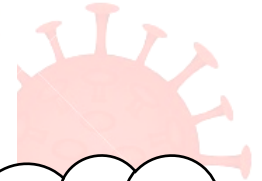


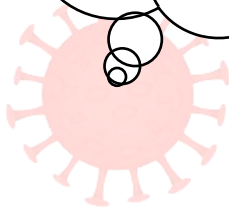
**MODE**

**MEAN**



**MEDIAN**

**RANGE**



# Sanem's Statistical Schoolwork

ALAA SIDDIQUI

It had been three months since the Coronavirus outbreak. The city of Mundus was under lockdown and the entire population was practicing social distancing to curb the pandemic.

Sanem Effendi was missing school. One day her parents received an e-mail from the school that they will soon commence online classes. After spending three months in quarantine, Sanem was thrilled on hearing this news. She couldn't wait to see her friends and teachers in the virtual classroom.

A week later her school started. Math was her favourite subject. However, she was struggling with her new lesson. She requested her parents to help her out with her homework.

Temizlik Effendi and Huriye Effendi were the famous humanitarians of Mundus. To help nations around the world fight the novel coronavirus (2019-nCoV) they had established an organization, COVID-19 Preventive Organisation (CPO).

"Temizlik, you have an urgent phone call regarding the export of CPK to Asia!", said Huriye.

"What's CPK mamma?", asked Sanem.

"CPK is the short-form of COVID-19 Prevention Kit", replied her mother.

With a curious look, Sanem asked, "What is inside the kit?"

Her mother explained that it is a kit that consists of preventive items that help people in fighting the novel coronavirus (2019). It has sanitizers, soaps, face masks, disinfectants and tissue rolls.

With a worrisome tone, she continued, "Your papa and I are working very hard with hundreds of people to help export these kits all over the world."

"That's amazing mamma! Now we will be able to save so many lives.", said Sanem.

"I hope so my darling.", sighed her mother.



Temizlik rejoined Sanem and Huriye in the living room after his phone call. He noticed that his beautiful and bright daughter was struggling with her math homework.

Sanem with a confused look on her face asked her father, "Pappa..... what do the terms **MEAN**, **MODE**, **MEDIAN** and **RANGE** mean? I am struggling with my new online math assignment"

Temizlik put down his mobile phone and like a doting father sat next to his daughter and said, "Come sweetheart, I'll explain."

He continued, "As you can see Sanem our organization, CPO, exports millions of CPKs to different continents such as Australia, Asia, Africa, Europe, North America and South America. We have been doing this for several weeks now. Now, if we want to know the **MEAN** export of CPKs to Asia, I will first tabulate all the **original data** that I have which is called **RAW DATA**."

Temizlik drew a table on a sheet of paper.

**CPK Export (in millions)**

Month	Asia	Australia	Africa	Europe	North America	South America
1 <sup>st</sup> Month	18	7	18	30	27	15
2 <sup>nd</sup> Month	25	9	22	50	35	50
3 <sup>rd</sup> Month	50	12	30	80	70	75

He asked Sanem, "Now, Sanem, look carefully at the table and tell me which continent had the highest and the lowest export and in which month."

Sanem quickly replied, "The highest export was to Europe in the third month, and the lowest export was to Australia in the first month."

"Bravo! Darling." He then continued and explained to Sanem that **Average in arithmetic is the same as Mean in statistics**. To calculate the mean export of Asia, we will do the following:

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{No. of observations}} \quad \text{Mean} = \frac{18+25+50}{3} \quad \text{Mean} = \frac{93}{3}$$

**Average or Mean is a number that shows the central tendency of a group of observations.**

Therefore, the Mean export of CPKs to Asia = 31 million

"Now, can you find what was the average export in the second month to all the continents?", asked Temizlik.

Sanem enthusiastically said, "Yes Pappa...let me try and get this one."

Sanem quickly calculated.

$$\text{Mean} = \frac{50+12+30+80+70+75}{6}$$

$$\text{Mean} = \frac{317}{6}$$

$$\text{Mean} = 52.83 \text{ million}$$

"It's 52.83 million!", exclaimed Sanem. "Superb Sanem!", replied her father.

The father-daughter duo continued working together on the math assignment as the online submission deadline was approaching. Next, they learned how to find **MODE**.

**Mode** of any given data is the observation which occurs for a maximum number of times.

"Always, remember Sanem, that, **Mode means most often or most frequent**. You can remember this with the first two letters of Mode - '**MO**' which can be remembered as '**Most Often**'.", explained Temizlik.

"To calculate mode, we have to arrange the raw data in ascending order in the FREQUENCY TABLE", said Temizlik. Temizlik then drew the frequency table.

**CPK Export Frequency Table**

No. of CPK Exported (in millions)	Tally	Frequency
7	I	1
9	I	1
12	I	1
15	I	1
18	II	2
22	I	1
25	I	1
27	I	1
30	II	2
35	I	1
50	III	3
70	I	1
75	I	1
80	I	1

After careful observation excited Sanem replied,  
"Pappa, I think I know the answer. The mode is 50!"

"You are absolutely right, my little genius.",  
applauded Temizlik.

"But did you understand, why?", asked her father.

"Yes, Pappa. 50 has occurred the highest number of  
times and therefore it is the mode. 50 million CPKs  
have been exported the most number of times."

CPK Export Frequency Table

No. of CPK Exported (in millions)	Tally	Frequency
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25	I	1
27	I	1
30	II	2
35	I	1
50	III	3
70	I	1
75	I	1
80	I	1



The phone rings again and Temizlik attends the phone call. "This one will take some time my dear, why don't you ask mamma to help you with your assignment," said Temizlik.

Sanem then approached her mother and said, "Mamma, can you explain me what is **MEDIAN?**"

"Of course, dear," said Sanem's mother.

**"Median is the middlemost value of a sorted list of data.** But remember Sanem, when you have a set of data with **odd number of values**, there will be **only one median**. And when you have a set of data with **even number of values**, there will be **two middle values and the average of these two middle values will be the median**. Can you tell me what is the median export during the third month to all the continents?"

**Median** refers to the value which lies in the middle of the set of data when arranged in an increasing or decreasing order with half of the observations above it and the other half below it.

Sanem looked at the data set and found out that there are six values.

Month	Asia	Australia	Africa	Europe	North America	South America
1 <sup>st</sup> Month	18	7	18	30	27	15
2 <sup>nd</sup> Month	25	9	22	50	35	50
3 <sup>rd</sup> Month	50	12	30	80	70	75

So, she arranged them in ascending order.

Month	Asia	Australia	Africa	Europe	North America	South America
3 <sup>rd</sup> Month	12	30	50	70	75	80

Then she calculated the average (mean) of the two middle values to find the median.

$$\text{Mean} = \frac{50+70}{2}$$

$$\text{Mean} = \frac{120}{2}$$

Median = 60 million

Feeling overjoyed, Sanem responded, "Mamma! The median export during the third month to all the continents is 60 million! Did I get it right?"

"Yes! You did. That's fantastic!", Huriye replied.

Sanem looked at her watch and noticed that there was only one hour remaining for her assignment submission deadline.

"Oh Mamma!, learning math with you and pappa is so much fun that I completely lost track of time. I need to quickly finish learning one more topic."

"What is it Sanem?," asked Huriye.

Range is the difference between the highest and the lowest values for any given set of data.

"It's Range," replied Sanem.

"Oh, that's very easy. To calculate **Range**, we just have to **find the difference between the highest and the lowest values for the data set**," explained Huriye.

"Ah! that's easy," said Sanem.

"So, can you calculate the range of the CPK export to all the continents for the past three months?," asked Huriye.

"Yes mamma," said Sanem.

Sanem looked again at the data set and circled the highest and the lowest value.

**CPK Export (in millions)**

Month	Asia	Australia	Africa	Europe	North America	South America
1 <sup>st</sup> Month	18	7	18	30	27	15
2 <sup>nd</sup> Month	25	9	22	50	35	50
3 <sup>rd</sup> Month	50	12	30	80	70	75

She then found the difference between the two values.

$$\text{Range} = \text{Highest value} - \text{Lowest value}$$

$$\text{Range} = 80 - 7$$

$$\text{Range} = 73 \text{ million}$$

After finding the value, Sanem promptly said, "Mamma...the range of CPK export during the past three months to all the continents is 73 million."

"That's brilliant my dear!" exclaimed Huriye.

Feeling proud of her daughter's efforts she hugged and kissed her on the forehead.

Temizlik sees the exchange of love between the mother and daughter and smiles.

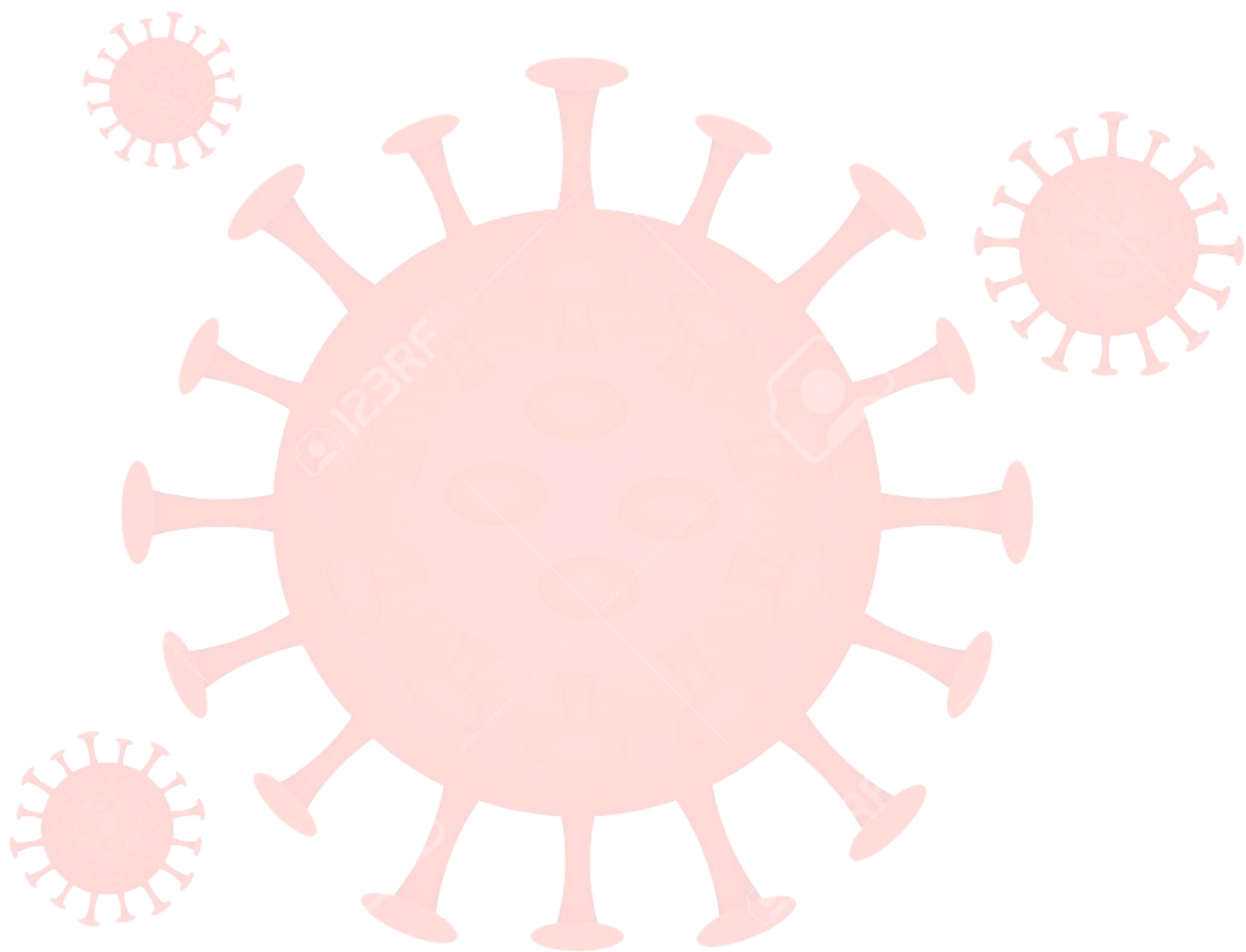
"Well Sanem. Did you finish your math assignment?" inquired Temizlik.

"Yes pappa. I did! You and mamma made math so interesting and easy for me to understand. Also, I learned how hard you and mamma work and what our organization does. Thank you so much for helping me today!", replied Sanem.

Sanem submitted her assignment online just in time. Two days later, her math teacher e-mailed her parents and informed that Sanem was the only one in class who was awarded A+ for her math assignment.







## About the Author

My name is Alaa K. Siddiqui. I am 12 years old and I study at Modern Middle East International School, Riyadh, Saudi Arabia. I got the inspiration to write this story when I was studying math at home. Currently, we are not allowed to go to school due to the coronavirus outbreak as we are practising social-distancing. This was a new topic for me and this competition gave me an opportunity to explain the concepts in a fun way. I really enjoyed doing research on the new math terms and working on the story. When I finished writing my story, I felt as if I became friends with the main character, Sanem. I hope people will enjoy reading my story and learn the mathematical concepts in a fun way.

