TOPIC: ALGEBRAIC EQUATIONS					
LESSON 3					
TERM	2	**WEEK**		**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS SKILLS	Solve equations by inspection				

RELATED CONCEPTS / TERMS / VOCABULARY / EAC

Substitution; Equality; Constant; Co-efficient

PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE

Seeing equal sign as representing equivalence; Distributive property; Commutative and associative property; Inverses and inverse operations; The idea of balancing the equation

RESOURCES

Wits Maths Connect Supporting Secondary Maths(WMCS Equations); Mathematics TODAY Grade 9 learners' Book; Mathematics Grade 9 Examination Aid; Classroom mathematics

ERRORS/MISCONCEPTIONS / PROBLEM AREAS

Seeing equal sign as used to mean " and the answer is" instead of saying "same as"

METHODOLOGY

Examples

Solve the following equations by inspection

1. $x-4=11$
2. $x+10=25$
3. $2x-3=24$
4. $2(x-3)=24$
5. $x+9=12+3-9$

ACTIVITIES/ASSESSMENTS

Solve the following equations by inspection:

1. $5x+7=-3$
2. $6-x=8$
3. $10-4x=50$
4. $4(x-4)=60$
5. $27=6x+3$
6. $7-2x=11$
7. $3x=12$
8. $\frac{3x}{4}+5=14$
9. $\frac{x}{2}-3=9$
10. $\frac{x}{2}=5-\frac{x}{3}$
11. $x+7=3x-15$

Question 10 and 11 was included for the purpose of preparing learners for next lesson: solving equations using multiplicative and additive inverses.

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 4					
TERM	2	**WEEK**		**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS and SKILLS	Solve Equations By using Additive and Multiplicative Inverses (equations with variables on one side)				
RELATED CONCEPTS / TERMS / VOCABULARY / EAC					
Constant. Additive inverse, multiplicative inverse, Co-efficient, Distributive law					
PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE					
Seeing equal sign as equivalence; Distributive property; Commutative and associative property; Inverses and inverse operations; Addition of like terms					
RESOURCES					
• Wits Maths Connect Supporting Secondary Maths(WMCS Equations); Mathematics TODAY Grade 9 learners' Book; Mathematics Grade 9 Examination Aid; Classroom mathematics					
ERRORS/MISCONCEPTIONS / PROBLEM AREAS					
Invalid distribution of brackets; Deletion error; Transposition error; Sign errors; Interference of new/old knowledge					
METHODOLOGY					

Worked examples

Solve for x:

1. $x+5=7$
2. $2x+3=7$
3. $11=3x-4$
4. $4(x+5)=40$
5. $3(x+2)+5=23$

Solutions

1. $x+5=7$

Step 1 Add -5, the additive inverse of 5 on both side of the equation

$x+5+(-5)=7+(-5)$

Step 2 Simplify

$x+5-5=7-5$

Step 3 Add like terms

$\therefore x=2$

2. $2x+3=7$

Step 1 Subtract 3 to both sides of the equation so that constant terms sum to zero on the left hand Side

$2x+3-3=7-3$

We get

$2x=4$

Step 2 We are looking for x not 2x, therefore we multiply both sides by the multiplicative inverse of 2

$2x\times\frac{1}{2}=4\times\frac{1}{2}$

Step 3 **Simplify** $\therefore x=2$

Note: In example 1 we added negative 5. We could also have said "subtract 5"because adding a negative number" is the same as "subtracting a positive number". In example 2, we multiplied by the multiplicative inverse of 2 which is $\frac{1}{2}$. We could have also said "divide by 2" because dividing 2" is the same as "multiplying by $\frac{1}{2}$"

3. $11 = 3x - 4$

Step 1	Add the additive inverse to both sides of the equations	$11 + 4 = 3x - 4 + 4$
Step 3	Add the like terms	$15 = 3x$
Step 4	Divide both side by 3	$\frac{15}{3} = \frac{3x}{3}$
Step 5	Simplify	$\therefore 5 = x$

4. $4(x + 5) = 40$

Step 1	Remove brackets by applying the distributive law	$4x + 20 = 40$
Step 2	Add the additive inverse to both sides of the equation	$4x + 20 - 20 = 40 - 20$
Step 3	Add the like terms	$4x = 20$
Step 3	Divide both sides by 4	$\frac{4x}{4} = \frac{20}{4}$
Step4	Simplify	$\therefore x = 5$

5. $3(x + 2) + 5 = 23$

Step 1	Remove brackets by applying the distributive law	$3x + 6 + 5 = 23$
Step 2	Add like terms on the left hand side of the equation	$3x + 11 = 23$
Step 4	Add the additive inverse of +11 to both side of the equation	$3x + 11 - 11 = 23 - 11$
Step 5	Add the like terms	$3x = 12$
Step 4	Divide by the 3 to both sides of the equation	$\frac{3x}{3} = \frac{12}{3}$
Step 5	Simplify	

ACTIVITIES/ASSESSMENTS

1. Solve for the variables in each of the following

1.1 $6x - 1 = 17$ 1..2 $2p + 3 = 15$ 1.3 $3y - 8 = 19$

1.4 $17 = 3 + 3x$ 1.5 $3 = -3 + 3x$ 1.6 $\frac{1}{2}x + 2 = 14$

2. Solve for x

2.1 $2(x + 5) = 8$ 2.2 $4(x + 3) = 32$ 2.3 $2(3x + 1) = 14$

2.4 $3(2x - 1) = 9$ 2.5 $2(x + 1) + 3 = 9$ 2.6 $2(x - 5) + 17 = 23$

3. Solve for x

3.1 $3(x+1)+2(2x+3)=23$

3.2 $2(3x+4)+2x=64$

3.3 $5x+3(6-x)=14$

3.4 $4x-4-2(x+3)-4=8$

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 5					
TERM	2	**WEEK**		**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS SKILLS	Solve Equations By using Additive and Multiplicative Inverses (equations with variables on both sides)				

RELATED CONCEPTS / TERMS / VOCABULARY / EAC

Constant. Additive inverse, multiplicative inverse, Co-efficient, Distributive law

PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE

- Seeing equal sign as equivalence
- Distributive property
- Commutative and associative property
- Inverses and inverse operations
- Identify and Addition of like terms

RESOURCES

Wits Maths Connect Supporting Secondary Maths(WMCS Equations); Mathematics TODAY Grade 9 learners' Book; Mathematics Grade 9 Examination Aid; Classroom mathematics

ERRORS/MISCONCEPTIONS / PROBLEM AREAS

Transposing without changing the signs

METHODOLOGY

1. *Solve for x*

   1.1 $5x-8=2x+4$

   1.2 $2-3x=7-x$

   1.2 $3x+5=11-x$

   1.4 $5(x-4)=3(x+2)+8$

ACTIVITIES/ASSESSMENTS

1. Solve for x

   1.1 $x+7=3x-15$ 1.2 $15-2x=9x-7$ 1.3 $6x+3=x-27$

   1.4 $7x-5=4x+16$ 1.5 $3x+6=-10-5x$ 1.6 $3x-6=x+2$

2. Solve for x

   1.1 $x+7=3x-15$ 1.2 $15-2x=9x-7$ 1.3 $6x+3=x-27$

   1.4 $7x-5=4x+16$ 1.5 $3x+6=-10-5x$ 1.6 $3x-6=x+2$

3. Solve for x

2.1 $3(x+3)=2(2x-3)$

2.2 $3(x-1)-24=2(-1-x)$

2.3 $6(x-1)-x=-2(x+1)+x-1$

2.4 $3(x+2)=-3(x-1)+9$

2.5 $-4(x+3)+5=2(x-6)-1$

2.6 $(x-2)^2+3x-2=(x+3)^2$

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 6					
TERM	3	**WEEK**	2	**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS SKILLS	Solve Equations By using Additive and Multiplicative Inverses (equations with fractions)				

RELATED CONCEPTS / TERMS / VOCABULARY / EAC

Constant. Additive inverse, multiplicative inverse, Co-efficient, Distributive law, Highest Common Factor (HCF)

PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE

Seeing equal sign as equivalence; Distributive property; Commutative and associative property; Inverses and inverse operations; Addition of like terms

RESOURCES

Wits Maths Connect Supporting Secondary Maths(WMCS Equations); Mathematics TODAY Grade 9 learners' Book; Mathematics Grade 9 Examination Aid; Classroom mathematics

ERRORS/MISCONCEPTIONS / PROBLEM AREAS

Invalid distribution of brackets; Deletion error; Transposition error; Sign errors; Interference of new/ old knowledge

METHODOLOGY

1. Solve for x

1.1 $\frac{x}{4}+\frac{x}{2}=3$

1.2 $\frac{p}{4}-\frac{2p}{3}=\frac{5}{6}$

1.3 $\frac{y+3}{4}-\frac{y+2}{8}=\frac{y}{2}-1$

1.4 $\frac{a+1}{2}-\frac{2a}{3}=1$

ACTIVITIES/ASSESSMENTS

1. Solve the following equations

1.1 $\frac{5x}{4}-\frac{10x}{3}=15$

1.1 $\frac{5x}{3}+3=-\frac{2x}{5}$

1.3 $\frac{3x}{2}-\frac{15}{2}=\frac{2x}{3}-\frac{5}{3}$

1.4 $\frac{x}{5}=\frac{3}{35}+\frac{x+1}{7}$

1.5 $\frac{3x}{2}+\frac{2}{3}=\frac{1}{2}+x+\frac{7}{6}$

2. Solve for the unknown variable in each of the following equations

2.1 $\frac{x+2}{3}-\frac{x+3}{2}=5$

2.2 $\frac{a+1}{2}-\frac{a+2}{3}=2+\frac{a+3}{4}$

2.3 $\frac{p+1}{3}-\frac{5p-1}{2}=\frac{2p-4}{2}$

2.4 $\frac{2k}{5}+\frac{2k-18}{3}+\frac{k}{3}=3k-2$

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 7					
TERM	3	**WEEK**	2	**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS and SKILLS	Solve equations by using laws of exponents				

RELATED CONCEPTS / TERMS / VOCABULARY / EAC

Constant. Additive inverse, multiplicative inverse, Co-efficient, Distributive law, Base, Exponent, Power

PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE

Understanding of Prime Numbers; literal equations

RESOURCES

Calculator

ERRORS/MISCONCEPTIONS / PROBLEM AREAS

Confusing bases with exponents

METHODOLOGY

Examples:

Solve for the unknown

1.1 $5^x = 25$

1.2 $a^2 = 49$

1.3 $2^{x-3} = 16$

1.4 $3^x + 3 = 83$

1.5 $v^3 = 1000$

1.6 $3^{2x} = \frac{1}{27}$

1.7 $2.3^x = 18$

1.8 $x^3 = 64$

ACTIVITIES/ASSESSMENTS

Solve for the unknown

1.1 $2^m = 32$

1.2 $m^2 = 225$

1.3 $2^{x+3} = 128$

1.4 $5^{-x} = \frac{1}{25}$

1.5 $9^x = 1$

1.6 $3^x = 81$

1.7 $x^3 = 729$

1.8 $3^{x-1} = 27$

1.9 $5^x = \frac{1}{125}$

1.10 $7^{x+1} = 1$

1.11 $5.5^x = 100$

1.12 $3n^2 = 27$

1.13 $3^{3x+1} = 81$

1.14 $x^2 = \frac{1}{64}$

1.15 $13^{2x-1} = 1$

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 9					
TERM	3	**WEEK**	2	**GRADE**	9
DURATION	2 hours	**DATE**			
CONCEPTS SKILLS	Solve Equations of the form : a product of factors = 0				
RELATED CONCEPTS / TERMS / VOCABULARY / EAC					
Equations					
PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE					
Multiplication; Multiplication					
RESOURCES					
DBE Workbook					
ERRORS/MISCONCEPTIONS / PROBLEM AREAS					
Confusion between Multiplication					
METHODOLOGY					
Examples Solve for x 1. $(x+3)(x-7)=0$ 2. andDivision					
ACTIVITIES/ASSESSMENTS					
1. Solve for x 1.1 $(x-3)(x+4)=0$ 1.2 $(x-2)(x+3)=0$ 1.3 $(2x+3)(x+1)=0$ 2. Solve for x 2.1 $x(x-3)=0$ 2.2 $5x(x-1)=0$ 2.3 $x(x+5)=0$					

TOPIC: ALGEBRAIC EQUATIONS					
LESSON 10					
TERM	3	**WEEK**	2	**GRADE**	9
DURATION	1 hour	**DATE**			
CONCEPTS SKILLS	Solve equations of the form: a product of factors = 0				
RELATED CONCEPTS / TERMS / VOCABULARY / EAC					
Multiplication					
PRIOR-KNOWLEDGE / BACKGROUND KNOWLEDGE					
Common Factor					
RESOURCES					
DBE Workbook					
ERRORS/MISCONCEPTIONS / PROBLEM AREAS					
Confusing Multiplication and Division					
METHODOLOGY					

Worked examples

Solve for x

1. $3x^2 - 18x = 0$
2. $x^2 - 3x - 10 = 0$
3. $x^2 + 2x = 24$
4. $x^2 - 25 = 0$

ACTIVITIES/ASSESSMENTS

1. Solve for x

   a) $2x^2 + 10x = 0$ b) $x^2 - 4x = 0$ c) $x^2 + 3x = 0$

2. Solve for x

   a) $5(x-4) = 60$ *b)* $x(x-1) + 2(x-1) = 0$ *c)* $x^2 - 7x + 6 = 0$

   d) $x^2 + x = 12$ *e)* $5x^2 + 25x = 30$ *f)* $2x^2 - 10x = 72$

   g) $3x^2 + 18x = -24$ *h)* $x^2 = x + 56$ *i)* $21x - 72 = -x^2$