Grade 6 Learner's Book pages 280–293.
- Heritage Based Curriculum (HBC) Junior Mathematics syllabus 2024–2030.

Suggested answers

Activity 32.1

Follow the instructions on **page 281** of the Learner's Book.

Exercise 32.1

- 1
 - a Apples
 - b Mangoes
 - c 35
 - d 50
 - e 15
- 2
 - a Bus
 - b Car
 - c 37
 - d 60
 - e 13

Exercise 32.2

- | | | | | | |
|---|-----------|------------|------|--------|--------|
| 1 | a oranges | b grapes | c 18 | d 8 | e 50 |
| 2 | a Tuesday | b Thursday | c 35 | d 4 mm | e 7 mm |

Exercise 32.3

- 1
 - a Black
 - b Red
 - c 15 cars
 - d $\frac{5}{50} = \frac{1}{10}$
- 2
 - a 40%
 - b 32
 - c $\frac{3}{10}$
 - d Flats increase.

Exercise 32.4

- 1
 - a 16
 - b 12
 - c 8
 - d 36
 - e Water

- 2 a 6
b 4
c 2
d 8
e 20
f Birds

Unit revision exercises

Multiple choice answers

- | | |
|-----|------|
| 1 B | 6 B |
| 2 B | 7 D |
| 3 C | 8 C |
| 4 C | 9 C |
| 5 C | 10 C |

Structured questions answers

- | | |
|--|------------------|
| 11 a Football
c 32
e $\frac{1}{5}$ | b Tennis
d 75 |
| 12 a Charlie
b Bob
c 4
d 25
e 11 | |
| 13 a Vanilla
b Mango
c $\frac{1}{4}$
d 16.7%
e 120° | |
| 14 a Wednesday
b Tuesday
c 12,5 hours
d Wednesday has more television hours than Thursday.
e 2,5 hours | |
| 15 a Bus
d 60 | b Car
e 13 |

c 37

Examination 2

Paper 1

Section A: Multiple choice answers

- | | | | |
|------|------|------|------|
| 1 B | 11 C | 21 B | 31 A |
| 2 C | 12 B | 22 B | 32 B |
| 3 C | 13 A | 23 B | 33 B |
| 4 B | 14 A | 24 B | 34 C |
| 5 A | 15 B | 25 C | 35 C |
| 6 C | 16 A | 26 A | 36 B |
| 7 A | 17 A | 27 C | 37 A |
| 8 B | 18 B | 28 B | 38 C |
| 9 A | 19 B | 29 B | 39 C |
| 10 B | 20 C | 30 C | 40 D |

Paper 2

Section B: Structured questions answers

- 1 a \$58.49
b \$41.51
- 2 Invoice total: \$184.50
- 3 Discount = \$12
Selling price = \$68
- 4 \$300
- 5 Profit = \$60
Profit % = 30%
- 6 320 kg
- 7 a 03:20
b 19:45
- 8 1 h 45 min
- 9 12 hours = 0,5 days
- 10 2 h 30 min
- 11 2026-08-15, 00:00
- 12 3,2 kg, 2 750 g
- 13 1,5 kg
- 14 480 kg is heavier by 160 kg.
- 15 450 kg remain; can take 150 kg more

- 16 a 3,5 m
b 3,5 m
- 17 50 cm
- 18 0,9 km
- 19 (Diagram)
- 20 a 3
b 2
c 5
- 21 12 cm
- 22 Learners draw and label a circle.
- 23 Perimeter = 380 m
Area = 9000 m²
- 24 50 m
- 25 10 cm
- 26 22 cm
- 27 6 hours
- 28 18 km/h, 5 m/s
- 29 4 days
- 30 \$90; 25 litres
- 31 60 m²; 6 litres
- 32 100 m²; \$200
- 33 12,25 m²; 49 tiles
- 34 75 cm²
- 35 3 m³; 3 000 l
- 36 3,375 m³; 3375 l
- 37 250 ml
- 38 SE; example: B is SW of A
- 39 Learners draw perpendicular and parallel lines.
- 40 a Football
b 75
c $\frac{1}{5}$
d Learners draw a simple bar chart.

Examination 3

Paper 1

Section A: Multiple choice answers

- | | | | |
|------|------|------|------|
| 1 A | 11 A | 21 B | 31 B |
| 2 A | 12 A | 22 B | 32 A |
| 3 A | 13 A | 23 A | 33 A |
| 4 A | 14 B | 24 A | 34 B |
| 5 A | 15 B | 25 A | 35 A |
| 6 B | 16 B | 26 A | 36 B |
| 7 B | 17 A | 27 A | 37 B |
| 8 A | 18 C | 28 B | 38 B |
| 9 A | 19 A | 29 D | 39 B |
| 10 C | 20 A | 30 B | 40 B |

Paper 2

Section B: Structured questions answers

- 2,808
- 8,008
- 8,262
- 14,28
- 61,875
- 17,64
- 3,3
- 8,82
- 42
- 19,6
- 7,8
- 17
- 21
- 11,9
- 30
- 13
- 38
- 13

19 1 080

20 a 68

b 36

21 14

22 80

23 108

24 6

25 260

26 30

27 $\frac{19}{42}$

28 $\frac{19}{126}$

29 $\frac{7}{20}$