



# Scrolling Through Summation Guide

## Project Goal:

Students will use lists and indexes as a strategy for summation to be used in a variety of settings including averaging, standard deviation and calculating z-scores in lessons related to statistics.

## Math Standard:

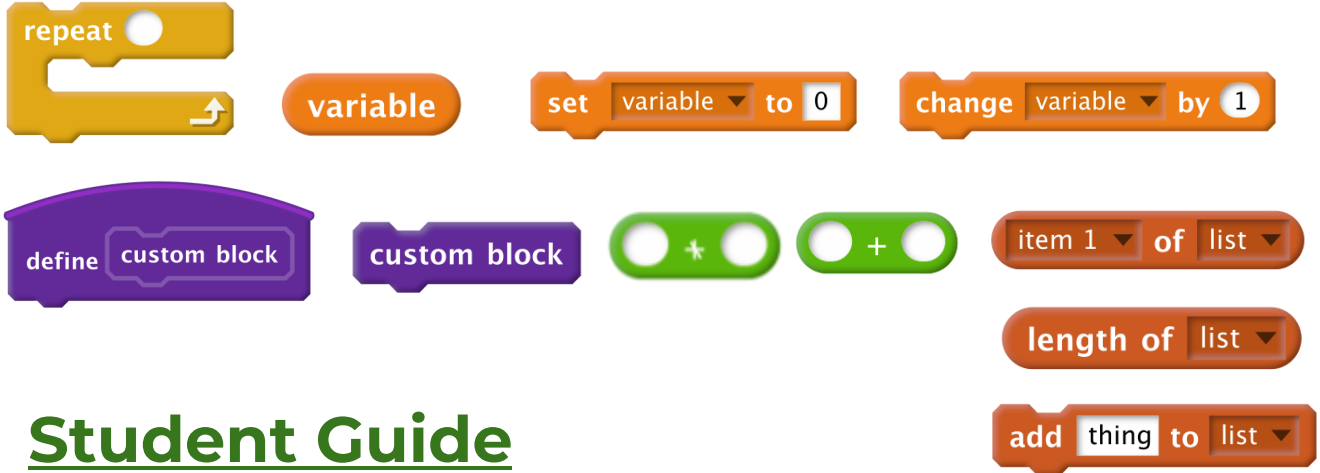
[CCSS.MATH.CONTENT.HSS.ID.A.2](#)

Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

## CSTA Standard:

L3A-AP-14 Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables.

## Blocks:



## [Student Guide](#)

## Teacher Notes:

Start by clicking the student guide link above and work through it on Scratch before trying with your students. If you need to check something, possible solutions are on the next page. The lesson is well suited for the statistics unit in advanced algebra courses, AP Statistics, or honors level algebra 1 :)

#CSandMath



@BoundsofoutMath & @ashleyanntewes



## Solutions:

### Page 1:

Since this code was not provided exactly, students will need to think about the order of linking the blocks. Provide guiding questions and positive encouragement to try different arrangements and think critically about what happened.

```
when p key pressed
  set x to 1
  delete all of perfect_squares
  repeat 10
    add x * x to perfect_squares
    change x by 1
```

### Top of page 3:

If your students have never defined a function (purple “More” block), then this step may be wicked tricky. If they are unable to get this piece right away, again let them grapple with it for some time. If you’re not sure how it’s working I created this short video to help :)

[How Does This Summation Code Work?](#)

```
when s key pressed
  Summation
  say sum

define Summation
  set sum to 0
  set counter to 1
  repeat length of perfect_squares
    set sum to sum + item counter of perfect_squares
    change counter by 1
```



Index	Value
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81
10	100

length: 10

## Next Challenges Possible Solutions:

### Averaging:

```

when a key pressed
  Average

define Average
  Summation
  set average to sum / length of perfect_squares
  say average
  
```



### Standard Deviation: Variable Names and progression will vary :)

```

when d key pressed
  Stndard Deviation

define Stndard Deviation
  Average
  set sd_sum to 0
  set counter to 1
  set std_dev to 0
  set deviation to 0
  set deviation_squared to 0
  repeat length of perfect_squares
    set deviation to item counter of perfect_squares - average
    set deviation_squared to deviation * deviation
    set sd_sum to sd_sum + deviation_squared
    change counter by 1
  set std_dev to sqrt of sd_sum / length of perfect_squares - 1
  say std_dev
  
```



Index	Value
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81
10	100

length: 10

## Z-Score:

```

when z key pressed
  Z-score
  define Z-score
    delete all of z_scores
    Average
    Standard Deviation
    set z_score to 0
    set counter to 1
    repeat length of perfect_squares
      set z_score to (item counter of perfect_squares - average) / std_dev
      add z_score to z_scores
      change counter by 1
  
```

Index	z_score
1	-1.097339
2	-1.009552
3	-0.86324
4	-0.658403
5	-0.395042
6	-0.073156
7	0.307255
8	0.746191
9	1.243651
10	1.799636

length: 10

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