WEEKLY DATA ANALYSIS CHALLANGE #19

In [1]:

```
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
```

In [2]:

```
cst = pd.read_csv('coastal_db.csv')
cst.head()
```

Out[2]:

	coaster_name	Length	Speed	Location	Status	Opening date	Type	Manufacturer	Height restriction	Model	...	speed1	speec
0	Switchback Railway	600 ft (180 m)	6 mph (9.7 km/h)	Coney Island	Removed	June 16, 1884	Wood	LaMarcus Adna Thompson	NaN	Lift Packed	...	6 mph	9 km/
1	Flip Flap Railway	NaN	NaN	Sea Lion Park	Removed	1895	Wood	Lina Beecher	NaN	NaN	...	NaN	Na
2	Switchback Railway (Euclid Beach Park)	NaN	NaN	Cleveland, Ohio, United States	Closed	NaN	Other	NaN	NaN	NaN	...	NaN	Na
3	Loop the Loop (Coney Island)	NaN	NaN	Other	Removed	1901	Steel	Edwin Prescott	NaN	NaN	...	NaN	Na
4	Loop the Loop (Young's Pier)	NaN	NaN	Other	Removed	1901	Steel	Edwin Prescott	NaN	NaN	...	NaN	Na

5 rows × 56 columns

Number of rows and columns

In [3]:

```
num_rows, num_columns = cst.shape
print(f'This dataset has {num_rows} rows and {num_columns} columns')
```

```
This dataset has 1087 rows and 56 columns
```

Is there any missing data?

In [4]:

```
cst.isnull().sum()
```

Out[4]:

```
coaster_name                0
Length                    134
Speed                     150
Location                    0
Status                    213
Opening date              250
Type                        0
Manufacturer               59
Height restriction        256
Model                     343
```

```
Height                             122
Inversions                         155
Lift/launch system                 292
Cost                               705
Trains                             369
Park section                       600
Duration                           322
Capacity                           512
G-force                            725
Designer                           509
Max vertical angle                 730
Drop                               593
Soft opening date                  991
Fast Lane available               1018
Replaced                           914
Track layout                       752
Fastrack available                1068
Soft opening date.1                991
Closing date                       851
Opened                            1060
Replaced by                        999
Website                           1000
Flash Pass Available              1037
Must transfer from wheelchair      981
Theme                             1043
Single rider line available       1006
Restraint Style                   1065
Flash Pass available2             1041
Acceleration                      1027
Restraints                        1063
Name                              1052
year_introduced                      0
latitude                           275
longitude                          275
Type_Main                            0
opening_date_clean                 250
speed1                             150
speed2                             152
speed1_value                       150
speed1_unit                        150
speed_mph                          150
height_value                       122
height_unit                        122
height_ft                            0
Inversions_clean                     0
Gforce_clean                       725
dtype: int64
```

In [5]:

```
remove = ['Length',
          'Speed',
          'Status',
          'Opening date',
          'Type',
          'Height restriction',
          'Model',
          'Height',
          'Inversions',
          'Lift/launch system',
          'Cost',
          'Trains',
          'Park section',
          'Duration',
          'Capacity',
          'G-force',
          'Designer',
          'Max vertical angle',
          'Drop',
          'Soft opening date',
          'Fast Lane available',
          'Replaced',
          'Track layout',
          'Fastrack available',
          'Soft opening date.1',
          'Closing date',
          'Opened',
          'Replaced by',
          'Website',
          'Flash Pass Available',
          'Must transfer from wheelchair',
          'Theme',
          'Single rider line available',
          'Restraint Style',
          'Flash Pass available2',
          'Acceleration',
          'Restraints',
          'Name',
          'latitude',
          'longitude',
          'speed1',
          'speed2',
          'speed1_value',
          'speed1_unit',
          'height_value',
          'height_unit']

cst_2 = cst.drop(remove, axis=1)
cst_2.isnull().sum()
```

Out[5]:

```
coaster_name            0
Location                0
Manufacturer           59
year_introduced         0
Type_Main               0
opening_date_clean    250
speed_mph             150
height_ft               0
Inversions_clean        0
Gforce_clean          725
dtype: int64
```

In [6]:

```
cst_2 = cst_2.dropna()
cst_2.isnull().sum()
```

Out[6]:

```
coaster_name          0
Location              0
Manufacturer          0
year_introduced       0
Type_Main             0
opening_date_clean    0
speed_mph             0
height_ft             0
Inversions_clean      0
Gforce_clean          0
dtype: int64
```

In [7]:

```
num_row, num_column = cst_2.shape
print(f'This dataset has {num_row} rows and {num_column} columns')
```

```
This dataset has 282 rows and 10 columns
```

Display the summary statistics of the numeric columns using the describe method.

In [8]:

```
cst_2.describe()
```

Out[8]:

	year_introduced	speed_mph	Inversions_clean	Gforce_clean
count	282.000000	282.000000	282.000000	282.000000
mean	2000.109929	54.313121	1.758865	3.749433
std	15.370813	17.295847	2.342249	0.894507
min	1884.000000	6.000000	0.000000	0.800000
25%	1995.000000	45.000000	0.000000	3.400000
50%	2001.000000	54.050000	0.000000	3.950000
75%	2009.000000	65.000000	3.000000	4.300000
max	2022.000000	149.100000	14.000000	6.500000

Rename the following columns: { 'coaster_name' : 'Coaster_Name', 'year_introduce' : 'Year_Introduced', 'opening_date_clean' : 'Opening_Date', 'speed_mph' : 'Speed_mph', 'height_ft' : 'Height_ft', 'Inversions_clean' : 'Inversions', 'Geforce_celan' : 'Geforce' }

In [9]:

```
replace = {
    'coaster_name' : 'Coaster_Name',
    'year_introduced' : 'Year_Introduced',
    'opening_date_clean' : 'Opening_Date',
    'speed_mph' : 'Speed_mph',
    'height_ft' : 'Height_ft',
    'Inversions_clean' : 'Inversions',
    'Gforce_clean' : 'Geforce'
}

cst_2 = cst_2.rename(columns=replace)
cst_2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 282 entries, 0 to 1084
Data columns (total 10 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   Coaster_Name     282 non-null    object 
 1   Location         282 non-null    object 
 2   Manufacturer     282 non-null    object 
 3   Year_Introduced  282 non-null    int64  
 4   Type_Main        282 non-null    object 
 5   Opening_Date     282 non-null    object 
 6   Speed_mph        282 non-null    float64
 7   Height_ft        282 non-null    object 
 8   Inversions       282 non-null    int64  
 9   Geforce          282 non-null    float64
dtypes: float64(2), int64(2), object(6)
memory usage: 24.2+ KB
```

Are there any duplicate rows?

In [10]:

```
duplicate = cst_2.duplicated().sum()
print(f'Total number of duplicate rows is {duplicate}')
```

```
Total number of duplicate rows is 0
```

What are the top 3 years with the most roller coaster

In [11]:

In [11]:

```
year_pivot = cst_2.pivot_table(index='Year_Introduced', values='Coaster_Name', aggfunc='
count')
n = 3
top3_years = year_pivot.nlargest(n, 'Coaster_Name')
top3_years
```

Out[11]:

	Coaster_Name
Year_Introduced	
2000	14
2001	13
1999	12

What are the top 5 Locations with the most number of coasters

In [12]:

```
location = cst_2.pivot_table(index='Location', values='Coaster_Name', aggfunc='count')
n = 5
top10_location = location.nlargest(n, 'Coaster_Name')

top10_location
```

Out[12]:

	Coaster_Name
Location	
Other	12
Kings Island	10
Six Flags Magic Mountain	10
Alton Towers	9
Warner Bros. Movie World	6

What are the top 10 Manufacturers with the most number of coaster built

In [13]:

```
manufacturer = cst_2.pivot_table(index='Manufacturer', values='Coaster_Name', aggfunc='c
ount')
n = 10
top10_manufacturer = manufacturer.nlargest(n, 'Coaster_Name')

top10_manufacturer
```

Out[13]:

	Coaster_Name
Manufacturer	
Bolliger & Mabillard	49
Vekoma	39
Intamin	28
Arrow Dynamics	23
Mack Rides	19
Gerstlauer	17
Rocky Mountain Construction	10

Manufacturer	Coaster_Name
Anton Schwarzkopf	8
Custom Coasters International	8
Premier Rides	8

What is the average speed? Also display a plot to show it's distribution.

In [14]:

```
avg_speed = cst_2['Speed_mph'].mean().round(2)
print(f'The average speed of roller coasters is {avg_speed} mph')
```

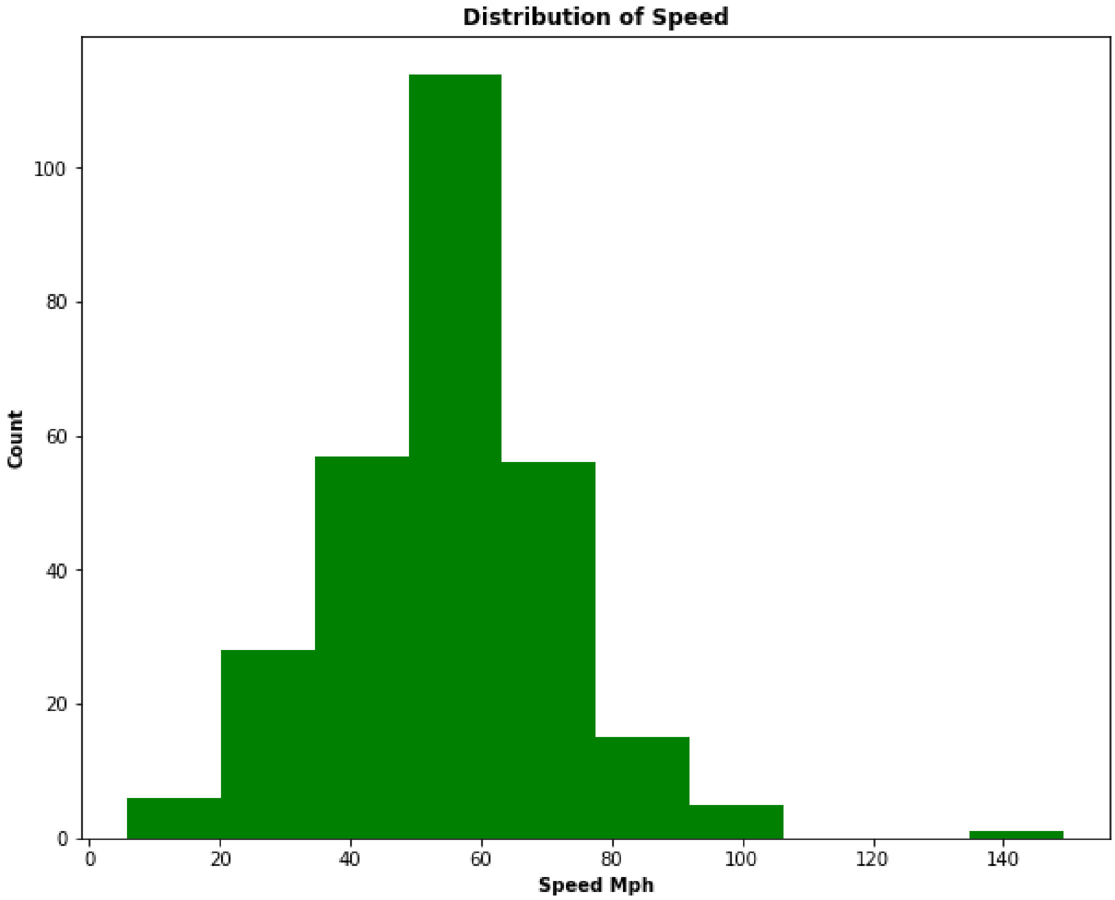
```
The average speed of roller coasters is 54.31 mph
```

In [15]:

```
fig = plt.figure(figsize=(10,8))
plt.hist(data=cst_2, x='Speed_mph', color='green')
plt.xlabel('Speed Mph', weight='bold')
plt.ylabel('Count', weight='bold')
plt.title('Distribution of Speed', weight='bold')
```

Out[15]:

```
Text(0.5, 1.0, 'Distribution of Speed')
```



Explore the feature relationships. Are there any positively or negatively correlated relationships

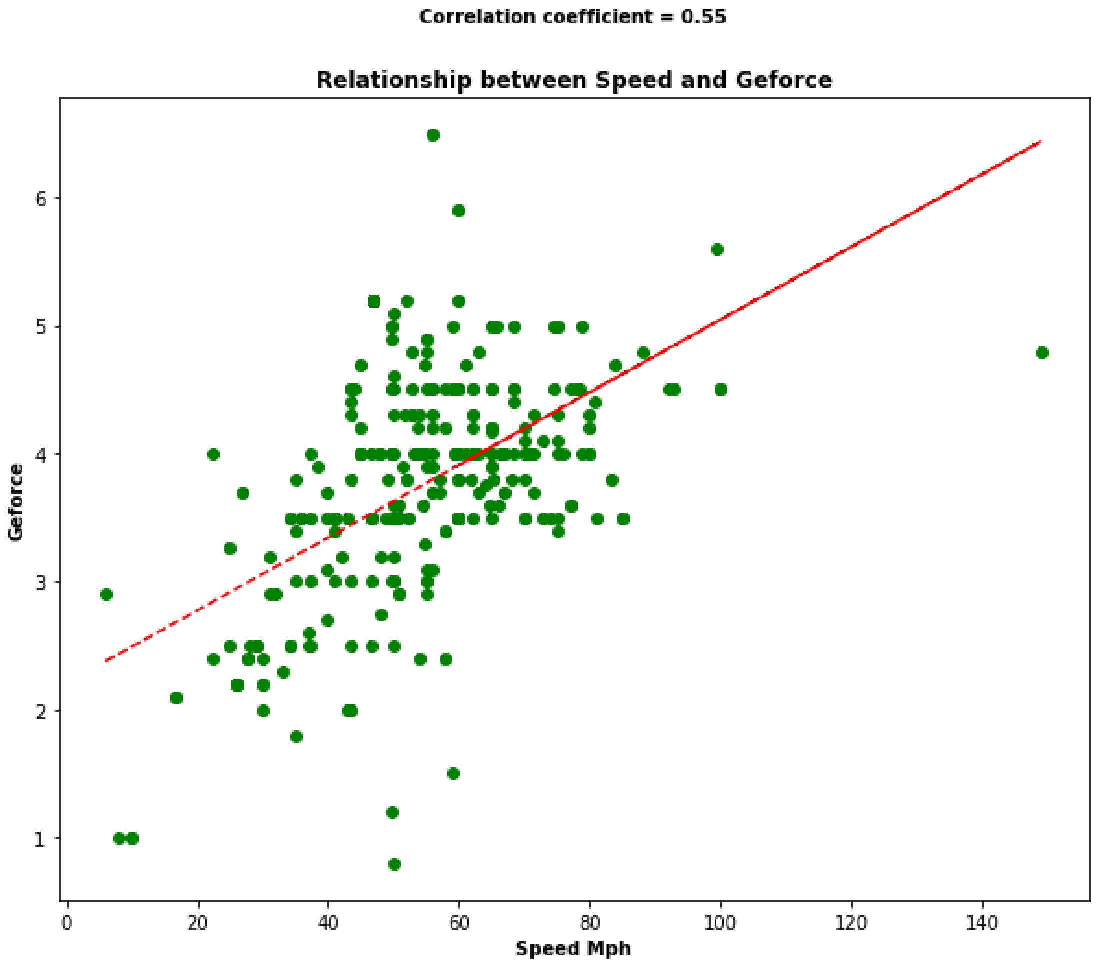
In [16]:

```
x = cst_2['Speed_mph']
y = cst_2['Geforce']

fig = plt.figure(figsize=(10,8))
plt.scatter(x, y, color='green')
z = np.polyfit(x, y, 1)
p = np.poly1d(z)
plt.plot(x, p(x), 'r--')
corr_coef = np.corrcoef(x, y)[1, 0]
```

```
plt.xlabel('Speed Mph', weight='bold')
plt.ylabel('Geforce', weight='bold')
plt.title('Relationship between Speed and Geforce', weight='bold')
plt.text(0.5, 1.1, f"Correlation coefficient = {corr_coef:.2f}", ha='center', va='center
', weight='bold', transform=plt.gca().transAxes)
```

Out[16]:

```
Text(0.5, 1.1, 'Correlation coefficient = 0.55')
```



In [17]:

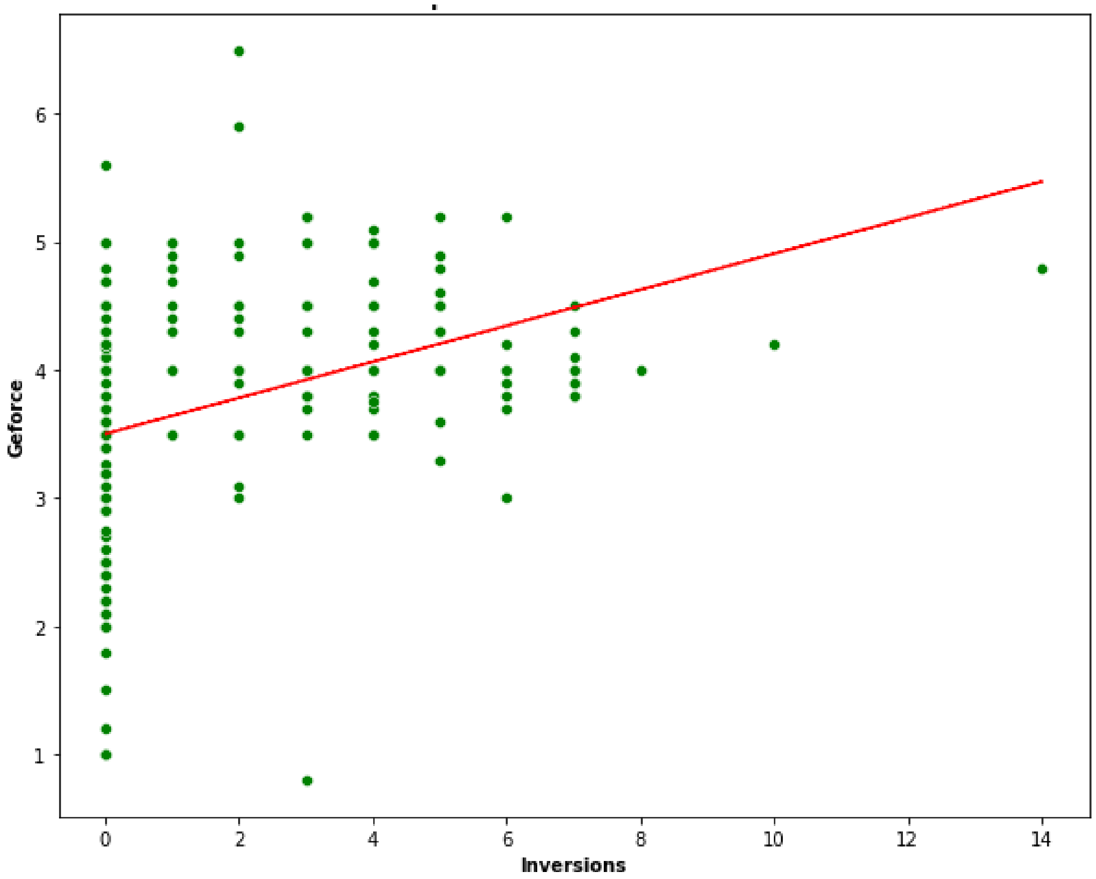
```
x = cst_2['Inversions']
y = cst_2['Geforce']

fig = plt.figure(figsize=(10,8))
sns.scatterplot(x, y, color='green')
z = np.polyfit(x, y, 1)
p = np.poly1d(z)
plt.plot(x, p(x), 'r--')
corr_coef = np.corrcoef(x, y)[1, 0]

plt.xlabel('Inversions', weight='bold')
plt.ylabel('Geforce', weight='bold')
plt.title('Relationship between Inversions and Geforce', weight='bold')
plt.text(0.5, 1.1, f"Correlation coefficient = {corr_coef:.2f}", ha='center', va='center
', weight='bold', transform=plt.gca().transAxes)
```

```
c:\Python\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following
variables as keyword args: x, y. From version 0.12, the only valid positional argument wi
ll be `data`, and passing other arguments without an explicit keyword will result in an e
rror or misinterpretation.
  warnings.warn(
```

Out[17]:

```
Text(0.5, 1.1, 'Correlation coefficient = 0.37')
```

Correlation coefficient = 0.37
Relationship between Inversions and Geforce



In [18]:

```
try:
    cst_2['Height_ft'] = cst_2['Height_ft'].astype('float64')
except:
    cst_2['Height_ft'] = pd.to_numeric(cst_2['Height_ft'], errors='coerce')

cst_2['Height_ft'].info()
```

```
<class 'pandas.core.series.Series'>
Int64Index: 282 entries, 0 to 1084
Series name: Height_ft
Non-Null Count  Dtype
--------------  -----
207 non-null    float64
dtypes: float64(1)
memory usage: 4.4 KB
```

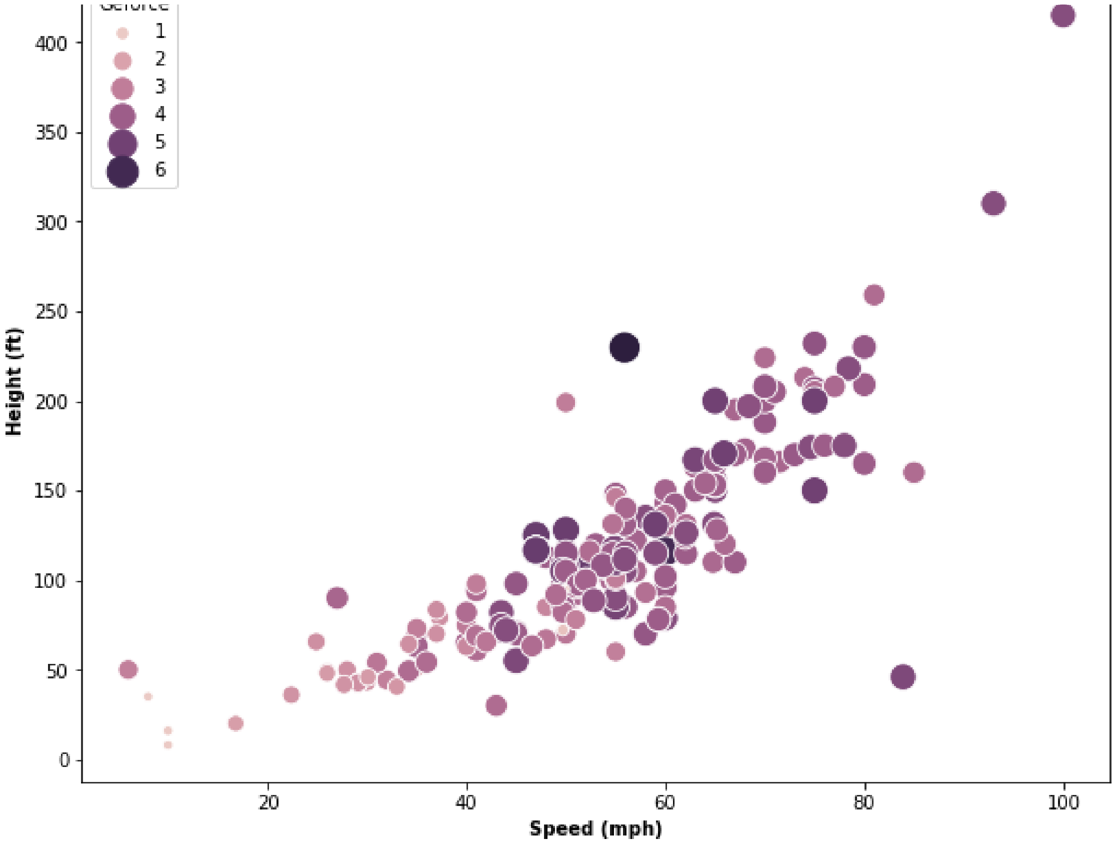
In [19]:

```
x = cst_2['Speed_mph']
y = cst_2['Height_ft']
z = cst_2['Geforce']

fig = plt.figure(figsize=(10,8))
sns.scatterplot(x, y, z, size=z, sizes=(20, 300))

plt.xlabel('Speed (mph)', weight='bold')
plt.ylabel('Height (ft)', weight='bold')
plt.title('Relationship between Speed, Height and Geforce', weight='bold')
```

```
c:\Python\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variables as keyword args: x, y, hue. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[19]:

```
Text(0.5, 1.0, 'Relationship between Speed, Height and Geforce')
```


Gforce
1
2
3
4
5
6
400
350
300
250
200
150
100
50
0
Height (ft)
20
40
60
80
100
Speed (mph)