**Data Structure Specifications**

Math Directive | Batch 2 | Science Simulations | Edukite Learning

* **Hierarchical Overview**

The representation of complete equation has been divided as below:

equation

question ( single step object )

exerciseSteps ( array of step objects )

interactiveSolutionSteps ( array of step objects )

step

numerator ( array of group objects )

denominator ( array of group objects )

group

parenthesis ( Boolean )

decimal

exponent ( maybe string | object | array, more explained in description )

expanded ( present only in interactive steps )

decimal

type ( string )

value ( maybe string | object | array, more explained in description )

sign ( string | input object storing info for input box )

expanded

color ( array of 4 integers: RGBA )

group ( expanded group object )

Note that every term above denotes a custom object unless specified otherwise

* **General Instructions**

While most terms used are pretty general, some need an explanation which is provided in the specifications Here are some quick instructions to help modify the structure for more equations

* Create a group everytime you see a parenthesis or a cdot
* Decimal object can have sign, group or array of sign or group as it’s value
* Sign object either has string or input object as it’s value
* When you need just a decimal & exponent, create group & use sign object for decimal & exponent both
* On the contrary, when you need a combination of strings & input objects, create an array of sign
* Also,create an array of group when you need to chain groups of decimal & exponent with cdot or more parenthesis
* **Specifications**
* Important points to note
* denotes objects
* denotes keys
* denotes comments
* All data types unless known are objects
* All keys of objects unless specified are compulsory
* All specifications defined for optional keys are valid only if the value for the key has been provided
* All strings used & provided are case & white-space sensitive
* Number is a data type in JavaScript which can store both integers & floats Number has been used to represent data even when integer is needed When integer is needed, the Number value will be rounded to convert into integer as a fail-safe to prevent fractional input to integer field
* equation
* This object holds the entire equation
* An interactive may contain array of those objects

* question
* Contains the question
* Type: step

* exerciseSteps
* Contains all the steps of the exercise
* Type: Array ( step )
* Minimum Length: 1

* interactiveSolutionSteps
* Contains all the steps of the interactive solution
* Type: Array ( step )
* Minimum Length: 1
* step
* numerator
* Stores the numerator of the step
* Type: Array ( group )
  + - Minimum Length: 1
* denominator
* Stores the denominator of the step
* Type: Array ( group )
* Optional
* Default: null
* Minimum Length: 1
* group
* A group object is suffixed with a cdot if it is one of the elements in an array of group objects & is not the last element in that array
* parenthesis
* Represents the parenthesis around a group object
* Type: Boolean
* Optional
* Default: false
* decimal
* Represents the decimal part of the group
* Type: decimal
* exponent
* Represents the exponent part of the group
* Type: sign | Array ( sign )
* Optional
* Default: null
* Minimum Length: 1 ( if type is Array )
* expanded
* Represents the expanded part of an interactive step
* Present only in interactive steps
* Type: expanded
* Optional
* Default: null
* decimal
* type
* Type of the object contained in value of decimal
* Type: string ( “sign” | “group” )
* value
* Value of the decimal part
* Type: sign | Array ( sign ) | group | Array ( group )
* Minimum Length: 1 ( if type is Array )
* sign
* Stores the actual values
* Type: string | input
* string type for plain characters
* input object for inputtable boxes
* input
* Stores information about input boxes
* maxChars
* Maximum allowed input characters
* Characters include all special characters, alphabets & numbers
* Type: Number
* Optional
* Default: 1
* minBoxChars
* Minimum width of input box in character unit
* Characters include all special characters, alphabets & numbers
* Type: Number
* Optional
* Default: 1
* maxBoxChars
* Maximum width of input box in character unit
* Characters include all special characters, alphabets & numbers
* Type: Number
* Optional
* Default: maxChars
* expanded
* color
* Stores an array of numbers denoting values of R, G, B & A
* Type: Array ( Number )
* The values are floored & ceiled as required to range them between 0-255
* A value of -1 indicates that the algorithm will choose a random color between 0-255
* Optional
* Default: [ -1 , -1 , -1 , -1 ]
* Length: 4
* group
* Stores the expanded group
* Type: group
* Tips about choosing type of decimal & exponent while defining it:
* To surround anything with parenthesis, create a group
* To separate group objects with cdot, supply array of group objects to decimal. Value
* Use group object or array of them to represent nested parenthesis
* If value of decimal/exponent is just some characters, use sign object directly meaning a string.
* If value of decimal/exponent is a combination of characters & input boxes, supply an array of sign objects which may contain both strings & input objects.