Data Structure Specifications

Math Directive | Batch 2 | Science Simulations | Edukite Learning

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❖ Hierarchical Overview

The representation of complete equation has been divided as below:

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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**

➢ <u>Important points to note</u>

- ➢ 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

- ➢ <u>Tips about choosing type of decimal & exponent while defining it:</u>

  - ◆ 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.