Test #1 Concepts Review: Ch. 1

Set Notation (§1.1)

Roster Form – List Finite or describable infinite

{a, b, c, …}

Set Builder – Describes infinite sets

$\{x \mid x \in I, -1 < x \leq 5\}$

Important Sets of Numbers (§1.1)

$\mathbb{R}$➤Real – Rational & Irrational #'s

Q➤Rational – Described by $^p/_q$ where $q \neq 0$

H➤Irrational – Mostly $\sqrt{\ }$, π & e (non-repeating & non-terminating decimals)

I➤Integers – Positive, Negative & Zero

W➤Whole #'s – Includes zero

N➤Natural/Counting #'s – No Zero & ≥ 1

Subsets (§1.1)

Part of another set

Relate Set of #'s to one another in this way

Notation for – $\subseteq$

Intersection & Union (§1.1)

$\cap$ – Intersection (in both)

$\cup$ – Union (includes all)

{} or $\emptyset$ – Empty or null set

Graphing & Using Roster & Set Builder Notation

Graphing on Number Line (§1.1)

Points – Use a solid dot & label

Inequalities

Endpoints – Brackets (solid dot) for inclusion ($\geq$ or $\leq$)

Parentheses (open circle) for not included ($<$ or $>$)

Compound Inequalities – When standard form (small # $<$ x $<$ large #) endpoints

and everything in between with a line between endpoints

Comparing $\mathbb{R}$ (§1.1, §1.2)

Inequality Symbols – $>$ Greater Than, $\geq$ Greater Than or Equal To

$<$ Less Than, $\leq$ Less Than or Equal To

Consider # Line When Ordering

Absolute Values & Opposites

Fractions & Decimals

Properties of $\mathbb{R}$ (§1.2)

Multiplication:	Associative	$a(b \bullet c) = (a \bullet b)c$
	Commutative	$a \bullet b = b \bullet c$
	Identity	$a \bullet 1 = a$
	Inverse	$a \bullet {^1/_a} = 1$
Addition:	Associative	$a + (b + c) = (a + b) + c$
	Commutative	$a + b = b + c$
	Identity	$a + 0 = a$
	Inverse	$a + -a = 0$

Subtraction & Division have no such properties

Subtraction is addition of the inverse (opposite)

Properties of ℝ (§1.2)

Division is multiplication by the inverse (reciprocal)

Properties of Zero:　Multiplication　　　$a \cdot 0 = 0$

Division by Zero　　$\frac{a}{0}$ = undefined　(nothing else accepted)

Zero ÷ Anything　　$\frac{0}{a}$ = Zero

Distributive Prop.　　$a(b + c) = ab + ac$

Absolute Value (§1.2)

Distance ($\therefore$ no sign) from zero regardless of direction (sign)

Simplifying/Evaluating

Opposite (§1.2)

Same number, opposite sign

Simplifying/Evaluating

Real Number (Integer) Operations (§1.2)

Subtraction redefined (see above; must be able to show subtraction as addition)

Addition

Same sign – Add #'s & keep like sign

Opposite Sign – Subtract & keep sign of larger

Mult/Division

$+ \cdot + = +$　　　　　$- \cdot - = +$

$+ \cdot - = -$　　　　　$- \cdot + = -$

All operations using **fractions**, **mixed numbers** and **decimals** (w/out calculator)

Order of Operations (§1.1, §1.2)

PEMDAS

Multiplication & Division Left to Right order

Addition & Subtraction Left to Right order

Including Absolute Values, Fractions, Decimals

Denominator ends up as zero – UNDEFINED } Must work the problems in their entirety,

Numerator ends up as zero -- ZERO } regardless of final solution.

Evaluation (§1.1)

Parentheses for variables & plug in

Use order of operations (see above)

Roots & Radicals (§1.2 & §7.2)

$\sqrt[n]{a} = b$　　　　　　**b** used as a factor **n** times equals **a**

$a^{1/n} = b$　　　　　　same as above; another way to write root

Negative # to odd exponent is negative } Neg under odd index is OK, Neg under even

Negative # to even exponent is positive } index is No ℝ solution

Even Index, Radicand can't be negative or No Real Solution

Odd Index, Radicand is negative, Root is Negative

$-a^n \neq (-a)^n$　　　Example:　　$-2^2 = -(2 \cdot 2) = -4$ while $(-2)^2 = -2 \cdot -2 = 4$

Translation of Mathematical & Algebraic Expression and Algebraic Equations (§1.1)

Know words for operators

Addition: sum, total, plus, increased by, added to, greater than,
　　　　years older than

Subtraction: subtract, less, difference of, decreased by, take away,
　　　　subtracted from, years younger than, less than

Multiplication: multiply, product, twice, times, at, of, repeated addition

Translation of Mathematical & Algebraic Expression and Algebraic Equations (§1.1)
    Division: divided by, ratio, quotient, divide
    Exponents: squared, cubed, raised to the power of (or a portion of this)
    Equals: any form of "to be" (is, was, were, etc.), yields, equals
    Parentheses: 4 phrasings
  Define variable if used

Simplifying Algebraic Expressions (§1.2)
  Vocabulary Associated With
    Term (like vs unlike meaning), Constant, Variable, Numeric Coefficient
  Can't be solved
  Can't be cleared
  Use distributive property
  Combine like terms (use skills with fractions, decimals, mixed #'s, integers)

Rectangular Coordinate System & Graphing (§1.3)
  Plotting & Labeling Ordered Pairs & Quadrant Information
  Linear Equations in 2 Variables
    Plot by plug & chug (finding solutions)
  Non-Linear Equations
    2nd Degree Equations/Quadratic
      Recognize: Shape, Up/Down, Vertex, Symmetry
    Absolute Value
      Recognize: Shape, Up/Down, Vertex, Symmetry

Solving Equations (§1.4)
  Clearing of Fractions & Decimals (not solving, just clearing)
  Know how to properly do a check
  Solving using distributive prop., simplification, add. prop. & mult. prop.
    Give solution set as x = # or {#} or Null Set or All Reals
  Know the indicators for Identities & Contradictions & Solutions as a Result
    Identity Indicator is #1 = #1 and the solution is All Reals
    Contradiction Indicator is #1=#2 and the solution is Null Set

Word Problems (§1.5)
  Know how to show setup!!
  Always give units with answer
  Linear Equation Problems
    Total Cost = baseline + Cost per Use
    Percent Increase/Decrease

Solving Equations for 1 Variable (§1.5)
  Focus on the variable of interest
    Simplify, Addition Property, Multiplication Property

Exponent Rules (§1.2 & §1.6)

Definition

$a^r = a \cdot a \cdot a \ldots \cdot a$

Difference between $-a^r$ & $(-a)^r$

Negative Exponent

$a^{-r} = 1/a^r$

Zero Exponent

$a^0 = 1$

Product Rule

$a^r\, a^s = a^{r+s}$

Quotient Rule

$a^r/a^s = a^{r-s}$

Power Rules

$(a^r)^s = a^{r\cdot s}$

$(ab)^r = a^r\, b^r$

$(a/b)^r = a^r/b^r$

Scientific Notation (§1.7)

Standard Form to Scientific Notation

Correct Sci Note: 1 # to left of decimal x factor of 10

Negative exponents for #'s < 1 and Positive exponents for #'s > 1

Scientific Notation to Standard Form

As we usually see #'s written

Multiplying & Dividing Using Exponent Rules

Make sure end in CORRECT SCI NOTE

Add/Subtract Sci Note

Key is same factor of 10

Functions (§2.1)

F(n) vs. Relation

Domains & Ranges

Evaluation using f(x) notation:

Find g(2)