UNIT 1: IDENTIFY VARIABLES AND WORK WITH LIKE AND UNLIKE TERMS

Exercise 1.2.1

Work on your own. Complete the following table. The first row has been done for you as an example.

Term	Coefficient	Variable
1. $-7ab^2c$	-7	ab^2c
2. $3xy^2$		
3. $1098\frac{a^3}{b^2}$		
4. $-\frac{d}{e}$		
5. $\sqrt{11}q^5$		
6. $-\frac{3}{7}\sqrt{x}$		
7. $-4^3\frac{p}{q}$		

Exercise 1.3.1

Individual activity. Complete the following table. The first row has been done for you as an example.

Term 1	Term 2	Variable 1	Variable 2	Like terms or unlike terms?
1. $2x^2$	$3x$	x^2	x	Unlike
2. $4xy$	$-7x$			
3. $12pq$	$3pq$			
4. $5\frac{y}{x^2}$	$-5\frac{y}{x}$			
5. $17p^2m^3$	$2p^2m^3$			
6. $-5acb$	$3abc$			
7. $-4x^2zy$	$-5yzx^2$			

Exercise 1.4.1

Individual activity. Read each question carefully before answering. Complete your work on a separate page and put it behind this page in your file. Mark you questions clearly.

1. Study the algebraic expression and answer the answers that follow:

   $6x + 3yz - 2z^2$

   (i) How many terms are in this expression?

   (ii) Are there any like terms? If there are, group them together.

2. Study the following algebraic expression and answer the answers that follow:

   $3(a + b) + \frac{3a - 2}{5} \times z^2$

   (i) How many terms are in this expression?

   (ii) Write the terms down separately, one below the other.

3. Study the following algebraic expression and answer the answers that follow:

   $7x^2 - 3 + 5x^3 - 3x + x^5 - 2x^6$

   (i) How many terms are in this expression?

   (ii) What is the coefficient of the fifth term?

   (iii) What is the coefficient of the sixth term?

   (iv) What is the power of x in the fourth term?

4. Study the following algebraic expression and answer the answers that follow:

   $4x^2 \times 3 + 5x - 3x + (x^5 - 2x^6)$

   (i) How many terms are in this expression?

   (ii) Are there any like terms in the expression? If "yes", then write them down one below the other.

5. Complete the following table:

Algebraic expression	Number of terms
$\frac{5b^4}{2} + 4x$	(i)
$\frac{m+n}{3} \times \frac{2^3}{a}$	(ii)
$(4 - p)q^2$	(iii)
$6x + 5y \times 8x$	(iv)

Exercise 1.5.1

Individual activity. Read each question carefully before answering. Complete your work on a separate page and put it behind this page in your file. Mark you questions clearly.

1. Simplify the following algebraic expressions:

   (i) $5x + 1 - x + 3$

   (ii) $14y + 3 - 3y + 7 + y$

   (iii) $5a + a + a + 2b + b - 2a$

   (iv) $2x^2 + x + 3x + 5x^2 - 2$

   (v) $12xy + 3yx - 5yx + 2xy$

2. Add the following two algebraic expressions:

   $5x^3 + 7 - 2x^3 + 3x^2 + 2$ and $x^2 + 6x + 10 + x^2 - 2x - 3$

3. Simplify the following as much as possible:

   (i) $5xy + 2yx$

   (ii) $2xy + y - 3xy$

   (iii) $x - 3x + 2 - 4x$

   (iv) $4ab + 10bc - 2ab - 5bc$

   (v) $2x^2y - xy^2 + 3yx^2 - 2y^2x$

Exercise 1.5.2

Individual activity. Read each question carefully before answering. Complete your work on a separate page and put it behind this page in your file. Mark you questions clearly.

Subtract the following:

1. Subtract $a - 2b + 3c$ from $3a - 4b + 2c$.
2. Subtract $xy + 3x + 2y$ from $5xy + 6x + 5y$
3. Subtract $-a^3b + 3a^2b^2 - 2$ from $5a^3b - 10 - 5a^2b^2$
4. Subtract $12mp - 8p + 5m^2$ from $20pm + 7m^2 - p$

Simplify these as much as possible:

5. $q^2 + q^3 + 2q^2 - q^3$
6. $x^2 - 5x + 4 - x^2 + 6x - 3$
7. $h^3 + 5h - 3 - 4h^2 - 2h + 7 + 5h^2$
8. $3a^2b - 2ab + 4ba^2 - ba$

UNIT 2: THE BASE, COEFFICIENT, INDEX (EXPONENT) AND POWER OF A TERM

Exercise 2

Individual activity. Complete the table below. The first row has been done for you as an example.

Term	Coefficient	Base	Index / power / exponent
1. $-7x^5$	-7	x	5
2. $20y^2$			
3. $\frac{4}{5}m^{12}$			
4. $-5p^2$			
5. $0{,}34d^5$			

Rearrange the following expressions in ascending powers.

6. Rearrange the following expression in ascending powers of x:

   $2x^3 - 1 + \frac{3}{4}x + 7x^2$

7. Rearrange the following expression in descending powers of q:

   $2q^2 + 3q^3 + 2 - 5q$

8. Rearrange the following expression in descending powers of b:

   $\sqrt{13}b^5 - 6b^8 + b^2 + 7b$

9. Rearrange the following expression in ascending powers of x:

   $3x^3 + 5 - 4x^2 - 4x^5$

UNIT 3: USE THE BASIC LAWS OF EXPONENTS

Exercise 3.1

	Complete the exercise as classwork or homework by applying the laws of exponents.
1. $4^x \times 4^3$	2. $x^3 \times x^3$
3. $y^8 \div y^3$	4. $x^5 \div x$
5. $x^5 \times x^3$	6. $a^4 \times a^2 \div a^3$
7. q^0	8. $(p^2)^6$
9. $y^3 \times y^5$	10. $(mn)^3$
11. $2^{10} \div 2^4$	12. $(2^3)^4$

Exercise 3.2

	Do Exercise 3.2 as classwork or homework by applying the laws of exponents.
1. $cd^2 \times cd$	2. 8^0
3. $x^3y^4 \div xy$	4. $x^5 \times x^1$
5. $(2cd^4)^2(cd)^5$	6. $(2fg^4)^4(fg)^6$
7. $x^9 \times x^{-7}$	8. $(4x^4y^{-4})^3$
9. $(j^{13})(j^4)(j^6)$	10. $x^2y(x^4y^3)$
11. $a^2 \times a^3 \times a^4$	12. $2 \times 6 \times a^4 \times a^2$
13. $2a^3 \times 3a^4$	14. $2(e^4)^2$
15. $3m(2m^2)^3$	16. $3a^2(3a^2)^2$

UNIT 4: SIMPLIFICATION OF ALGEBRAIC EXPRESSIONS

Exercise 4.1.1

Work on your own. Complete the exercise as classwork or homework. Do the following multiplications:

1. $3x \times x^2$
2. $5a^3 \times 3a^2$
3. $2t \times 3s$
4. $2y \times 2y \times y$
5. $(2a)^2 \times 5a$
6. $5x^3 \times 3y^2 \times x$
7. $(3y)^2 \times 2y$
8. $6xy^2 \times 2x^3 \times 3xy$
9. $7x \times 2y^2 \times (2y)^2$
10. $(2ab)^2 \times 5a^2b^5$

Exercise 4.1.2

Work on your own. Complete the exercise as classwork or homework. Do the following multiplications:

1. $5(2+3a)$
2. $2(b-4c)$
3. $-3(2a+6)$
4. $-5(3-x)$
5. $-(a-2b)$
6. $3a+2(a+2b)$
7. $5(t-3)-6$
8. $7x-(x-y)$
9. $2(x-y+z)$
10. $5(3a+b-4c)$
11. $3(4x-6y+8)$
12. $5x-3(2x-y)$
13. $2(2-x)-(x+3)$
14. $5x-7y-(x-2y+z)$
15. $x(x-y)-4y(x+2y)+5x(y-x)$

Exercise 4.2.1

	Work on your own. Complete the exercise as classwork or homework. Simplify the following by multiplying the two brackets with each other.

1. $(x+1)(x+4)$
2. $(x-7)(x+3)$
3. $(y+2)(y-6)$
4. $(x-4)(x-5)$
5. $(2y+5)(3y-2)$
6. $(x+6)^2$
7. $(3x-4)(4x-3)$
8. $(3a-b)(2a+b)$
9. $(2a-b)(2a+b)$
10. $(4x-5y)^2$

UNIT 5: FACTORISATION

Exercise 5.1

Work on your own. Complete the exercise for classwork or homework. For each of the following groups of numbers, find the highest common factor (HCF).

1. $4ac^2;\ 8bc;\ 4b^2c$
2. $3x^2;\ xy;\ 9y^2$
3. $25a^3b^2c;\ 15a^2b^2c;\ 20a^2b^4$
4. $12cd;\ 16c^2;\ 10cd^2$
5. $15x^2y^3;\ 21xy;\ 12y^2$
6. $5a^2bc;\ 12ac;\ 7bc^2;\ 10ac^2$
7. $30x^4yz^3;\ 45x^2y^4z^2;\ 50x^5y^3z^2$
8. $32x^2y^2;\ 24x^2y;\ 16x^2y^3$
9. $10mn;\ 2m;\ 5n$
10. $5xy;\ 15y;\ 20xy^2$

Exercise 5.2.1

	Work on your own. Complete for classwork or homework. Factorise the following expressions by taking out the highest common factor.

1. $5x - 25$	2. $8k^2 - 64$
3. $3g^2 + 4g$	4. $4q^2 - 8q$
5. $5q^2 - 4q$	6. $3w^2 - 8w$
7. $7w^2 - 49w$	8. $s^2 - 4s$
9. $3h^2 + 4h$	10. $16x^2 - 4x$
11. $5x - 15$	12. $10 + 20n^2$
13. $50x - 80y$	14. $21p^2 + 30p^2 + 27p$
15. $-10x^4 + 20y^2 + 12x$	16. $27y^2 + 12y^2x + 9y^2x^2$
17. $30m^6 + 15mn^2 - 25$	18. $3p + 12q - 15q^2$
19. $28b + 14b^2 + 35b^3$	20. $4a^2b^3 + 4a^2b - 8ab - 8ab^2$

Exercise 5.2.2

	Work on your own. Complete the exercise for classwork or homework. Factorise the following expressions by taking out the highest common factor.
1. $6x^2 - 36$	2. $9y - 81$
3. $5g^2 + 10g$	4. $12q^2 - 24q$
5. $10q^2 - 4q$	6. $3w^2 - 9w$
7. $2w^2 - 10w$	8. $s^2 - 16s$
9. $4h^2 + 5h$	10. $25x^2 - 5$
11. $9 + 18b^2$	12. $45x^2 - 25$
13. $56 - 35p$	14. $7ab - 35a^2b$
15. $-3a^2 + 6a^3b^2$	16. $-5x^2 - 5x^3 - 15x^4$
17. $20x^4 - 30x + 30$	18. $24m^4 + 40m^3 + 8$
19. $30b^9 + 5ab - 15a^2$	20. $-18n^5 + 3n^3 - 21n - 9n^2$

UNIT 6: IDENTIFY AND SOLVE LINEAR EQUATIONS

Exercise 6.2.1

	Work on your own. Complete the exercises as classwork or homework. Solve the following equations to find the unknown variable.
1. $8 = 8n$	2. $11 - x = 8$
3. $n + 12 = 12$	4. $a + 8 = 12$
5. $11 - x = 7$	6. $y - 3 = 2$
7. $z + 5 = 12$	8. $9 = 6 - 6p$
9. $7(v - 6) + 4v = 8$	10. $-3 = 4(a + 5)$
11. $7a - 3 = 5 + 5(a - 8)$	12. $5b + 3 = 2 + 7(b - 6)$
13. $5(k - 7) - 9 = 9$	14. $2 = 8(w - 8)$
15. $9t + 6 = -1 + 6(t - 4)$	16. $2m + 9 = -4 + 7(m - 6)$
17. $6 = \frac{p}{8}$	18. $\frac{(a-4)}{6} = 7$
19. $\frac{5c}{8} = 4$	20. $\frac{6a}{1} = 1$
21. $4 = 5p$	22. $\frac{x}{7} = 8$
23. $\frac{7m}{9} = 4$	24. $5 = \frac{t-6}{2}$
25. $8x - 3 = 4x + 1$	26. $2x + 5 = 5x - 1$
27. $7x - 5 = 9x - 13$	28. $2x + 7 = 5x + 16$
29. $14 - 3x = 10 - 7x$	30. $5x + 1 = 8 - 2x$

Exercise 6.3.1

	Work on your own. Do the exercises as classwork or homework. Solve word problems with one variable.
1. Divide $R50$ between two people so that one gets $R6$ more than the other.	
2. The sum of two consecutive numbers is 67. Find the numbers.	
3. Albert is 3 years older than Philip. Together they are 17 years old. How old is Albert?	
4. Oceanside Bike Rental Shop charges R 14 plus R 6 an hour to rent a bike. Tim paid R 50 to rent a bike. How many hours did he rent the bike for?	
5. On Monday, 236 students went on a trip to the zoo. All 4 buses were filled and 8 students had to travel in cars. How many students were in each bus?	
6. Mike had R 118 to spend on 8 books. After buying them he had R 14. How much did each book cost?	
7. Nosiphe bought a cold drink for R 3 and 5 chocolates. She spent a total of R 23. How much did each chocolate cost?	
8. Nwabisa sold half of her comic books and then bought 9 more. She now has 11. How many did she begin with?	
9. Lwazi spent half of his allowance going to the movies. He washed the family car and earned R 8. What is his weekly allowance if he ended with R 16?	
10. Jessica had R 286 to spend on 7 books. After buying them she had R 13. How much did each book cost?	

UNIT 7: MANIPULATE A SIMPLE FORMULA

Exercise 7.1.1

	Work on your own. Do the exercises as classwork or homework. Change the subject of the formula to the letter given in brackets, after the formula.
1. $ax - b = c$ (x)	2. $px + q = r$ (x)
3. $m + \frac{x}{n} = p$ (x)	4. $r - sx = t$ (x)
5. $V = l \times b \times h$ (b)	6. $A = l \times b$ (b)
7. $m = \frac{a+b}{2}$ (a)	8. $E = mc^2$ (m)
9. $A = \frac{1}{2}b \times h$ (h)	10. $ax = 2a$ (x)

Exercise 7.2.1

	Work on your own. Do the exercises as classwork or homework. Do the following: (i) Change the subject of the formula to the letter given in brackets, after the formula. (ii) Calculate the value of the variable which is now the new subject, by substituting the given values. Remember to round to three decimal places where necessary.
1. (i) $v = u + at$ $(t.)$ (ii) $v = 15;\ u = 10;\ a = 4{,}5$	
2. (i) $3a = 2b - ax$ (x) (ii) $a = 7,\ b = 3.$	
3. (i) $p = m^2 - \frac{x}{2}$ (x) (ii) $p = 25{,}6;\ m = 4$	
4. (i) $v^2 = u^2 + 2as$ (s) (ii)…$v = 24;\ u = 3;\ a = 5$	
5. (i) $T = ar^2$ (r) (ii) $T = 540;\ a = 10$	
6. (i) $D = \sqrt{WL}$ (L) (ii) $D = 120,\ W = 24$	