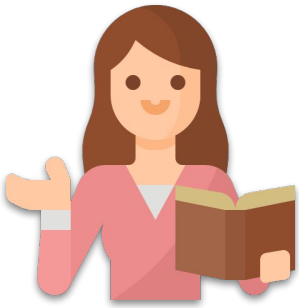
Helping With Math

Applying Concept of Inferential Statistics (Estimation of Parameters)

GRADE 7

Inferential Statistics uses a random sample of data from a given population or from a larger amount of sample. It is also known as Null Hypothesis Testing.



Hi learners! I am Teacher Mia! Today, we will learn about Inferential Statistics.

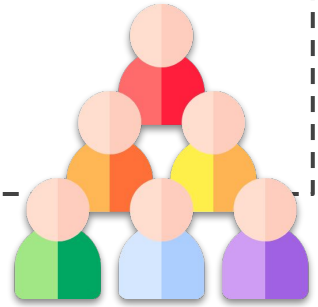
The goal of inferential statistics is to make a conclusion from the sample and apply the conclusion to the population where the sample is drawn. When you estimate the sample from the population, the sample data is most likely to have a near or almost equal value to the data of the population.

POPULATION AND SAMPLE

What is a POPULATION?

Population refers to a large group of people, objects animals, or events that can't be sampled one by one. Examples of population are:

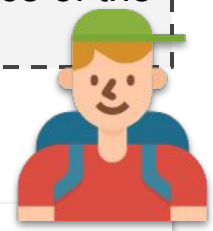
- Students in a university
- Fishes in the fishpond
- People living in the Philippines



What is a SAMPLE?

Sample is the random selection from a given population. They are used to draw conclusions for the whole population where they were obtained. They act as the "representative" from the given population. Examples of sample are:

- 5 students to do a survey for the university
- 10 persons to do a survey for the whole population
- A survey for 15 customers to see if the customer service of the company is doing good as a whole



Example of Population and Sample Relationship

- A traveller would like to know what countries do people like to travel the most. He did a survey to 10 people from different countries to obtain the data that he needed.
- A talent agency needs to know if people living in the USA prefer singing, dancing, or acting. He made 5 person from the different parts of the country to do a survey.

STATISTICAL TERMS

- ***MEAN***

The mean describes the sample with a number that represents the center of a data set. The mean is also known as the “arithmetic average.”

- ***MEDIAN***

The median is the middle of the data set. It separates an ordered set (from the lowest number to the highest) of data into two equal parts.

- ***MODE***

The mode is the most repetitive number in a data set. You can find the mode by simply identifying which number in the data set has the most number of frequency.

- ***RANGE***

Range is the difference of the highest (H) and lowest (L) scores in a data set.

- ***STANDARD DEVIATION***

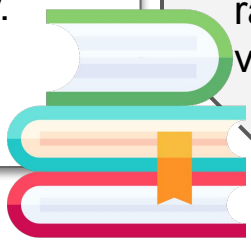
It is the most important measure of variability. It differentiates the scores with equal averages.

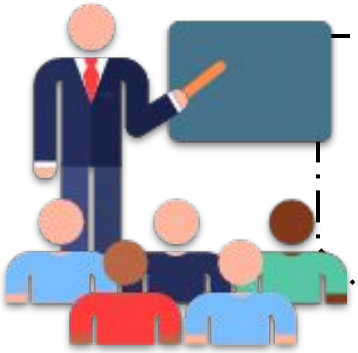
- ***VARIANCE***

Variance is the measure of how widely spread the data is.

- ***INTERQUARTILE RANGE***

It is calculated by arranging the data in numerical order, removing the upper and lower one-quarter of the values, and then nothing range of the remaining values.

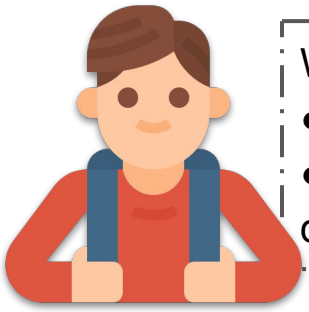




- ***MEAN ABSOLUTE DEVIATION***

It is also called average deviation which refers to the sum of the deviations from the mean divided by the number of elements.

EXAMPLE PROBLEM



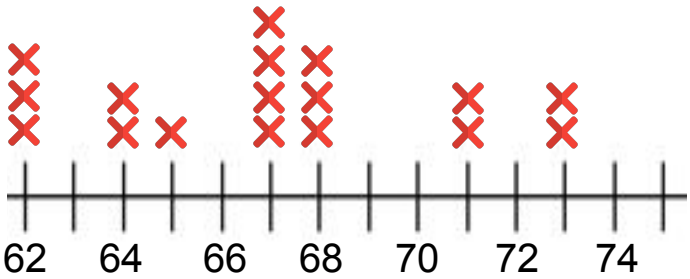
What is a ***Dot Plot***?

- Using Dot Plot will help you draw inferences easily.
- It is a statistical chart showing the distribution of data points where each points represents a value.

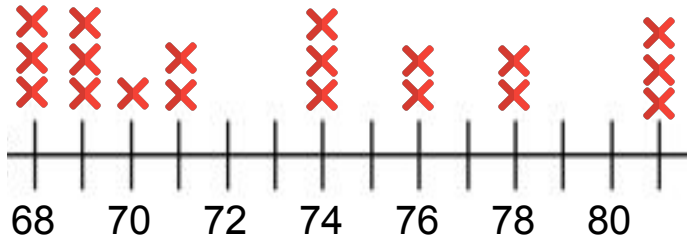
Now, let's try to draw informal comparative inferences about two populations.

The height of the women basketball team players and men basketball team players of HWM University is given below using a dot plot.

Women's Basketball Team
(**WBT**)
(Height in inches)

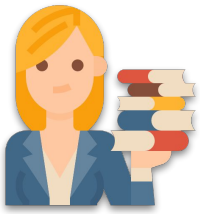


Men's Basketball Team
(**MBT**)
(Height in inches)



Compare the two data sets by solving the mean and mean absolute deviation.

EXAMPLE PROBLEM



STEP 1

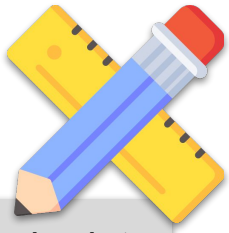
Solve for the mean.

WBT : $\frac{62+62+62+64+64+65+67+67+67+67+68+68+68+71+71+73+73}{17}$

Mean = **67**

MBT :
68+68+68+69+69+69+70+71+71+74+74+74+76+76+78+78+79+80+80+80 = 1472; 1472/20 = 73.6

Mean = **73.6**



STEP 2

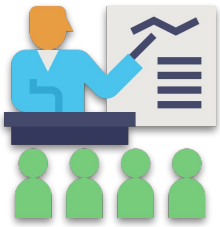
Find the absolute value of the difference between each data value and the mean.

WBT

|62 - 67| = 5	|67 - 67| = 0	|68 - 67| = 1
|62 - 67| = 5	|67 - 67| = 0	|71 - 67| = 4
|62 - 67| = 5	|67 - 67| = 0	|71 - 67| = 4
|64 - 67| = 3	|67 - 67| = 0	|73 - 67| = 6
|64 - 67| = 3	|68 - 67| = 1	|73 - 67| = 6
|65 - 67| = 2	|68 - 67| = 1	

EXAMPLE PROBLEM

MBT



|68 - 73.6| = 5.6	|71 - 73.6| = 2.6	|78 - 73.6| = 4.4
|68 - 73.6| = 5.6	|71 - 73.6| = 2.6	|78 - 73.6| = 4.4
|68 - 73.6| = 5.6	|74 - 73.6| = 0.4	|79 - 73.6| = 5.4
|69 - 73.6| = 4.6	|74 - 73.6| = 0.4	|80 - 73.6| = 6.4
|69 - 73.6| = 4.6	|74 - 73.6| = 0.4	|80 - 73.6| = 6.4
|69 - 73.6| = 4.6	|76 - 73.6| = 2.4	|80 - 73.6| = 6.4
|70 - 73.6| = 3.6	|76 - 73.6| = 2.4	

STEP 3

Find the mean absolute deviation by solving for the mean of the absolute values.

WBT:

$$\frac{5 + 5 + 5 + 3 + 3 + 2 + 0 + 0 + 0 + 0 + 1 + 1 + 1 + 4 + 4 + 6 + 6}{17} = \mathbf{2.71}$$

MBT:

5.6 + 5.6 + 5.6 + 4.6 + 4.6 + 4.6 + 3.6 + 2.6 + 2.6 + 0.4 + 0.4 + 0.4 + 2.4 + 2.4 + 4.4 + 4.4 + 5.4 + 6.4 + 6.4 + 6.4 = 84.2 ; 78.8/20 = **3.94**

- WBT players has a mean height of 67in. while the MBT players has a height of 73.6in--- a differences of 6.6in.
- The mean absolute deviation of 2.71 for WBT players' height and 3.94 for MBT players' height indicates a high variability.
- There is higher variability in the height of the MBT players.
- The difference between the heights of the teams is approximately ***2 times the variability*** of the data sets (6.6/3.94 = 1.67)

LET'S PRACTICE

Compare the mean and mean absolute deviation of the height of Southville varsity players and St. Claire varsity players.

Solution:

TABLE OF ACTIVITIES

FIRST DAY OF SCHOOL

It's the first day of school! Your teacher asks you to define the following statistical terms in your own words. Write your answer on the space provided.

MEAN

1.)

MEDIAN

2.)

MODE

3.)

RANGE

4.)

INTERQUARTILE RANGE

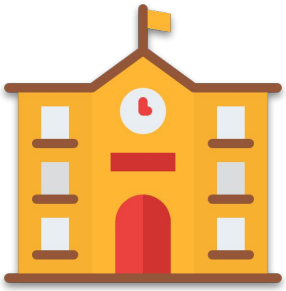
5.)

VARIANCE

6.)

MEAN ABSOLUTE DEVIATION

7.)



NEW CLASSMATES

Your new classmate needs your help in answering the problems below. Given the following sets of data, determine the mean, median and mode. Show your solution on the space provided.

20, 21, 22, 22, 22, 23, 24, 25

1.) MEAN

2.) MEDIAN

3.) MODE

55, 55, 56, 57, 58, 58, 58, 61

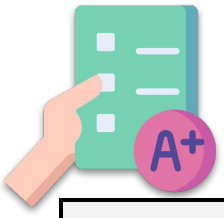
4.) MEAN

5.) MEDIAN

6.) MODE

IT'S CARD DAY TODAY!

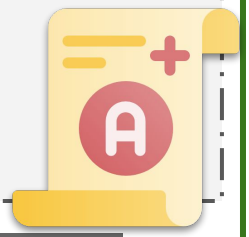
To get your report card, read and analyze the given problem below. Answer the question and show your solution on the space provided.



The data below shows your grades in 7 different subjects for each grading periods.

Subject	Grading 1	Grading 2	Grading 3	Grading 4
English	92	91	92	91
Mathematics	85	87	89	89
History	94	95	92	93
Science	89	90	87	92
Theology	91	91	93	92
Physics	89	90	92	91
Computer Studies	95	94	91	92

What grading period where you got the highest mean? Justify your answer.

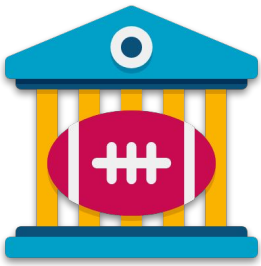


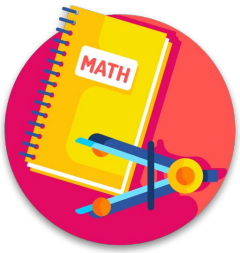
JOINING A SCHOOL CLUB

You are having a hard time in choosing what club to join. To choose your club, read and analyze the given problem below. Answer the question and show your solution on the space provided.

The table below shows the number of members of 5 different clubs in 4 consecutive years.

Club	2017	2018	2019	2020
Sports Club	22	25	36	42
Music Club	21	19	24	39
Math Club	29	32	30	21
Cooking Club	28	26	19	29
Debate Club	28	34	36	21



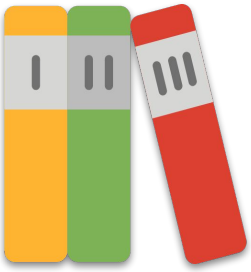


1.) If you want to join one of the five clubs in your school with the greatest median, what club will you join? _____

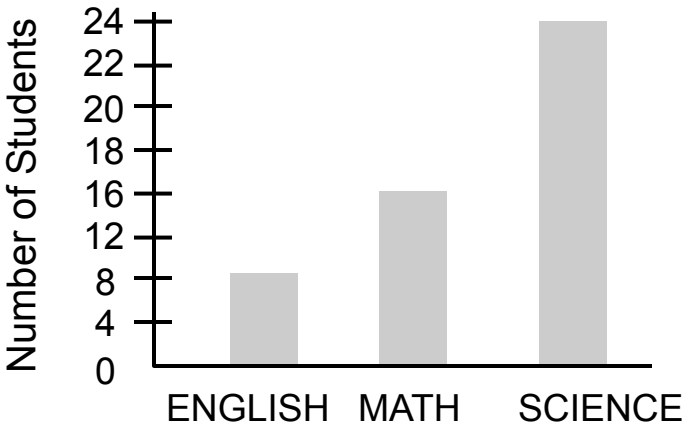
2.) Justify your answer.

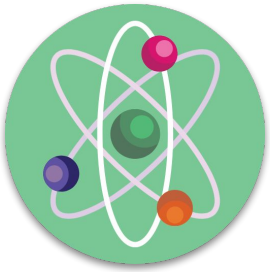
MY SUBJECTS

Oops! Your grades in some of your subjects are falling. To get your grades up, read and analyze the situation below carefully. Answer what are being asked. Justify your answer on the space provided.



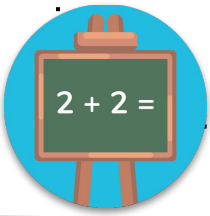
Teacher Vina wants to identify the most difficult subject for the majority of her students. She surveyed 48 students in her class and asked them what is the most difficult subject for them. The results of the surveyed are shown below.





1.) What is the most difficult subject for the majority of the students? Justify your answer.

2.) According to the bar graph, what percent of the students said that Math is the most difficult subject?



SCHOOL ELECTION

School election is fast approaching. To vote for president position, read and analyze the given situation. Give some inferences based on the table provided.

Ariane, John and Clyde are running for class presidents in the upcoming school election. The school principal surveyed random sample of 100 students and asked them who are they planning to vote for president position for the upcoming school election. The results are shown below.

Candidate	Number of Votes
Ariane	12
John	43
Clyde	45

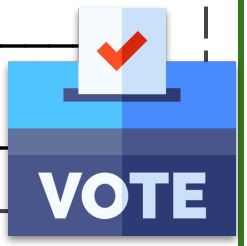
Give 3-5 inferences that can be made based on the results shown in the table above?

My inferences are…

1.) _____

2.) _____

3.) _____



LET'S DO SOME SCHOOLWORKS

To finish your schoolworks on time, solve for the Mean Absolute Deviation of the given set of data below. Complete the table below and show your solution.

11, 12, 12, 14, 15, 15, 15, 15, 16, 16, 17, 19, 19, 19, 20, 21, 21, 21, 22

MEAN

1.)

2.) Absolute value of the difference between each data value and the mean.

3.) Mean Absolute Deviation

AIMING FOR EXCELLENCE

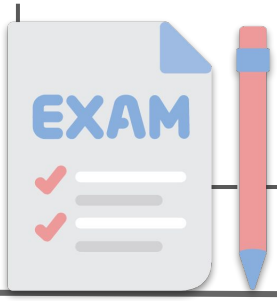
You are aiming for a high average this school year. To achieve high grades, read and analyze the situation carefully. Identify the mean and the mean absolute deviation of the given data.

Myrna is a 7th grader who has 8 subjects.The following are her grades in her 7 subjects: 91, 85, 87, 89, 92, 94 and 86.

1.) What should be the minimum grade she must get on one subject to have an average grade of 90?

2.) Solve for the median.

3.) Solve for the Mean Absolute Deviation.



SCHOOL POPULATION

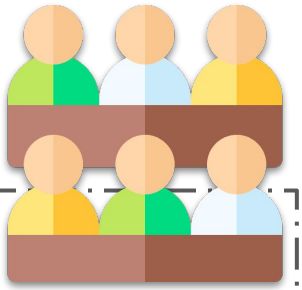
There are a lot of students enrolled in your school. To know some of them, read and analyze the situation below. Compare the given sets of data by identifying the mean and the mean absolute deviation.

Dorothy wants to compare the number of population of her current school and her previous school for 7 consecutive years. Looking at the data below, she thinks that her current school has greater number of population but she's doesn't know how much greater.

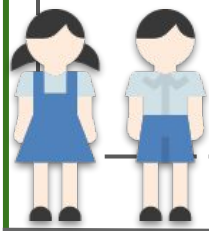
Current School: 2023, 2025, 2232, 2401, 2160, 2210, 2111

Previous School: 2022, 2029, 2150, 2391, 2201, 2199, 2150

Compare the data by computing the mean and the mean absolute deviation.



Solution:

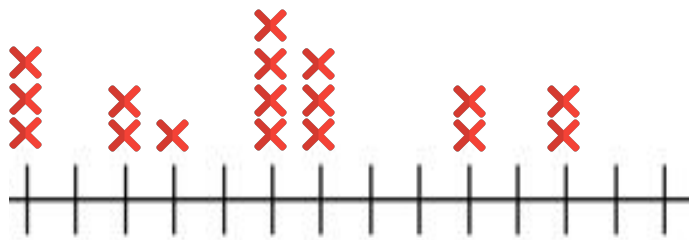


VARSITY PLAYERS

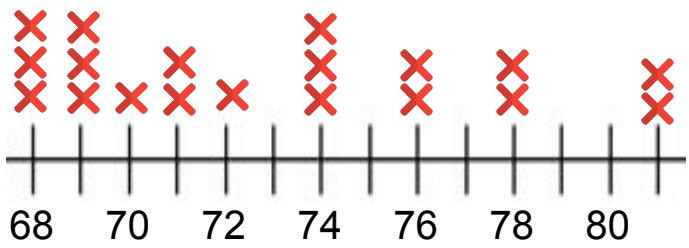
You are a fan of the varsity players in your school. To meet them, read and analyze the situation below. Based on the Dot Plot, identify the mean and the mean absolute deviation of the given sets of data.

Jeric wants to compare the height of the volleyball team players and soccer team players of his school. Given the sets of data, compare the height by computing the mean and mean absolute deviation.

Volleyball players' height (inches)



Soccer players' height (inches)



1.) Mean

2.) Mean Absolute Deviation

ANSWER GUIDE

Activity 1

1.) The mean describes the sample with a number that represents the center of a data set. The mean is also known as the “arithmetic average.”
2.) The median is the middle of the data set. It separates an ordered set (from the lowest number to the highest) of data into two equal parts.
3.) The mode is the most repetitive number in a data set. You can find the mode by simply identifying which number in the data set has the most number of frequency.
4.) Range is the difference of the highest (H) and lowest (L) scores in a data set.
5.) Standard Deviation is the most important measure of variability. It differentiates the scores with equal averages.
6.) Variance is the measure of how widely spread the data is.
7.) Interquartile Range is calculated by arranging the data in numerical order, removing the upper and lower one-quarter of the values, and then nothing range of the remaining values.
8.) Mean absolute deviation is also called average deviation which refers to the sum of the deviations from the mean divided by the number of elements.

Activity 2

1.)
20+21+22+22+22+23+24+25
= 179 ;
Mean= 179/8 = 22.375

3.) Mode = 22

2.)

$X_1 = 8/2 = 4$; 4th term ; $X_1 = 22$

$X_2 = 8/2 + 1 = 5$; 5th term ; $X_2 = 22$

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{22 + 22}{2} = 22$$

4.)

55+55+56+57+58+58+58+61
= 458 ;
Mean= 458/8 = 57.25

6.) Mode = 58

5.)

X_1= 8/2 = 4 ; 4th term ; X_1= 57

X_2= 8/2 + 1 = 5 ; 5th term ; X_2= 58

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{57 + 58}{2} = 57.5$$

Activity 3

Grading 1: $$X = \frac{92 + 85 + 94 + 89 + 91 + 89 + 95}{7} = \frac{635}{7} = 90.71$$

Grading 2: $$X = \frac{91 + 87 + 95 + 90 + 91 + 90 + 94}{7} = \frac{638}{7} = 91.14$$

Grading 3: $$X = \frac{92 + 89 + 92 + 87 + 93 + 92 + 91}{7} = \frac{636}{7} = 90.86$$

Therefore, grading 2 has the highest mean.

Activity 4

Sports Club

X_1= 4/2 = 2 ; 2nd term ; X_1= 25

X_2= 4/2 + 1 = 3 ; 3rd term ; X_2= 36

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{25 + 36}{2} = 30.5$$

Music Club

X_1= 4/2 = 2 ; 2nd term ; X_1= 21

X_2= 4/2 + 1 = 3 ; 3rd term ; X_2= 24

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{21 + 24}{2} = 22.5$$

ANSWER GUIDE

Math Club

$X_1 = 4/2 = 2$; 2nd term ; $X_1 = 29$

$X_2 = 4/2 + 1 = 3$; 3rd term ; $X_2 = 30$

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{29 + 30}{2} = 29.5$$

Cooking Club

$X_1 = 4/2 = 2$; 2nd term ; $X_1 = 28$

$X_2 = 4/2 + 1 = 3$; 3rd term ; $X_2 = 26$

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{28 + 26}{2} = 27$$

Debate Club

$X_1 = 4/2 = 2$; 2nd term ; $X_1 = 28$

$X_2 = 4/2 + 1 = 3$; 3rd term ; $X_2 = 34$

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{28 + 34}{2} = 31$$

Debate Club population has the greatest median

Activity 5

1.) According to the bar graph, 8 students said that english is the most difficult, 16 students said it is math and 24 of the students said science is the most difficult subject. Majority of the students said Science is the most difficult subject.

2.) $\frac{16}{48} \times 100\% = 33.33\%$

Activity 6

1.) Clyde has a higher chance of winning the election.
2.) Either John or Clyde will likely to win the election.
3.) Among the three candidates, Ariane has the lowest chance of winning.

ANSWER GUIDE

Activity 7

1.)

$$\frac{11+12+12+14+15+15+15+15+16+16+17+19+19+19+20+21+21+21+22}{19}$$

Mean = 16.84

2.)

$\lvert 11-16.84 \rvert = 5.84$	$\lvert 15-16.84 \rvert = 1.84$	$\lvert 20-16.84 \rvert = 3.16$
$\lvert 12-16.84 \rvert = 4.84$	$\lvert 16-16.84 \rvert = 0.84$	$\lvert 21-16.84 \rvert = 4.16$
$\lvert 12-16.84 \rvert = 4.84$	$\lvert 16-16.84 \rvert = 0.84$	$\lvert 21-16.84 \rvert = 4.16$
$\lvert 14-16.84 \rvert = 2.84$	$\lvert 17-16.84 \rvert = 0.16$	$\lvert 21-16.84 \rvert = 4.16$
$\lvert 15-16.84 \rvert = 1.84$	$\lvert 19-16.84 \rvert = 2.16$	$\lvert 22-16.84 \rvert = 5.16$
$\lvert 15-16.84 \rvert = 1.84$	$\lvert 19-16.84 \rvert = 2.16$	
$\lvert 15-16.84 \rvert = 1.84$	$\lvert 19-16.84 \rvert = 2.16$	

3.)

$$\frac{5.84+2(4.84)+2.84+4(1.84)+2(0.84)+0.16+3(2.16)+3.16+3(4.16)+5.16}{19}$$

Mean Absolute Deviation = 2.89

Activity 8

1.) Let x be the Myrna's grade in her one subject

$$\frac{91 + 85 + 87 + 89 + 92 + 94 + 86 + x}{8} = 90 \; ; \; x = 96$$

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2.) 85, 86, 87, 89, 91, 92, 94, 96

$X_1 = 8/2 = 4$; 4th term ; $X_1 = 89$

$X_2 = 8/2 + 1 = 5$; 5th term ; $X_2 = 91$

$$\tilde{x} = \frac{X_1 + X_2}{2} = \frac{89 + 91}{2} = 90$$

3.)

$\lvert 85 - 90 \rvert$	= 5	$\lvert 91 - 90 \rvert$	= 1
$\lvert 86 - 90 \rvert$	= 4	$\lvert 92 - 90 \rvert$	= 2
$\lvert 87 - 90 \rvert$	= 3	$\lvert 94 - 90 \rvert$	= 4
$\lvert 89 - 90 \rvert$	= 1	$\lvert 96 - 90 \rvert$	= 6

$$\frac{5 + 4 + 3 + 1 + 1 + 2 + 4 + 6}{8} = 3.25$$

Activity 9

MEAN

Current School: $\frac{2023+2025+2232+2401+2160+2210+2111}{7}$ = **2166**

Previous School: $\frac{2022+2029+2150+2391+2201+2199+2142}{7}$ = **2162**

MEAN ABSOLUTE DEVIATION

Current School:

$\lvert 2023-2166 \rvert$	= 143
$\lvert 2025-2166 \rvert$	= 141
$\lvert 2232-2166 \rvert$	= 66
$\lvert 2401-2166 \rvert$	= 235
$\lvert 2160-2166 \rvert$	= 6
$\lvert 2210-2166 \rvert$	= 44
$\lvert 2111-2166 \rvert$	= 55

Previous School:

$\lvert 2022-2162 \rvert$	= 140
$\lvert 2029-2162 \rvert$	= 133
$\lvert 2150-2162 \rvert$	= 12
$\lvert 2391-2162 \rvert$	= 229
$\lvert 2201-2162 \rvert$	= 39
$\lvert 2199-2162 \rvert$	= 37
$\lvert 2142-2162 \rvert$	= 20

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Current School: $\frac{143 + 141 + 66 + 235 + 6 + 44 + 55}{7}$ **= 98.57**

Previous School: $\frac{140 + 133 + 12 + 229 + 39 + 37 + 20}{7}$ **= 87.14**

Activity 10

Volleyball players' height:
62, 62, 62, 64, 64, 65, 67, 67, 67, 67, 68, 68, 68, 71, 71, 73, 73

Mean:

$$\frac{62+62+62+64+64+65+67+67+67+67+68+68+68+71+71+73+73}{17} = 67$$

Soccer Players' height:
68, 68, 68, 69, 69, 69, 70, 71, 71, 72, 74, 74, 74, 76, 76, 78, 78, 81, 81,

Mean:

$$\frac{68+68+68+69+69+69+70+71+71+72+74+74+74+76+76+78+78+81+81}{19} = 73$$

For Volleyball Team	$\lvert 62-67 \rvert = 5$	$\lvert 65-67 \rvert = 2$	$\lvert 68-67 \rvert = 1$	$\lvert 73-67 \rvert = 6$
	$\lvert 62-67 \rvert = 5$	$\lvert 67-67 \rvert = 0$	$\lvert 68-67 \rvert = 1$	$\lvert 73-67 \rvert = 6$
	$\lvert 62-67 \rvert = 5$	$\lvert 67-67 \rvert = 0$	$\lvert 68-67 \rvert = 1$	
	$\lvert 64-67 \rvert = 3$	$\lvert 67-67 \rvert = 0$	$\lvert 71-67 \rvert = 4$	
	$\lvert 64-67 \rvert = 3$	$\lvert 67-67 \rvert = 0$	$\lvert 71-67 \rvert = 4$	

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For Soccer Team

$\lvert 68-73 \rvert = 5$	$\lvert 69-73 \rvert = 4$	$\lvert 74-73 \rvert = 1$	$\lvert 78-73 \rvert = 5$
$\lvert 68-73 \rvert = 5$	$\lvert 70-73 \rvert = 3$	$\lvert 74-73 \rvert = 1$	$\lvert 78-73 \rvert = 5$
$\lvert 68-73 \rvert = 5$	$\lvert 71-73 \rvert = 2$	$\lvert 74-73 \rvert = 1$	$\lvert 81-73 \rvert = 8$
$\lvert 69-73 \rvert = 4$	$\lvert 71-73 \rvert = 2$	$\lvert 76-73 \rvert = 3$	$\lvert 81-73 \rvert = 5$
$\lvert 69-73 \rvert = 4$	$\lvert 72-73 \rvert = 1$	$\lvert 76-73 \rvert = 3$	

For Volleyball Team

$$\frac{5+5+5+3+3+2+0+0+0+0+1+1+1+4+4+6+6}{17} = \mathbf{2.71}$$

For Soccer Team

$$\frac{5+5+5+4+4+4+3+2+2+1+1+1+1+3+3+5+5+8+8}{19} = \mathbf{3.68}$$

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