Grade 10 Mathematics

Topic: Algebra — Notes and Worked Examples

Study App · Zambia — These notes cover solving equations you will meet in Term 1. Work through each example with a pen and paper before trying the practice questions at the end.

1. Linear Equations

A linear equation has the variable (usually x) raised to the power 1. To solve it, do the same operation to both sides until x stands alone.

Example 1: Solve 3x + 5 = 20

Subtract 5 from both sides: 3x = 15

Divide both sides by 3: x = 5

Check: 3(5) + 5 = 15 + 5 = 20 ✓ Always check your answer by substituting back.

Example 2: Solve 2(x – 4) = 10

Expand the bracket: 2x – 8 = 10

Add 8 to both sides: 2x = 18

Divide by 2: x = 9

2. Simultaneous Equations

Two equations with two unknowns are solved together. Use elimination: add or subtract the equations to remove one variable.

Example: Solve $x + y = 10$ and $x - y = 4$

Add the equations: $2x = 14 \rightarrow x = 7$

Substitute back: $7 + y = 10 \rightarrow y = 3$

> **Answer:** x = 7, y = 3. Check in the second equation: 7 – 3 = 4 ✓

3. Quadratic Equations

A quadratic has the form $ax^2 + bx + c = 0$. Try factoring first; if that fails, use the quadratic formula.

Example 1 (factoring): Solve $x^2 + 5x + 6 = 0$

Find two numbers that multiply to 6 and add to 5: 2 and 3.

$(x + 2)(x + 3) = 0 \rightarrow x = -2$ or $x = -3$

The Quadratic Formula

$x = [-b \pm \sqrt{(b^2 - 4ac)}] \div 2a$

Example 2: Solve $2x^2 + 3x - 2 = 0$

Here a = 2, b = 3, c = –2. Substituting: $x = [-3 \pm \sqrt{(9 + 16)}] \div 4 = [-3 \pm 5] \div 4$

$x = ½$ or $x = -2$

4. Practice Questions

1. Solve: $5x - 7 = 18$

2. Solve: $4(x + 3) = 28$

3. Solve simultaneously: $x + y = 12$ and $x - y = 2$

4. Solve by factoring: $x^2 - 7x + 12 = 0$

5. Use the formula: $x^2 + 2x - 8 = 0$

Answers

1. $x = 5$ · 2. $x = 4$ · 3. $x = 7, y = 5$ · 4. $x = 3$ or $x = 4$ · 5. $x = 2$ or $x = -4$

Keep practicing — open the Study App and try the Exercise for this topic to test yourself.