Maths CBA 2

Designing a Question:

The first step of my statistical investigation was to design a question. When we were coming up with a question, we tried to come up with one that was good enough to meet the success criteria. Everyone spent a few days thinking about questions we could use. I personally found this quite hard to think of any good enough questions. We also tried to find a topic that we were interested in, and that we could relate to in our everyday lives.

When designing the question, we had to consider:

- I only have 3 weeks to complete the project.
- Sample size
- Was the question biased?
- Covid 19
- How will I conduct this project?

Near the end of week one in the investigation, we all put our question ideas down and discussed them with each other. We thought about them and put our opinion forward on why each question was good and why they weren't.

We came up with the question:

"What is the most popular song from each year, and the most popular song from the decade?"

We thought that this would be a good question because we could change each year (variables), that we could conduct a survey, and that we were all interested in the topic.

After speaking to our Maths teacher we soon realised that our question was not concise. It was a very broad question that would not give us an accurate answer after an investigation. It was not specific, and would be quite hard to investigate considering there are hundreds of years that had popular music, and people are of all ages.

So, we decided to change our question. We picked a specific time period, and we added an age range because if we didn't it would be biased and unfair, for example people from the 1950's may prefer rock music to pop and would not like any new music from 2020.

I thought that after collecting the results I could find the mean, mode, median and range for the votes of each songs for every year.

Our new question was,

What is the most popular song in each year from 2010-2020, among students aged 14-16, and what is the most popular song of this decade?

We felt this was a much better question because we could then:

- Find out the variables
- Collect the data by answering the question.
- Do it in the given timeframe of 3 weeks.
- Conduct a survey

This would give us non-ordinal data. Our data would also be primary and secondary data, as we would collect primary data from the survey, and we would collect secondary data from the research online.

Shows some awareness of how variability may affect data gathered

Poses a question that anticipates variability and seeks generalisation

CBA2 Statistical Investigation: Popular Songs

Data Collection Plan/Measuring Strategy

Step 1: Research into popular songs of each year. Narrow down the most popular ones and select five songs from each year.

Step 2: Using my research findings, create a survey with short, concise questions. For example:

What was your favourite song from 2010? Chose one:

- ❑ Tiktok
- ❑ The only girl in the world
- ❑ Like a G6
- ❑ Just the way you are
- ❑ Superbase

Step 3: Using the primary data collected from the survey, display my findings on bar charts, pie charts and line plots. Also work out the percentages in pie charts. This will make the data be neat.

Step 4: Analise and conclude on my data found. Find the mode, median and mean of the ages, and the range of votes each year.

Step 5: Compare the data to Billboard's most popular songs in the world. And You tube's most viewed/listened to songs.

How does variability affect the validity and reliability of the findings?

Our variables to the investigation are the years we change. This meant that for our 5 songs we picked, each year was going to change. This would give us a more reliable result because we can find out what are people's favourite songs from each year and in the decade, not just people's favourite songs. We can then use the data from this, to seek any trends on what people's current taste in music is.

Based on our results we could find out what was the most popular songs genre, which would help to findable an accurate result in our investigation.

Gathering Data:

What was I going to change and what was I going to keep the same?

In this investigation, I was going to change the years. I was measuring the students' favourite songs from each year, to achieve my conclusion. I would be able to do this by following the measuring strategy listed above.

To start off we researched popular songs of each year on Google. Many songs came up, but we decided to pick 5 songs from each year as we couldn't do every song, due to it taking too long and then when it comes to our survey, people would hesitate to answer it because it would be so long and boring. When picking the five songs from each year, we considered:

- The genre of the song
- Have we heard of it ourselves as students?
- Is it played on the radio often?
- The singer of the song

We took each song into deep consideration because we wanted people to have a wide variety of songs to choose from not just one-sided songs for example:

Favourite songs of 2019

- Boyfriend by Ariana Grande
- Thank u next by Ariana Grande

Develops a measuring strategy

Chosen measuring strategy with provide valid and reliable data

Shows some awareness of how variability may affect data gathered

- Bad idea by Ariana Grande
- Fake smile by Ariana Grande
- Don't call me Angel by Lana del Ray, Miley Cyrus and Ariana Grande.

I think this would be an example of a poor question to ask people because Ariana Grande sings all those songs, and they are all pop songs.

After thought and consideration we came up with our list of songs for each year which were:

Research

Popular Songs from 2010:

- TikTok by Kesha
- Just the way you are by Bruno Mars
- Only girl in the world by Rihanna
- Like a G6 by Far East Movement
- Super Bass by Nicki Minaj

Popular Songs from 2011:

- Party Rocket Anthem by LMFAO
- Someone like you by Adele
- Edge of glory by Rihanna
- Stereo hearts by Gym Class Heroes
- What the hell by Avril Lavigne

Popular Songs from 2012:

- Call me maybe by Carly Rae Jepson
- Payphone by Maroon5
- Die young by Kesha
- Whistle by Flo Rida
- Live while we are young by One Direction

Popular songs from 2013:

- Roar by Katy Perry
- Blurred Lines by Robin Thicke
- Wrecking Ball by Miley Cyrus
- Counting Stars by one Republic
- What does the fox say by Ylvis

Popular songs from 2014:

- Problem by Ariana Grande
- Stay with me by Sam Smith
- Fancy by Iggy Azalea
- Chandelier by Sia
- All about that base by Megan Trainor

Popular songs from 2015:

- See you again by Wiz Khalifia and Charlie Puth
- Hotline Bling by Drake
- Love me like you do by Ellie Goulding.
- Watch me whip by Silentó
- Hello by Adele

Shows some awareness of how variability can affect the data

CBA2 Statistical Investigation: Popular Songs

Popular songs from 2016:

- Work by Rihanna
- Work from home by Fifth Harmony
- Pillow talk by Zayn
- Don't let me down by the Chainsmokers
- Treat you better by Shawn Mendes

Popular songs from 2017:

- Shape of you by Ed Sheeran
- Wild Thoughts by Rihanna
- Despacito by Louis Fonsi
- Look what you made me do by Taylor Swift
- Humble by Kendrick Lamar

Popular songs from 2018:

- Sickomode by Travis Scott
- The Middle by Maren Morris
- Havana by Camila Cabello
- Shallow by Lady Gaga
- In my feelings by Drake

Popular songs from 2019:

- Old Town Road by Billy Ray Cyrus
- Bad Guy by Billie Eilish
- Someone you loved by Lewis Capaldi
- Dance Monkey by Tones and I
- 7 rings by Ariana Grande

Popular Songs from 2020:

- Savage by Megan Thee Stallion
- Savage love by Jason Derulo
- Blinding Lights by the Weekend
- Don't Start Now by Dua Lipa
- Kings and Queens by Ava Max

After finalising our songs, we needed to come up with an ideal sample size. We decided to survey the population of 3rd year students. Obviously, we weren't going to get 145 responses as not every single person in our year would answer our survey, so we aimed to have 50 people answer our survey. We felt this would be a good sample representative of the population of 3rd year students our school. The more people answer it, the better the result!

Seeks to generalise to the population by selecting a representative sample

Using the research above we could conduct a survey. Our first draft of our survey was not good. We were unaware that we asked some personal questions that were not needed. For example, we asked:

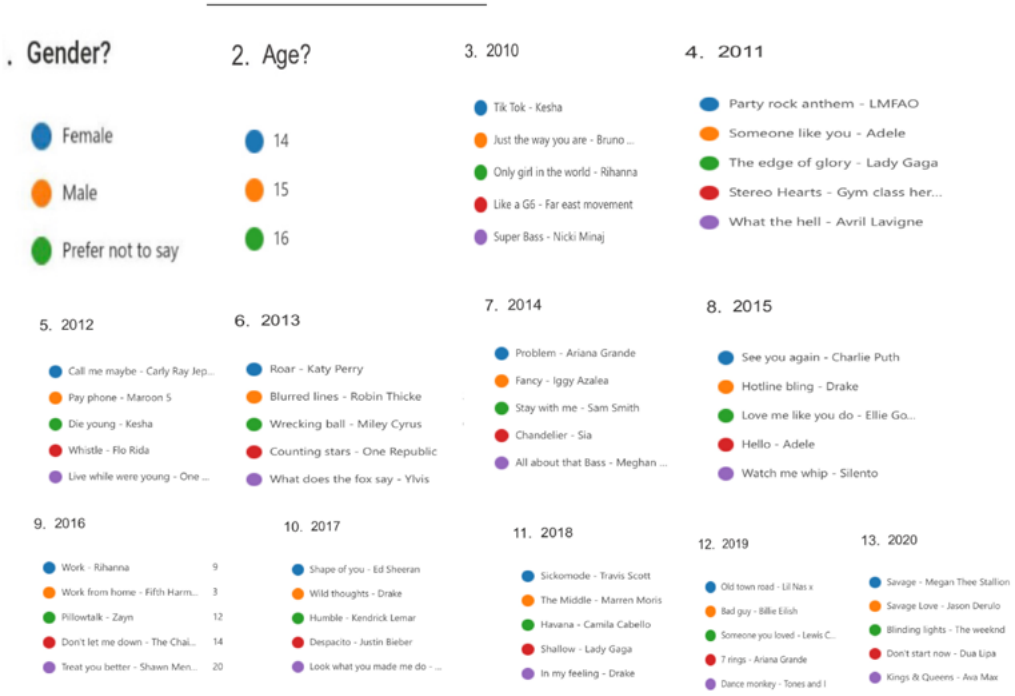
+ Did you enjoy this survey?

Then we made an updated version of the survey, with more accurate questions. We conducted the survey on Microsoft Forms. We felt this was a good way to conduct a survey because it was easy to use. We couldn't hand out a survey this year due to COVID-19 rules.

CBA2 Statistical Investigation: Popular Songs

The questions were:

Instructions: Please select one option listed below from each year as your favourite song.



Thanks for entering our survey!

We sent it to all class group chats on teams and our Maths teacher sent it to the other third year maths classes.

It took a few days for the responses to come in. We decided that the 44 responses we got would be enough, even though our aimed sample size was 50.

Using the results, I was able to make frequency tables, pie charts, bar charts, line plots and work out percentages of votes for each question as I felt this was the most appropriate way to show my data.

The data is we collected is categorical data.

How I worked out percentages?

1. I got the result of the question, and I divided it by the number of responses I got, then multiplied it by 100.
2. Example: Old town Road was voted 16 times and 44 people entered the survey.

16/44 x 100=36%

How I worked out the angles needed for a pie Chart?

1. I knew that a full circle has 360°, so for each result I divided it by the number of responses gathered, and this time I multiplied it by 360.
2. This gave me each angle for the pie chart.
3. Example: Old Town road got voted 16 times, and 44 people answered it.
4. 16/44 x 360= 131°.
5. Then, once I had all my angles, I drew a circle using a compass. Then i used my protractor to measure the angles up.
6. I then checked that all the angles add up to 360°.

Develops a measuring strategy

CBA2 Statistical Investigation: Popular Songs

While we were displaying our data, we noticed a sudden change in the responses in our survey on Microsoft Forms. It went from 44 responses to 58 responses. This was because we forgot to close the survey on Microsoft forms. At the time I didn't have all the raw data written out (like I do now) so I decided to start fresh and make new bar/pie/dot plot charts. I thought this was a good decision because although it was time consuming and I had less time I could:

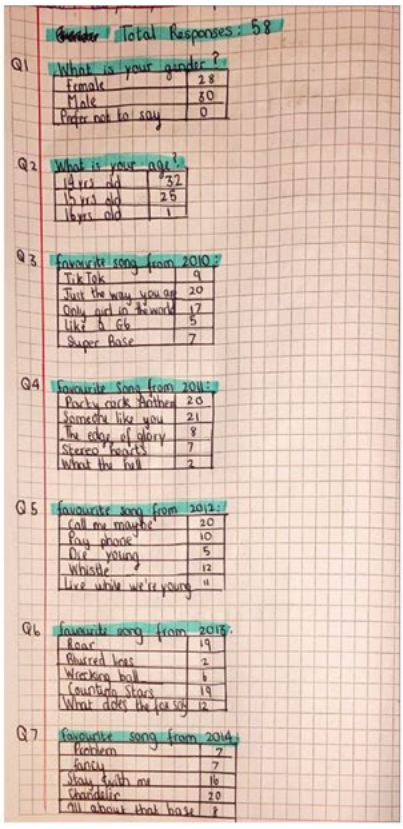
- ☺ Improve my bar charts. I think they are awful. I drew them in pencil, then traced them over in black pen and the ink smudged- it was messy.
- ☺ Have a more accurate conclusion because more people answered it.
- ☺ I did not round the decimal values, so to make it easier on the new charts I would round the decimal place to the nearest 10.
- ☺ Have a better margin of error

It wasn't until this point until I realised that due to my data being categorical data with numbers and words, I could not work out the Mean, outlier or interquartile range. Although I could find the mode of the ages, the mean of the ages and the range of votes from each year and the median

Managing Data

Here is my updated raw data.

Updated Raw Data:.



Total Responses: 58

Q1 What is your gender?

Female	28
Male	30
Prefer not to say	0

Q2 What is your age?

14 yrs old	32
15 yrs old	25
16yrs old	1

Q3 Favourite song from 2010:

TikTok	9
Just the way you are	20
Only girl in the world	17
Like I G6	5
Super Base	7

Q4 Favourite Song from 2011:

Party rock Anthem	20
Somedhe like you	21
The edge of glory	8
Stereo hearts	7
What the hell	2

Q5 favourite song from 2012:

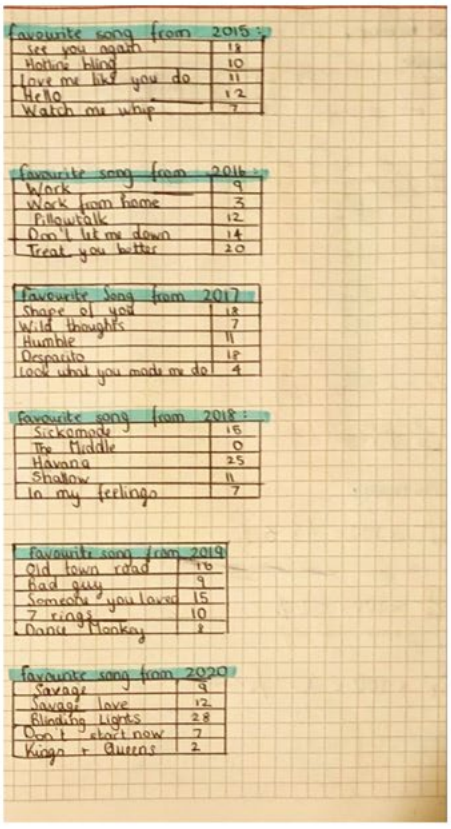
Call me maybe	20
Pay phone	10
Die young	5
Whistle	12
Live while we're young	11

Q6 favourite song from 2013:

Roar	19
Blurred lines	2
Wrecking ball	6
Counting Stars	19
What does the fox say	12

Q7 favourite song from 2014:

Problem	2
Fancy	7
Stay with me	16
Chandelier	20
All about that base	8



favourite song from 2015:

See you again	12
Hotline bling	10
Love me like you do	11
Hello	12
Watch me whip	7

favourite song from 2016:

Work	9
Work from home	3
Pillowtalk	12
Don't let me down	14
Treat you better	20

favourite Song from 2017

Shape of you	18
Wild thoughts	7
Humble	11
Despacito	18
Look what you made me do	4

favourite song from 2018:

Sickomode	15
The Middle	0
Havana	25
Shallow	11
In my feelings	7

favourite song from 2019

Old town road	16
Bad guy	9
Someone you loved	15
7 rings	10
Dance Monkey	8

favourite song from 2020

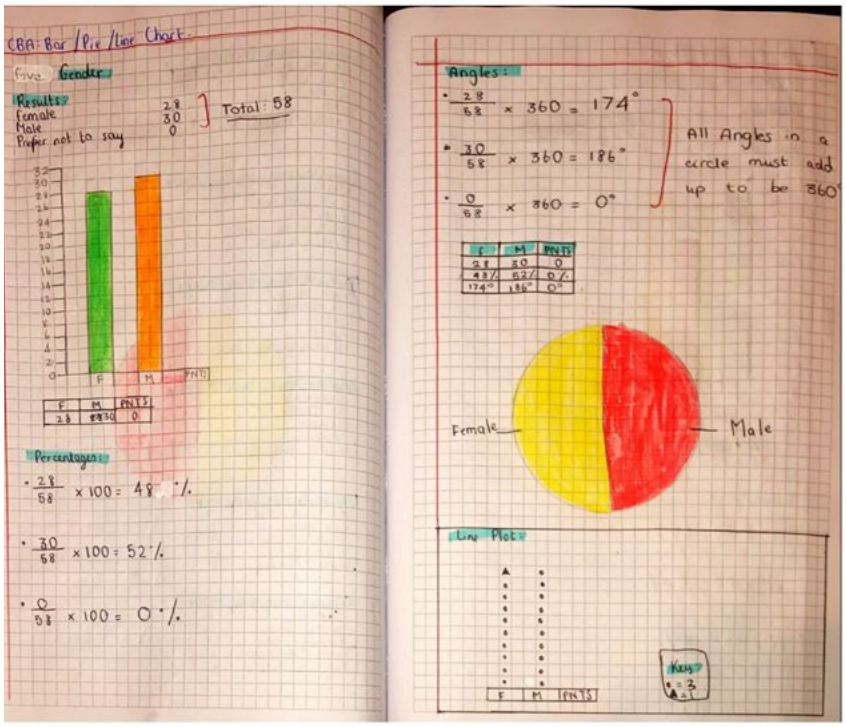
Savage	9
Savage love	12
Blinding Lights	28
Don't start now	7
Kings + Queens	2

Using my raw data, I could display my findings on bar charts, pie charts, frequency tables, and dot plots.

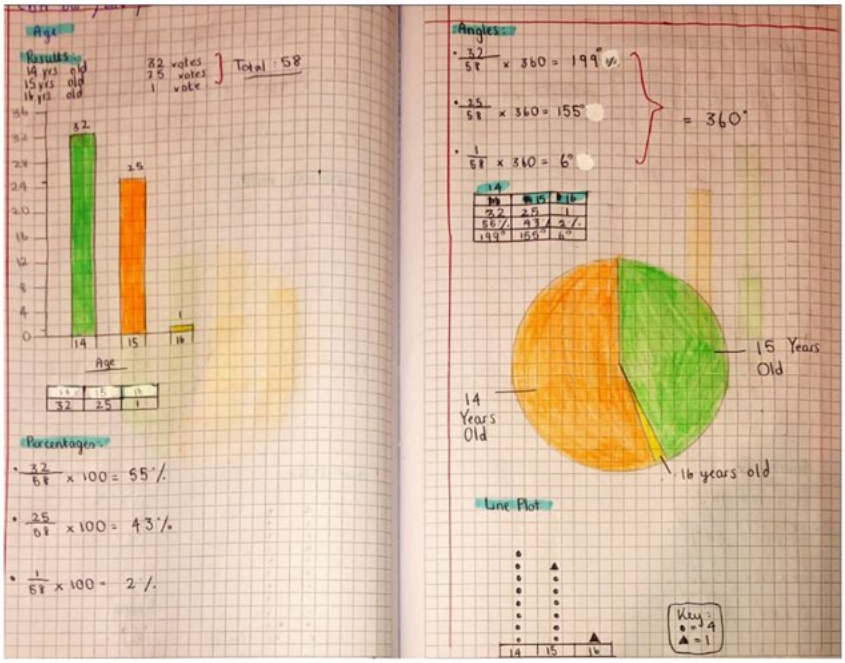
Displays data

CBA2 Statistical Investigation: Popular Songs

Gender:



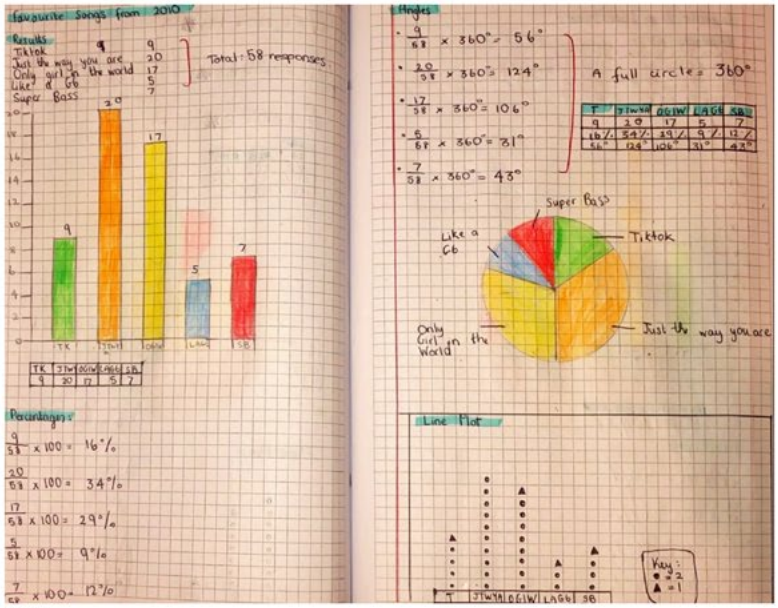
Age



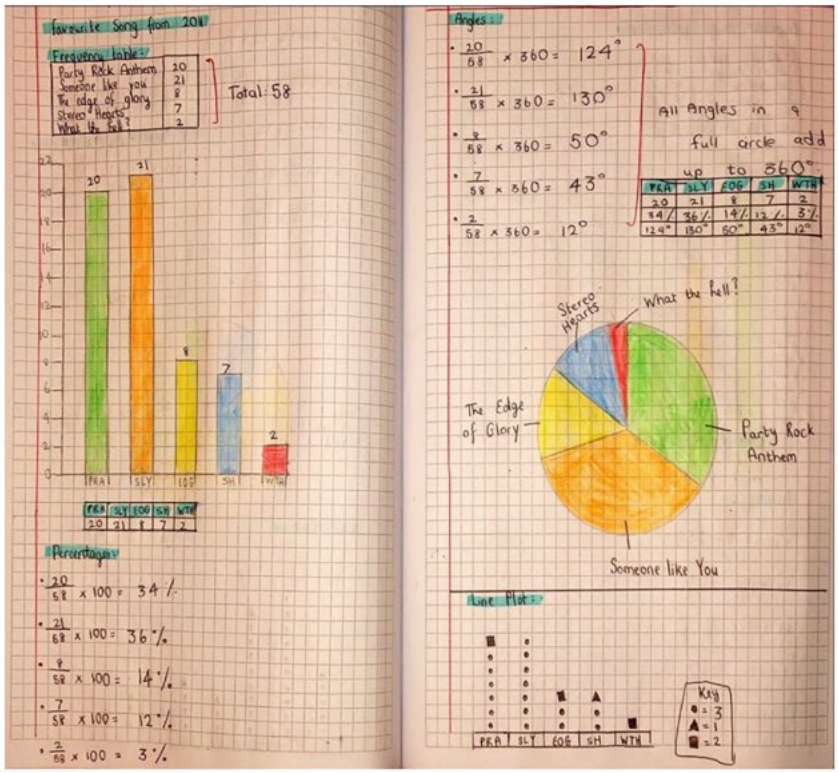
Displays data

CBA2 Statistical Investigation: Popular Songs

2010



2011

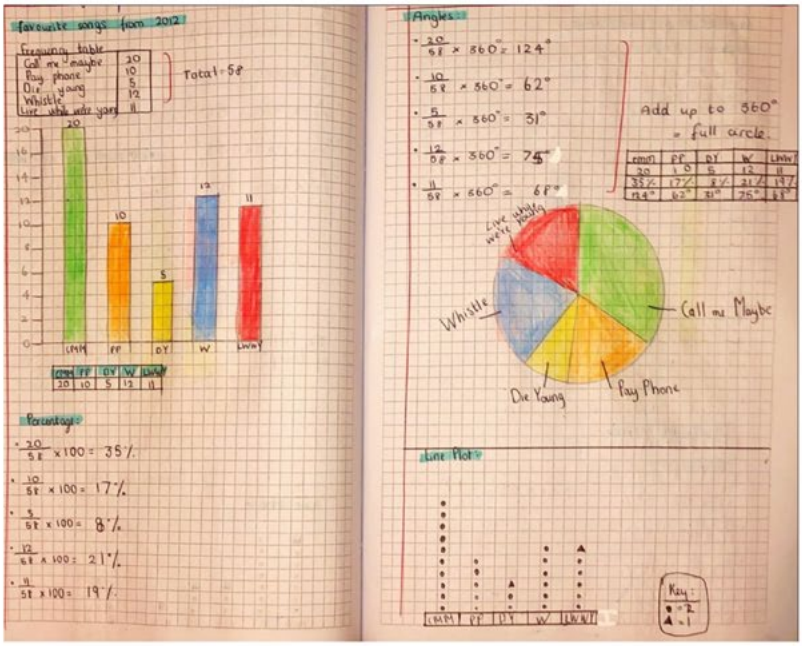


Displays data

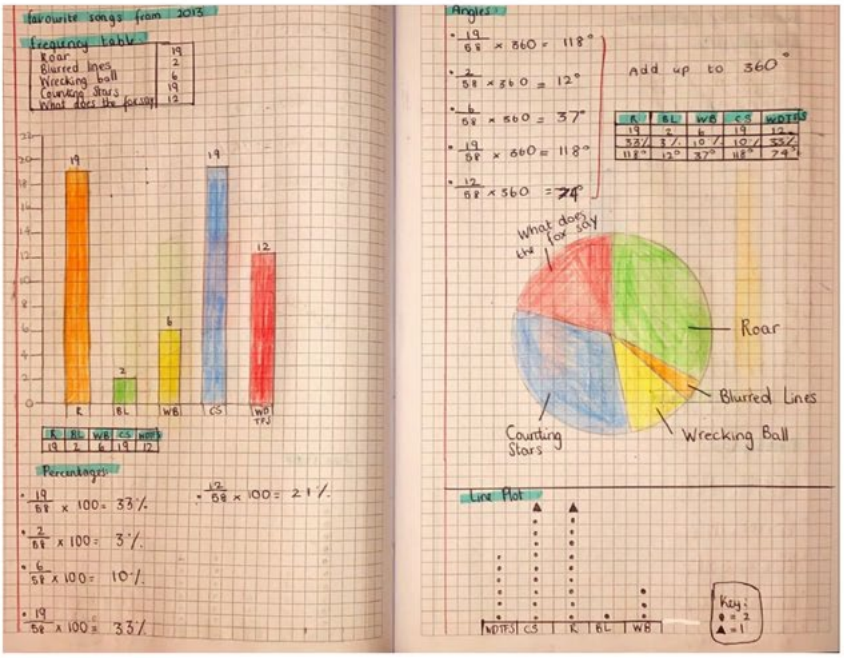
Although multiple ways are chosen no consideration is given as to which display best suits the data

CBA2 Statistical Investigation: Popular Songs

2012



2013



Displays data

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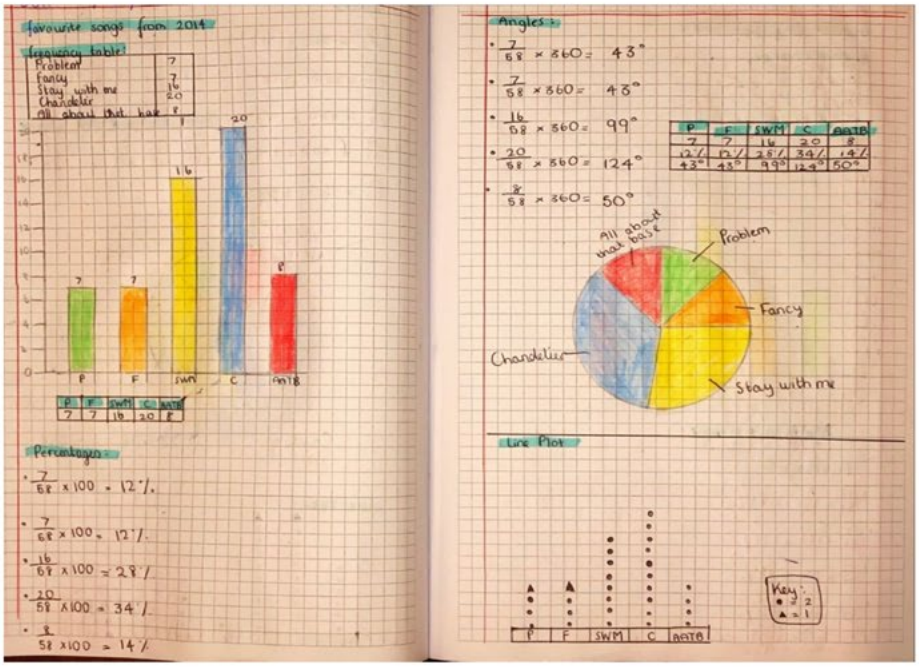
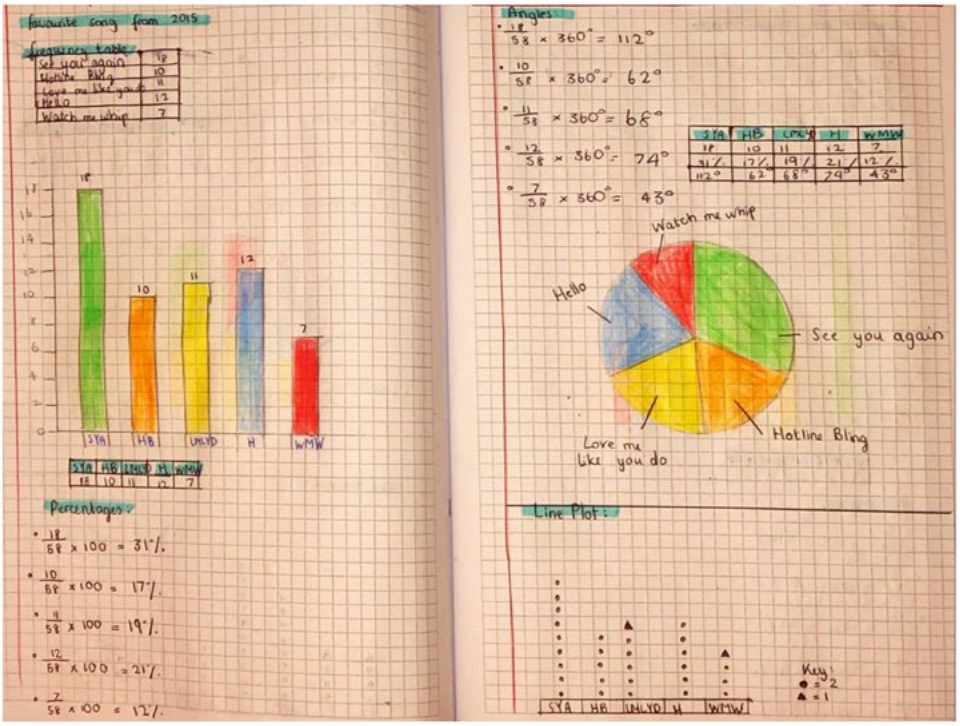
CBA2 Statistical Investigation: Popular Songs

2014



2015



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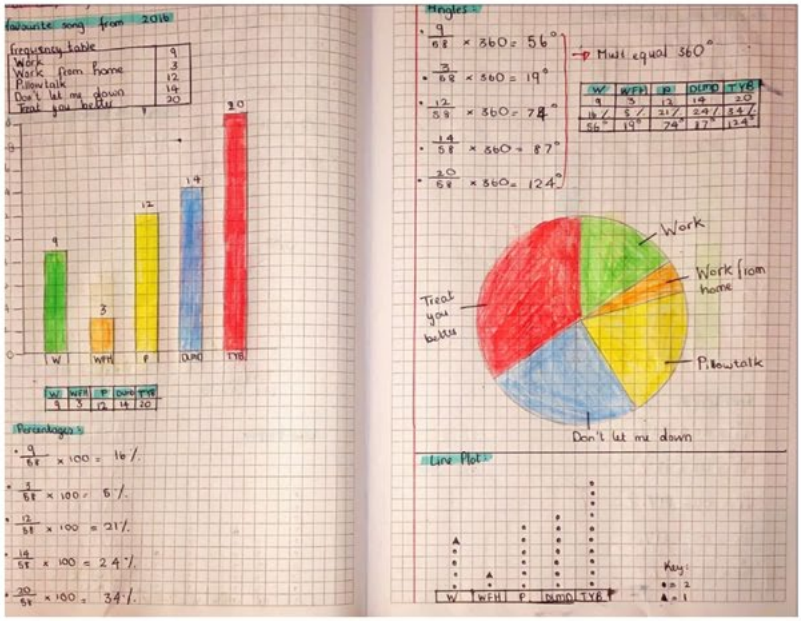
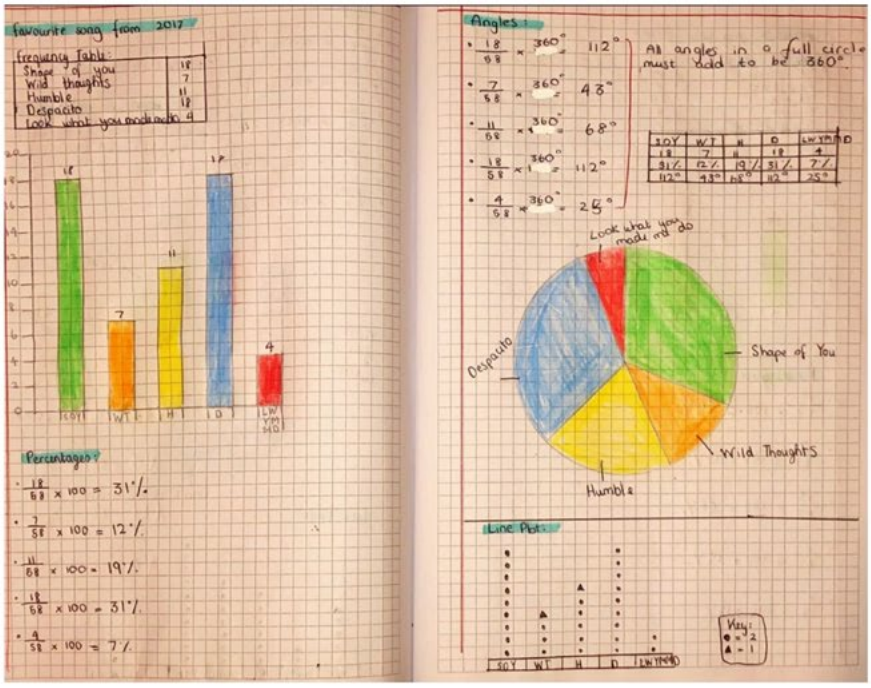
CBA2 Statistical Investigation: Popular Songs

2016



2017



Displays data

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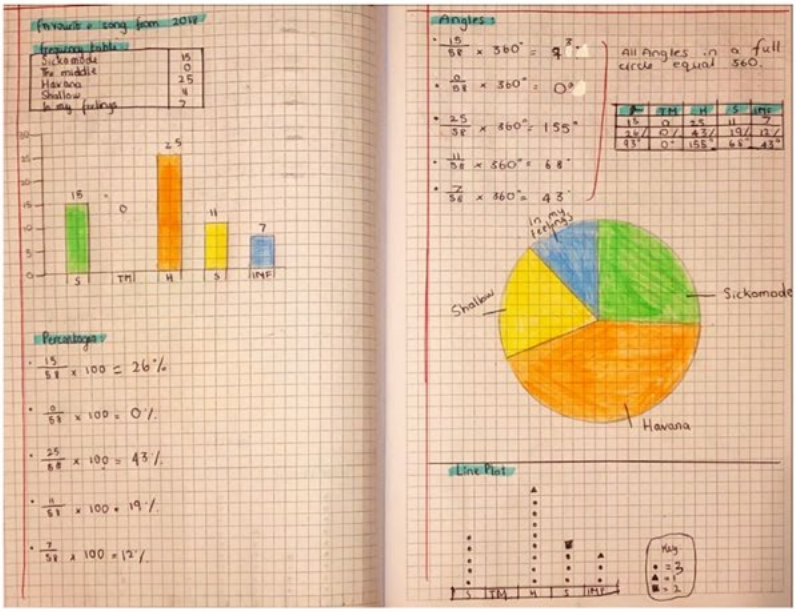
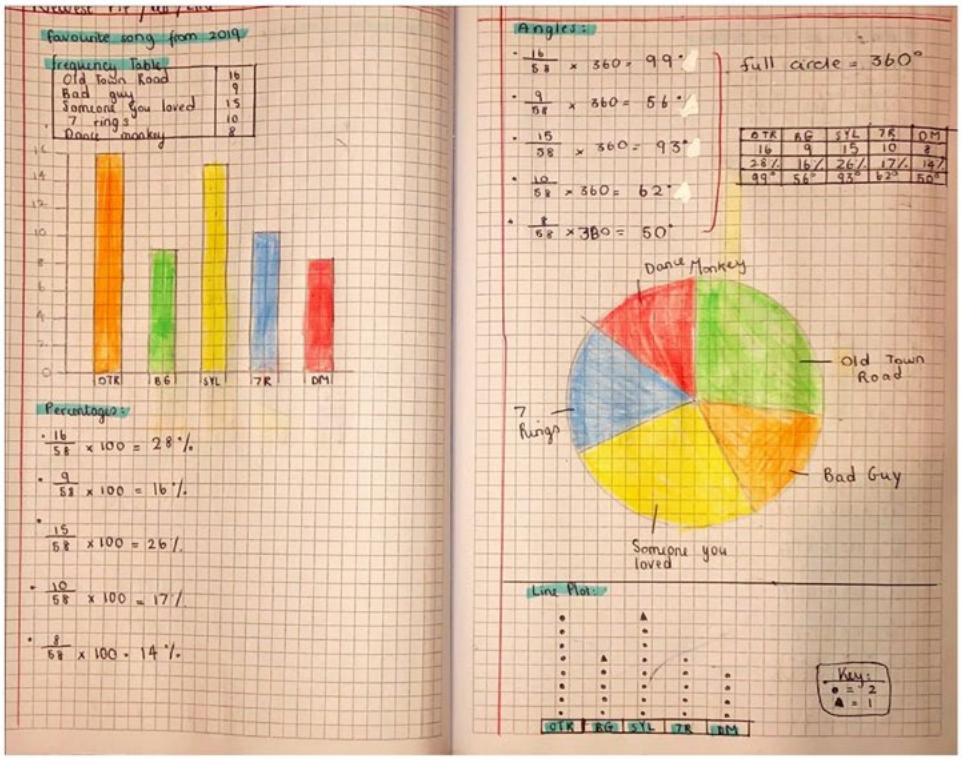
CBA2 Statistical Investigation: Popular Songs

2018



2019



Displays data

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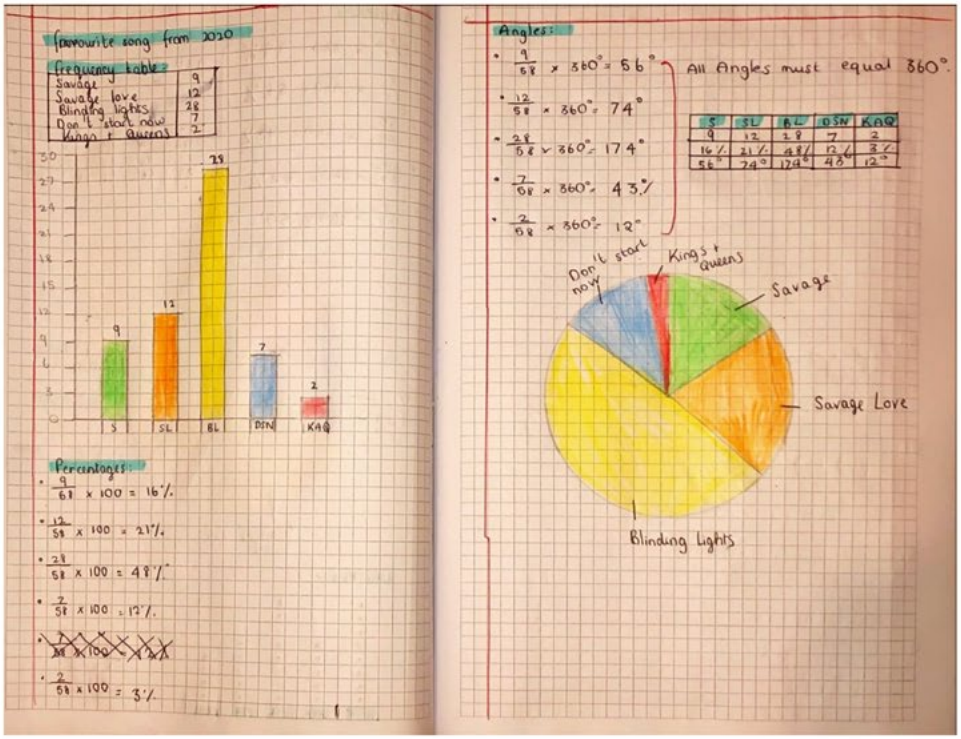
CBA2 Statistical Investigation: Popular Songs

2020



I am happy I redone my graphs because they are more accurate and concise now.

Other Calculations:

Mode=(most common) or the number that is there the most.
I will find the mode of the ages:
14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,15,16.
Mode of the ages=14

Mean=also known as the average. Add up all the numbers and divide by the number of numbers.
14+15+16=45
45÷3=15
Mean of ages=15

Range= Highest value minus the lowest value
2010; 20-5=15
2011: 21-2=19
2012: 20-5=15
2013:19-2=17
2014: 20-7=13
2015:18-7=11
2016: 20-3=17
2017: 18-4=14
2018: 25-0=2
2019:16-8=8
2020: 28-2=26

Displays data

Although multiple ways are chosen no consideration is given as to which display best suits the data

Measures of centre and spread calculated on data not relevant to the question asked

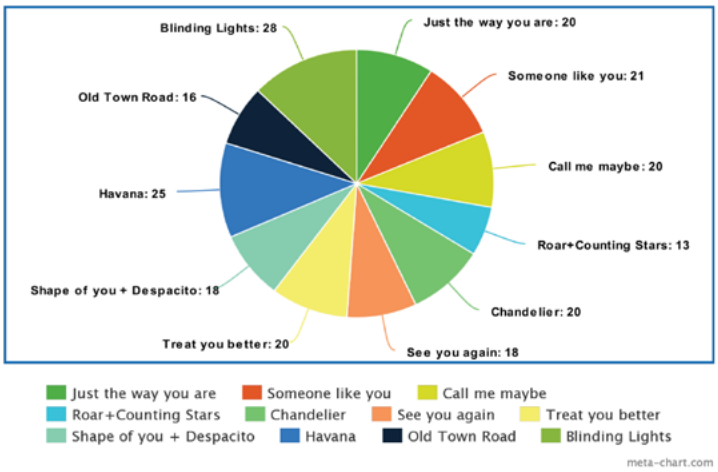
Organising and Managing Data

As shown above, I was limited to the measures of centre used to describe my data. I could only find the mode of the ages, the mean of the ages, the range of responses and the median of the responses too.

FINAL RESULTS:

Year	Most Popular Song	Result
2010	Just the way you are	20 votes
2011	Someone like you	21 votes
2012	Call me maybe.	20 votes
2013	Roar + Counting stars	Both 19 votes each
2014	Chandelier	20 votes
2015	See you again	18 votes
2016	Treat you better	20 votes
2017	Shape of you + Despacito	Both 18 votes
2018	Havana	25 votes
2019	Old Town Road	16 votes
2020	Blinding Lights	28 Votes

Favourite songs from each year displayed on a pie chart



Based on my results, I can tell not only the most popular song from each year, but the song of the decade. The song of the decade is Blinding Lights as it was voted people's favourite song the most.

CBA2 Statistical Investigation: Popular Songs

Comparison to Billboard:

www.billboard.com is a global website that tells you trending songs or the top 100 songs of each year. I thought this would be a good way for me to compare my data to.

Year	My result of the most popular song	Billboard's result
2010	Just the way you are	Tiktok
2011	Someone like you	Rolling in the deep
2012	Call me maybe	Somebody that I used to know
2013	Counting Stars	Thrift Shop
2014	Chandelier	Happy
2015	See you again	Uptown Funk
2016	Treat you better	Love yourself
2017	Shape of you+ Despacito	Shape of you
2018	Havana	God's Plan
2019	Old Town Road	Old Town Road
2020	Blinding Lights	*data unreleased yet on billboard*

I can tell based on the table that my result is the same as billboard's result in some years. Others were the second most popular on my list, and some songs that Billboard stated as the most popular weren't even on my list!

Although we must consider that our survey had a small sample size, and that it hadnt a targeted age group.

An awareness of the need to look beyond the data

Assumptions made:

- I assumed that everyone who entered the survey liked at least one option from the list given.
- I assumed five songs would be enough options for each year, as it would be quite difficult to do more than five songs, and people would get bored with it being so long.
- I assumed it would be fine to round the angles up to the nearest 10 decimal places.
- I assumed that hand drawing the bar charts would be better.

Mistakes Made:

- We forgot to close the survey which led to a surge in responses.
- In all my display charts, I thought a dot plot was a line plot. This was a big mistake, as I now realize it is not a line plot, and all my dot plots contain the title line plot.
- We asked for people's gender because we thought we could find out if one gender liked one song than another, but Microsoft forms would not let us do that. So now, it is a personal question.

Conclusion:

My question was:

"What is the most popular song in each year from 2010-2020, among students aged 14-16, and what is the most popular song of this decade".

Along with my teammates, I did find out what the most popular song in each year from 2010-2020 among students aged 14-16 is.

From 2010 it was Just the way you are.

From 2011 it was Someone like you.

From 2012 it was Call me maybe.

From 2013 it was Roar and Counting Stars.

From 2014 it was Chandelier.

From 2015 it was See You Again

From 2016 it was Treat You Better.

From 2017 it was Shape of You and Despacito.

From 2018 it was Havana.

From 2019 it was Old Town Road.

From 2020 it was Blinding Lights.

And as Blinding Lights had the highest votes of 28/58, it was the most popular song of the decade.

Reports the findings and conclusion refers to the original question.

CBA2 Statistical Investigation: Popular Songs

Reflection....

I think this turned out to be a successful investigation because we were able to find students' favourite songs from 2010 until 2020. I feel this is topical to teenagers, because of us like listening to music, be it on the radio, while exercising, or just in general, (I know I do!).

I think currently, there is a massive trend in pop music for many reasons. I think one of the reasons is the gigantic social media platform TikTok. Over 800 million people have the app, and sometimes whenever a video is viral on Tiktok, it usually has a catchy song which would sometimes make people want to listen to that song again and again. It was interesting to see my results come back in and see if any of them had been on a viral trend on Tiktok.

Blinding Lights was a dance trend back in March, during lockdown when everyone was at home. The hashtag #blindinglights has over 3.4 billion views! I think Tiktok may have been a reason for Blinding Lights being the most popular song of the decade.

Not only tiktok as a reason, but I think that it is a catchy song with an upbeat, feel good tune.

I can use this investigation in my everyday life. I can my findings to increase my general knowledge.

One thing I could improve on is to work on my bar charts.

Thank you for reading, hope you enjoyed 😀.

Overall judgement: In line with expectations