

In November of this year, my friend asked me to help create a spreadsheet to track and understand his team's data better.

This was the spreadsheet he sent me that they used last year.

The first tab tracks different types of 3 pointers, as well as the attempts and makes (and % of makes) of those 3 pointers for the **entire team**.

The screenshot shows a Google Sheets document with the title "23-24 Mira Mesa Final 3 Point Statistics". The spreadsheet contains data for three categories of shots: All 3 Pointers, Hinge 3 Pointers, and Drive/Kick 3 Pointers. Each category has columns for Attempts, Makes, 3 Point %, BA Attempts, BA Makes, BA %, SA Shots, SA Makes, SA %, NA Shots, NA Makes, and NA %. The data is organized into rows corresponding to each shot type and its percentage breakdown. The bottom navigation bar includes tabs for "Team Statistics", "Template", "Team Shot Chart", and dropdown menus for players: Diego, Jeremiah, Connor, Cole, and All Shots.

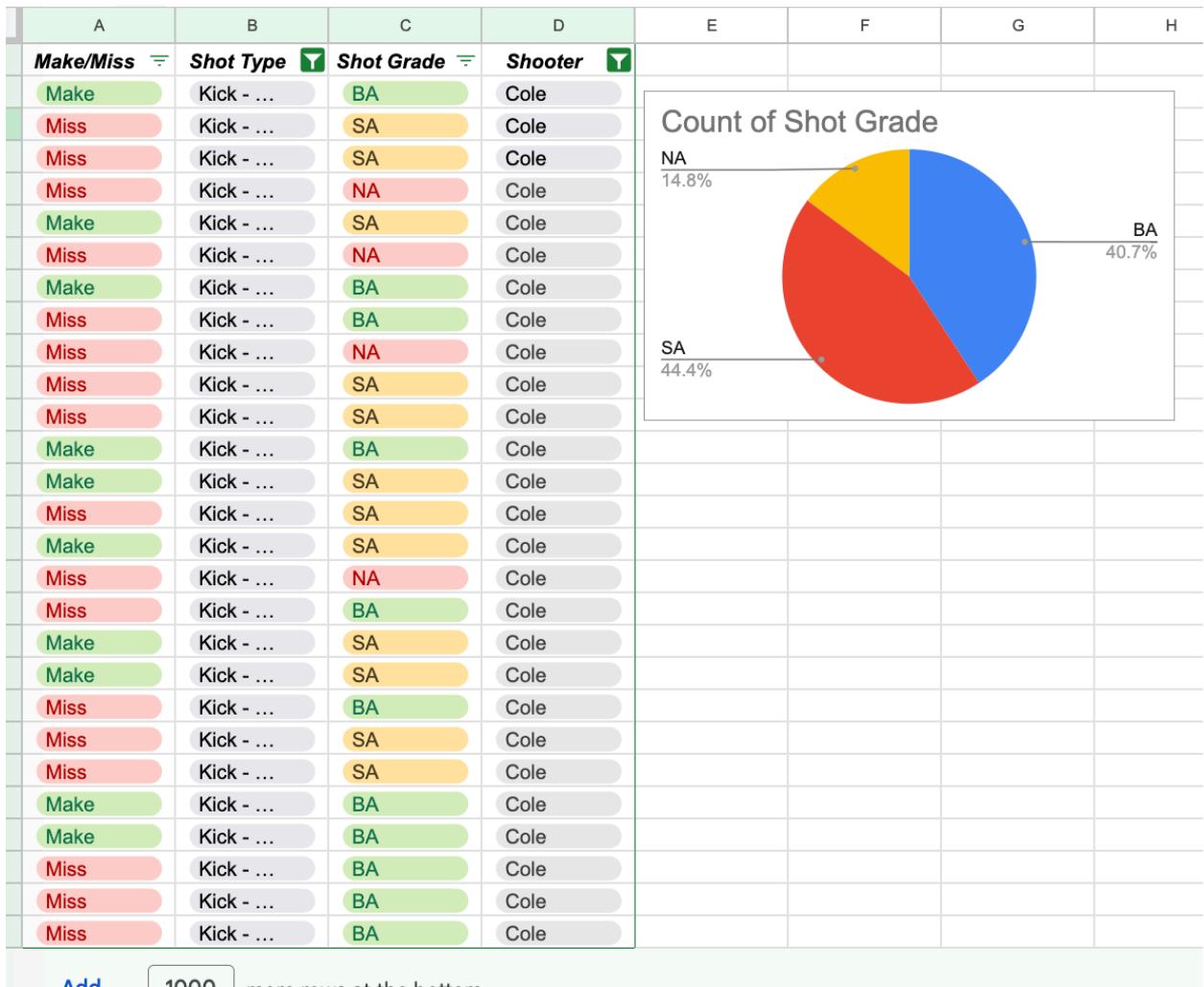
P26	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	All 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %	
2	34.1% BA	804	260	32%	275	106	39%	376	140	37%	154	14	9%	
3	46.8% SA													
4	19.1% NA													
5	Hinge 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %	
6	31.3% BA	415	129	31%	130	48	37%	204	78	38%	82	3	4%	
7	49.2% SA													
8	19.5% NA													
9	Drive/Kick 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %	
10	45.7% BA	290	99	34%	132	52	39%	117	44	38%	41	3	7%	
11	40.1% SA													
12	14.2% NA													
13	Dribble 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %	
14	12% BA	100	32	32%	12	6	50%	56	18	32%	32	8	25%	
15	56% SA													
16	32% NA													
17														
18														
19														
20														
21														
22														
23														

You can also track the same type of information at the **player level**. This tab also had where on the court those shots were taken and made.

A	B	C	D	E	F	G	H	I	J	K	L	M
All 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %
26.5% BA	291	110	38%	77	34	44%	146	66	45%	68	10	15%
50% SA												
23.5% NA												
Hinge 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %
31% BA	173	63	36%	54	22	41%	83	39	47%	36	2	6%
48% SA												
21% NA												
Drive/Kick 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %
37% BA	50	20	40%	18	9	50%	25	11	44%	6	0	0%
51% SA												
12% NA												
Dribble 3 Pointers	Attempts	Makes	3 Point %	BA Attempts	BA Makes	BA %	SA Shots	SA Makes	SA %	NA Shots	NA Makes	NA %
7% BA	69	27	39%	5	3	60%	38	16	42%	26	8	30%
55% SA												
37% NA												



In the last tab, they had a pie chart that showed the percentage of each type of shot attempted (BA versus NA versus SA) as compared to the overall shots taken.



New Spreadsheet

My friend sent me a spreadsheet with one tab called “template” that had four columns: “Make/Miss”, “Shot Type”, “Shot Grade”, and “Shooter”. And the 30 tabs (30 games) named “Opponent Name (H/A)” for each different opponent and whether the game was Home or Away.

A	B	C	D
Make/Miss	Shot Type	Shot Grade	Shooter
Make ▼	SA Balanced Layup ▼	8	Tim ▼
Miss ▼	BA Layup ▼	9	Tim ▼
Miss ▼	SA Hinge 3 ▼	5	Rashad ▼
Miss ▼	Out of Control Shot ▼	3	Diego ▼
Miss ▼	SA Midrange ▼	4	Diego ▼
Miss ▼	SA Drive/Kick 3 ▼	6	Diego ▼
Miss ▼	SA Balanced Layup ▼	8	Jeremiah ▼
Make ▼	BA Hinge 3 ▼	6	Rashad ▼
Make ▼	Drive/Kick BA 3 ▼	7	Diego ▼
Miss ▼	BA Hinge 3 ▼	6	Jase ▼
Make ▼	BA Layup ▼	9	Che ▼
Make ▼	BA Layup ▼	9	Diego ▼

My first suggestion was to add a “Game” column so that we didn’t need to use 30 tabs, and a binary column to assign the “Make/Miss” column a value (so it can be used in formulas in a little bit of an easier way).

A	B	C	D	E	F
Make/Miss	Shot Type	Shot Grade	Shooter	Game	Make
Make ▼	SA Balanced Layup ▼	8	Tim ▼	Helix (A)	1
Miss ▼	BA Layup ▼	9	Tim ▼	Helix (A)	0
Miss ▼	SA Hinge 3 ▼	5	Rashad ▼	Helix (A)	0
Miss ▼	Out of Control Shot ▼	3	Diego ▼	Helix (A)	0
Miss ▼	SA Midrange ▼	4	Diego ▼	Helix (A)	0
Miss ▼	SA Drive/Kick 3 ▼	6	Diego ▼	Helix (A)	0
Miss ▼	SA Balanced Layup ▼	8	Jeremiah ▼	Helix (A)	0
Make ▼	BA Hinge 3 ▼	6	Rashad ▼	Helix (A)	1
Make ▼	Drive/Kick BA 3 ▼	7	Diego ▼	Helix (A)	1
Miss ▼	BA Hinge 3 ▼	6	Jase ▼	Helix (A)	0
Make ▼	BA Layup ▼	9	Che ▼	Helix (A)	1
Make ▼	BA Layup ▼	9	Diego ▼	Helix (A)	1

Next, he would text me if it would be possible to view the data in certain ways.

As it always does, the requests at first were relatively straightforward and simple (“Can we see the number of attempts for each shot type?” and then would get increasingly complex. (“Is there a way to color 3 point shots like red or green depending if its below 30 percent” – my friend).

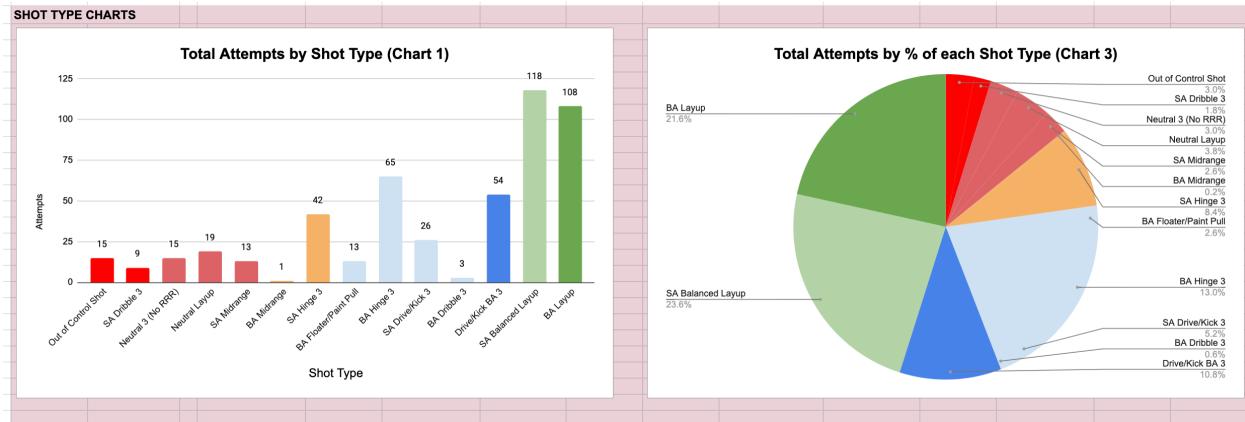
Thus, the “Season Charts” tab was born.



I first began with the visualizations. Simple column/bar charts, pie charts, and a combo chart (total attempts of each shot type as the bar and then a line for the make % of each shot type overlaying the chart – but automating of colors using script was proving to be too difficult with a combo chart, so it was removed).

By default, when creating bar charts and pie charts in Google Sheets, it will automatically assign random colors (blue for all of the bars in a bar chart, and a variety for pie charts). However, since each shot type was assigned a shot grade, and each shot grade had a specific color associated with it (which at first, the coloring was somewhat random as it was provided by my friend, but I suggested let's make the “worse” shots a color like red, and the “better” shots blue or green), we needed to apply our own coloring.

So I manually changed the colors of the early charts for each series/bar/slice, etc. Problem solved (for now).



The next thing I added was the filters. My friend had asked if they could remove “Diego” from the data because he is one of their better shooters and it is skewing the stats. I suggested we add some filters, rather than deleting data (generally, not a great practice).

I added the ability to filter by game and player in the first few columns. By checking/unchecking the boxes in column B, all of the data/charts on screen will update.

Notice the difference between the filters checked and resulting data/charts.

Now with the filters, another problem emerged. By selecting a certain combination of filters, its possible that a series that had data there before, now could have no data. For example, if you de-select all of the filters to only look at one game, its possible the team did not take a certain shot type (e.g., Out of Control Shot, hopefully). But if you add more games back via the filters, that bar returns, but it gets a random color.

So, I wrote some code in the Google Apps Script functionality to automate the coloring of the charts.

```

// Update ALL charts on Season Charts
function updateSeasonChartsColors() {
  var ss = SpreadsheetApp.getActiveSpreadsheet();
  var sh_active = ss.getActiveSheet(); // "Season Charts" tab
  var sh_colors = ss.getSheetByName('Shot Grades'); // "Shot Grades" tab

  // Get All Charts
  var [chart1, chart2, chart3, chart4, chart5, chart6, chart7, chart8] = sh_active.getCharts();

  // Chart 1 (Top Left): Shot Type Attempts Bar Chart

  var names1 = sh_colors.getRange('A2:A15').getValues();
  var colors1 = sh_colors.getRange('C2:C15').getValues();

  var values1 = chart1.getRanges()[0].getValues();
  console.log(values1);

  for (var i = 1; i<values1.length;i++) {
    var seriesName = values1[i][0];
    var index = names1.findIndex(x=>x[0] == seriesName);
    items1.push({color: colors1[index][0]});
  }

  chart1 = chart1.modify()
    .setOption("series.0.items", items1)
    .build();

  sh_active.updateChart(chart1);

  // Chart 2 (Top Left): Shot Type Make % Bar Chart

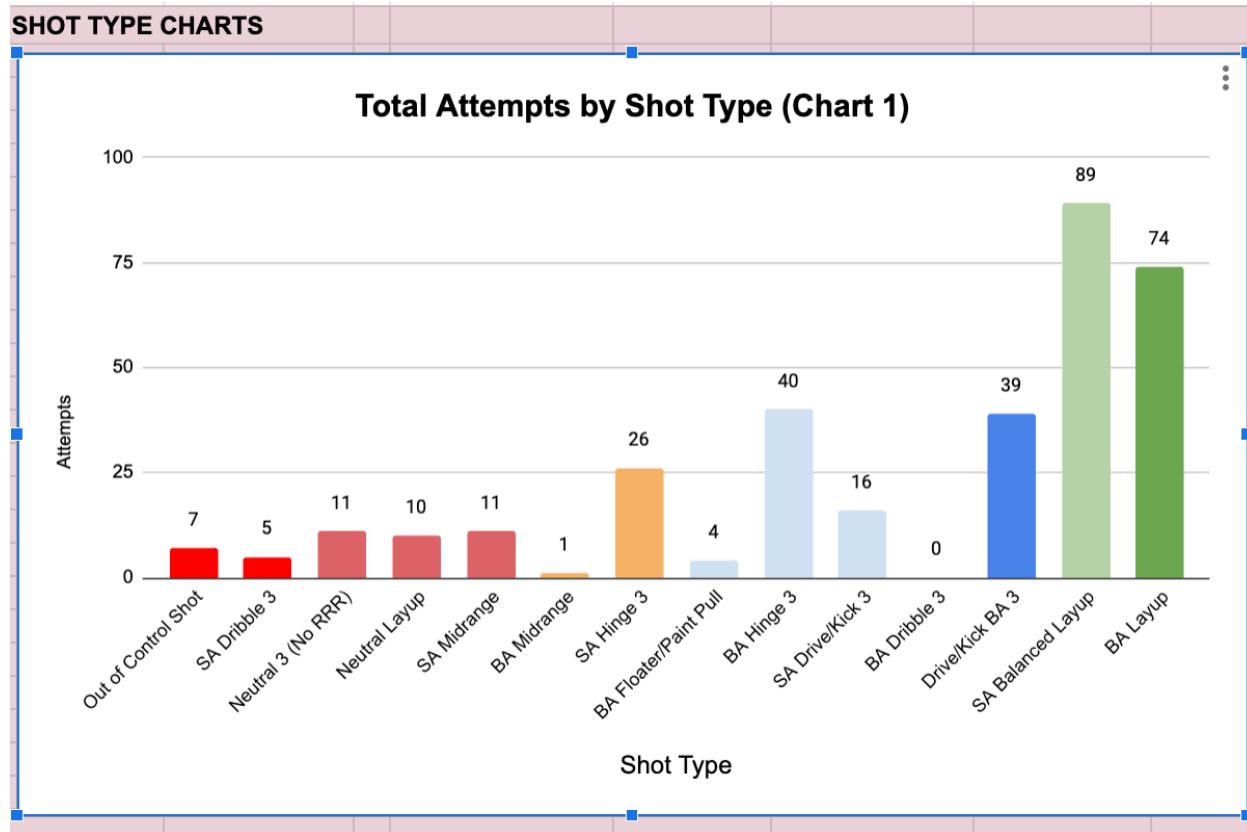
  var names2 = sh_colors.getRange('J2:J15').getValues();
  var colors2 = sh_colors.getRange('O2:O15').getValues();

```

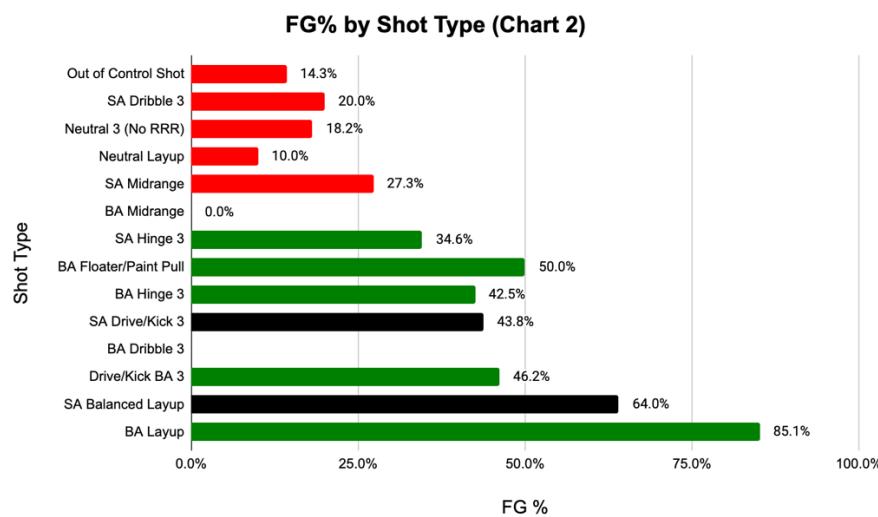
This code grabs all of the charts on the screen, and will apply a particular color mapping defined in the “Shot Grades” tab.

A	B	C	D
Shot Type	Shot Grade	Hex Codes	Color Desc
Out of Control Shot	3	#ff0000	red
SA Dribble 3	3	#ff0000	red
Neutral 3 (No RRR)	4	#e06666	light red 1
Neutral Layup	4	#e06666	light red 1
SA Midrange	4	#e06666	light red 1
BA Midrange	5	#f6b26b	light orange 1
SA Hinge 3	5	#f6b26b	light orange 1
BA Floater/Paint Pull	6	#cfe2f3	light blue 3
BA Hinge 3	6	#cfe2f3	light blue 3
SA Drive/Kick 3	6	#cfe2f3	light blue 3
BA Dribble 3	6	#cfe2f3	light blue 3
Drive/Kick BA 3	7	#4a86e8	cornflower blue
SA Balanced Layup	8	#b6d7a8	light green 2
BA Layup	9	#6aa84f	dark green 1

The code grabs Chart 1 and grabs each series name (x axis) and assigns a color (hex code) based on matching the series names in the charts to the shot type in column A. It then updates the charts with the right color mapping.



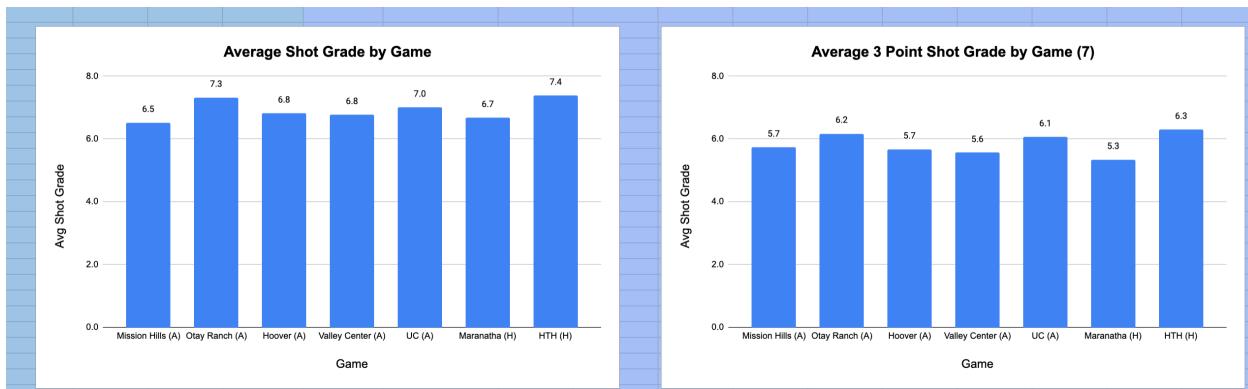
Then a few more views were added like field goal % by shot type, avg shot grade by game, 3 point % make by game.



This chart was a little bit more complex because it had to dynamically update the color of the bars depending on the % value. Based on some pre-defined thresholds for each shot type set by my friend, we were able to use column O to assign the proper mapping in the code.

J	K	L	M	N	O
Shot Type	Shot Grade	Hex Codes	Color Desc	Make % on 'Season Charts'	Make % Hex Codes
Out of Control Shot	3	#ff0000	red	14.3%	red
SA Dribble 3	3	#ff0000	red	20.00%	=IFERROR(IF(\$N3 <= 0.3, "red", IF(\$N3 <= 0.34, "black", "green")), "blue")
Neutral 3 (No RRR)	4	#e06666	light red 1	18.2%	
Neutral Layup	4	#e06666	light red 1	10.0%	red
SA Midrange	4	#e06666	light red 1	27.3%	red
BA Midrange	5	#f6b26b	light orange 1	0.0%	red
SA Hinge 3	5	#f6b26b	light orange 1	34.6%	green
BA Floater/Paint Pull	6	#fce2f3	light blue 3	50.0%	green
BA Hinge 3	6	#fce2f3	light blue 3	42.5%	green
SA Drive/Kick 3	6	#fce2f3	light blue 3	43.8%	black
BA Dribble 3	6	#fce2f3	light blue 3	#DIV/0!	blue
Drive/Kick BA 3	7	#4a86e8	cornflower blue	46.2%	green
SA Balanced Layup	8	#b6d7a8	light green 2	64.0%	black
BA Layup	9	#6aa84f	dark green 1	85.1%	green

The other charts mentioned above. I mentioned to my friend that this could be a line chart with two line instead since it is tracking changes over time, and the Y value measure of shot grade would be the same across both charts, but he wanted to keep the bars and keep them separate (you can only convince the client of so much!).

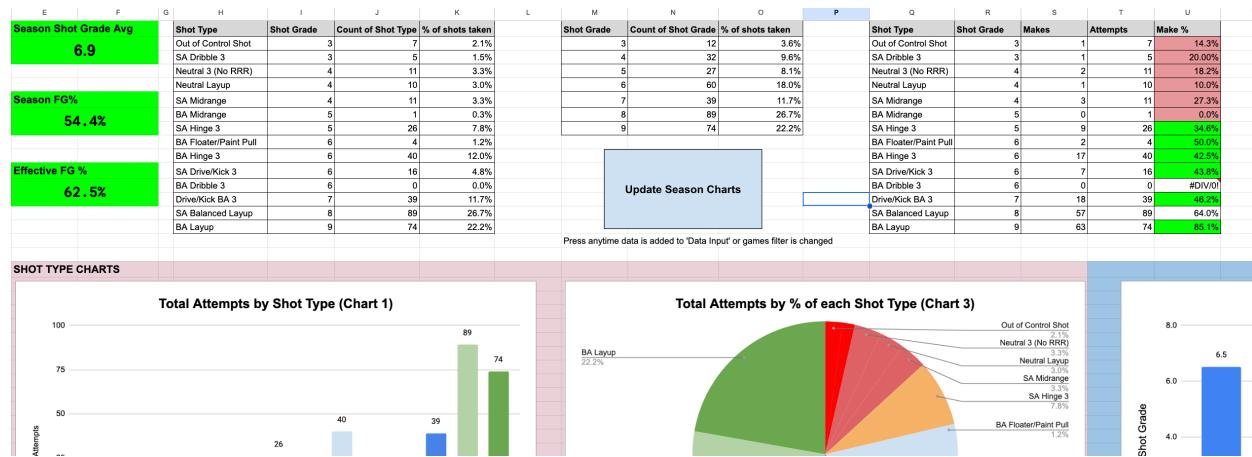


The data for that comes from here.

W	X	Y	Z	AA
Game	Shot Grade Avg	3 Point Shot Grade Avg	3 Point Make %	Color Code
Mission Hills (A)	6.5	5.7	55.0%	green
Otay Ranch (A)	7.3	6.2	63.6%	green
Hoover (A)	6.8	5.7	38.5%	green
Valley Center (A)	6.8	5.6	34.5%	green
UC (A)	7.0	6.1	37.5%	green
Maranatha (H)	6.7	5.3	23.1%	red
HTH (H)	7.4	6.3	41.7%	green

Column W takes the unique list from the source data once the filters have been checked/unchecked. Then there are “array” formulas to the right that will dynamically calculate those stats as rows are added or deleted to column W. Originally the tables to the left of this (see below screenshot) used array formulas as well, I was trying to be cute, and make everything dynamic and only show stats of the data that is controlled by the filters, but it was slowing down performance and once you had enough volume of games, it was pretty much a guarantee that every shot type will be present.

Across the top of this tab, we have some key metrics highlighted in green which he requested. The tables being on the same tab I was not originally in love with, but my friend liked them there and I have come to think they are fine there as well. You can click the ‘Update Season Charts’ button as well after selecting/de-selecting certain filters and it will update the coloring of the charts (just the coloring, the data is automatically refreshed). I tried automating the coloring to be triggered as soon as those filters were clicked, but it was proving too be too difficult in google sheets, so you have to manually trigger it via that button.



Finally, I added a tab with some pivot tables because my friend wanted to quickly see how each individual player was shooting.

This screenshot shows a pivot table tab with the following data:

Shooter	AVERAGE of Shot Grade	AVERAGE of Make	Pivots Shooter Sort Shooter
All Total	6.1	#DIV/0!	
Che Total	8.2		
Cole Total	6.4		
Connor Total	7.1		
Gabe Total	6.5		
Gio Total	6.5		
Jase Total	7.3		
Jeremiah Total	6.6		
Justin Total	5.6		
Rashad Total	6.0		
Roan Total	7.8		
Shea Total	6.8		
Tim Total	7.4		
Grand Total	6.9		

He wanted it ordered a certain way as well so I added a Helper column to assign a number to each shooter (those with the most minutes have lower numbers, “1”, “2”, etc.)

These pivots track the average shot grade for the season (left) and percentage of makes for 3 point shots (right). It is also affected by the filters that are checked/unchecked on Season Charts tab, which I informed my friend so that he always knows to double check what is filtered.

All in all this took about 40 hours to complete, but he occasionally asks for updates and new views which I have helped him with since start of season in November. Apologies for the verbosity and stream of consciousness style of writing, if this was official documentation or a playbook, it would be much more concise and streamlined.