Steps for Creating a SAS Datasets			**Scope**
1	**LIBNAME** libref '<Path>';	Reference a SAS data library	Global
2	**FILENAME** fileref '<Path>';	Reference (Temp) an external file	Global
3	**DATA** 'SASDataSetName';	Name a SAS data set	
4	**INFILE** 'file name/fileref' *OBS*=10;	Identify an external file using INFILE statement **OBS** mention the ***range till which data needs to be read.*** Can be used in data and proc print. Used to ***verify Data*** reading without affecting RAM space much.	
5	**INPUT** <informats>;	Describe data	
6	**RUN;**	Execute the DATA step	
7	PROC PRINT Data=<DS>;	List the data	
8	RUN;	Execute the final program step	

Column Style: [Standard Data + *Well Ordered in Column]*

```
1--------10---------20---------30--------40---------50---------60---------70---------80--------90

124      61        Mod       Male        Pradeep                  United States

123      76        Ded       Female      Sruthi                   India

142      89        Reg       Male        Sathyamurthy             United Kingdom
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PROC PRINT DATA=DATASETNAME NOOBS *used to avoid printing observation column while printing; DOUBLE *print double spacing in SAS Output and not in SAS Report; (OBS=3) * Print only the first 3 observation of the dataset in print;		**Scope**
Sum <Col Name>;	Calculate the sum of the column	Local
VAR <Col Name>;	Mention the variable and its ***order*** of printing	Local
Label <Col Name>=’’;	Define label name for a column Can mention up to ***256 char*** ***Can be defined in single or multiple lines***	**Local**
Where <column condi> **CONTAINS** ‘str’; **?** ‘str’; **IN**(‘str1’,’str2’);	Defines the column condition ***=, ^=, >, <, >=, <=*** ***CONTAINS*** *is string comparison* ***AND, OR*** *operator used along with col name each time* ***IN*** *operator is used as SQL style in comparison.*	Local
ID <Col Names>;	Act as a primary key, ***replace OBS*** column without explicitly mention of NOOBS. ID used along with ***Var*** will ***display*** a ***column twice***.	Local
SUM <Col Name>;	Will provide the total of the column specified.	Local
BY <Col Name>;	Col Name should be ***same as one that is sorted before*** using this. ***Subset results***.	Local
BY <Col Name1>; **ID** <Col Name1>;	When ID used along with BY it will: 1. ***Supress OBS*** column 2. ID/BY variable name is printed in left col 3. Each ***ID/BY value is printed only once*** at the start of each by group and on the line, that has group sub-total.	Local
By <Col Name1>; **PAGEBY**<Col Name1>;	Mostly used along with sum-by-id. ***Column used in PAGEBY should be same as one used in BY***. Used to ***print each sub-total on a separate page***.	Local
FORMAT <Col Name>;	When defined ***inside PROC it scopes within it***. To make it ***permanent FORMAT or Labels*** need ***to be defined in DATA step***	Local/Global
TITLE ‘str1’;	Generally, ***need to be defined outside a PROC step***. However, it can be used inside PROC too ***TITLE is global.*** Once defined will stay forever until title statement is modified, cancelled or end SAS session. ***Cancel of title*** is done by ***title;***	Global
FOOTNOTE ‘str2’;	Used to print note below a table/graph It is same as TITLE function, up to ***10 footnotes can be defined*** in SAS. ***Cancel of footnote*** is done by: ***Footnote;***	Global

PROC SORT DATA=DATASETNAME **OUT=DATASETNAME** ***o/p SAS dataset**		
by <Col Name>; **by descending** <col1>	Sorted by the column mentioned, sort takes place from right to left columns mentioned. If used with descending it will apply to ***column which is immediately after it***, rest of the other columns will be sorted in ascending order.	Local
NOTSORTED;	To explicitly mention not to sort if the ***values are equal*** based on by condition.	Local

PROC FORMAT LIB=library **LIBRARY/LIB** ***Defines the SAS library that needs to be referred;** **FMTLIB** ***print all the user defined format present in the Library mentioned;**			**Scope**
1	**LIBNAME *library*** '<Path>';	Reference a SAS data library	Permanent
2	**PROC FORMAT LIB**=library **FMTLIB**;	Library can be the SAS library referred above or it can be a catalog like ***library.catalog.*** ***FMTLIB*** will list all the user defined format present in the library. ***formats.sas7bcat*** file is created in the path mentioned in library.	Permanent
3	**Value** <format-name>	Format name must begin with ***$ for Char*** var Cannot be > 8 char in length Cannot be the name of existing SAS format Cannot end with a number Does not end with a period when defined	Permanent

	Range1='label1'	Range1= Actual Column Data
		Label1= Description of Range1
		Numeric => 102='Manager'
		Character => 'A'='Good Performance'
		Range => low-<12='Not Teen Age'
			Permanent

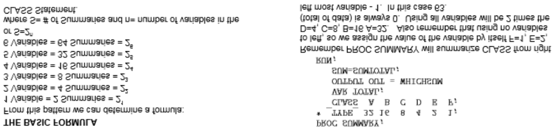
	Range2='label2';	Always the last Range must be ended with; which implies SAS that PROC FORMAT statement ends.	Permanent
4	**PROC FORMAT;**	This format will be created in the ***work directory*** which ***means temporary***.	Temporary
	Value <format-name>	Scope within that SAS session only	Temporary
	Range1='label1'	Scope within that SAS session only	Temporary
	Range2='label2';	Scope within that SAS session only	Temporary
5	**PROC CATALOG;**	You can delete the user defined format	Permanent

PROC REPORT DATA=<DATASETNAME> **WD/NOWD *Decides should the o/p be printed in a dedicated report window;** **DOUBLE *print double spacing in SAS Output and not in SAS Report;** **SPLIT='<symbol>' * Symbol can be *, # $ etc., Used to define the label split in reporting;**			**Scope**
1	**COLUMN** <Col Names>	Used ***to subset the column*** that is needed to be displayed in the report.	Local
2	**WHERE** <Col Condi/Name> **In** ('value1','value2')	Used to ***filter out the data*** required In ***used along with where to filter the data*** based on values provided, SQL style usage.	Local

3	**DEFINE** <Col1>/<***usage***>
	DEFINE <Col2>/<***attribute***>
	DEFINE <Col3>/<***options***>
	DEFINE <Col4>/<**Justify**>
	DEFINE <Col5>/<***Col*** Heading>
	
	* Column definition;
	PROC REPORT DATA=CARS_SAMPLE NOWD SPLIT='*' HEADLINE HEADSKIP;
	define Make/format=$CHAR8. width=**3** spacing=**10**;
	define Type/'Car*Type';
	define Model/center;
	define Cylinders/order DESCENDING;
	define Cylinders/group;
	RUN;
	
	* Column definition - usage of group definition;
	PROC REPORT DATA=CARS_SAMPLE NOWD SPLIT='*' HEADLINE HEADSKIP;
	column cylinders MSRP;
	define cylinders/group;
	RUN;
	
	* Specifying statistics;
	PROC REPORT DATA=CARS_SAMPLE NOWD SPLIT='*' HEADLINE HEADSKIP;
	column cylinders MSRP;
	define cylinders/group;
	define MSRP/mean 'Average of MSRP';
	RUN;
	
	* Column definition - usage of across definition;
	PROC REPORT DATA=CARS_SAMPLE NOWD SPLIT='*' HEADLINE HEADSKIP;
	column cylinders type MSRP;
	define cylinders/across;
	define type/across;
	RUN;
		Used to ***build column definitions*** in report like column space and width, etc.,
		Let to ***define more than one column attribute*** at a time.
		Column can be defined ***in any order*** and list ***options within it in any order as well***.
		
		Usage specifies ***how to use the variables***:
		By ***default***, **Char** Variable defined as ***Display***
		And ***Numeric*** variables defined as ***Analysis***
		1. **Across** – Displays variable ***horizontally*** rather vertically
		2. **Analysis** - Default ***SUM*** analysis.
		3. **Computed** – ***position*** of compute variable is ***very important. Use compute*** *and* ***endcomp*** *and* ***derive the value*** with some formula
		4. ***Display*** – This is for ***Char*** variables
		5. ***Group*** – to create ***summary report***. To get a proper result, display/character variables need to be grouped properly.
		6. **Order** – This is like Grouping and Order, by ***default it is ordered in ascending***, if needed we need explicit mention of value ***DESCENDING***.
		
		Attributes specifies the ***look*** of each column:
		Width and spacing has its ***effect only in o/p window*** and doesn't affect HTML window.
		1. **Format** – define SAS/user format, default is ***its variable type***
		2. **Width** – width of col, default is ***Max***
		3. **Spacing** – No of blank char, default is ***2***
		
		Options specifies the ***further formatting*** option:
		1. DESCENDING
		2. NOPRINT
		3. NOZERO
		4. PAGE
		
		Justification specifies ***arrangements*** of column:
		1. **Center** – Justify the char in centre
		2. **Left** – ***default for chars*** n left justify
		3. **Right** – ***default for num*** n right justify
			Local

Column Heading is the ***label definition***. ***Split*** in report definition is used to ***split the column label*** as needed. (e.g. ***SPLIT='*';***) define col/c*t;			

SI.NO	Statistics	Definition
1	**CSS**	Corrected sum of squares
2	**USS**	Uncorrected sum of squares
3	**CV**	Coefficient of variation
4	**MAX**	Maximum value
5	**MEAN**	Average
6	**MIN**	Minimum Value
7	**N**	Number of observations with non-missing values
8	**NMISS**	Number of observations with missing values
9	**RANGE**	Range
10	**STD**	Standard deviation
11	**STDERR**	Standard error of the mean
12	**SUM**	Sum
13	**SUMWGT**	Sum of the `Weight` variable values
14	**PCTN**	Percentage of a cell or row frequency to a total frequency
15	**PCTSUM**	Percentage of a cell or row sum to a total sum
16	**VAR**	Variance
17	**T**	Student's *t* for testing the hypothesis that the population mean is 0
18	**PRT**	Probability of a greater absolute value of student's *t*

Computing Statistics for Numeric Variable			
PROC MEAN DATA=<DATASETNAME> ***By default gives descriptive statistics, with n-count of all non-missing values;** <STATS KEYWORDS> ***To suppress default o/p and choose what stats is required for o/p;** **MAXDEC=2** ***To set the decimal point;** **NOPRINT** ***Supress the result being printed;**			**Scope**
1	**VAR** <Col Names>;	Used to display the ***variables for which the statistics are required***	Local
2	**CLASS** <Col Names>;	Specifies categorical variables which needed ***group processing***	Local
3	**OUTPUT** <***STATS***>=<Col Names> ***OUT*** = <O/p dataset>	***Output*** is used to ***structure the final output of the PORC MEAN*** above the segregation done based on a class variable. <***STATS***> can be any ***statistic key-word*** and col name specifies on which columns it needs to be applied. If <STATS> keywords are ***not mentioned***, then ***SAS will produce*** whole statistics and add ***_STAT_ variable along with _TYPE_ and _FREQ_*** ***_TYPE_*** is a ***simple binary pattern to summarise the CLASS variable***.  **THE BASIC FORMULA** From this pattern we can determine a formula: 1 Variable = 2 Summaries = 2^1 2 Variables = 4 Summaries = 2^2 3 Variables = 8 Summaries = 2^3 4 Variables = 16 Summaries = 2^4 5 Variables = 32 Summaries = 2^5 6 Variables = 64 Summaries = 2^6 or $S=2^n$ where S= # of Summaries and n= number of variables in the CLASS statement. PROC SUMMARY; * _TYPE_ 32 16 8 4 2 1; CLASS A B C D E F; VAR TOTAL; OUTPUT OUT = WHICHSUM SUM=SUMTOTAL; RUN; Remember PROC SUMMARY will summarize CLASS from right to left, so we assign the value of the variable by itself F=1, E=2, D=4, C=8, B=16 A=32. Also remember that using no variables (total of data) is always 0. Using all variables will be 2 times the left most variable - 1. In this case 63. ***_FREQ_*** is the count of class variable occurrence ***OUT*** specifies the ***output dataset*** in which the final ***statistic result needs to be stored***.	Local

Computing Statistics for Numeric Variable			
PROC SUMMARY DATA=<DATASETNAME> PRINT;			**Scope**
1	**VAR** <Col Names>;	Used to display the ***variables for which the statistics are required***	
2	**CLASS** <Col Names>;	Specifies categorical variables which needed ***group processing***	
3	**OUTPUT** <***STATS***>=<Col Names> ***OUT*** = <O/p dataset>	***Output*** is used to ***structure the final output of the PORC MEAN*** above the segregation done based on a class variable.	

Descriptive Statistics

SI.NO	Keywords	Definition
1	**CLM**	Two-sided confidence limit for the mean
2	**CSS**	Corrected sum of squares
3	**CV**	Coefficient of variation
4	**KURTOSIS / KURT**	Kurtosis
5	**LCLM**	One-sided confidence limit below the mean
6	**MAX**	Maximum value
7	**MEAN**	Average
8	**MIN**	Minimum value
9	**N**	Number of observations with non-missing values
10	**NMISS**	Number of observations with missing values
11	**RANGE**	Range
12	**SKEWNESS / SKEW**	Skewness
13	**STDDEV / STD**	Standard deviation
14	**STDERR / STDMEAN**	Standard error of the mean
15	**SUM**	Sum
16	**SUMWGT**	Sum of the Weight variable values
17	**UCLM**	One-sided confidence limit above the mean
18	**USS**	Uncorrected sum of squares
19	**VAR**	Variance

Quantile Statistics

SI.NO	Keywords	Definition
1	**MEDIAN / P50**	Median or 50th percentile
2	**P1**	1st percentile
3	**P5**	5th percentile
4	**P10**	10th percentile
5	**Q1 / P25**	Lower quartile or 25th percentile
6	**Q3 / P75**	Upper quartile or 75th percentile
7	**P90**	90th percentile
8	**P95**	95th percentile
9	**P99**	99th percentile
10	**QRANGE**	Difference between upper and lower quartiles: Q3-Q1

Hypothesis Testing

SI.NO	Keywords	Definition
1	**PROBT**	Probability of a greater absolute value for the *t* value
2	**T**	Student's *t* for testing the hypothesis that the population mean is 0

Computing Statistics for Categorical Variable			
PROC FREQ DATA=<DATASETNAME> **WD/NOWD *Decides should the o/p be printed in a dedicated report window;**			**Scope**
1	**TABLE** <Col Names> / **NOCUM**;	Used to ***mention the column names based on which a frequency table*** needs to be constructed. ***One column name*** in TABLE will construct a ***simple frequency table with frequency and cumulative frequency and percentage***, totally 4 outputs. ***NOCUM*** will ***supress the display of cumulative frequency and percentage*** from the output.	Local
2	**TABLE** <COL1> - <COL5>	This will again create simple frequency table for columns-1 to column-5	Local
3	PROC FORMAT; Value <frmt_name> range1 ‘label-1’ Range2 ‘label-2’ Range3 ‘label-3’ RUN; **PORC FREQ** data=<datasetnames>; **Tables** <cat_col_name>; ***Format weight <frmt_name>.***;		
4	**TABLE** <COL1> * <COL2>;	This will ***create two-way table***. This will ***cross tabulate*** 2 different categorical variables.	Local
5	**TABLE** <COL1> * <COL2> * <COL3>;	This will ***create N-way table***. This will ***cross tabulate*** N different categorical variables.	Local
6	**TABLE** <COL1> * <COL2> / ***CROSSLIST***;	***CROSSLIST*** will ***display cross tabulation in a ODS format***. This ***ODS output can be customized using*** the ***TEMPLATE*** procedure.	Local
7	**TABLE** <COL1> * <COL2> / ***LIST***;	Produce list output for crosstabulation. Puts frequency table in a simple and short table.	Local
	TABLE <COL1> * <COL2> / ***nofreq nopercent norow nocol***;	***Nofreq*** will ***supress the cell frequency*** ***Nopercent*** will supress the ***cell percentage*** ***Norow*** will supress ***row percentages*** ***Nocol*** will supress ***column percentage***	Local