![C:\Users\Christina\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\1BNG3R6R\MC900433868[1].png]()**Unit 1 – Equations and Inequalities - Algebra Review Sheet**

**The Real Number System**

**RATIONAL NUMBERS**

any number that **CAN** be written as a fraction

* Decimals that repeat (0.333…)
* Decimals that end (-2.5643)
* The square roots of perfect squares ()
* fractions (, , etc.)

**IRRATIONAL NUMBERS**

any number that **CAN’T** be written as a fraction

* Decimals that don’t repeat or terminate (1.23462…)
* The square roots of non-perfect square ()



**Inequalities**

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Meaning** | **Graph** |
| $$<$$ | Less than |  |
| $$>$$ | Greater than |  |
| $$\leq $$ | Less than or equal to  |  |
| $$\geq $$ | Greater than or equal to |  |

* If you multiply or divide by a negative 🡪 flip the inequality sign
* Write the variable on the **LEFT**

**Compound Inequalities**

* $⋀$ **means AND**
* two points are connected by a line segment
* arrows point at each other
* examples:

$$[-3, 9)$$

$$7<x\leq 25$$

$x>-12 ⋀$ $x<0$

* $⋁$ **means OR**
* arrows point different directions
* examples:

$\left(-\infty , -2\right) ⋁$ $[5, \infty )$

$x<-3 ⋁$ $x\geq 7$

**Interval Notation**

$( )$ for open circles

$[$ $ ]$ for closed points

$\infty $ and $-\infty $ always use ( )



Use your calculator to help determine if a number is rational or irrational ☺

**Solving Equations and Inequalities**

1. Distribute (if necessary)
2. Get rid of fractions by multiplying by the denominator (if necessary)
3. Sort (variables to the left, constants to the right)
4. Combine like terms
5. Divide by the coefficient
6. Check using your calculator

Cross multiply to solve proportions

**Checking Answers Using the TI-Nspire**

1. Store the value you got for the variable into the variable

x = 2 looks like 2 STO x

for x $>$ 7 you could use 8, 9, 10, etc. but NOT 7

Press CTRL 🡪 VAR to get the STO key

1. Type the whole equation or inequality into your calculator and press enter
2. **TRUE** means you solved it correctly, **FALSE** means you made a mistake

**Order of Operations**

|  |  |  |
| --- | --- | --- |
| **P** | Parenthesis/Groupings(absolute value, brackets | **G** |
| **E** | Exponents/Square Roots(whichever comes first) | **E** |
| **M****D** | Multiply/Divide(whichever comes first) | **M** |
| **A****S** | Add/Subtract(whichever comes first) | **S** |

**Differences Between Equations, Expressions and Equations**

* **Expressions** DO NOT have $=, >, <, \geq , or \leq $ symbols
* **Equations** ALWAYS have an equal sign
* **Inequalities** have $>, <, \geq , or \leq $ symbols
* A TERM is an expression joined by multiplication or division

EX: x, 2xy, AB EX: 2x + 1 is 2 TERMS

**Intepreting Solutions**

* If you solve an **equation** and your solution is a variable equal to a number, you have ONE solution. EX: x = -3
* If you salve an **inequality**, be careful of what actually is a solution. It must make the inequality statement TRUE.

EX: x $<$ 4 the number 4 NOT a solution because 4 is not less than 4 but 3, 2, 1, -50, etc. are all solutions.

* If you solve an **equation or inequality** and your solution has no variables and neither side is the same, you have NO solutions. EX: 7 = -2
* If you solve an **equation or inequality** and both sides of your solution are the same, you have INFINITELY many solutions. EX: 0 = 0

**Properties of Real Numbers**

* **The Commutative Property**
	+ Changes the **order** of the terms
	+ Only works for addition and multiplication
	+ $a+b=b+a$ or $a∙b=b∙a$
* **The Associative Property**
	+ Changes **groupings** (associates – think friends)
	+ Only works for addition and multiplication
	+ $\left(a+b\right)+c=a+\left(b+c\right)$ or $\left(a∙b\right)∙c=a∙(b∙c)$
* **The Identity Property**
	+ After the operation, the number (or variable) **stays the same**
	+ Addition – Always 0
		- $a+0=a$
	+ Multiplication – Always 1
		- $a∙1=a$
* **The Inverse Property**
	+ Trying to get back to the **identity**
	+ Addition – always the “opposite” sign of *a*
		- $a+ -a=0$
		- Add to get 0
	+ Multiplication – always the reciprocal of *a*
		- $a∙\frac{1}{a}=1$
		- Multiply to get 1
* **The Distributive Property**
	+ **gets rid of parenthesis** through multiplication
	+ Always in the form $a(b+c)$ or $ a(b-c)$
	+ $a\left(b+c\right)=ab+ac$ or $a\left(b-c\right)=ab-ac$
	+ You can also pull out a variable as well (backwards distributing)

**Equivalent Equations**

🡪Re-writing equations with lots of variables

EX: AB + C = D solve for A

 AB = D – C

 Divide both sides by B

 $A= \frac{D-C}{B}$

 DONE ☺

* Follow the same steps as solving a regular equation
* Move all TERMS (EX: AX, 4WQ, x, etc.) with the variable you need to solve for to one side and all other terms to the other, then divide or multiply (use the opposite operation)
* Answers will usually look messy

**Solving Word Problems**

1. Read and underline key info
2. Define variables (or draw a picture OR table)
3. Write and solve an equation
4. Does your answer make sense?
5. Write a sentence that answers the question

**Consecutive Integer**: x, x+1, x+2, x+3, …

Consecutive EVEN: x, x+2, x+4, x+6, …

Consecutive ODD: x, x+2, x+4, x+6, …

**Age** – set up a table

**Money** – use parenthesis and never forget to multiply the quantity by the value of the coin

**Perimeter** – draw a picture

**Pythagorean Theorem** – use a2 + b2 = c2

* If you don’t know 3 things you need 3 LET, 2 things 2 LET statements, etc.
* Always define variables first – that will help you get an equation or inequality
* NEVER leave blank – you can get tons of partial credit!