

Write this score next
to your name

④ Hans Rosling
9/8/16

May 2019
IB Studies scores

5
5
5
5
4 5
4 5
4 5 6
4 5 6
3 4 5 6 7

THE **MEDIAN**

IS ANOTHER KIND OF CENTER: THE "MIDPOINT" OF THE DATA, LIKE THE "MEDIAN STRIP" IN A ROAD.



TO FIND THE MEDIAN VALUE OF A DATA SET, WE ARRANGE THE DATA IN ORDER FROM SMALLEST TO LARGEST. THE MEDIAN IS THE VALUE IN THE MIDDLE.

3 5 7 7 38
 ↑
 THE MEDIAN

IF THE NUMBER OF POINTS IS *EVEN*—IN WHICH CASE THERE IS NO MIDDLE, WE AVERAGE THE TWO VALUES AROUND THE MIDDLE... SO IF THE DATA ARE

3 5 7 7 WE AVERAGE 5 AND 7 TO GET $\frac{5 + 7}{2} = 6$

↑
MIDDLE SPACE

6, 3, 6, 22, 100

Mode

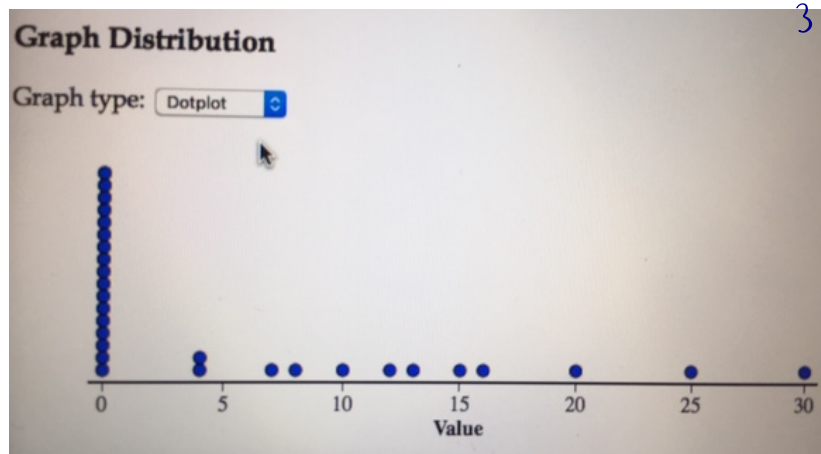
Height (H cm)	Frequency
$170 \leq H < 175$	1
$175 \leq H < 180$	8
$180 \leq H < 185$	9
$185 \leq H < 190$	11
$190 \leq H < 195$	9
$195 \leq H < 200$	3
$200 \leq H < 205$	3

Modal Class

Per. 3 ^{Sept} 2019

Raw Data

12	0	10	20	7	0	
15	0	0	0	25	0	
0	16	10	4	0	0	
0	0	0	10	8	0	
0	0	0	0	30	4	
0	5	15	0	0		



Median - There are 35 positions
 - $\frac{35+1}{2} = 18^{\text{th}}$ position is the middle (median) location

3. In the applet, look below the dotplot at the "Summary Statistics". Record the mean and median (med). *Include units!*

Mean = 5.46 hours

Median = 0 hours

4. Which is larger: the mean or the median? What is the **shape** of the distribution?

positively skewed

5. We forgot to add Mr. Cedarlund to the data set. He works 65 hours per week. Add his value and see how the mean and median change.

New mean: 7.11 hours

New median: 0 hours

6. Which of the two statistics was more "resistant" to change when the larger data value was added to the data set?"

Median is more resistant to extreme values

Lesson 1.6 – Measuring Center

Mean = average

Median = middle

if there are 2
middle numbers,
average them

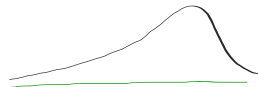
Lesson 1.6 – Measuring Center

Mean = average

Median = middle

if there are 2
middle numbers,
average them

skewed left



mean is smaller

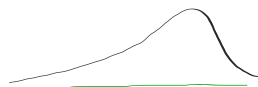
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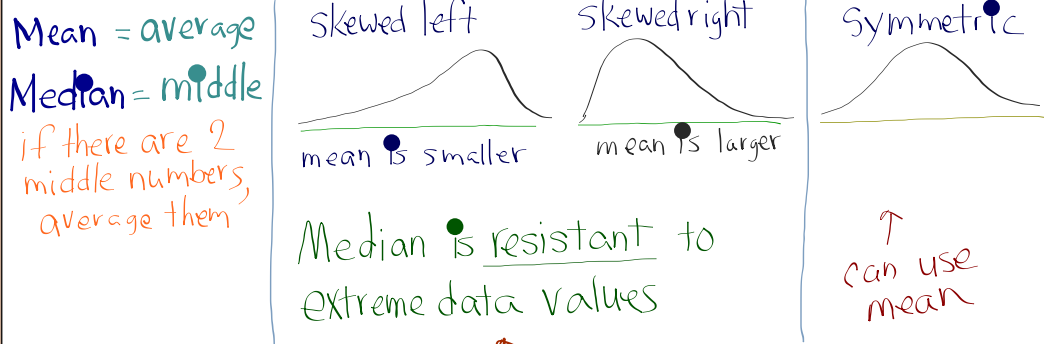


mean is larger

Median is resistant to
extreme data values

↑
use median
if outliers

Lesson 1.6 – Measuring Center



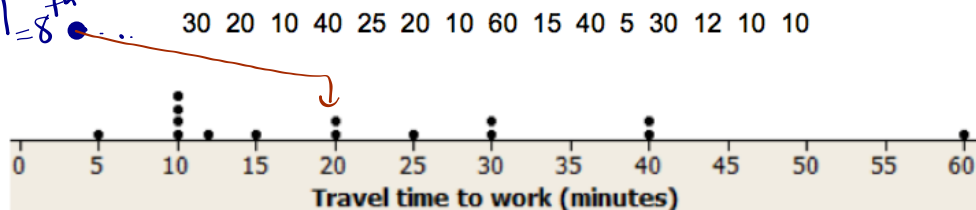
↑
use median if outliers



Is the pace of life slower in smaller cities?

Does it take less time to get to work in smaller cities? Here are the travel times in minutes for 15 workers in North Carolina, chosen at random by the Census Bureau along with a dotplot of the data:

$\frac{15+1}{2} = 8^{\text{th}}$...

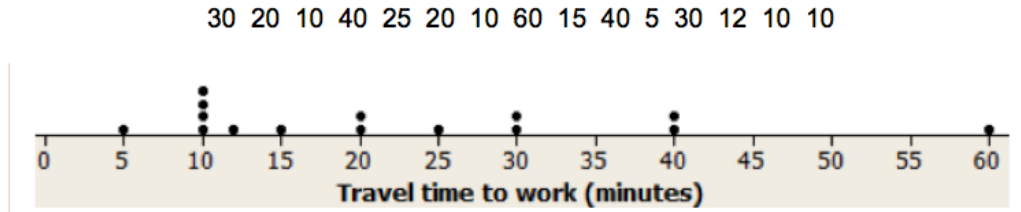


1. Find the median. Interpret this value in context.

20 min.

Is the pace of life slower in smaller cities?

Does it take less time to get to work in smaller cities? Here are the travel times in minutes for 15 workers in North Carolina, chosen at random by the Census Bureau along with a dotplot of the data:



1. Find the median. Interpret this value in context.

Median = 20 min.

About $\frac{1}{2}$ the travel times are greater than 20 min.
(and about $\frac{1}{2}$ are less than 20 min)

2. Using your graphing calculator, quickly calculate the mean travel time. Show your work which means show your two critical values involved in the calculation.

← Use Graphing
Calculator basics

3. Which measure of center—the median or the mean—describes a typical travel time to work for this sample of workers in North Carolina? Justify your answer.

2. Using your graphing calculator, quickly calculate the mean travel time. Show your work which means show your two critical values involved in the calculation.

$$\bar{x} = \frac{337}{15} = 22.4666\dot{6} = 22.5$$

because IB wants you to use 3 signif. figures if not exact.

3. Which measure of center—the median or the mean—describes a typical travel time to work for this sample of workers in North Carolina? Justify your answer.

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because IB wants you to use 3 signif. figures if not exact.

3. Which measure of center—the median or the mean—describes a typical travel time to work for this sample of workers in North Carolina? Justify your answer.

The median is better because the distribution is skewed right and has a possible outlier.

Understanding Statistical Notation

Calculate the mean of *non-continuous data* that has been **grouped**

A boy rolled a die 50 times with the following results:

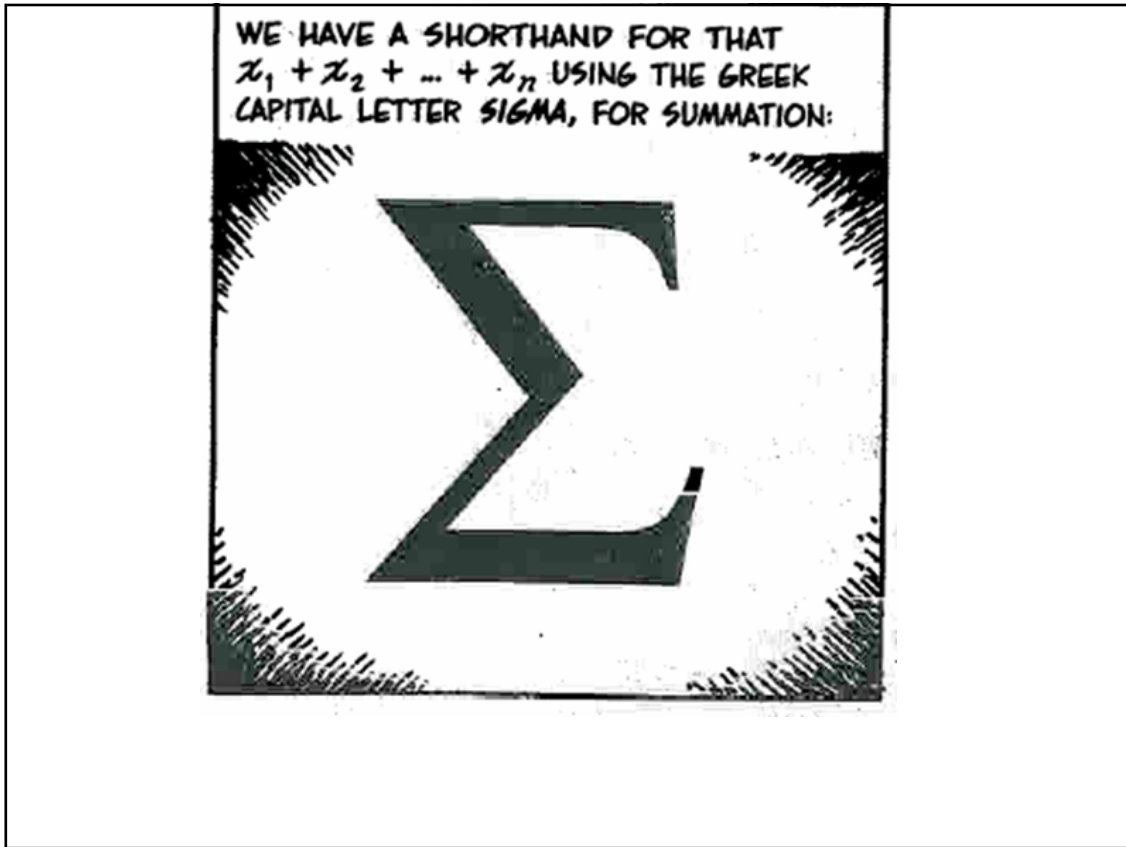
Score	Frequency
1	9
2	10
3	5
4	8
5	7
6	<u>11</u>

Data

	①	②	③	④	⑤	...	i
x	5	7	3	38	7	...	x_i
	x_1	x_2		x_4			

the 4th piece
of data could
be denoted as

→



A boy rolled a die 50 times with the following results:

Score	Frequency
1	9
2	10
3	5
4	8
5	7
6	11

a) An illustration of the average (mean) score:

Let x_i represents scores and f_i represents frequencies:

Multiply f_i by x_i .

x_i	f_i	$f_i \cdot x_i$
1	9	9
2	10	20
3	5	15
4	8	32
5	7	35
6	11	66
	$\Sigma f_i = 50$	$\Sigma f \cdot x = 177$

a) **An illustration of the average (mean) score:**

Let x_i represents scores and f_i represents frequencies:

Multiply f_i by x_i .

x_i	f_i	$f_i \cdot x_i$
1	9	9
2	10	20
3	5	15
4	8	32
5	7	35
6	11	66
	$\Sigma f_i = 50$	$\Sigma f \cdot x = 177$

Find the sum of all " $f \cdot x$ " values which is written as $\Sigma f \cdot x$

$$\text{Mean score} = \frac{\Sigma f \cdot x}{\Sigma f_i} = \frac{177}{50} = 3.54 \text{ points}$$

Find the formula for
the mean on
your IB formula Sheet

Topic 2—Descriptive statistics

2.5	Mean of a set of data	$\bar{x} = \frac{\sum_{i=1}^k f_i x_i}{n}, \text{ where } n = \sum_{i=1}^k f_i$
2.6	Interquartile range	$\text{IQR} = Q_3 - Q_1$

b) Calculate using the “spreadsheet” on your GDC

$$\bar{x} = \frac{177}{50} = 3.54$$

177 points

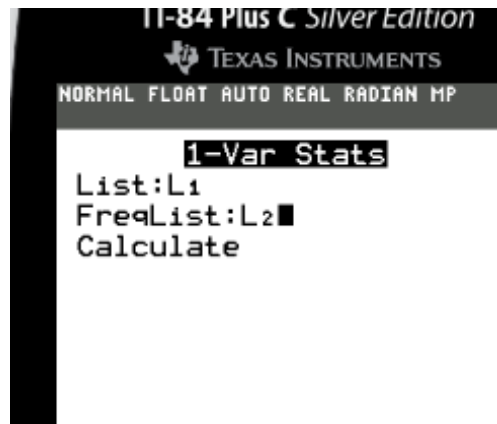
c) Calculate directly, the preferred method on an IB exam, showing critical totals

Calculate Mean of data with frequencies

STAT **2** **1-Variable Stats** L_1, L_2

for those that have the
newer type calculators

- remove the L_2 when finished



real Spreadsheet

Assignment

Study pp 170-177

Do.... p. 173....7, 8abc, 11

- page 174... Investigation #2 (1 to 4)
page 178....1 and 2

AP Statistics Tutorial

Exploring Data

- ▶ The basics
- ▶ Charts and graphs
- ▶ Regression
- ▶ Categorical data

Planning a Study

- ▶ Surveys
- ▶ Experiments

Anticipating Patterns

AP Statistics Tutorial

Welcome to Stat Trek's free, online Advanced Placement (AP) Statistics tutorial. It has been carefully developed to help you master the Advanced Placement Statistics Examination. > [Begin lesson 1](#)

About the Tutorial

This tutorial provides accurate and complete coverage of the AP Statistics curriculum. Specifically, the AP Statistics curriculum and this tutorial cover the following topics:

- **Exploring data.** Using graphical and numerical techniques to study patterns of data. Emphasizes interpreting graphical information and descriptive statistics.
- **Sampling and experimentation.** How to plan and conduct a study. Focuses on clarifying
..... and specific methods to collect and analyze data.

AP Statistics Tutorial

Exploring Data

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- ▶ Planning a Study
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- ▶ Experiments

Anticipating Patterns

- ▶ Probability

Planning a Study

- ▼ Surveys
 - Data collection
 - Sampling methods
 - Bias in surveys

