Section 8 – Algebra, Elimination, and Logic

This book belongs to: _KEY_   **Block:** _____

Section	Due Date	Questions I Find Difficult	Marked	Corrections Made and Understood

Self-Assessment Rubric

Category	Sub-Category	Description	
Expert	6	Work meets the objectives; is clear, error free, and demonstrates a mastery of the Learning Targets	"You could teach this!"
	5	Work meets the objectives; is clear, with some minor errors, and demonstrates a clear understanding of the Learning Targets	"Almost Perfect, one little error."
Apprentice	4	Work almost meets the objectives; contains errors, and demonstrates sound reasoning and thought concerning the Learning Targets	"Good understanding with a few errors."
	3	Work is in progress; contains errors, and demonstrates a partial understanding of the Learning Targets	"You are on the right track, but key concepts are missing."
Novice	2	Work does not meet the objectives; frequent errors, and minimal understanding of the Learning Targets is demonstrated	"You have achieved the bare minimum to meet the learning outcome."
	1	Work does not meet the objectives; there is no or minimal effort, and no understanding of the Learning Targets	"Learning Outcomes not met at this time."

Learning Targets and Self-Evaluation

Learning Target	Description	Mark
8 − 1	• Understand the concept of balance and the equal sign	
8 − 2	• Using addition and multiplication principle to isolate unknowns	

Competency Self-Evaluation

A valuable aspect to the learning process involves self-reflection and efficacy. Research has shown that authentic self-reflection helps improve performance and effort, and can have a direct impact on the growth mindset of the individual. In order to grow and be a life-long learner we need to develop the capacity to monitor, evaluate, and know what and where we need to focus on improvement. Read the following list of Core Competency Outcomes and reflect on your behaviour, attitude, effort, and actions throughout this unit.

Rank yourself with a check mark: E (Excellent), G (Good), S (Satisfactory), N (Needs Improvement)

		E	G	S	N
Personal Responsibility	• I **listen** during instruction period and come to class ready to ask questions				
	• I am **fully prepared** for the class, with all the required supplies				
	• I am **fully prepared** for Quizzes				
	• I **follow** instructions and **assist** peers				
	• I am **on task** during work blocks				
	• I **complete** assignments **on time**				
Self-Regulation	• I keep track of my **Learning Targets**				
	• I take **ownership** over my goals, learning, and behaviour				
	• I can **solve problems** myself and know when to ask for help				
	• I can **persevere** in challenging tasks				
	• I **take responsibility** to be actively engaged in the lesson and discussions				
	• I only use my phone for school tasks				
Classroom Responsibility and Communication	• I am **focused** on the discussion and lessons				
	• I **ask questions** during the lesson and class				
	• I give **my best effort** and **encourage** others to work well				
	• I am polite and communicate questions and concerns with my peers and teacher				
Collaborative Actions	• I can **work with others** to achieve a common goal				
	• I make **contributions** to my group				
	• I am **kind** to others, can work collaboratively and **build relationships** with my peers				
	• I **can identify** when others need support and provide it				
Communication Skills	• I present informative **clearly**, in an organized way				
	• I **ask and respond** to simple direct questions				
	• I am an **active listener**, I support and encourage the speaker				
	• I **recognize** that there are different points of view and can disagree respectfully				
	Overall				
Goal for next Unit – refer to the above criteria. **Please select** (underline/highlight) **two areas** you want to focus on					

Pre-Unit Questions

1. Did you struggle with anything in our unit on integers (adding, subtracting, multiplying, or dividing positive and negative numbers)? If so, what did you struggle with?

_____

_____

2. What skills do I have going into this unit?

_____

_____

3. What is your learning goal this unit?

_____

_____

4. How do you plan on accomplishing your learning goals this unit?

_____

_____

Try every question in this booklet. Show your steps (thinking process) and keep trying until you get the right answer. If you are struggling and would like additional support, ask!

Section 8 – Basic Algebra

What is algebra anyway?

- It comes from the word "al-jabr" in Arabic, which was part of the title used in the historic book written by mathematician Mohammed ibn Mûsâ al-Khowârizmî in approximately 830 CE to introduce this form of math

- Algebra is the "reduction" and "balancing" of equations that use symbols as terms

Examples

$$3z = 6 \qquad \text{or} \qquad 15 - t = 9$$

- If we have the equation above, the goal is to **solve for the unknowns** z and $t.$

- When we are **working with algebra**, we are trying to **solve puzzles**.

- Don't let the **unknowns phase** you!

Solving for Unknowns

- Think of unknowns as numbers that are hiding their value... it's a puzzle for you find out and reveal the number they represent.

    If $15 - t = 9$, then how do we find t? (Try it on your own)

The trick to Basic Algebra

- In the case of equations, the **right side** of the **equals sign** is always **equal to the left side**.

- In order to find out what number our symbol represents, we have to manipulate, or move, the numbers from side to side to solve.

- Whatever we were doing on the original side, <u>**we have to do the opposite on the other side of the equals sign**</u>.

    o If we were **adding** a number, now we are **subtracting**

    o If we were **subtracting** a number, now we are **adding**

    o If we were **multiplying** a number, now we are **dividing**

    o If we were **dividing** a number, now we are **multiplying**

- So if $15 - t = 9$, we do the following: and then check our work by trying out the formula:

$$15 - t = 9$$
$$-t = 9 - 15$$

> Then we can check our answer but plugging our answer back into our equation instead of our unknown

$$\frac{-t}{-1} = \frac{-6}{-1}$$

$$15 - 6 = 9 ✓$$

$$\boxed{t = 6}$$

Let's practice! Try solving for the symbols in the following equations and checking our work

1. $x + 5 = 12$

$$x = 12 - 5$$
$$\boxed{x = 7}$$
$$7 + 5 = 12 ✓$$

3. $2b = 14$

$$b = 14 ÷ 2$$
$$\boxed{b = 7}$$

$$2 × 7 = 14 ✓$$

2. $y - 4 = 6$

$$y = 6 + 4$$
$$\boxed{y = 10}$$

$$10 - 4 = 6 ✓$$

4. $\frac{m}{3} = 1$

$$m = 1 × 3$$
$$\boxed{m = 3}$$

$$\frac{3}{3} = 1 ✓$$

- We can also manipulate these equation when we only have letters, we just solve for one of the letters, with respect to the rest

Example: Solve the following for the letter a $ab + c = d$

$$ab + c = d$$
$$ab = d - c$$
$$\boxed{a = \frac{d - c}{b}}$$

5

Solve the Equations

1) $\frac{z}{3} = 4$

   $z = 12$

2) $5f = -55$

   $f = -11$

3) $5 = x - 6$

   $x = 11$

4) $-8 = 2n$

   $n = -4$

5) $13 = -5 + d$

   $d = 18$

6) $h + 3 = 12$

   $h = 9$

7) $-49 = 7b$

   $b = -7$

8) $-10 = \frac{r}{3}$

   $r = -30$

9) $-2y = -16$

   $y = 8$

10) $-11 = 5 + v$

   $v = -16$

Solve the Equations

1) $5 = \dfrac{k}{5}$

    $k = 25$

2) $-40 = 5d$

    $d = -8$

3) $-4 = n - 3$

    $n = -1$

4) $10 = -2 + x$

    $x = 12$

5) $-7b = 63$

    $b = -9$

6) $z + 3 = -7$

    $z = -10$

7) $54 = -6r$

    $r = -9$

8) $3f = -27$

    $f = -9$

9) $\dfrac{c}{4} = -4$

    $c = -16$

10) $-11 = 4 + s$

    $s = -15$

Math-Aids.Com

7

Solve the Equations

1) $y + 3 = -5$

$y = -8$

2) $-12 = -3x$

$x = 4$

3) $7 = -4 + a$

$a = 11$

4) $5s = 30$

$s = 6$

5) $9 = \frac{k}{6}$

$k = 54$

6) $\frac{c}{4} = 8$

$c = 32$

7) $-25 = 5r$

$r = -5$

8) $-2d = 16$

$d = -8$

9) $-13 = -7 + h$

$h = -6$

10) $-12 = n - 2$

$n = -10$

Math-Aids.Com

Name : _____   Score : _____

Teacher : _____   Date : _____

Solve the Equations

Round your answers to the nearest hundredth if needed.

1) $\dfrac{s + 22}{17} = -21$

   $s = -379.00$

6) $\dfrac{6 - c}{4} = -19$

   $c = 82.00$

2) $\dfrac{8 + v}{14} = -4$

   $v = -64.00$

7) $\dfrac{2}{5}y + 12 = -22$

   $y = -85.00$

3) $5 + \dfrac{1}{6}r = -3$

   $r = -48.00$

8) $23 - 5k = 12$

   $k = 2.20$ $\dfrac{11}{5}$

4) $\dfrac{9 + b}{-11} = -28$

   $b = 299.00$

9) $\dfrac{x - 26}{-2} = 17$

   $x = -8.00$

5) $22a + 5 = -15$

   $a = -0.91$ $\dfrac{-10}{11}$

10) $\dfrac{18 - d}{-26} = -4$

   $d = -86.00$

Simplifying Algebraic Expressions

1) $3 + \dfrac{w}{4} - 7s$ use w = 12 and s = 7

-43

6) 2b - n   use b = 9 and n = 4

14

2) 7f - 8(-5 - 3s)   use s = 5 and f = 9

223

7) $\dfrac{d}{9} + 7x$ use d = 18 and x = 2

16

3) -5s - 2 + 4 + 3z   use s = 8 and z = 9

-11

8) 3d + 8 - 6s   use d = 2 and s = 8

-34

4) $9 - \dfrac{18}{s} + 7h$ use s = 9 and h = 4

35

9) $\dfrac{10}{w} - 4r$ use w = 5 and r = 8

-30

5) -5 + 9n - 2k - 4   use n = 4 and k = 5

17

10) 6k + 8c   use k = 3 and c = 5

58

Section Reflection

How did this section on basic algebra go? Please circle the number that you think best describes how this section went:

1	2	3	4	5	6	7	8	9	10
(Not well at all)				(OK)					(Awesome!)

Please explain why you think it went the way it did:

_____

_____

_____

_____

What was one process you struggled with in this section?

_____

_____

_____

_____

What is one studying technique that you think would help you with algebra on our final exam?

_____

_____

_____

_____