Mathematics

Teacher's Guide

Standard Seven



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION,
SCIENCE AND TECHNOLOGY

Certificate of Approval

No. 396

Tittle of Publication: Mathematics Teacher's Guide Standard Seven
Publisher: Tanzania Institute of Education
Author: Tanzania Institute of Education
ISBN: 978-9987-09-204-8

This book was approved by the Ministry of Education, Science and Technology on 27th November, 2020 as a Teacher's Guide for Standard Seven in Primary Schools in Tanzania as per Mathematics Pupil's Book Standard Seven, 2020.

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Commissioner for Education

Tanzania Institute of Education

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Published, 2020

ISBN: 978-9987-09-204-8

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Acknowledgements

The Tanzania Institute of Education (TIE) recognises the contributions of all the individuals and organisations who prepared this guide.

TIE would like to acknowledge the following experts:

Translators: Dr Makungu S. Mwanzalima, Dr Halidi A. Lyeme, Mr Lusato M. Majula, Mr Shabani Baya, Mr Jonathan H. Paskali, Miss Doreen C. Samuel and Ms Emaline J. Ndelwa

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TIE also extends its sincere gratitude to the primary school teachers who participated in the trial phase of the manuscript.

Likewise, TIE would like to thank the Global Partnership for Education (GPE) through the Literacy and Numeracy Education Support Project (LANES II) for financial support that facilitated the process of translating the Kiswahili version into English and printing this guide.

Similarly, TIE would like to express its appreciation to the Ministry of Education, Science and Technology for its close supervision during the translating and printing phases.

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Introduction

This is the fifth book in a series of five Teacher's Guides on Mathematics for Primary Schools from Standard Three to Seven, prepared specifically for Standard Seven. The guide is prepared in line with the Pupil's Textbook as well as the 2020 Mathematics Syllabus for Primary Schools issued by the Ministry of Education, Science and Technology. The guide is intended to help you in developing pupils' knowledge and skills. This book consists of 13 chapters which are: Whole numbers, Addition and subtraction of whole numbers, Multiplication of whole numbers, Division of whole numbers, BODMAS, Ratios, Exponents and square roots of numbers, Fractions and Decimals. Others are Algebra, Speed, Pythagoras theorem, Business arithmetic, and Statistics.

The guide includes pupil's activities, learning, and teaching resources as well as steps to be followed when teaching. You are advised to use the real environment as well as improvised teaching and learning materials so as to enable pupils to develop the needed competences. In addition, the guide provides answers for each exercise in the Pupil's Book. However, you are advised to create, develop, and use additional exercises according to your pupils needs.

The Pupil's Book includes projects, figures, practical activities, and exercises that facilitate learning. You are required to encourage pupils to do all activities suggested and do all the exercises in their textbook and assignments you provide them. Allow them to attempt assignments individually and in groups. It is our hope that you will encourage pupils to participate effectively according to your instructions. This will enable them to develop the intended competencies.

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Chapter One

Whole numbers

Introduction

The basis of learning whole numbers is the fact that they are important in daily life. The amount of money we spend, the number of days we attend school, and the distance we travel are some of our experiences that need the use of whole numbers. In Standard Six, the pupil learnt counting, identifying place values, reading, and writing whole numbers not exceeding 10 000 000. In this chapter, they will continue to learn counting, place values of digits, reading, and writing whole numbers not exceeding 1 000 000 000. The competencies gained will help the pupil to apply the concept of whole numbers in daily life such as measurements, money transactions, and business.

Pupil's activities

(a) Counting whole numbers not exceeding 1 000 000 000 in groups

(b) Reading numbers not exceeding 1 000 000 000

(c) Writing numbers not exceeding 1 000 000 000 in numerals

(d) Writing numbers not exceeding 1 000 000 000 in words

(e) Identifying place values of digits in numbers not exceeding 1 000 000 000

Teaching and learning resources

Number cards, abacus, number basin, counters, Tanzanian specimen banknotes of 10 000 shillings, as well as a chart of numbers written in numerals and in words

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1.1 Revision

Activity
Identifying, counting, reading, and writing correctly, numbers not exceeding 10 000 000.

Teaching materials
Number cards, Tanzanian specimen banknotes, chart of numbers, and abacus

Teaching steps
(i) Guide the pupils to identify, count, read, and write numbers not exceeding 10 000 000.
(ii) Instruct the pupils to:
- Write place values of digits in numbers.
- Attempt Exercise 1.

Answers to Exercise 1
1. (a) Four million nine hundred ninety thousand one hundred and twelve
   (b) Nine million nine hundred fifty-two thousand and sixty-seven
   (c) Two million one hundred thirty-eight thousand and seven
   (d) Nine million two hundred fifteen thousand three hundred and ten
   (e) One million three hundred twenty-seven thousand six hundred and eighty-nine

2. (a) 8 160 145
   (b) 5 480 822
   (c) 7 900 000
   (d) 6 770 511
   (e) 3 230 258

3. (a) Hundred thousands
   (b) Millions
   (c) Ones
   (d) Hundreds
   (e) Thousands

4. (a) 2 465 471
   (b) 1 088 015
   (c) 6 370 568
   (d) 9 859 701
   (e) 4 072 524

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5. (a) 4 000 000 + 800 000 + 30 000 + 6 000 + 700 + 10 + 2
   (b) 2 000 000 + 300 000 + 70 000 + 4 000 + 900 + 80 + 6
   (c) 9 000 000 + 500 000 + 0 + 0 + 800 + 20 + 1
   (d) 8 000 000 + 800 000 + 10 000 + 2 000 + 0 + 90 + 3
   (e) 7 000 000 + 0 + 0 + 9 000 + 200 + 80 + 5

6. (a) 9 876 531 (b) 1 356 789

7. (a) 4 183 763 (b) 4 183 763 (c) 5 407 132
   (d) 3 718 456 (e) 4 183 763

8. (a) 5 677 890, 5 677 892, 5 677 894, 5 677 896, 5 677 898, 5 677 900
   (b) 6 600 600, 6 600 700, 6 600 800, 6 600 900, 6 601 000, 6 601 100
   (c) 4 900 000, 4 800 000, 4 700 000, 4 600 000, 4 500 000, 4 400 000
   (d) 3 333 485, 3 333 480, 3 333 475, 3 333 470, 3 333 465, 3 333 460
   (e) 7 920 000, 7 930 000, 7 940 000, 7 950 000, 7 960 000, 7 970 000

9. 5 700 000, 5 750 000, 5 800 000, 5 850 000, 5 900 000, 5 950 000, 6 000 000

10. (a) 8 410 139 (b) 5 603 415 (c) 3 745 241
    (d) 7 514 790 (e) 1 005 072

1.2 Counting in groups

Activity

Counting whole numbers up to 1 000 000 000 using groups of one hundred million objects.

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Teaching and learning materials

Tanzanian specimen banknotes, abacus, number basin, and a chart of numbers

Teaching steps

(i) Instruct the pupils to sit in groups depending on the class size, then guide them to:

- Count objects using Activities 1 and 2.
- Collect objects in groups that represent whole numbers.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. Ten
2. Sixty
3. Six
4. Four
5. Three
6. Ten
7. (a) 300 000 000
   (b) 200 000 000
   (c) 600 000 000
   (d) 400 000 000
   (e) 500 000 000
8.

5	6	8	2	0	4	3	9	1

1.3 Place values and total values of digits in numbers not exceeding 1 000 000 000

Activity

Writing place values of digits in numbers not exceeding 1 000 000 000.

Teaching and learning materials

Tanzanian specimen banknotes of 10 000 shillings, chart of numbers and number basin

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Teaching steps

(i) In carrying out Activity 3, guide the pupils to use the following instructions:

- Prepare ten number cards. One of the cards should be marked 1 and the rest of the cards should be marked 0.
- Ten pupils should stand in a line in front of the class facing other pupils.
- One of the ten pupils should hold the card marked 1 and each of the other nine pupils should hold cards marked 0.
- The pupil holding the card marked 1 should stand from the right and the pupils holding the cards marked 0 should stand to the left next to the first pupil.
- Let the pupil with the card marked 1 show the card and say, **"I am number one, I am in ones place, and thus my total value is one (1)"**.
- The pupil with the card marked 1 should exchange position with the first pupil on his or her left holding a card marked 0. The pupil with the card marked 1 should show his or her card and then say, **"I am a number one, I am in tens place, and thus my total value is ten (10)"**.
- The pupil with the card marked 1 should continue exchanging positions until he or she finishes all the pupils in the line. The pupil will reach a total value of one billion.

(ii) Guide the pupils to indicate the total value of digits in a number using Example 1 up to 4.

(iii) Guide the pupils to:

- Identify and write the place values of digits in a number using Example 1 up to 4.
- Attempt Exercise 3.

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Answers to Exercise 3

1. Bolded digits show the answers in the blank spaces.

Number	Place value of a digit									
	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
230 821 834		2	**3**	0	**8**	2	**1**	8	**3**	4
45 903 475			**4**	**5**	9	**0**	3	**4**	7	5
154 368 210		1	**5**	4	**3**	6	8	**2**	1	**0**
264 105 275		**2**	**6**	4	**1**	0	**5**	2	**7**	5
783 796 534		**7**	8	**3**	7	**9**	6	**5**	3	**4**
22 536 907			**2**	2	**5**	3	**6**	**9**	0	7
63 731 425			**6**	**3**	7	**3**	1	4	2	**5**
956 200 512		9	**5**	6	**2**	0	**0**	5	1	2
999 999 999		**9**	**9**	**9**	9	**9**	**9**	9	9	**9**
1 000 000 000	**1**	**0**	**0**	0	**0**	0	**0**	0	**0**	0

2. (a) 900 000 000 + 70 000 000 + 8 000 000 + 200 000 + 0 + 3 000 + 300 + 20 + 2

   (b) 200 000 000 + 30 000 000 + 1 000 000 + 300 000 + 70 000 + 8 000 + 600 + 80 + 0

   (c) 400 000 000 + 50 000 000 + 7 000 000 + 100 000 + 0 + 5 000 + 200 + 70 + 5

   (d) 800 000 000 + 50 000 000 + 8 000 000 + 500 000 + 40 000 + 6 000 + 100 + 20 + 4

   (e) 200 000 000 + 60 000 000 + 7 000 000 + 500 000 + 30 000 + 6 000 + 900 + 0 + 7

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3. (a) Hundred thousands
   (b) Ten millions
   (c) Millions
   (d) Hundred millions
   (e) Hundreds

4. (a) 7 000 000
   (b) 70 000 000
   (c) 10 000
   (d) 200 000 000
   (e) 400 000

5. The following are the answers for the digits represented by the counters in the abacus

3	0	3	5	4	6	1	1	7

6. The following are the answers for the digits represented by the counters in the abacus

2	1	3	4	4	6	0	0	5

1.4 Reading and writing numbers not exceeding one billion (1 000 000 000)

(a) Reading numbers not exceeding one billion (1 000 000 000)

Activity
Reading numbers based on total values of digits.

Teaching and learning materials
Number cards and chart of numbers written in numerals and in words

Teaching steps
(i) Prepare number cards with values from 10 000 000 to 1 000 000 000
(ii) Guide the pupils to:
- Sit in groups and compete reading numbers appearing on the number cards.
- Read aloud the numbers in question 1, Exercise 4.

(iii) Instruct the pupils to attempt question 2 and 3 in Exercise 4.

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Answers to Exercise 4

1. The pupils to read aloud all numbers in Question 1.

2.		Number	How to read the number
	(a)	233 843 564	Two hundred thirty-three million eight hundred forty-three thousand five hundred and sixty-four
	(b)	62 402 400	Sixty-two million four hundred two thousand and four hundred
	(c)	76 666 666	Seventy-six million six hundred sixty-six thousand six hundred and sixty-six
	(d)	978 457 813	Nine hundred seventy-eight million four hundred fifty-seven thousand eight hundred and thirteen
	(e)	102 000 000	One hundred and two million

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3. (a) 213 536 112

(b) Two hundred thirteen million five hundred thirty-six thousand one hundred and twelve

(c) Two hundred thirteen million five hundred thirty-six thousand one hundred and twelve

(b) Writing whole numbers not exceeding one billion (1 000 000 000) in numerals and in words

Activity

Writing numbers by considering the total values of digits from left towards right.

Teaching and learning materials

Abacus, number cards, chart of numbers written in numerals and in words, and number basin

Teaching steps

(i) Guide the pupils to sit in groups and compete writing whole numbers in numerals and in words.

(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. (a) 3 5 2 0 1 4 0 6 1

(b) 352 014 061

(c) Three hundred fifty-two million fourteen thousand and sixty-one

2. (a) Nineteen million three hundred forty-two thousand and fifty-seven

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(b) One hundred twenty-three million two hundred fifty-six thousand and eighty

(c) Three hundred thirty-three million four hundred thirty-seven thousand

(d) Five hundred sixty-two million eight hundred seventy thousand and seventy-four

(e) One billion

3. (a) 820 990 570
   (b) 45 879 500
   (c) 921 124 244
   (d) 77 674 885
   (e) 78 000 646

4. (a) Hundred thousands
   (b) Thousands
   (c) Ten thousands
   (d) Millions
   (e) Hundreds

5. (a) 600 000
   (b) 6 000
   (c) 60 000
   (d) 6 000 000
   (e) 600

6. (a) 50 000 000 + 5 000 000 + 300 000 + 0 + 1 000 + 100 + 0 + 6

(b) 200 000 000 + 50 000 000 + 7 000 000 + 400 000 + 80 000 + 6 000 + 100 + 20 + 0

(c) 500 000 000 + 60 000 000 + 1 000 000 + 0 + 70 000 + 4 000 + 500 + 0 + 8

(d) 40 000 000 + 8 000 000 + 0 + 50 000 + 1000 + 900 + 0 + 0

(e) 20 000 000 + 9 000 000 + 100 000 + 0 + 9 000 + 200 + 30 + 9

7. (a)

1	3	4	4	6	1	0	7

(b) 13 446 107

(c) Thirteen million four hundred forty-six thousand one hundred and seven

Teaching steps

Instruct the pupils to attempt the Revision exercise.

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Answers to Revision exercise

1. (a) 13 673 800, 14 673 800, 15 673 800, 16 673 800
   (b) 45 318 166, 46 318 166, 47 318 166, 48 318 166
   (c) 237 105 200, 238 105 200, 239 105 200, 240 105 200
   (d) 568 245 000, 569 245 000, 570 245 000, 571 245 000
   (e) 31 003 890, 32 003 890, 33 003 890, 34 003 890

2. (a) 53 500 000, 53 000 000, 52 500 000, 52 000 000
   (b) 554 219 585, 553 719 585, 553 219 585, 552 719 585
   (c) 63 862 000, 63 362 000, 62 862 000, 62 362 000
   (d) 17 165 140, 16 665 140, 16 165 140, 15 665 140
   (e) 235 703 000, 235 203 000, 234 703 000, 234 203 000

3. 30 800 000, 30 830 000, 30 860 000, 30 890 000, 30 920 000, 30 950 000, 30 980 000, 31 010 000

4. (a) 213 446 507
   (b) Two hundred thirteen million four hundred forty-six thousand five hundred and seven

5. (a) 19 153 235, 19 153 135, 19 153 035, 19 152 935
   (b) 73 000 000, 72 999 900, 72 999 800, 72 999 700
   (c) 33 995 768, 33 995 668, 33 995 568, 33 995 468
   (d) 125 813 831, 125 813 731, 125 813 631, 125 813 531
   (e) 222 183 216, 222 183 116, 222 183 016, 222 182 916

6. 20 000 000

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7.

Number	Place value of a digit								
	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
645 834 821	6	4	5	8	3	4	8	2	1
989 967 093	9	8	9	9	6	7	0	9	3
244 101 368	2	4	4	1	0	1	3	6	8
979 807				9	7	9	8	0	7
99 687 345		9	9	6	8	7	3	4	5

8. (a) 900 000 000 + 30 000 000 + 8 000 000 + 400 000 + 70 000 + 5 000 + 900 + 30 + 0

   (b) 400 000 000 + 30 000 000 + 6 000 000 + 100 000 + 30 000 + 8 000 + 100 + 0 + 2

   (c) 70 000 000 + 1 000 000 + 0 + 50 000 + 4 000 + 200 + 50 + 7

   (d) 100 000 000 + 0 + 0 + 900 000 + 60 000 + 8 000 + 500 + 40 + 3

   (e) 600 000 000 + 70 000 000 + 5 000 000 + 300 000 + 60 000 + 2 000 + 0 + 70 + 9

9. (a) 300 000 000

   (b) 500

   (c) 200 000

   (d) 1 000

   (e) 4 000 000

10. (a) Millions

    (b) Hundred millions

    (c) Ten thousands

    (d) Ten millions

    (e) Hundred millions

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11. (a) Thirty-four million seven hundred twenty-nine thousand and seventy-five

(b) Four hundred twenty million five hundred forty-eight thousand five hundred and sixty

(c) Six hundred forty-four million four hundred eighty-eight thousand three hundred and seventy-nine

(d) Seventy-five million seven hundred eighty thousand and forty-five

(e) Twenty-five million one hundred eleven thousand one hundred and eleven

12. (a) 145 214 000
(b) 300 800 000
(c) 500 000 001
(d) 619 600 066
(e) 22 010 002

13. (a) 630 543 129
(b) 87 605 432
(c) 792 180 000

14. Guide the pupils to draw the abacus based on the place value of each digit in a given number.

15. Guide the pupils to draw a number basin based on the place value of each digit in a given number.

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Chapter Two

Addition and subtraction of whole numbers

Introduction

In our daily life, we need to apply operations which involve addition and subtraction of whole numbers. These operations can be used to know the amount of money obtained in a business, number of pupils in a school, and can be used in various applications in daily life. In this chapter, the pupil will continue to learn the operations of whole numbers which involve addition and subtraction of numbers that do not exceed one billion (1 000 000 000). The competencies gained will help the pupil to apply operations of numbers in day to day life activities. For example, in business the operations are used in the buying and selling of commodities and money transactions.

Pupil's activities

(a) Adding whole numbers arranged horizontally and vertically without regrouping and by regrouping
(b) Subtracting whole numbers arranged horizontally and vertically without regrouping and by regrouping
(c) Solving word problems involving the concepts of addition and subtraction of whole numbers

Teaching and learning resources

Number cards, counters, flip charts, charts of place values of digits, abacus, counting basin, and charts of numbers

2.1 Revision

Activity

Adding whole numbers without regrouping and by regrouping, subtraction of whole numbers without regrouping and by regrouping, and solving word problems involving the concepts of addition and subtraction of whole numbers.

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Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, and counting basin

Teaching steps

(i) Guide the pupils to remember how to add whole numbers without regrouping and by regrouping, to subtract whole numbers without regrouping and by regrouping. Also, remind them to solve word problems on addition and subtraction of whole numbers.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 9 323 805
2. 5 587 176
3. 6 571 263
4. 6 854 401
5. 4 462 940
6. 7 699 594
7. 9 697 999
8. 9 906 986
9. 9 163 649
10. 1 801 098
11. 6 920 926
12. 4 440 112
13. 5 567 487
14. 2 473 265
15. 3 229 097
16. 3 178 867
17. 4 171 184
18. 4 979 978
19. 8 949 641
20. 9 986 639
21. 3 425 841 metres
22. 5 248 414 farmers
23. 3 404 799 cars
24. 2 107 476 clothes
25. 3 534 756 livestock

2.2 Addition of whole numbers

(a) Addition of whole numbers arranged horizontally and vertically without regrouping

Activity

Adding whole numbers arranged horizontally and vertically without regrouping.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

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Teaching steps

(i) Instruct the pupils to sit in groups depending on the class size, then guide them to:

- Carry out Activity 1.
- Present their answers of Activity 1 in the class.
- Add numbers arranged horizontally and vertically by using the steps illustrated in the given examples.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. 593 435 444	8. 699 676 868	15. 887 959 765
2. 794 799 566	9. 967 757 726	16. 647 934 685
3. 346 572 643	10. 779 339 522	17. 437 798 897
4. 667 534 787	11. 436 778 439	18. 989 888 666
5. 888 888 888	12. 393 999 999	19. 799 679 686
6. 774 639 522	13. 999 999 999	20. 679 978 365
7. 356 852 978	14. 897 996 987	

(b) Addition of whole numbers arranged horizontally and vertically by regrouping

Activity

Addition of whole numbers arranged horizontally and vertically by regrouping.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

Teaching steps

(i) Guide the pupils to add numbers arranged horizontally and vertically by regrouping using the steps illustrated in the examples.

(ii) Instruct the pupils to attempt Exercise 3.

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Answers to Exercise 3

1. 760 587 090
2. 737 110 669
3. 928 050 782
4. 832 470 550
5. 15 596 733
6. 1 000 000 000
7. 925 657 444
8. 896 090 318
9. 999 404 967
10. 882 666 332
11. 16 924 362
12. 678 665 895
13. 15 032 939
14. 232 401 312
15. 40 110 979
16. 866 806 280
17. 829 132 211
18. 881 991 821
19. 734 009 494
20. 991 620 821

(c) Word problems on addition

Activity

Word problems on addition of whole numbers.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

Teaching steps

(i) Use Examples 1 and 2 to guide the pupils in solving word problems on addition of whole numbers.

(ii) Instruct the pupils to attempt Exercise 4.

Answers to Exercise 4

1. 46 212 675 kilograms
2. 167 217 657 kilograms
3. 24 325 146 bricks
4. 472 172 000 shillings
5. 79 888 200 shillings
6. 9 997 798 bricks
7. 13 311 600 shillings
8. 28 048 046 fans
9. 106 306 810 kilograms
10. 22 575 835 people

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11. 60 085 062 bars
12. 80 500 000 shillings
13. 2 054 972 books
14. 5 099 260 cars
15. 3 193 775 shillings
16. 1 631 000 shillings
17. 1 396 562 shillings
18. 53 474 700 shillings
19. 121 594 225 shillings
20. 432 886 382 exercise books

2.3 Subtraction of whole numbers

(a) Subtraction of whole numbers arranged horizontally and vertically without regrouping

Activity

Subtracting whole numbers arranged horizontally and vertically without regrouping.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

Teaching steps

(i) Instruct the pupils to sit in groups depending on the class size, then guide them to do Activity 2.

(ii) Guide the pupils to:

- Present their answers of Activity 2 in the classroom.
- Subtract numbers arranged horizontally and vertically by using the steps illustrated in the examples.

(iii) Instruct the pupils to attempt Exercise 5.

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Answers to Exercise 5

1. 514 208 527
2. 414 138 227
3. 412 122 231
4. 112 005 205
5. 111 333 435
6. 152 244 021
7. 374 122 021
8. 330 230 141
9. 444 663 011
10. 2 204 259
11. 42 112 221
12. 303 320 200
13. 742 300 424
14. 128 532 645
15. 110 333 210
16. 301 333 120
17. 123 012 636
18. 333 555 555
19. 200 500 000
20. 102 208 001

(b) Subtraction of whole numbers arranged horizontally and vertically by regrouping

Activity

Subtracting whole numbers arranged horizontally and vertically by regrouping.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

Teaching steps

(i) Guide the pupils to:

- Subtract numbers arranged horizontally and vertically by regrouping using the steps illustrated in the examples.
- Discuss the reasons why subtraction of small numbers from large numbers is not sufficient and how to regroup them.

(ii) Instruct the pupils to do Exercise 6.

Answers to Exercise 6

1. 156 709 125
2. 51 201 058
3. 95 201 923
4. 52 863 661
5. 156 455 326
6. 181 506 212
7. 277 569 235
8. 289 232 300
9. 1 111 223

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10. 192 110 112
11. 65 063 155
12. 102 891 491
13. 199 890 200
14. 499 200 000
15. 869 333 801
16. 99 889 881
17. 213 915 766
18. 7 098 989
19. 118 119 420
20. 21 214 000

(c) Word problems on subtraction

Activity

Solving word problems involving the concepts of subtraction of whole numbers.

Teaching and learning materials

Number cards, counters, charts, charts of value of digits, abacus, counting basin, and charts of numbers

Teaching steps

(i) Use the steps illustrated in Examples 1 and 2 to guide the pupils to solve word problems on subtraction of whole numbers.

(ii) Instruct the pupils to attempt Exercise 7.

Answers to Exercise 7

1. 3 557 505 kilograms
2. 13 222 119 chickens
3. 9 351 700 shillings
4. 27 640 000 shillings
5. 12 105 406 dresses
6. 7 113 204 livestocks
7. 3 121 036 kilograms
8. 1 975 090 bricks
9. 3 021 122 pairs
10. 7 449 850 shillings
11. 165 562 trees
12. 764 470 shillings
13. 2 475 023 litres
14. 871 960 shillings
15. 1 114 235 shillings
16. 364 197 livestock
17. 622 934 men
18. 758 900 shillings
19. 837 188 women
20. 2 660 061 bags

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Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. 649 216 753
2. 51 201 058
3. 283 212 726
4. 922 048 217
5. 858 218 617
6. 624 116 520
7. 244 656 575
8. 502 807 025
9. 900 510 617
10. 610 792 463
11. 157 999 576
12. 429 779 356
13. 920 119 016
14. 849 378 456
15. 159 536 540
16. 286 857 863
17. 528 159 066
18. 629 619 520
19. 757 848 842
20. 118 119 420
21. 944 913 550 litres
22. 290 800 000 shillings
23. 954 531 600 shillings
24. 796 524 300 brochures
25. 238 291 329
26. 5 786 800 shillings
27. 2 902 000 shillings
28. 33 530 000 shillings
29. 2 565 500 shillings
30. 246 764 777

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Chapter Three

Multiplication of whole numbers

Introduction

We use the multiplication operation in daily life. In this chapter, the pupil will continue to learn multiplication of whole numbers with a product not exceeding one billion (1 000 000 000). The concept of multiplication can be applied when computing the amount of money earned in business, calculating the number of building materials needed, to obtain the number of pupils arranged in rows, and in various applications in everyday life. The competencies gained will help the pupil to solve real-life problems involving whole numbers, such as running a business, preparing statistical data, estimating amount of building materials, making financial transactions, and preparing budgets.

Pupil's activities

(a) Multiplying whole numbers with a product not exceeding 1 000 000 000

(b) Solving word problems on multiplication of whole numbers

Teaching and learning materials

Number cards, flip chart, a chart of place values, abacus, number basin, number chart, and counters

3.1 Revision

Activity

Multiplying whole numbers to get a product which does not exceed 10 000 000.

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Teaching and learning materials
Number cards, chart showing total values of numbers, abacus, number plate, charts of numbers, and counters

Teaching steps
(i) Guide the pupils to revise multiplication of numbers with the product not exceeding 10 000 000.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 608 095	11. 6 782 728	21. 11 005 000 shillings
2. 4 450 005	12. 3 165 876	22. 8 745 000 shillings
3. 339 815	13. 4 598 232	23. 8 450 200 shillings
4. 3 142 315	14. 5 041 912	24. 2 964 000 shillings
5. 2 663 297	15. 5 803 112	25. 10 873 250 shillings
6. 5 197 896	16. 5 488 574	26. 1 569 500 shillings
7. 1 900 600	17. 3 372 480	27. 2 700 000 shillings
8. 4 208 897	18. 3 305 792	28. 1 211 250 sticks
9. 6 581 685	19. 5 871 620	29. 9 072 000 shillings
10. 2 089 260	20. 4 709 975	30. 2 310 075 passengers

3.2 Multiplication of whole numbers with a product not exceeding 1 000 000 000

Activity
Multiplying numbers to get a product which does not exceed 1 000 000 000.

Teaching and learning materials
Number cards, chart displaying the total values of numbers, abacus, and counting basin

Teaching steps
(i) Guide the pupils to:

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- Multiply whole numbers following the Steps described in Example 1 up to 4.
- Do the activity provided.
- Present their results in the class.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. 103 914 456
2. 14 560 752
3. 475 438 512
4. 788 493 184
5. 188 047 392
6. 177 660 428
7. 227 008 888
8. 250 577 692
9. 243 639 318
10. 232 635 320
11. 150 942 468
12. 301 389 948
13. 850 481 478
14. 993 786 689
15. 820 122 935
16. 481 112 706
17. 962 768 268
18. 347 370 108
19. 536 737 278
20. 614 938 450

3.3 Word problems on multiplication

Activity

Solving word problems on multiplication of whole numbers with a product not exceeding 1 000 000 000.

Teaching and learning materials

Number basin, multiplication chart, abacus, flip chart, marker pen, ruler, and scissors

Teaching steps

(i) Guide the pupils to gain competencies of solving word problems on multiplication of whole numbers using the steps shown in Examples 1 and 2.

(ii) Instruct the pupils to attempt Exercise 3.

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Answers to Exercise 3

1. 898 595 072 litres
2. 17 228 250 shillings
3. 64 762 950 shillings
4. 30 323 750 grams
5. 23 829 435 metres
6. 18 645 000 shillings
7. 90 240 000 shillings
8. 134 820 600 shillings
9. 34 462 500 shillings
10. 541 792 500 shillings
11. 88 022 950 shillings
12. 10 489 000 shillings
13. 851 800 050 tree seedlings
14. 718 162 200 shillings
15. 14 712 500 shillings
16. 16 257 360 litres
17. 16 822 500 tubes
18. 23 479 001 kilograms
19. 100 826 000 shillings
20. 436 440 144

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. 525 842 016
2. 852 694 392
3. 127 415 392
4. 723 722 272
5. 147 074 334
6. 602 155 278
7. 9 773 792
8. 963 331 392
9. 631 466 672
10. 136 154 043
11. 359 594 156
12. 807 568 272
13. 212 172 069
14. 449 417 799
15. 291 405 178
16. 555 600 658
17. 779 182 158
18. 137 952 918
19. 806 601 348
20. 153 931 248
21. 110 074 815
22. 800 201 108
23. 880 166 694
24. 832 198 356
25. 493 394 226
26. 544 494 126
27. 27 183 750 eggs
28. 56 970 000 shillings
29. 11 562 000 kilograms
30. 43 688 352 m^2

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Chapter Four

Division of whole numbers

Introduction

In our daily life, we need to apply the concept of division of numbers. In this chapter, the pupil will continue to learn division of numbers with a dividend not exceeding one billion (1 000 000 000) by a divisor not exceeding one hundred thousand (100 000). The competencies gained will help the pupil in making different decisions. For example, sharing profits, financial income, and duties. Moreover, the knowledge on division will help the pupil to plan the expenditures of what they earn based on one's needs and budget.

Pupil's activities

(a) Dividing numbers with a dividend not exceeding 1 000 000 000

(b) Solving word problems on division of whole numbers

Teaching and learning resources

Number cards, flip chart, chart of total values of digits, abacus, number basin, number charts, and counters

4.1 Revision

Activity

Dividing whole numbers with a dividend not exceeding 10 000 000.

Teaching and learning materials

Number cards, flip chart, a chart showing the total values of digits, abacus, and number basin

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Teaching steps

(i) Guide the pupils to do revision on dividing numbers with a dividend not exceeding 10 000 000.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 6 609 remainder 97
2. 380 remainder 771
3. 375
4. 125
5. 22 093
6. 8 903 remainder 2
7. 7 remainder 3 500
8. 234 remainder 1 666
9. 68
10. 6
11. 450
12. 354
13. 25 714
14. 452
15. 55 775
16. 53 247
17. 45 crates
18. 453 bags
19. 2150 shillings
20. 8 trips

4.2 Dividing whole numbers with a dividend not exceeding 1 000 000 000

Activity

Dividing whole numbers with a dividend not exceeding 1 000 000 000.

Teaching and learning materials

Number basin, multiplication chart, abacus, flip chart, marker pens, ruler, and scissors

Teaching steps

(i) Guide the pupils to divide whole numbers with a dividend not exceeding 1 000 000 000 using Examples 1, 2, and 3.

(ii) Instruct the pupils to do Exercise 2.

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Answers to Exercise 2

1. 47 078
2. 2 001 004
3. 261 863
4. 2 001 002
5. 12 281 remainder 1 670
6. 2 023 387
7. 18 567
8. 41 714
9. 1 953 649
10. 3 215 982
11. 377 272 remainder 60
12. 28 283
13. 143 062
14. 535 682
15. 81 204
16. 35 428
17. 133 443 remainder 30
18. 54 995
19. 706 375
20. 98 389

4.3 Word problems on division

Activity

Solving word problems on division of numbers with a dividend not exceeding 1 000 000 000.

Teaching and learning materials

Number basin, multiplication chart, abacus, flip chart, marker pens, ruler, and scissors

Teaching steps

(i) Guide the pupils to solve word problems on dividing whole numbers with a dividend not exceeding 1 000 000 000 using the steps described in Examples 1 and 2.

(ii) Instruct the pupils to attempt Exercise 3.

Answers to Exercise 3

1. 1 845 250 shillings
2. 25 850 shillings
3. 1 384 307 shillings
4. 8 888 square metres
5. 55 972 tablets
6. 86 712 litres

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7. 12 293 260 shillings
8. 93 401 bricks, remainder 89
9. 1 600 kilograms
10. 2 250 shillings
11. 55 588 000 shillings
12. 298 sacks, remainder 17 400
13. 18 178 iron sheets
14. 39 950 shillings
15. 178 043 bottles
16. 733 276 metres
17. 980 690 tons
18. 997 201 shillings
19. 2 180 rows
20. 2 821 303 shillings

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. 55 469 remainder 5 764
2. 717 306
3. 55 555
4. 367 870
5. 57 050 remainder 1 600
6. 1 230 602
7. 711 756
8. 355 599 remainder 1 500
9. 270 023
10. 6 474 245
11. 88 494
12. 132 080
13. 375 237
14. 107 841
15. 411 715 remainder 696
16. 19 877
17. 26 335
18. 133 795
19. 7 005 088
20. 72 079 remainder 1 850
21. 4 721 657
22. 6 530
23. 1 339 357
24. 1 211 818
25. 7 662 344
26. 7 282 727
27. 119 047 tablets
28. 33 468 750 shillings
29. 91 941 vehicles
30. 96 828 dairy cattle

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Chapter Five

BODMAS

Introduction

In this chapter, the pupil will learn the BODMAS rule which is used to evaluate and simplify expressions. The competencies gained will help the pupil to obtain the right method for simplifying mathematical expressions that involve numbers and operations such as, addition, subtraction, multiplication, and division. This will also help the pupil to solve mathematical expressions involving numerals and operations.

Pupil's activities

(a) Identifying mathematical expressions with two operations
(b) Identifying mathematical expressions with three operations
(c) Identifying mathematical expressions with four operations
(d) Identifying mathematical expressions with operations and brackets
(e) Identifying mathematical expressions with operations, brackets and exponents

Teaching and learning resources

Mathematical cards for addition, subtraction, multiplication, and division

5.1 Mathematical expressions involving two operations

Activity

Calculating expressions involving two mathematical operations.

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Teaching and learning materials
Mathematical cards for addition, subtraction, multiplication, and division

Teaching steps
(i) Guide the pupils to find the value of expressions with two mathematical operations by using the given examples.
(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 34	6. $\frac{7}{60}$	11. 2	16. $\frac{1}{40}$
2. 7	7. 9	12. 7	17. $\frac{71}{210}$
3. 22	8. $70\frac{9}{10}$	13. 90	18. 6.65
4. 862	9. 24	14. 14	19. 280.7
5. 146	10. 30.4	15. 504	20. 220.48

5.2 Mathematical expressions involving three operations

Activity
Finding the value of expressions involving three mathematical operations.

Teaching and learning materials
Number cards

Teaching steps
(i) Guide the pupils to find the values of mathematical operations with three operations using the BODMAS rule.
(ii) Instruct the pupils to do Exercise 2.

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Answers to Exercise 2

1. 29	6. $\frac{191}{280}$	11. 12.4	16. 15.35 or $15\frac{7}{20}$
2. 7.36	7. $1\frac{15}{16}$	12. 18	17. $1\frac{51}{64}$
3. 393	8. 28	13. 7.411	18. 8.04
4. 5	9. 14.8	14. $\frac{2}{45}$	19. 126.06
5. $1\frac{17}{32}$	10. 25.794	15. 40	20. $32\frac{1}{4}$

5.3 Mathematical expressions involving four operations

Activity
Calculating expressions involving four mathematical operations.

Teaching and learning materials
Mathematical operation charts for addition, subtraction, multiplication, and division of whole numbers

Teaching steps
(i) Guide the pupils to:
- Simplify expressions involving four mathematical operations.
- Discuss the steps in Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 3.

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Answers to Exercise 3

1. 23	6. $25\frac{7}{40}$	11. 3	16. 146.56
2. $144\frac{19}{30}$	7. $18\frac{1}{4}$	12. 10	17. 45.7
3. 14.6	8. 67.998	13. – 11.5	18. $2\frac{2}{33}$
4. $499\frac{1093}{1750}$	9. 0	14. 1 870	19. $5\frac{1}{15}$
5. $\frac{-17}{126}$	10. 48.6683	15. 26.361	20. 1 765.9

5.4 Mathematical expressions involving operations and brackets

Activity

Simplifying and evaluating expressions involving mathematical operations and brackets.

Teaching and learning materials

Number cards

Teaching steps

(i) Guide the pupils to discuss the steps of simplifying and evaluating expressions involving mathematical operations and brackets by using example 1 up to 3.

(ii) Instruct the pupils to perform the given activity by following the steps identified. Also guide them to:

- Visit other groups to learn about the expressions which they have used.
- Discuss the challenges they have encountered when doing this activity.

(iii) Instruct the pupils to do Exercise 4.

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Answers to Exercise 4

1. 7	6. 50	11. 371.5	16. 23.17
2. 341	7. 38	12. $38\frac{7}{48}$	17. 170.31
3. 10.3	8. 85	13. $156\frac{1}{2}$	18. 0.36
4. 30	9. 795	14. $\frac{18}{25}$	19. $131\frac{5}{8}$
5. 41	10. 617	15. $20\frac{3}{10}$	20. $10\frac{11}{56}$

5.5 Mathematical expressions involving operations, brackets and exponents (powers).

Activity

Simplifying and evaluating mathematical expressions involving operations, brackets, and exponents

Teaching and learning materials

Number cards

Teaching steps

(i) Guide the pupils to:

- Discuss how to simplify and evaluate expressions involving exponents.
- Simplify mathematical expressions involving operations, brackets and exponents in a number.

(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. 31	3. 11	5. 75	7. 111
2. 9	4. 40	6. 800	8. 124

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9. 125 12. 4.83 15. $182\frac{1}{4}$ 18. 30.57

10. 18 13. $129\frac{7}{16}$ 16. 1 263 19. $17\frac{3}{4}$

11. $199\frac{37}{49}$ 14. $12\frac{16}{25}$ 17. 7.8 20. 12.4224

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. (a) 29 (b) 14 (c) 2 (d) 669.1 (e) $-11\frac{11}{15}$

(f) 324 (g) 2 956 (h) 40 (i) 61 (j) $1\frac{1}{60}$

2. (a) $4+(4\times 3)=16$ (f) $(16.75+3.25)-(6.75-3.17)=16.42$

(b) $(7-6)+11=12$ (g) $4\times 6-4=20$

(c) $2\times 9+4=22$ (h) $\left(14\frac{2}{7}+\frac{5}{7}\right)+60-11=64$

(d) $(2+2)\times 4=16$ (i) $(2.5+1.2)-(2.6-0.6)=1.7$

(e) $4-(3\times 3)=-5$ (j) $\frac{1}{4}+\left(\frac{1}{3}-\frac{1}{24}\right)=\frac{13}{24}$

3. (a) 84 (b) 6 (c) 129.44 (d) 52.97 (e) $3\frac{3}{16}$

(f) 54 (g) $12\frac{7}{8}$ (h) $15\frac{5}{12}$ (i) 20 (j) 21.79

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Chapter Six

Ratios

Introduction

The ratio of two or more quantities is the relationship of those quantities by division. In this chapter, the pupil will learn how to identify and simplify the ratio of two or more quantities and solve word problems on ratios. The ratio of two or more quantities can be written using various ways including, colons (:) placed between the numbers which are related. The competencies gained will help the pupils to relate the quantities of whole objects or part of them in daily life.

Pupil's activities

(a) Writing and calculating the ratio of two or more quantities
(b) Calculating simple ratios and mixed ratios

Teaching and learning resources

Manila, chalk, various objects showing ratios, such as pens and pencils

6.1 (a) Ratio of two quantities

Activity

Writing the ratio of two quantities.

Teaching and learning materials

Flip chart and marker pen

Teaching steps

(i) Guide the pupils to do the following in groups:
- Write the ratio of two numbers or quantities.

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- Discuss the procedure involved when writing the ratio of two numbers using Examples 1 and 2.
- Discuss how to simplify the ratio of two numbers using Example 3 up to 5.
- Discuss how to use the equivalent ratio table using Example 1 and 2.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. (a) 3 : 7 (b) 5 : 11 (c) 7 : 9 (d) 13 : 19 (e) 4 : 13

2. (a) 9 : 10 (b) 6 : 13 (c) 11 : 13 (d) 7 : 19

3. (a) 13 : 6 (b) 4 : 5 (c) 3 : 4 (d) 3 : 5 (e) 7 : 4

4. (a) x = 39 (b) x = 19 (c) x = 3 (d) x = 20

5.

18	**24**	30	42	**60**
9	12	15	**21**	30

6. a = 26, b = 130, c = 66 and d = 78

6.1 (b) Finding the ratio of two quantities

Activity
Calculating the ratio involving two quantities.

Teaching and learning materials
Grains of beans and maize, flip chart, and marker pen

Note: You can use other objects found in the local environment.

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Teaching steps

(i) In carrying out the given activity, guide the pupils to do the following in groups:

- Present responses to this activity before the class.
- Discuss how to find the ratio of two objects following Step 1 up to 4.
- Discuss how to find the ratio of two objects by using Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. N = 525
2. J = 2
3. D = 84
4. T = 144
5. (a) 288 kilograms
   (b) 224 kilograms
6. 3:4
7. Getrude got 90 mangoes and Hassan got 210 mangoes
8. 3 000 sacks
9. 312 doctors
10. 400 hectares of rice, 500 hectares of maize
11. 800 sheep
12. 38 metres by 57 metres
13. (a) L = 288 (b) S = 338
14. 36 periods
15. 750 books for Kiswahili department and 1 050 books for English department
16. (a) 60 (b) 55
17. 30
18. (a) 65 824 cows (b) 32 164 cows
19. 8 500 shillings
20. 8 balls

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6.2 Ratio of three quantities

Teaching and learning materials

Three objects like bean grains, maize grains, and orange seeds

Teaching steps

(i) Guide the pupils to:

- Discuss how to find the ratio of three quantities by considering step 1 up to 3.
- Simplify and find the ratio of three quantities
- Discuss how to find the ratio of three quantities using Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 3.

Answers to Exercise 3

1. (a) 5:6:8 (b) 4:5:8 (c) 4:5:8
   (d) 4:5:8 (e) 3:5:8 (f) 4:8:15
2. (a) Y = 384 (b) H = 378 (c) M = 192 (d) W = 108
3. 935 kg to 561 kg to 374 kg
4. 45° to 63° to 72°
5. 242 200 sacks to 276 800 sacks to 346 000 sacks
6. 16 000 litres, 12 000 litres, 36 000 litres
7. 360, 120, 480
8. Mercy 72 seedlings, Juma 36 seedlings
9. Judith 90, Sasha 60, Jerome 150
10. Mariam 40, Deusi 160, Piala 80
11. y = 39
12. (a) 400 tomatoes (b) 150 eggplants

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6.3 Simple ratios

Activity
Finding the simple ratio.

Teaching and learning materials
Oranges, flip chart, and marker pen

Teaching steps
(i) Guide the pupils to do the following in groups:
- Discuss how to calculate the simple ratio by considering Steps 1 and 2.
- Discuss how to calculate the simple ratio of two quantities by using Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 4.

Answers to Exercise 4

1. 36 litres
2. 72 kilometres
3. 450 sacks
4. 192 000 shillings
5. 567 kilometres
6. 14 400 shillings
7. 6 000 kilograms
8. 296 000 shillings
9. 1 680 kilograms
10. 140 classes
11. (a) 2 850 bricks
    (b) 458 bags
12. (a) 228 000 shillings
    (b) 156 litres
13. 476 000 shillings
14. 52 200 shillings
15. 24 000 shillings
16. 120 000 shillings
17. 144 exercise books
18. 230 400 shillings
19. 475 750 shillings
20. 11.5 hours or 11 hours and 30 minutes

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6.4 Mixed ratios

Activity
Finding mixed ratios.

Teaching steps
(i) Guide the pupils to discuss how to calculate mixed ratio of the mixture of quantities using Examples 1 and 2.
(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. 4 days
2. 5 days
3. 2 160 000 shillings
4. 80 minutes
5. 30 boxes
6. 48 days
7. 12 days
8. 36 days
9. 8 days
10. 4 days
11. 10 people
12. 12 000 square metres
13. 125 sacks
14. (a) 96 years
    (b) 24 years
15. 60 years
16. 18 minutes
17. 18 days
18. 2 700 000 shillings
19. (a) 25 days
    (b) 50 pupils
20. 90 days

Teaching steps
Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. 3 : 4
2. 1 : 3
3. 2 : 15
4. 16 : 7
5. 7 : 10
6. 6 : 7 : 12
7. 15 : 19 : 25
8. 2 : 3 : 12
9. 16 : 40 : 49
10. S = 657
11. E = 288

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12. 90 000 metres, 120 000 metres and 150 000 metres
13. G = 48
14. (a) 54 years, 40 years, 32 years (b) 27 : 20 : 16
15. 441 hectares, 504 hectares
16. 5 760 grams
17. Abdallah 60 000 shillings to 20 000 shillings
18. 325 boys, 195 girls
19. 54°, 60°, 66°
20. 50 000 shillings
21. 420 kilograms
22. 478 500 shillings
23. 162 000 shillings
24. 180 sacks
25. 15 days
26. 12 days
27. 12 800 000 shillings
28. m = 22, n = 12, p = 44, q = 55, r = 24
29. s = 5, t = 14, u = 15, v = 35, w = 30
30. K = 34, L = 51, M = 12, N = 85, Q = 18

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Chapter Seven

Exponents and square roots of numbers

Introduction

In Standard Five, the pupil learnt to calculate square numbers, squares of numbers, and square root of a square number. In this chapter, the pupil will continue to learn operations on exponents, simplification of exponential expressions, and finding square roots of square numbers that do not exceed six digits. The competencies gained will help the pupils to write large numbers and count living organisms such as bacteria and viruses whose population increases exponentially.

Pupil's activities

(a) Finding exponents and square roots of numbers
(b) Multiplying exponential numbers
(c) Dividing exponential numbers
(d) Simplifying exponential expressions
(e) Finding a square of a number with not more than four digits
(f) Finding the square root of a number with not more than six digits

Teaching and learning resources

Multiplication chart, number cards, and marker pen

Activity

Finding exponents and square roots of square numbers.

Teaching and learning materials

Multiplication chart and marker pen

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Teaching steps

(i) Guide the pupils to:

- Learn the concept of exponents and square roots of the square numbers in real life situation.
- Discuss and relate the concepts of exponents and square roots of square numbers using the given examples.
- Discuss the steps used in the examples.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. (a) 4^5 (b) $\left(\frac{2}{3}\right)^5$ (c) 9^7 (d) 3^9 (e) 8^5

2. (a) $13 \times 13 \times 13 \times 13$
   (b) $\left(\frac{11}{12}\right) \times \left(\frac{11}{12}\right)$
   (c) $(-7) \times (-7) \times (-7) \times (-7)$
   (d) $17 \times 17 \times 17$
   (e) $\left(-\frac{1}{9}\right) \times \left(-\frac{1}{9}\right) \times \left(-\frac{1}{9}\right)$
   (f) $3 \times 3 \times 3$

3. (a) 16 (b) $\frac{9}{16}$ (c) -125

4. (a) 2^9 (b) $2 \times 3^2 \times 19$ (c) 2×5^3
   (d) 5^5 (e) 3^6 (f) $3^2 \times 5^2$

7.1 Multiplication of exponential numbers

Activity

Multiplying exponential numbers.

Teaching and learning materials

Multiplication chart, marker pen, and number cards

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Teaching steps

(i) Guide the pupils to:

- Multiply exponential numbers with the same base.
- Use Examples 1 and 2 to discuss how to multiply exponential numbers.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. 3^{14}
2. 6^{25}
3. a^5
4. 7^{11}
5. $\left(\frac{4}{9}\right)^{14}$
6. 11^8
7. $(-5)^{11}$
8. 6^6
9. $\left(\frac{-5}{11}\right)^8$
10. 7^{12}
11. $\left(\frac{-5}{13}\right)^{11}$
12. m^{10}
13. 2^{17}
14. 5^{18}
15. p^{29}
16. 40^3
17. $\left(\frac{12}{13}\right)^{20}$
18. $\left(\frac{-13}{17}\right)^{17}$
19. 5^{19}
20. 4^{27}

7.2 Division of exponential numbers

Activity

Dividing exponential numbers.

Teaching and learning materials

Multiplication chart, marker pen, and integer cards

Teaching steps

(i) Guide the pupils to:

- Divide exponential numbers.
- Discuss the steps used in dividing exponential numbers.
- Use Examples 1, 2 and 3 to divide exponential numbers.

(ii) Instruct the pupils to attempt Exercise 3.

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Answers to Exercise 3

1. (a) 7^3 (b) 5^2 (c) 15^3 (d) 3^2 (e) 4^{18}
   (f) 100^6 (g) 17^{13} (h) 8^{12} (i) 9^1 or 9 (j) 3^4

2. (a) $3p^2q$ (b) $2a^2b^2 + 1$ (c) $2m^3n - 1$
   (d) $9y^4w^3z^6$ (e) $8c^2e^4 - 2$ or $2\left(4c^2e^4 - 1\right)$ (f) $4d^4b^4 + 1$

3. 8 4. 2 5. 10 6. $\frac{40}{3}$ or $13\frac{1}{3}$

7. 136 8. $\frac{4112}{3}$ 9. $\frac{-1}{32}$ 10. $56020\frac{8}{15}$

7.3 Square root of a square number

Activity

Finding the square roots of square numbers with not more than three digits.

Teaching and learning materials

Multiplication chart, marker pen, and integer cards

Teaching steps

(i) Guide the pupils to:

- Compute the square roots of numbers with not more than three digits.
- Follow the steps in computing the square roots of square numbers by using the method of grouping digits, tree diagram and prime factorisation using Examples 1, 2 and 3.

(ii) Instruct the pupils to attempt Exercise 4.

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Answers to Exercise 4

1. (a) 14 (b) 17 (c) 20 (d) 30 (e) 24
   (f) 23 (g) 22 (h) 21

2. (a) 19 (b) 28 (c) 12 (d) 29 (e) 18
   (f) 10 (g) 13 (h) 25

3. (a) 26 (b) 27 (c) 11 (d) 29

7.4 Finding square root of square numbers with not more than six digits

Activity

Calculating the square roots of square numbers with not more than six digits.

Teaching and learning materials

Multiplication chart, marker pen, and number cards

Teaching steps

(i) Guide the pupils to discuss how to compute a square root of a square number with not more than six digits using Examples 1, 2 and 3.

(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. (a) 99 (b) 35 (c) 196 (d) 234 (e) 264
   (f) 654 (g) 982 (h) 324

2. (a) 96 (b) 52 (c) 310 (d) 284 (e) 927
   (f) 896

3. (a) 37 (b) 88 (c) 285 (d) 196 (e) 864
   (f) 678

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Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. (a) 128 (b) 729 (c) 121 (d) 625

2. (a) 6^4 (b) t^2 (c) b^4 (d) $5^2 \times 7^3$
   (e) $a^3 \times c^4 \times d$

3. (a) $2^3 \times 3^4$ (b) $3^4 \times 5$ (c) $2^2 \times 3^3 \times 5$ (d) $2^4 \times 3^2 \times 5^2$

4. (a) 4^{13} (b) 15^0 or 1 (c) 7^{17} (d) 13^{20} (e) 3^{11}
   (f) 4^8 (g) $\left(\frac{3}{5}\right)^4$ (h) 23^2

5. (a) xy^2z^2 (b) $2x^2yz$ (c) $4a^2b^2 - 2$

6. (a) 32 (b) 7 (c) 30

7. (a) 23 (b) 80 (c) 282 (d) 999 (e) 60
   (f) 684

8. (a) 170 (b) 123 (c) 321

9. (a) 44 (b) 82 (c) 235 (d) 522

10. 89

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Chapter Eight

Fractions and decimals

Introduction

In Standard Six, the pupil learnt addition, subtraction, and multiplication of fractions and decimals. Also, the pupil learnt simplification of fractions, changing fractions into percentages, percentages into decimals, and decimals into percentages. In this chapter, the pupil will learn to divide whole numbers by fractions, fractions by whole numbers, fractions by fractions, and fractions by decimals. The competencies gained in this chapter will help the pupil to apply the concept of ratio of numbers, distribution of objects, and make comparison of objects in daily life.

Pupil's activities

(a) Dividing whole numbers by fractions
(b) Dividing fractions by whole numbers
(c) Dividing fractions by fractions
(d) Dividing fractions by decimals
(e) Solving word problems on division of fractions and decimals

Teaching and learning resources

Number cards, ruler, pair of scissors, marker pen, real objects like oranges and others

8.1 Revision

Activity

Preparing examples on addition, subtraction and multiplication of fractions and decimals.

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Teaching and learning materials
Number cards, ruler, and marker pen

Teaching steps

(i) Guide the pupils to:

- Add, subtract and multiply fractions.
- Add, subtract and multiply decimals.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 1	8. $12\frac{3}{8}$	15. 2.9	22. $\frac{1}{36}$
2. $\frac{11}{20}$	9. $4\frac{7}{45}$	16. 4.07	23. $1\frac{4}{7}$
3. $5\frac{9}{20}$	10. $4\frac{19}{24}$	17. 16.27	24. $16\frac{5}{16}$
4. $30\frac{6}{35}$	11. 3.42	18. 331.15	25. 78
5. $3\frac{5}{6}$	12. 11.365	19. 128.32	26. 111.93
6. $\frac{9}{40}$	13. 106.877	20. 20.895	27. 100.7
7. $8\frac{83}{84}$	14. 56.57	21. $\frac{1}{4}$	28. 0.2475

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29. 0.0624 32. 6.15 kilograms 35. $428\frac{3}{4}$ litres 38. 4.46 metres

30. 16.56 33. $8\frac{1}{6}$ metres 36. 257.5 square centimetres 39. 62.75

31. $\frac{3}{4}$ 34. $\frac{2}{15}$ 37. 463.89 square metres 40. 17.5 kilometres

8.2 Division of whole numbers by fractions

Activities

(i) Dividing whole numbers by fractions using diagrams.

(ii) Dividing whole numbers by fractions without using diagrams.

Teaching and learning materials

Number cards

Teaching steps

In carrying out the given activity:

(i) Instruct the pupils to identify the number of pieces obtained after dividing three equal objects into small quarter pieces, $\left(3 \div \frac{1}{4} = 12\right)$.

(ii) Guide the pupils to identify the pieces obtained after dividing four objects into equal pieces of halves, that is $\left(4 \div \frac{1}{2} = 8\right)$.

(iii) Ask the pupils in their groups to show that $3 \div \frac{1}{4} = 12$ or $12 = 3 \times \frac{4}{1}$, $4 \div \frac{1}{2} = 8$ and $8 = 4 \times \frac{2}{1}$.

Emphasize that when dividing a whole number by a fraction, the divisor is changed into its reciprocal and multiplied by a whole number.

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(iv) Guide the pupils to divide whole numbers by fractions using Example 1 to 3.

(v) Instruct the pupils to do Exercise 2.

Answers to Exercise 2

1. 9	6. 891	11. $2\frac{5}{6}$	16. $16\frac{5}{22}$
2. 21	7. 33	12. $157\frac{1}{2}$	17. $\frac{8}{25}$
3. $14\frac{2}{5}$	8. 2 345	13. $\frac{3}{20}$	18. $961\frac{7}{13}$
4. 108	9. 26	14. $3\frac{24}{37}$	19. 860
5. 64	10. 121	15. $12\frac{4}{5}$	20. 50

8.3 Division of fractions by whole numbers

Activity

Dividing fractions by whole numbers using diagrams.

Teaching and learning materials

Number cards, marker pen, and ruler

Teaching steps

(i) Guide the pupils to apply the procedures used in Example 1.

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(ii) Guide the pupils to identify that $\frac{1}{6}$ is equal to $\frac{1}{2} \div 3$. This answer can also be obtained without using a diagram. That is multiplying $\frac{1}{2}$ by $\frac{1}{3}$, which means, $\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$.

(iii) Instruct the pupils to discuss Examples 2 and 3 in the Pupil's Book, facilitate pupils' learning.

(iv) Instruct the pupils to do Exercise 3.

Answers to Exercise 3

1. $\frac{2}{25}$	6. $\frac{9}{10}$	11. $\frac{1}{1536}$	16. $\frac{15}{56}$
2. $\frac{1}{22}$	7. $\frac{5}{3}$ or $1\frac{2}{3}$	12. $\frac{1}{40}$	17. $\frac{32}{45}$
3. $\frac{3}{26}$	8. $\frac{3}{560}$	13. $\frac{1}{15}$	18. $\frac{53}{56}$
4. $\frac{2}{7}$	9. $\frac{1}{204}$	14. $\frac{5}{92}$	19. $\frac{2}{65}$
5. $\frac{11}{450}$	10. $3\frac{3}{5}$	15. $\frac{115}{1178}$	20. $\frac{15}{608}$

8.4 Division of fractions by fractions

Activity

Dividing fractions by fractions.

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Teaching and learning materials
Number cards and shaded diagrams

Teaching steps
(i) Guide the pupils to:

- Discuss the steps used in Example 1.
- Compose a question on division of fractions by fractions and ask them to find its answer by using diagrams.
- Obtain a formula for dividing fractions by fractions, and then use it in solving Example 2 up to 5.

(ii) Instruct the pupils to attempt Exercise 4.

Answers to Exercise 4

1. $\frac{5}{9}$	6. $\frac{6611}{122404}$	11. 3	16. $2\frac{7}{9}$
2. 2	7. $\frac{200}{30609}$	12. $2\frac{2}{3}$	17. $\frac{91}{10440}$
3. $1\frac{1}{2}$ or $\frac{3}{2}$	8. $\frac{44}{325}$	13. $\frac{343}{2880}$	18. 12
4. $\frac{104}{125}$	9. $\frac{13735}{160003}$	14. $\frac{5}{144}$	19. $\frac{3}{16}$
5. $9\frac{11}{63}$	10. $\frac{34}{75}$	15. $\frac{9}{500}$	20. $1\frac{7}{8}$

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8.5 Division of fractions by decimals

Activity
Dividing fractions by decimals.

Teaching and learning materials
Charts with decimals and fractions

Teaching steps
(i) Guide the pupils to:
- Do revision on conversion of fractions into decimals by using few examples.
- Use Example 1 up to 3 to discuss how to divide fractions by decimals.

(ii) Instruct the pupils to do Exercise 5.

Answers to Exercise 5

1. 3 750
2. $12\frac{1}{2}$
3. $18\frac{2}{3}$
4. $10\frac{17}{78}$
5. 65
6. $\frac{5}{51}$
7. 100
8. $4\frac{5}{6}$
9. $3\frac{2}{5}$
10. $3\frac{17}{25}$
11. $\frac{1}{112}$
12. 0.03042
13. 3846.153846
14. $28\frac{1}{2}$
15. $\frac{64}{2625}$
16. $\frac{32}{10225}$
17. $\frac{19}{3140}$
18. $\frac{33}{35840}$
19. $3\frac{327}{476}$
20. $11\frac{1}{4}$

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8.6 Word problems on division of fractions and decimals

Activity
Solving problems on division of fractions and decimals.

Teaching and learning materials
Diagrams, real objects, and number line

Teaching steps
(i) Guide the pupils to:

- Discuss the steps to follow in solving word problems on division of fractions by decimals using Examples 1 and 2.
- Follow the required steps in solving word problems.

(ii) Instruct the pupils to do Exercise 6.

Answers to Exercise 6

1. 34 pupils
2. 480 pupils
3. 3 plots
4. 96 letters
5. 7 buckets
6. $4\frac{1}{2}$ metres
7. 1 450 packets
8. 18 pieces
9. 6 pair of shorts
10. 100
11. $3\frac{1}{4}$
12. 6 pieces
13. 6 days
14. 150 bags
15. 250 steps
16. 4 children
17. 80
18. 40 families
19. 11 weeks
20. 137 pupils

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Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. 72
2. 732
3. $586\frac{2}{3}$
4. 16
5. 37 844
6. $\frac{9}{35}$
7. $\frac{1}{480}$
8. $\frac{11}{2000}$
9. $\frac{1}{33750}$
10. $\frac{1}{606}$
11. $5\frac{9}{80}$
12. 8
13. $24\frac{16}{111}$
14. $33\frac{1}{50}$
15. $\frac{40}{9849}$
16. 30
17. 2
18. $\frac{1}{2}$
19. $\frac{3}{5}$
20. $3\frac{1}{5}$
21. $\frac{5}{18}$
22. $\frac{3}{32}$
23. 70 pieces
24. $18\frac{1}{10}$ kilograms
25. $4\frac{1}{2}$ metres
26. 20
27. 7 pieces
28. 2
29. 63 cars
30. 7

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Chapter Nine

Algebra

Introduction

In Standard Six, the pupil learnt addition, subtraction, multiplication, and division of algebraic terms. Also, the pupil learnt how to solve simple equations. In this chapter, the pupil will learn to simplify algebraic expressions involving whole numbers, fractions, and decimals. Also, the pupil will learn how to find the value of an expression and solve word problems on algebra. The competencies gained will enable the pupil to solve problems and challenges in our environment by translating them into simplified mathematical expressions.

Pupil's activities

(a) Simplifying algebraic expressions involving addition and subtraction operations with whole number coefficients

(b) Simplifying algebraic expressions involving multiplication and division operations with whole number coefficients

(c) Simplifying algebraic expressions involving addition and subtraction operations with fractional coefficients

(d) Simplifying algebraic expressions involving multiplication and division operations with fractional coefficients

(e) Simplifying algebraic expressions involving addition and subtraction operations with decimal coefficients

(f) Simplifying algebraic expressions involving multiplication and division operations with decimal coefficients

(g) Finding the value of an algebraic expression and solving simple equations

(h) Solving algebraic word problems

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Teaching and learning resources

Chart displaying like and unlike terms

9.1 Revision

Activity

Simplifying algebraic expressions involving addition, subtraction, multiplication, division, and solving simple equations.

Teaching and learning materials

Chart displaying like and unlike terms

Teaching steps

(i) Guide the pupils to work on operations of addition, subtraction, multiplication and division of algebraic expressions with whole number coefficients and solving simple equations.

(ii) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. (a) $6x$ (b) $-4v$ (c) $1\frac{5}{6}s$ (d) $2\frac{3}{10}t$ (e) $3x$

   (f) $4pq$ (g) $3.6a^2$ (h) $5y$ (i) 1 (j) $\frac{5}{6}k$

2. (a) $y = 3$ (b) $x = 3$ (c) $p = 5$ (d) $m = 4$ (e) $r = 7$

   (f) $x = 2$ (g) $q = 28.35$ (h) $x = 3$ (i) $y = 4$ (j) $f = 1\frac{1}{3}$

9.2 Addition and subtraction of algebraic expressions with whole number coefficients

Activity

Addition and subtraction of terms with whole number coefficients.

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Teaching and learning materials
Charts of addition and subtraction of algebraic terms

Teaching steps
(i) Guide the pupils to work on operations of addition and subtraction of algebraic expressions with whole number coefficients by using Example 1 up to 3.
(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. $6x + 19y$
2. $7mn + 18q$
3. $2k + 4y$
4. $-8rs - 20r$ or $-4r(2s + 5)$
5. $6z^2y + 12zy$
6. $7nm^2 + m$
7. $2pq$
8. $4uv + 64$
9. $a + 54$
10. $5xy - 13x$
11. $16pq + 8st$
12. $3xy$
13. $10y^2 + 4x^2 + 4$
14. $12a^2b + 8x^2y^2 - 4$
15. $2m - mn^2$
16. $t^3r^2 + 3ab$
17. $m^2p - 16mp^2$
18. $4t^2y - 8ty^2 + 8$
19. $-10a^2 - 3a^2b + 5$
20. $12kl - 3mnr$

9.3 Multiplication and division of algebraic expressions with whole number coefficients

Activity
Multiplication and division of algebraic expressions with whole number coefficients.

Teaching and learning materials
Charts of multiplication and division formula of like terms

Teaching steps
(i) Guide the pupils to multiply and divide algebraic expressions with whole number coefficients by using Example 1 up to 6.

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(ii) Instruct the pupils to attempt Exercise 3.

Answers to Exercise 3

1. $18l^5$
2. k^{10}
3. $2r^6h^7$
4. $120n^2$
5. $-3a^2$
6. $-5t^2e^9$
7. $2w^8$
8. $3b^2 + \frac{1}{3}b + \frac{1}{2}$
9. $\frac{1}{4}c$
10. $9v^4$
11. $3n^2$
12. $24a^3bc + 8ab^2c - 12abc^4$
13. $8k^4n$
14. $-5c^5d^3$
15. $6s^{15}t^8u^8$
16. $6n^4r^2$
17. $\frac{1}{2}xy$
18. $2k^3l^4$
19. $4k^{18}n^{11}$
20. $2x^2yz^2$

9.4 Addition and subtraction of algebraic expressions with fractional coefficients

Activity

Addition and subtraction of algebraic expressions with fractional coefficients.

Teaching and learning materials

Charts displaying examples of algebraic expressions with fractional coefficients

Teaching steps

(i) Guide the pupils to add and subtract algebraic expressions with fractional coefficients by using Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 4.

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Answers to Exercise 4

1. $1\frac{1}{10}x$
2. $\frac{p+q}{pq}$
3. $1\frac{1}{8}t$
4. $\frac{8y^2}{bc}$
5. $-\frac{q}{21}$
6. $2\frac{3}{7}b$
7. $\frac{5}{54t}$
8. $\frac{17}{24}w$
9. $\frac{c^2}{5} - cd$
10. $2\frac{1}{3}m$
11. $\frac{16y}{35m^2}$
12. $\frac{7}{5}k^2 + \frac{1}{5}ky$
13. $\frac{3d^2}{xy}$
14. $\frac{9m^2}{28t^2}$
15. $3\frac{4}{7}n^2r$
16. $\frac{1}{20}kt$
17. $\frac{21n-32}{12}$
18. $\frac{-7}{20}kl$
19. $\frac{1}{3}m^2n - \frac{7}{9}mn^2$
20. $\frac{5}{52}k^2y^2$

9.5 Multiplication and division of algebraic expressions with fractional coefficients

Activity

Multiplication and division of algebraic expressions with fractional coefficients.

Teaching and learning materials

Charts displaying examples of algebraic expressions with fractional coefficients

Teaching steps

(i) Guide the pupils to multiply and divide algebraic expressions with fractional coefficients by using Example 1 up to 3 and monitor the correctness of their responses.

(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. 9
2. 2p
3. $\frac{n^2}{18m^2}$
4. $\frac{1}{3}t^4b^2q^3$

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5. $4a^2b^4$

6. $\frac{3}{7}xy^3$

7. $\frac{8}{9}a^2b$

8. $4m$

9. $\frac{2}{3}hyr^2$

10. $5a + 5$

11. $\frac{784}{k^2l^3m^3n^5}$

12. $26mn$

13. $6p^4q^5$

14. $\frac{3}{5}l^3m$

15. $\frac{2}{3}k^2tn$

16. $\frac{7}{3}a^5b^2$

17. $\frac{2l^2}{m^2n^3}$

18. $\frac{1}{6}l^8j^3k^8$

19. $\frac{3}{8b}$

20. $\frac{48}{5}z^2n^2$

9.6 Addition and subtraction of algebraic expressions with decimal coefficients

Activities

Addition and subtraction of algebraic expressions with decimal coefficients.

Teaching and learning materials

Charts displaying examples of algebraic expressions with decimal coefficients

Teaching steps

(i) Guide the pupils to add and subtract algebraic expressions with decimal coefficients by using Example 1 and 2.

(ii) Instruct the pupils to attempt Exercise 6.

Answers to Exercise 6

1. $10.654y$
2. $7.696rs$
3. $202.8c^3d^2$
4. $4326.979t$
5. $38.22u$
6. $4.07m$
7. $28.32abc$
8. $10.88g^2h$
9. $96.74p^3$
10. $46.89n$
11. $12.66t^2r^2$
12. $89.32a^2b$

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13. $282.86k^4l^3$ 16. $33.587m^2a$ 19. $393.8s^2p$

14. $7.45n^2r^4$ 17. $2.488t^2u^2$ 20. $346.8t^3s^2 - 314.5t^2s^3$

15. $6.95a^3b + 17.42ab^2$ 18. $(-6.75)ay^2$

9.7 Multiplication and division of algebraic expressions with decimal coefficients

Activity

Multiplication and division of algebraic expressions with decimal coefficients.

Teaching and learning materials

Charts displaying examples of algebraic expressions with decimal coefficients

Teaching steps

(i) Guide the pupils to multiply and divide algebraic expressions with decimal coefficients by using Example 1 up to 3.

(ii) Instruct the pupils to attempt Exercise 7.

Answers to Exercise 7

1. m^3 6. $0.1a^3b^6$ 11. $48x^3$ 16. $0.9t$

2. $0.1k^6$ 7. $0.0625n^9$ 12. $2t^2$ 17. $2xy$

3. $20.736y^2$ 8. $0.15c^7d^6$ 13. $8z$ 18. $0.8\frac{m}{n}$

4. $0.14t^9$ 9. $40.964a^4b^3c^2$ 14. $40a^2$ 19. $40xy^5z$

5. $87.36x^8$ 10. $0.7005x^2y^2z$ 15. $2.4\frac{b^2}{a^2}$ 20. $5r^2p$

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9.8 Finding the value of an algebraic expression

Activity
Finding the value of an algebraic expression by substituting the variables with the given values.

Teaching and learning materials
A chart showing a formula for calculating the value of an expression like a formula of finding areas and volumes of various shapes

Teaching steps
(i) Guide the pupils to calculate the value of an expression by using Example 1 up to 3.
(ii) Instruct the pupils to attempt Exercise 8.

Answers to Exercise 8

1. (a) 1 (b) 144 (c) 4 (d) 8 (e) 9
2. (a) 44 (b) – 18 (c) 113.04 (d) 2 (e) 2 100
   (f) 4.17 (g) 37.68
3. (a) $\frac{15}{116}$ (b) 36 (c) $3\frac{2}{5}$ (d) $\frac{3}{4}$ (e) 120
   (f) –17152 (g) 1.3625 (h) $-\frac{3}{7}$

9.9 Word problems on algebra

Activity
Solving word problems involving algebra.

Teaching and learning materials
Charts displaying examples of algebraic expressions

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Teaching steps

(a) Guide the pupils to develop competencies in solving word problems on algebra by following the steps in Examples 1 and 2.

(b) Instruct the pupils to:

- Adhere to the procedures to be followed when answering word problems.
- Attempt Exercise 9.

Answers to Exercise 9

1. (x + 10) years
2. 100 – t
3. $\frac{w}{3}$
4. (4x +13) centimetres
5. (a) (18n +10m) centimetres
   (b) 45mn square centimetres
6. 12y shillings
7. $\frac{z}{20}$ grams
8. (3p – 3q) shillings
9. 48
10. $6x^2$ square centimetres
11. Father's age 27 years and child's age 3
12. 12, 14 and 16
13. 5
14. 40 and 42
15. (a) (y – 3) years
    (b) (y + 4) years
    (c) 17 years
16. 3 years
17. 20°
18. (a) 16.5 metres by 3.3 metres
    (b) 54.45 square metres
19. (a) 50 000 shillings
    (b) 200 000 shillings
20. 10 and 11

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Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. (a) $4x^2, 6x^2, -7x^2$ are like terms

   (b) $x^3, 5x^3, -x^3$ are like terms

   (c) $-x^2y, 4x^2y, -2x^2y$ are like terms

2. (a) $5x$ (b) $2y^2n^4 - 2yn$ (c) $v - u^2 + vu$ (d) $2t^3 + 3tk$

   (e) $8a^4b^3$ (f) $162a^5b^3$ (g) m^5n^5 (h) $3q^2$

   (i) $1\frac{1}{2}l^7$ (j) $11p - 2$ (k) $n - y$ (l) $1\frac{2}{45}x^2y$

   (m) $1\frac{1}{10}p$ (n) $\frac{1}{8}m$ (o) $1\frac{19}{35}y$ (p) $\frac{3}{5}c^2$

   (q) $\frac{2z}{3x}$ (r) $22.84x$ (s) $1101.236y$ (t) $1.2f$

   (u) $28.32ab^2$ (v) $0.175mn$ (w) x^2 (x) $-\frac{ab}{18}$

   (y) $1.5pq^3 - 0.09p^4q$

3. (a) 157 (b) 14 (c) 104.67 (d) 4.5476 (e) 0.471

4. (a) 9 (b) 17 (c) 5

5. (30 000 – 1 000x) shillings

6. (1 500y – 30 000) shillings

7. $4y + 500$

8. $2p^5$

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Chapter Ten

Speed

Introduction

In this chapter, the pupil will learn the formula of speed and how to use it in calculating distance, time, and speed of different moving objects. Also, the pupil will get to understand the knowledge of speed for objects moving on land, water surfaces, and in the atmosphere. The competencies gained will help the pupil to understand schedules of vehicles leaving or arriving at their stations, the uses of speedometer in motorbikes, cars, and other moving vehicles.

Pupil's activities

(a) Discussing the concept of speed
(b) Identifying the formula of speed and elaborating its components
(c) Using the formula of speed to calculate speed, distance and time

Teaching and learning resources

Playing ground/open space, tape measure, ruler, stopwatch, graph paper, manila paper, pencil, a pair of scissors, and tables for data entry

10.1 The concept of speed

Activities

(i) Mentioning various vehicles and comparing their speeds.
(ii) Mentioning living organisms and comparing their speeds.
(iii) Calculating speed by considering the given distance and time.

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Teaching and learning materials

Pictures of vehicles and pictures of animals

Teaching steps

(i) Guide the pupils to:

- Mention various means of transport used in their environment. For example: bicycles, motorbikes, cars, aeroplanes, canoes, ships.
- Mention living organisms and compare their speeds.
- Show that speed of different objects is calculated by considering the distance covered and time taken.
- Interprete speed of different objects.

(ii) Instruct the pupils to discuss the speed of a human being and compare it with that of other animals using pictures and explanations.

10.2 Formula for speed

Teaching steps

(i) Guide the pupils to:

- Identify the components of the formula of speed, and then writing their relationships.
- Mention the metric units of distance, time, and speed.

(ii) Instruct the pupils on how to:

- Use a stopwatch and tape measure or ruler in measuring the units of distance and time.
- Draw a graph by considering the vertical and horizontal axes.

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(iii) In carrying out Activity 1 in pairs, instruct the pupils to use the following steps:

- Prepare the playground or open space and mark two points.
- Indicate the initial point to start walking or running and the final point to stop.
- Measure the distance between the two points marked in step 2.
- Let the first pupil run from the starting point to the final point and walk from the final point back to the initial point.
- The second pupil should record the time taken by the first pupil during running and walking.
- Exchange the activities, then fill the table as follows:

Activity	**Pupil**	**Distance (m)**	**Time (s)**	**Average time**	**$\frac{\text{Distance}}{\text{Time}}$**
Run	Pupil 1				
	Pupil 2				
Walk	Pupil 1				
	Pupil 2				

- Compare the walking speed and the running speed. Also, identify the activity with high speed and the one with low speed.
- Draw graphs showing the relationship of distance (vertical axes) and time (horizontal axes). The graph should be drawn on the same axes by separating the graph of the walking activity and the graph of the running activity.
- Calculate the slope of each graph using

$$\text{Slope} = \frac{\text{Vertical increase}}{\text{Horizontal increase}}.$$

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- Compare the answers obtained in Step ix and the data in the vertical axes in the table filled in Step vi.
- Interpret the results.

(iv) In carrying out Activity 2, guide the pupils to use the following instructions:

- Prepare devices to measure distance and record time.
- Group the pupils according to class size.
- Each pupil in a group should run around the ground once.
- Each group should have a stopwatch to record the time taken by each pupil in each activity. The recording should be done in turns as it was done in Activity 1.
- Each recorder should fill the data in a table as follows:

Runner	**Distance (m)**	**Time (s)**
Pupil 1		
Pupil 2		
Pupil 3		
Pupil 4		

- The pupils should draw a graph to show the relationship between distance and time for each runner using graph paper.
- Each pupil should state how he/she can use the slope of each graph to compare the speed of each runner.
- Each pupil should state how the slope helps to identify the speed of each pupil in the group.

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10.3 Computation of speed

To find the speed using the formula of speed.

Teaching and learning materials

Charts of triangles to show the relationship of speed, distance, and time

Teaching steps

(i) Guide the pupils to find speed and distance by graph using Example 1 up to 3.

(ii) Instruct the pupils to write and elaborate components of the formula of speed.

(iii) Guide them to work on Example 1 up to 4.

(iv) Instruct the pupils to attempt Exercise 1.

Answers to Exercise 1

1. 19.64 km/hr
2. 40 km/hr
3. 60 km/hr
4. 500 cm/s
5. 1.3 m/s
6. 8.3 m/s
7. 46 km/hr
8. 50 m/min
9. 5 cm/s
10. (a) 50 km/hr
    (b) 13.3 m/s

10.4 Computation of distance

Activities

(i) Obtaining the formula of finding distance using the speed formula.

(ii) Finding distance, speed, and time.

Teaching and learning materials

Charts of triangles to show the simple method of finding the formula of distance

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Teaching steps

(i) Guide the pupils to identify the formula of finding distance using the formula of speed.

(ii) Instruct them to:

- Study and work on Examples 1 and 2.
- Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. 336 km
2. 19.2 km
3. 100.8 km
4. 5 metres
5. 24.5 metres
6. (a) Musa
   (b) 172.5 km
7. 456 km
8. 304 km
9. 8 160 metres
10. 1 054 metres

10.5 Computation of time

Pupil's Activities

(i) Obtaining the formula of finding time using the speed formula.

(ii) Finding time using speed and distance.

Teaching and learning materials

Charts of triangles to show the simple method of finding the formula of time

Teaching steps

(i) Guide the pupils to:

- Identify the formula of finding time using the formula of speed.
- Go through Examples 1 and 2.

(ii) Instruct the pupils to attempt Exercises 3 and 4.

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Answers to Exercise 3

1 (a) Deo
(b) 270 minutes
2. 3.28 hours
3. (a) Jerome
(b) 0.15 hours or 9 minutes
4. 4 hours
5. 3 hours
6. (a) Emma
(b) 1 hour
7. 6 hours 30 minutes
8. 0.75 seconds
9. 55.6 hours
10. 40 minutes

Answers to Exercise 4

1. True
2. False
3. True
4. False
5. True
6. True
7. False
8. False
9. True
10. False

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$
2. (i) metres per second
(ii) kilometres per hour
3. 960 kilometres
4. 20 seconds
5. 75 kilometres per hour
6. (a) 4 metres per hour
(b) 6.7 centimetres per minute
7. 1.8 kilometres per hour
8. 16.2 kilometres per hour
9. 3.6 metres per minute

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10. Hussein: 64 kilometres per hour
    Hidaya: 38.4 kilometres per hour
    Yakobo: 54.9 kilometres per hour
11. (a) 86 kilometres per hour
    (b) 2.56 hours or 2 hours 32 minutes
12. (a) 97.6 kilometres per hour
    (b) 8.6 hours or 8 hours 36 minutes
13. 60 minutes
14. 48 kilometres
15. (a) 9:50 am
    (b) 5.45 pm
16. 120 kilometres
17. 30 kilometres per hour
18. 6 hours
19. 3.38 hours
20. 5 hours
21. 899.88 kilometres per hour
22. 38.36 kilometres per hour
23. 0.6 hours or 36 minutes
24. 24 kilometres per hour
25. 16 kilometres per hour
26. 9.8 hours or 9 hours 48 minutes
27. 7.2 hours or 7 hours 12 minutes
28. 32 kilometres per hour
29. 1 000 metres per minute
30. 5.5 hours or 5 hours 30 minutes

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Chapter Eleven

Pythagoras' theorem

Introduction

In this chapter, the pupil will learn the Pythagoras' theorem and how to apply the theorem to determine the length of base, height, and hypotenuse of the right angled triangle. The pupil will also learn applications of the Pythagoras' theorem in daily life. The competencies gained in this chapter will help the pupil in daily life activities such as architectural work, construction of buildings, carpentry, and shorten the travelling distance.

Pupil's activities

(a) Measuring a right angle during the construction of the foundation of two walls which meet at right angle

(b) Drawing the base, height, and hypotenuse of the right-angled triangle in a graph paper with each side of the squares in ratio 3:4:5 as illustrated in Figure 9

Teaching and learning resources

Rope, protractor, pegs, ruler, hammer, tape measure, graph paper, pencil, and rubber

11.1 Measuring of the right angle in construction of foundation

Activity

Measuring of the right angle in constructing the foundation of two walls which meet at a right angle.

Teaching and learning materials

Rope, protractor, pegs, ruler, hammer, and tape measure

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Teaching steps

(i) Guide the pupils to go to an open ground with their tools and put them in groups according to class size.

(ii) In carrying out Activity 1, guide the pupils to use the following steps:

- The first pupil in each group should drive a peg into the ground using a hammer and tie a rope on the peg.
- The second pupil in every group should measure 3 metres of the rope from the first peg. The pupil should pull the rope to the right hand side and tie it to the second peg and fix it on the ground using the hammer. The pupil should make sure that the peg is firm in the ground so that it could not easily be removed. Also, the second pupil should confirm that the distance of the second peg from the first peg is 3 metres by using the ruler or tape measure.
- The third pupil should take the same rope and measure 4 metres from the second pupil's peg to the north side. The pupil should fix the third peg on the ground using the hammer and tie the rope tightly. The pupil should confirm that the distance of the third peg from the second peg is 4 metres using a ruler or tape measure.
- The first pupil should take the rope from the third pupil and tightly tie it to the first peg. The pupils can use the a ruler or tape measure to confirm the distance of the third peg from the first peg is 5 metres.
- Every group should tighten their rope between each peg in order to make sure that the length of each side is measured in the ratio of 3 metres to 4 metres to 5 metres.
- By using a protractor, each group should careful measure all the three angles and notice that one of the angles is the right angle.
- The pupils should consider Figures 4 and 5 as reference.

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(iii) Guide the pupils to:
- Measure the right angle when constructing the foundation of the two walls which make the right angle by following the steps illustrated in (ii).
- Use their tools effectively in doing this activity.

(iv) Caution the pupils to be careful when fixing the pegs into the ground in order to avoid injury.

11.2 Recognizing the sides of the right-angled triangle

Activity
Drawing the right-angled triangle on a graph paper.

Teaching and learning materials
Protractor, ruler, graph paper, pencil, and rubber

Teaching steps
(i) Guide the pupils to draw the right-angled triangle on the graph paper, and then indicate the height, base, and hypotenuse.

(ii) Instruct the pupils to:
- Measure the length of the base, height, and hypotenuse.
- Attempt Exercise 1.

Answers to Exercise 1
Guide the pupils to complete the drawing of the right-angled triangles and identify their base, height, and hypotenuse.

11.3 Verification of the Pythagoras' theorem

Activity
Verifying the Pythagoras' theorem by using the right-angled triangle with the base, height, and hypotenuse in the ratio of 3:4:5.

Teaching and Learning materials
Protractor, ruler, graph paper, pencil, and rubber.

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Teaching steps

(i) Instruct the pupils to:

- Use Figure 9 to draw the right-angled triangle with the base, height, and hypotenuse in the ratio 3:4:5.
- Count the small squares made from each side of the square (Base, height, and hypotenuse) of the right-angled triangle as illustrated from step 3 up to 5.

(ii) Guide the pupils to verify the Pythagoras' theorem by following step 5 up to 7.

(iii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

Guide the pupil to carefully study the right-angled triangles, then ask the pupils to copy them on graph paper and complete them by drawing squares on the opposite sides of the base, height, and hypotenuse from the Exercise 2.

1. The pupils to draw unit squares each side of the right-angled triangle with the base of 3 cm, height of 4 cm, and hypotenuse of 5 cm.
2. The pupils to draw unit squares in each side of the right-angled triangle with the base of 8 cm, height of 6 cm, and hypotenuse of 10 cm.
3. The pupils to draw unit squares in each side of the right-angled triangle with the base of 15 cm, height of 8 cm, and hypotenuse of 17 cm.
4. The pupils to draw unit squares in each side of the right-angled triangle with the base of 12 cm, height of 5 cm, and hypotenuse of 13 cm.
5. The pupils to draw unit squares in each side of the right-angled triangle with the base of 12 cm, height of 9 cm, and hypotenuse of 15 cm.
6. The pupils to draw unit squares in each side of the right-angled triangle with the base of 4 cm, height of 3 cm, and hypotenuse of 5 cm.

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7. The pupils to draw unit squares in each side of the right-angled triangle with the base of 6 cm, height of 8 cm, and hypotenuse of 10 cm.
8. The pupils to draw unit squares in each side of the right-angled triangle with the base of 5 cm, height of 12 cm, and hypotenuse of 13 cm.
9. The pupils to draw unit squares in each side of the right-angled triangle with the base of 9 cm, height of 12 cm, and hypotenuse of 15 cm.
10. The pupils to draw unit squares in each side of the right-angled triangle with the base of 8 cm, height of 15 cm, and hypotenuse of 17 cm.

11.4 Calculating lengths of the hypotenuse, height, and base using the Pythagoras' theorem

11.4.1 Calculation of the length of the hypotenuse

Teaching and learning materials

Protractor, ruler, graph paper, pencil, and rubber

Teaching steps

(i) Guide the pupils to go through Example 1 up to 4.
(ii) Instruct the pupils to:
- Verify the answers of the Example 1 up to 4 by drawing the right-angled triangle in each example.
- Attempt Exercise 3.

Answers to Exercise 3

1. 25 m	3. 29 cm	5. 30 cm	7. 34 cm	9. 5 m
2. 26 cm	4. 25 m	6. 13 m	8. 35 m	10. 10 cm

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11.4.2 Calculation of length of the height

Teaching steps

(i) Guide the pupils to:

- Go through the Example 1 up to 4.
- Verify the answers of the Example 1 up to 4 by drawing the right-angled triangle in each example.

(ii) Instruct the pupils to attempt Exercise 4.

Answers to Exercise 4

1. 20 cm	3. 21 m	5. 24 m	7. 12 m	9. 12 m
2. 15 m	4. 24 cm	6. 30 cm	8. 28 cm	10. 6 cm

11.4.3 Calculation of length of the base

Teaching steps

(i) Guide the pupils to:

- Go through Example 1 up to 3.
- Verify the answers of Example 1 up to 3 by drawing the right -angled triangle in each Example.

(ii) Instruct the pupils to attempt Exercise 5.

Answers to Exercise 5

1. 15 cm	3. 20 m	5. 18 cm	7. 16 cm	9. 8 cm
2. 7 m	4. 9 cm	6. 16 cm	8. 21 cm	10. 5 m

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

In each answer of part (a), make sure that every pupil has applied the Pythagoras' theorem to get the relationship between the sides of the triangle. For example, in part (i)

$$a^2 + b^2 = c^2$$

$$8^2 + 15^2 = 64 + 225$$

$$= 289$$

$$= 17^2$$

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Therefore, since $(8\ cm)^2 + (15\ cm)^2 = (17\ cm)^2$, this is the right angled triangle and length of the hypotenuse is 17cm.

(a) Type of a triangle	(b) Length of hypotenus
(i) Right-angled triangle	17 centimetres
(ii) Not right-angled triangle	-
(iii) Right-angled triangle	20 kilometres
(iv) Not right-angled triangle	-
(v) Not right-angled triangle	-
(vi) Right-angled triangle	45 kilometres
(vii) Right-angled triangle	41 kilometres
(viii) Right-angled triangle	35 centimetres
(ix) Right-angled triangle	34 centimetres
(x) Right-angled triangle	25 centimetres

2. (a) 17 cm (b) 26 cm (c) 30 cm (d) 34 cm
3. (a) 28 cm (b) 7 cm (c) 21 cm (d) 16 cm
4. (a) 18 cm (b) 30 cm (c) 6 cm (d) 24 cm
5. 8 metres
6. 0.3 km
7. 9 metres
8. $\sqrt{200}$ cm or $10\sqrt{2}$ cm
9. 20 cm
10. 3 km
11. 35 km
12.

a	b	c
10	24	26
15	36	39
20	48	52

13. The base is 30 cm and the height is 40 cm
14. 216 cm^2
15. 15 000 cm

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Chapter Twelve

Business arithmetic

Introduction

Financial institutions and individuals use business arithmetic to monitor their income and expenditure. Also, it helps them to know the profit and loss generated in their businesses. In this chapter, the pupil is supposed to learn how to classify sources of profit and loss, keep records of incomes and expenditures, and do a project on sales and purchases. The competencies gained will help the pupil to classify sources of profit and loss in sales and purchases. In addition, it will help the pupil to plan for proper expenditure on the available income and design projects on sales and purchases using proper business practices.

Pupil's activities

(a) Solving word problems on profit and loss
(b) Classifying sources of profit and loss in business
(c) Keeping records of incomes and expenditures of different business transactions
(d) Computing interest, interest rates, time, and principal

Teaching and learning resources

Manila cards, pens, pencils, chalk, glue, coins, A4 papers, metre rule, flip charts, marker pens, masking tape, ledgers, and specimen of banknotes

12.1 Revision

Activity

Solving word problems on profit and loss.

Teaching steps

(i) Guide the pupils to recall how to solve word problems on profit and loss.
(ii) Instruct the pupils to attempt Exercise 1.

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Answers to Exercise 1

1. (a) 6 050 shillings (b) 11%
2. 35 000 shillings
3. 25 000 shillings
4. (a)20 000 shillings (b) 25%
5. (a) 39 950 shillings (b) 15.57%
6. 72294.12 shillings
7. (a) Generated profit
   (b) 31.6%
8. (a) Generated a profit of 335 000 shillings
   (b) 91.78%
9. (a) 216 000 shillings
   (b) 135 000 shillings
10. 14 250 shillings
11. 253 125 shillings
12. (a) 5 750 shillings
    (b) 11.85%
13. 26 880 000 shillings
14. 1 156 250 shillings
15. (a) 2.86%; 10.53%
    (b) Alexander; 7.67%
16. 243 800 shillings
17. (a) 25%
    (b) 464 000 shillings

18. (a) Grace's bill on 24.01.2020 was as follows:

Items	**sh**	**ct**
12 kg of meat @ sh 9 000	108 000	00
15 kg of rice @ sh 2 500	37 500	00
6 kg of groundnuts @ sh 3 000	18 000	00
8 mangoes @ sh 1 500	12 000	00
4 litres of milk @ sh 2 600	10 400	00
14 bottles of soda @ sh 700	9 800	00
3 kg of wheat flour @ sh 1 800	5 400	00
5 kg of sugar @ sh 2 000	10 000	00
4 cans of butter @ sh 4 500	18 000	00
20 litres of cooking oil @ sh 4 200	84 000	00
Total	**313 100**	**00**

Grace spent a total of 313 100 shillings.

(b) The amount of money that Grace saved after the expenditures is given by: sh 485 000 – sh 313 100 = sh 171 900.

Therefore, Grace saved 171 900 shillings.

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19. (a) Aloyce's bill on 28.12.2019 was as follows:

Items	Sh	ct
4 bundles of tomatoes @ sh 2 500	10 000	00
3 bundles of onions @ sh 1 000	3 000	00
5 bundles of carrots @ sh 2 000	10 000	00
4 litres of yoghurt @ sh 1 500	6 000	00
2 bags of maize flour @ sh 8 500	17 000	00
5 kg of beans @ sh 2 800	14 000	00
4 chickens @ sh 20 000	80 000	00
10 eggs @ sh 400	4 000	00
2 brooms @ sh 3 400	6 800	00
Total	**150 800**	**00**

Aloyce spent a total of 150 800 shillings.

(b) The amount of money that Aloyce saved after the expenditures is given by:
sh 355 000 – sh 150 800 = sh 204 200.
Therefore, Aloyce saved 204 200 shillings.

20. (a) The bill on 28.01.2020 was as follows:

Items	sh	ct
360 plates of food @ sh 12 000	4 320 000	00
Reception hall	2 400 000	00
50 crates of soda @ sh 11 800	590 000	00
4 cars for transport @ sh 170 000	680 000	00
Cake	450 000	00
Master of Ceremony	750 000	00
500 contribution cards @ sh 1 000	500 000	00
Decorations	300 000	00
180 boxes of juice @ sh 2 500	450 000	00

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400 invitation cards @ sh 1 500	600 000	00
30 cartons of water @ sh 3 600	108 000	00
20% of collection as wedding gift	7 370 000	00
Total	**18 518 000**	**00**

The treasurer spent a total of 18 518 000 shillings.

(b) The amount of money the treasurer saved after the expenditure is given by:

sh 36 850 000 – sh 18 518 000 = sh 18 332 000

Therefore, after the wedding the treasurer saved 18 332 000 shillings.

12.2 Sources of profit and loss

Activity

Analysing the sources of profit and loss in business.

Teaching and learning materials

Manila cards, marker pens, masking tapes, flip charts, pens, pencils, and A4 papers

Teaching steps

(i) Instruct the pupils to do Activity 1.

(ii) Guide the pupils to discuss the sources of profit and loss in business.

12.3 Importance of keeping records of incomes and expenditures

Activity

Keeping records of income and expenditure in business.

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Teaching and learning materials

Flip charts, manila cards, marker pens, pencils, glue, masking tape, metre ruler, chalks, A4 papers, and ledgers

Teaching steps

(i) In carrying out Activity 2, guide the pupils to:

- Discuss the importance of keeping records on income and expenditure in business.
- Learn how to record transactions in a ledger using Examples 1 and 2.

(ii) Instruct the pupils to attempt Exercise 2.

(iii) Guide the pupils to recognise that the balance brought down and balance carried down are also called starting balance and ending balance, respectively.

Answers to Exercise 2

1.

Cash A/c **(1)**

Dr						Cr				
Date	**Particulars**	**Fo lio**	**Amount**		**Date**	**Particulars**	**Fo lio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2017					2017				
Dec 4	Capital	2	270 000	00	Dec 5	Purchases	3	12 500	00
Dec12	Sales	4	22 500	00	Dec 9	Purchases	3	4 500	00
Dec 23	Sales	4	6 500	00	Dec 15	Purchases	3	35 000	00
Dec 26	Sales	4	81 000	00	Dec 27	Rent	5	60 000	00
					Dec 27	Water bills	6	9 450	00
					Dec 31	Balance c/d		258 550	00
			380 000	00				380 000	00
Jan 1 2018	Balance b/d		258 550	00					

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2.(a)

Cash A/c **(1)**

Dr					Cr				
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2016					2016				
Oct 3	Capital	2	500 000	00	Oct 6	Chicken feed	3	60 000	00
Oct 26	Sales	7	700 500	00	Oct 13	Veterinary drugs	4	5 200	00
					Oct 19	Wire mesh	5	122 500	00
					Oct 23	Broiler chicks	6	300 000	00
					Oct 25	Chicken feed	3	48 000	00
					Oct 31	Balance c/d		664 800	00
			1 200 500	00				1 200 500	00
Nov 1 2016	Balance b/d		664 800	00					

(b) The balance brought down was 664 800 shillings.

3.(a)

Cash A/c **(1)**

Dr					Cr				
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2020					2020				
Jan 1	Capital	2	650 000	00	Jan 2	Seedlings	3	12 500	00
Jan 20	Sales	10	48 500	00	Jan 3	Fertilisers	4	17 500	00
Jan 22	Sales	10	36 000	00	Jan 4	Transport	5	8 300	00
Jan 28	Sales	10	42 000	00	Jan 5	Seedlings	3	18 750	00
					Jan 7	Water bills	6	6 000	00
					Jan 9	Fertilisers	4	21 400	00
					Jan 11	Pesticides	7	44 500	00
					Jan 14	Wages	8	30 000	00
					Jan 17	Electricity	9	12 000	00
					Jan 25	Fertilisers	4	25 000	00
					Jan 31	Balance c/d		580 550	00
			776 500	00				776 500	00
Feb 1 2020	Balance b/d		580 550	00					

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(b) The balance carried down and balance brought down is 580 550 shillings.

4.

Cash A/c (1)									
Dr									**Cr**
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2016					2016				
Nov 1	Capital	2	942 800	00	Nov 4	Purchases	3	548 750	00
Nov 12	Sales	5	302 000	00	Nov 7	Purchases	3	110 300	00
Nov 13	Sales	5	284 200	00	Nov 9	Transport	4	25 000	00
					Nov 16	Purchases	3	74 500	00
					Nov 19	Transport	4	15 500	00
					Nov 21	Water Bills	6	21 750	00
					Nov 22	Purchases	3	192 500	00
					Nov 24	Lantern	7	18 000	00
					Nov 25	Wages	8	180 000	00
					Nov 27	Rent	9	200 000	00
					Nov 29	Workers	10	100 000	00
					Nov 30	Balance c/d		42 700	00
			1 529 000	00				1 529 000	00
Dec 1 2016	Balance b/d		42 700	00					

12.4 Project on sales and purchase in business

Activity

Designing a project on sales and purchase in business based on proper criteria for designing a project.

Teaching and learning materials

Manila cards, marker pens, pencils, glue, masking tape, metre ruler, and A4 papers

Teaching steps

Instruct the pupils to:

- Sit in groups depending on the class size.
- Do the given project.

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- Present the project from their groups.
- Visit other groups to see and learn from other's work.
- Discuss in the class and selecting the best project.

12.5 Computations of interest, interest rate, time, and principal

Activities

(i) Obtaining the formulae for computing interest, interest rate, time and principal.

(ii) Computing interest, rate of interest, time, and principal.

Teaching and learning materials

Banknotes specimens, manila cards, marker pens, masking tape, and flip charts

Teaching steps

(i) Guide the pupils to:

- Learn how to solve word problems on profit and loss.
- Learn how to calculate interest, interest rate, time, and principal amount using Example 1 to 4.

(ii) Instruct the pupils to attempt Exercise 3.

Answers to Exercise 3

1. (a) 68 400 shillings (b) 131 000 shillings (c) 8%
   (d) 6 months (e) 204 000 shillings
2. 110 000 shillings
3. 1 000 000 shillings
4. 9 435 shillings
5. 10 010 shillings
6. $12\frac{1}{2}\%$
7. 3 years
8. 13%
9. 2 000 000 shillings
10. Half a year or 6 months

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11. $11\frac{1}{2}\%$
12. 9%
13. 4 800 000 shillings
14. $3\frac{1}{2}$ years
15. 23.2%
16. 72 000 shillings
17. $4\frac{1}{2}$ years
18. 270 000 shillings
19. 1 800 000 shillings
20. 13 050 000 shillings

Teaching steps

Instruct the pupils to attempt the Revision exercise.

Answers to Revision exercise

1. (a) I = 119 040 shillings
   (b) P = 250 000 shillings
   (c) T = 2 years
   (d) R = 20%
2. $2\frac{1}{2}$ years
3. Guide the pupils to answer the question by giving explanations
4. Guide the pupils to answer the question using the contents of the Pupil's Book
5. 11.25%
6. 2 550 000 shillings
7. Guide the pupils to answer the question through discussion
8. 2 years
9. 32 400 000 shillings
10. 14%
11. 23 230 000 shillings
12. 156 250 000 shillings
13. Guide the pupils to answer the question through discussion
14. Guide the pupils to answer the question through discussion
15. 5 280 000 shillings
16. Guide the pupils to answer the question through discussion

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17.

Cash A/c (1)									
Dr									**Cr**
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2015					2015				
Dec 1	Capital	2	347 000	00	Dec 7	Insurance	4	82 000	00
Dec 5	Sales	3	272 000	00	Dec 12	Furniture	5	146 000	00
Dec 15	Sales	3	120 500	00	Dec 19	Purchases	6	180 000	00
Dec 23	Sales	3	118 700	00	Dec 21	Purchases	6	100 000	00
Dec 24	Sales	3	75 000	00	Dec 25	Rent	8	164 000	00
Dec 27	Sales	3	125 500	00	Dec 26	Salary	9	67 000	00
					Dec 28	Purchases	6	220 000	00
					Dec 31	Balance c/d		99 700	00
			1 058 700	00				1 058 700	00
Jan 1 2016	Balance b/d		99 700	00					

18.

Cash A/c (1)									
Dr									**Cr**
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2013					2013				
Jan 1	Capital	2	700 000	00	Jan 3	Purchases	3	360 000	00
Jan 5	Carvings	4	450 000	00	Jan 7	Carvings	5	245 000	00
Jan 11	Carvings	4	280 000	00	Jan 13	Furniture	6	45 500	00
Jan 19	Sales	8	150 450	00	Jan 16	Wages	7	54 500	00
Jan 23	Sales	8	120 600	00	Jan18	Purchases	3	235 500	00
Jan 26	Sales	8	92 800	00	Jan 21	Transport	9	34 500	00
					Jan 22	Rent	10	25 000	00
					Jan 24	Purchases	3	225 000	00
					Jan 25	Wages	7	100 000	00
					Jan 27	Electricity and Water bills	11	25 000	00
					Jan 31	Balance c/d		443 850	00
			1 793 850	00				1 793 850	00
Feb 1 2013	Balance b/d		443 850	00					

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19.

Cash A/c									(1)
Dr									**Cr**
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2014					2014				
Jan1	Capital	2	630 800	00	Jan 3	Veterinary drugs	3	205 000	00
Jan 6	Sales	4	165 850	00	Jan 4	Treatment	3	144 500	00
Jan 14	Sales	4	140 700	00	Jan 8	Cattle shed	5	132 000	00
Jan 23	Sales	4	52 300	00	Jan 12	Salaries	6	220 000	00
Jan 26	Sales	4	240 000	00	Jan 19	Water & Electricity bills	7	35 000	00
Jan 29	Sales	4	85 000	00					
					Jan 31	Balance c/d		578 150	00
			1 314 650	00				1 314 650	00
Feb 1 2014	Balance b/d		578 150	00					

20.

Cash A/c									(1)
Dr									**Cr**
Date	**Particulars**	**Folio**	**Amount**		**Date**	**Particulars**	**Folio**	**Amount**	
			sh	**ct**				**sh**	**ct**
2019					2019				
Nov 1	Capital	2	942 800	00	Nov 2	Purchases	3	510 400	00
Nov 4	Sales	5	128 350	00	Nov 2	Transport	4	24 500	00
Nov 6	Sales	5	258 400	00	Nov 4	Electricity	6	95 500	00
Nov 12	Sales	5	327 200	00	Nov 9	Purchases	3	245 200	00
Nov 15	Sales	5	186 200	00	Nov 9	Transport	4	16 000	00
Nov 22	Sales	5	321 400	00	Nov 15	Electricity	6	21 000	00
Nov 26	Sales	5	94 700	00	Nov 19	Purchases	3	600 750	00
					Nov 19	Transport	4	10 000	00
					Nov 26	Wages	7	184 000	00
					Nov 30	Balance c/d		551 700	00
			2 259 050	00				2 259 050	00
Dec 1 2019	Balance b/d		551 700	00					

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Chapter Thirteen

Statistics

Introduction

Statistics is a mathematical science that deals with collection, analysis, and interpretation of data. Graphical presentations of statistical data are drawn as pictograms, bar graphs, pie charts, and line graphs. In previous classes, the pupil learnt how to draw pictorial representations, bar graphs, and pie charts. In this chapter, the pupil will learn how to draw and interpret line graphs from statistical data presented. Also, they will learn how to carry out projects using various data by considering given criteria. The competencies gained will help the pupil to collect, analyse, and interpret data in different fields such as currency and insurance, ecology and environmental education, pandemic diseases, population size, deaths, and geology.

Pupil's activities

(a) Reading and interpreting line graphs
(b) Drawing line graphs

Teaching and learning resources

Statistical data, statistics charts, cards, plain paper, graph paper, a ruler, a pencil, manila paper, and marker pen

13.1 Revision

Activities

(i) Collecting data.
(ii) Presenting the data collected in a pie chart.

Teaching and learning materials

Statistical data, pencils, cards, plain paper and statistical charts

Teaching steps

Instruct the pupils to attempt Exercise 1.

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Answers to Exercise 1

1. 94%
2. 130 centimetres or 1.3 metres
3. 60 kilograms or 60 000 grams or 0.06 ton
4. (a) Kipa (b) Jivu (c) 6 teachers (d) 36 teachers
5. (a)

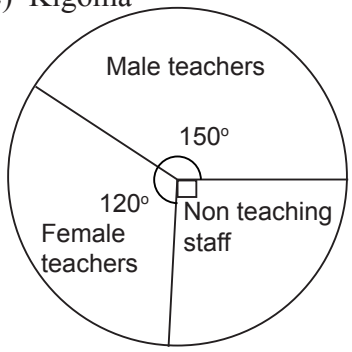
Region	Mwanza	Kagera	Kigoma	Mbeya
Angle	120°	80°	60°	100°

(b)

Region	Mwanza	Kagera	Kigoma	Mbeya
Passengers	1 200	800	600	1 000

(c) Kigoma

6.



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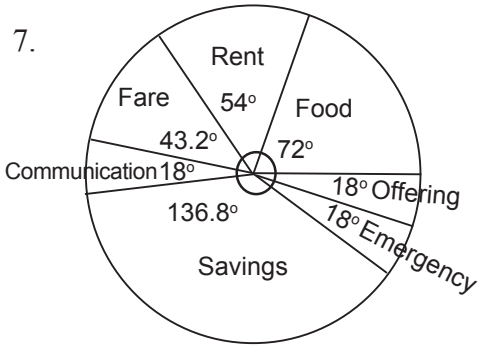

8. (a)

Expenditure	Angle
Food	80°
School fees	200°
Fuel and maintanance	40°
Offering	20°
Electricity and water bills	20°

(b)

Item	Expenditure (sh)
Food	400 000
School fees	1 000 000
Fuel and maintanance	200 000
Offering	100 000
Electricity and Water bills	100 000

(c)

Item	Percentage
Food	22.22
School fees	55.56
Fuel and maintanance	11.11
Offering	5.56
Electricity and water bills	5.56

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9. (a)

Year	Angle
2013	110°
2014	120°
2015	130^0

(b)

Year	Number of pupils
2013	11 000
2014	12 000
2015	13 000

(c) 2015 year (d) 2013 year

13.2 Line graphs

Activities

Reading and interpreting a line graph.

Teaching steps

(i) Guide the pupils to interpret a line graph using the provided example.

(ii) Instruct the pupils to attempt Exercise 2.

Answers to Exercise 2

1. (a) (i) 40 bags (ii) 50 bags (iii) 70 bags
   (b) (i) 2 minutes (ii) 5 minutes (iii) 7 minutes

2. (a)

Monday	Tuesday	Wednesday	Thursday	Friday
40	30	50	40	34

(b) Wednesday (c) Tuesday (d)Monday and Thursday

3. (a) 12 tons (b) 6 tons (c) 12 tons (d) 4th week
   (e) 22 tons

4. (a) 8th hour (b) 1st and 6th hours (c) Decreased, 5
   (d) 20 (e) 8 (f) 1
   (g) 10 (h) 103

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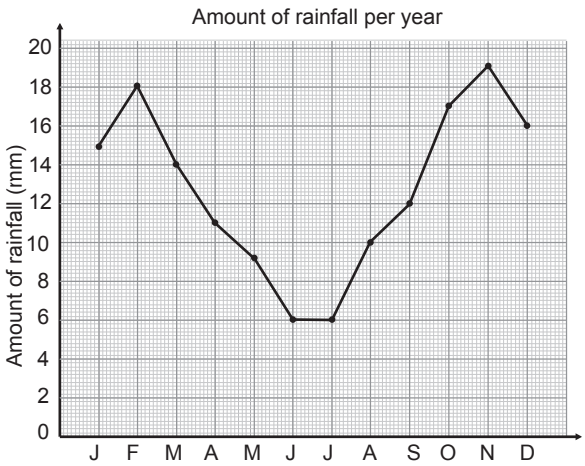
5. (a) 2005, 2007 and 2010 (b) 860 (c) 2005 and 2007
(d) 140 workers (e) Nil (f) 600
(g) 2 400

6. (a) 600 (b) 0 (c) 2002, 200
(d) 2000, 400
2001, 200
2004, 200
2005, 200
2006, 100
(e) 200 (f) 2005, 800 (g) 2003, 200

7. (a)

Month	Amount of Rainfall (in mm)
January	15
February	18
March	14
April	11
May	9
June	6
July	6
August	10
September	12
October	17
November	19
December	16



(b) 4 millimetres (c) June and July (d)12.75 millimetres (e) November
(f) (i) Yes (ii) No idea (iii) Yes (iv) Yes
(v) Yes

8. (a) 10 (b) Wednesday (c) Monday
(d) Friday (e) 7
(f) Tuesday, he did many questions than the previous day (Monday)

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9. (a)

Time (hours)	1	2	3	4	5	6	7
Distance (km)	5	10	5	0	10	5	10

(b) 0 kilometre per hour

(c) (i) 5 kilometres (ii) 5 kilometres

(d) The bicycle rider stopped / rested for 1 hour.

(e) 45 kilometres

(f) The explanation will vary among pupils

(g) The pupils should list any 5 questions relating to the explanations in part (f)

10. (a) 5 minutes (b) 68 per minutes (c) 81 per minute

(d) 5 to 7 minutes.

13.3 Drawing a line graph

Activities

Drawing and interpreting a line graph.

Teaching steps

(i) Guide the pupils to draw and interprete a line graph.

13.4 Projects on various statistics

Activities

(i) Collecting statistical data and presenting them in a table.

(ii) Drawing a line graph by using the statistics data presented in (i).

(iii) Interpreting the line graph in (ii).

Teaching and learning materials

Manila paper and marker pen

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Teaching steps

(i) Instruct the pupils to:

- Form groups according to the size of the class or information needed.
- Collect various statistical information from the school environment (example, number of girls and boys in every class, truants, sick pupils, data on sales of various items in the school shop) in their groups.

(ii) Guide the pupils to:

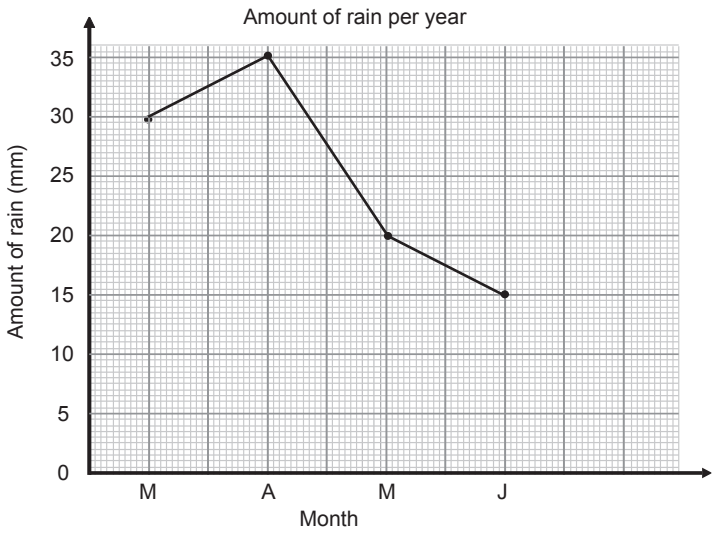
- Write the given information in the table and present it in the classroom.
- Draw a line graph using the data presented in the table.
- Analyse and interprete the line graph.

(iii) Discuss how to present the data and write a report.

(iv) Instruct the pupils to attempt Exercise 3.

Answers to Exercise 3

1. (a)



(b) June (c) April (d) June (e) 25 mm

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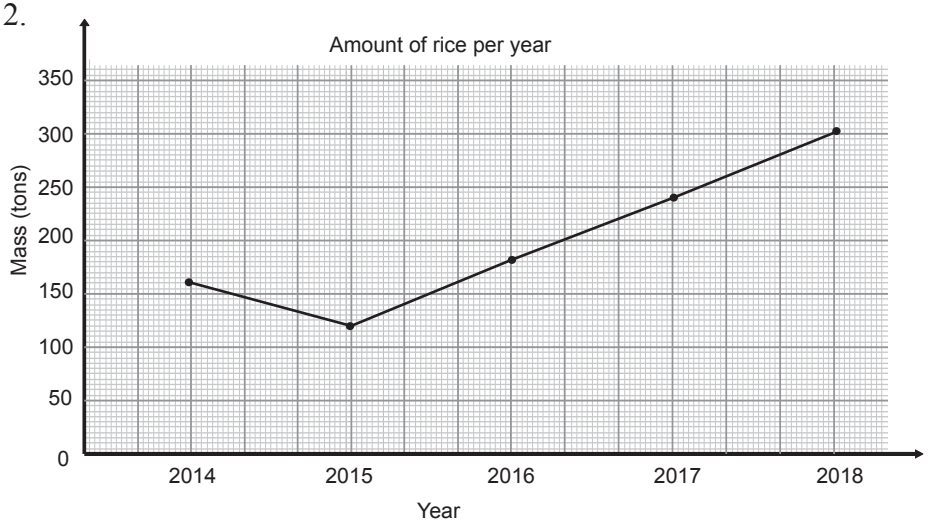
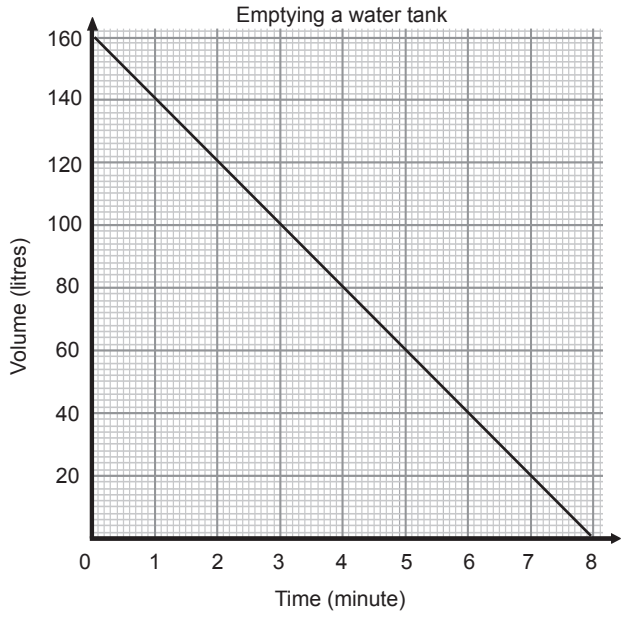
2.



3. (a)



(b) After 8 minutes the tank was empty. So, the pupil was allowed to go for self-study.

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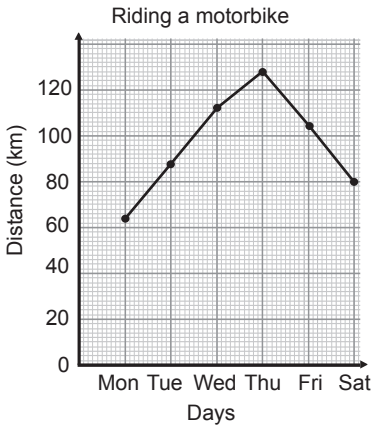
4. (a)

Day	43	53	50	57	59	67
Degree (°F)	1	2	3	4	5	6

(b) 50°F
(c) Day 1
(d)1 and 3, low temperature
(e) 5 and 6, high temperature

5.



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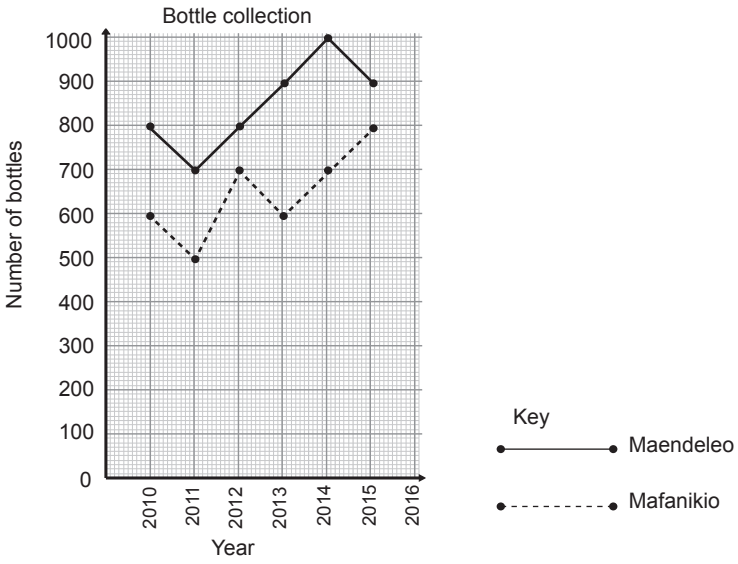

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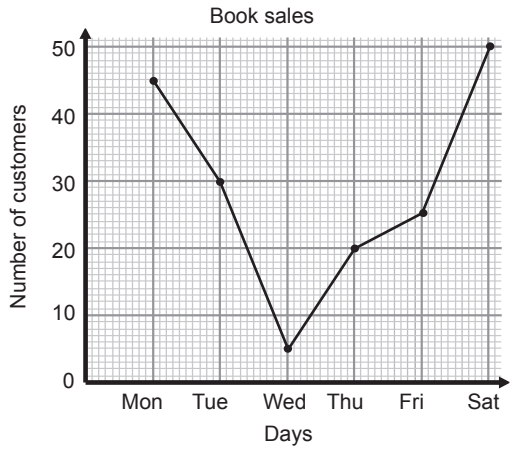
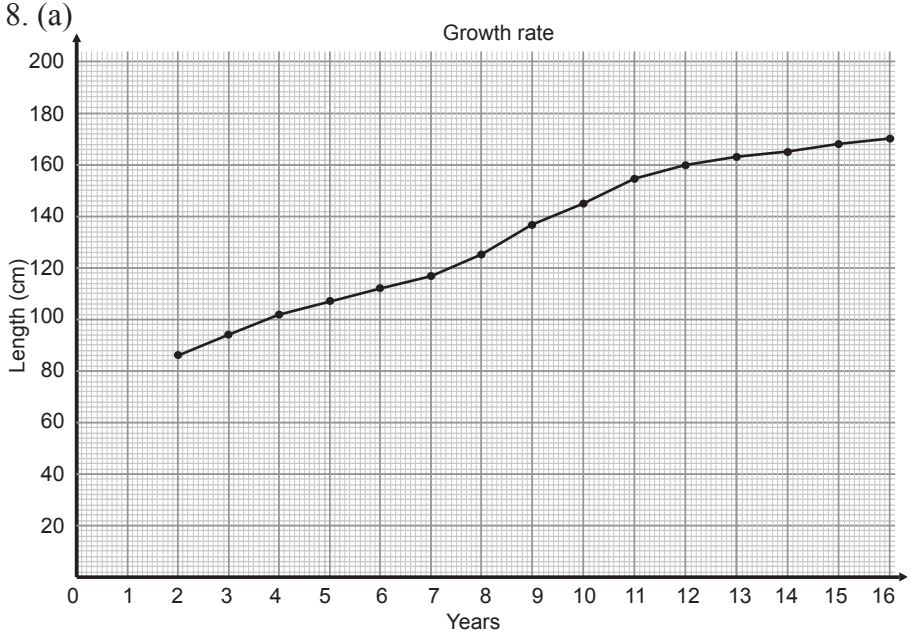
7.



(a) Saturday
(b) Wednesday
(c) 45 customers (d) 29 customers (e) 175 gifts
(f) Wednesday. The least number of customers.

8. (a)



(b) 4 years (c) 6 years (d) 10 years
(e) (i) No (ii) No (iii) Yes (iv) Yes

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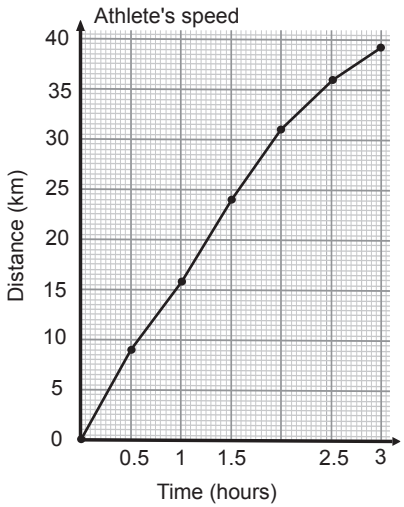
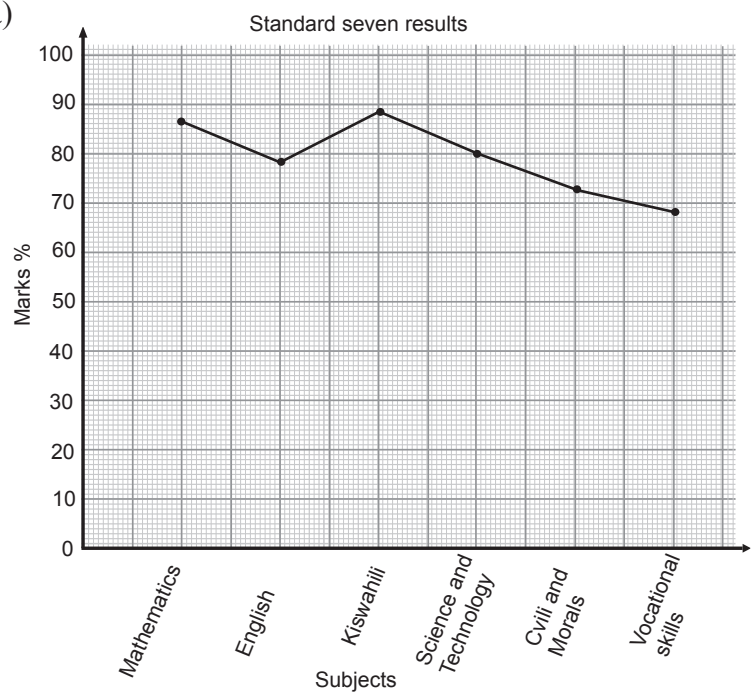
9.



(a) 1 hour and quarter

(b) Speed decreases after 2 hours

10. (a)



(b) Kiswahili (c) Vocational skills (d) 78.7

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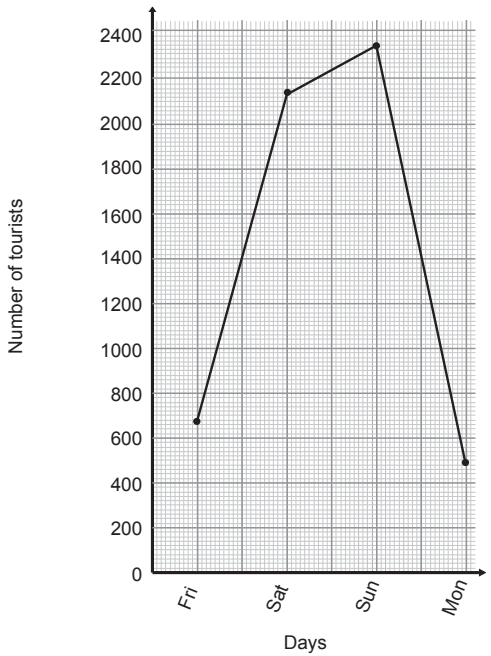
Teaching steps

Instruct the pupils to attempt the Revision exercise

Answers to Revision exercise

1. (a) 120 kilometres (b) Car A (c) Car B (d) 60 kilometre
   (e) Car A (f) 15 minutes (g) 1:15 hours
   (h) Car B, 2.45 p.m to 3.00 p.m and 5.15 p.m to 6.00 p.m
   (i) Yes, 4.45 p.m, 5.40 p.m, 6.15 p.m
2. (a)



   (b) Sunday, weekend
   (c) Monday, week start
   (d) 33 738 000 shillings

3. (a) A story about carrying sugar in a leaking bag, or a story about carrying rice in a leaking bag or a story about carrying water in a leaking bucket.

(b)

Distance	180	160	140	120	100	80	60	40	20	0
Time	0	1	2	3	4	5	6	7	8	9

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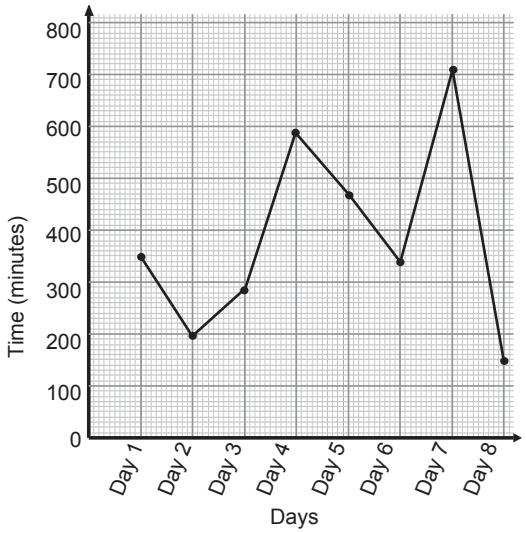
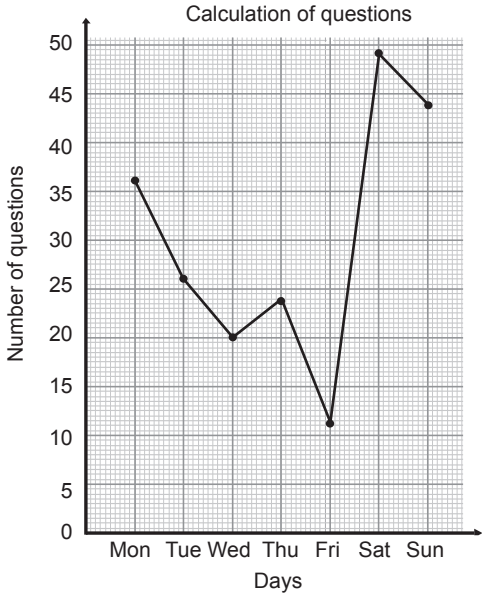
4. (a)



(b) Guide the pupils to draw a line graph using the data from the given table.

5. (a) 40 centimetres (b) 80 centimetres (c) 6 years (d) 4 years
(e) between 2 and 4 years (f)10 centimetres (g) 160 centimetres
(h) No, sometimes the height of a human being remains constant.

6. (a)



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(b) 92 (c) 62 (d) 210 (e) 30

7. (a) 100%
   (b) 266
   (c) She passed the test; the average score for 6 weeks is 93 %
   (d) 2, 4 and 6 week, the scored marks are 90, 86 and 80

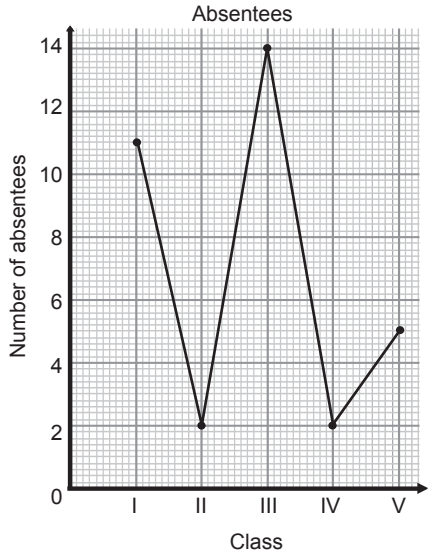
8. (a)

Year	2013	2014	2015	2016	2017	2018	2019	2020
Price (sh)	1400	1600	1800	2200	2300	2200	2300	2400

   (b) 2300 shillings (c) Raised by 100 shillings
   (d) 2017 and 2019, 2016 and 2018
   (e) 800 shillings and 1 000 shillings
   (f) Year 2021; 2 500 shillings Year 2022; 2 600 shillings
   Year 2023; 2 700 shillings

9. (a) 32.4%, 5.9%, 41.1%, 5.9%, and 14.7%

   (b)



   (c) Standard I and III, the number of absentees is very high.

10. Guide the pupils to answer Question 10.

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