In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings as w
w.filterwarnings("ignore")
```

In [2]:
```
df=pd.read_csv("Scores.csv")
df
```

Out[2]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30
5	1.5	20
6	9.2	88
7	5.5	60
8	8.3	81
9	2.7	25
10	7.7	85
11	5.9	62
12	4.5	41
13	3.3	42
14	1.1	17
15	8.9	95
16	2.5	30
17	1.9	24
18	6.1	67
19	7.4	69
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

In [3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Hours   25 non-null     float64
 1   Scores  25 non-null     int64
dtypes: float64(1), int64(1)
memory usage: 528.0 bytes
```

In [4]:
```
# in the above Scores dataset we have 25 rows and 2 columns
# 1st column is hour  and datatype is float and sencond column is scores and d
```

In [5]:
```
df.describe()
```

Out[5]:

	Hours	Scores
count	25.000000	25.000000
mean	5.012000	51.480000
std	2.525094	25.286887
min	1.100000	17.000000
25%	2.700000	30.000000
50%	4.800000	47.000000
75%	7.400000	75.000000
max	9.200000	95.000000

```
in the above dataset
average hour student stdy is 5 hours and average marks he get 51.48 out of
100
minimum hour student study is 1 hour and minimumn marks he get is 17 out of
100
maximum hour student study is 9.2 hours and marks he get is 95 out of 100
```

Feature creation: creating new features from the existing data that can provide additional information to the model.

In [6]:
```
def getgrade(marks):
    if marks>=75:
        return "A"
    elif marks<75 and marks>=60:
        return "B"
    elif marks<60 and marks>=35:
        return "C"
    else:
        return "F"
```

In [7]:
```
df["Grade"]=df["Scores"].apply(getgrade)
```

In [8]:
```
df
```

Out[8]:

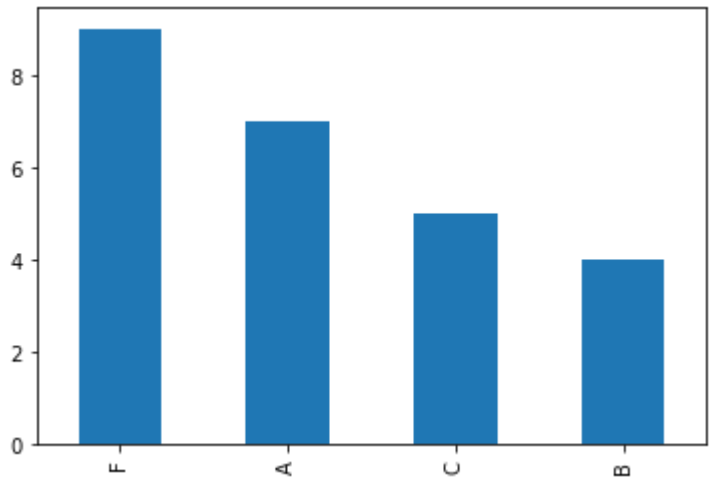
	Hours	Scores	Grade
0	2.5	21	F
1	5.1	47	C
2	3.2	27	F
3	8.5	75	A
4	3.5	30	F
5	1.5	20	F
6	9.2	88	A
7	5.5	60	B
8	8.3	81	A
9	2.7	25	F
10	7.7	85	A
11	5.9	62	B
12	4.5	41	C
13	3.3	42	C
14	1.1	17	F
15	8.9	95	A
16	2.5	30	F
17	1.9	24	F
18	6.1	67	B
19	7.4	69	B
20	2.7	30	F
21	4.8	54	C
22	3.8	35	C
23	6.9	76	A
24	7.8	86	A

In [9]:
```
df.Grade.value_counts()
```

Out[9]:
```
F    9
A    7
C    5
B    4
Name: Grade, dtype: int64
```

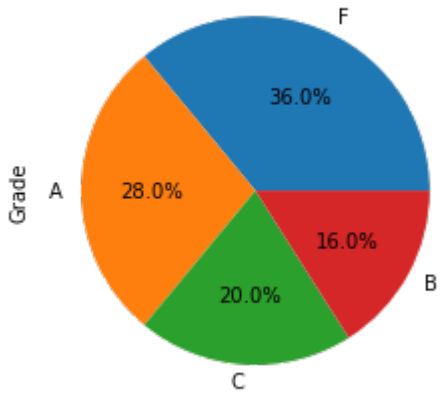
In [10]:
```
df.Grade.value_counts().plot(kind="bar")
```

Out[10]:
```
<AxesSubplot:>
```



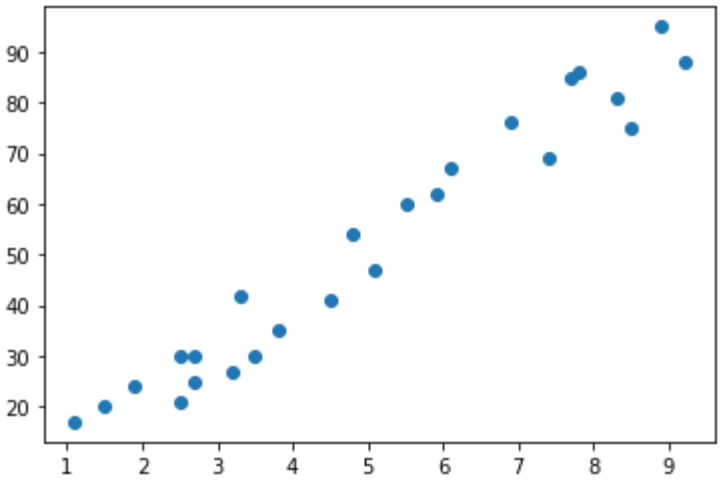
In [11]:
```
df.Grade.value_counts().plot(kind="pie",autopct="%1.1f%%")
```

Out[11]:
```
<AxesSubplot:ylabel='Grade'>
```



In [12]:
```
plt.scatter(df["Hours"],df["Scores"])
```

Out[12]:
```
<matplotlib.collections.PathCollection at 0x1dd6b5984c0>
```



In [13]:
```
df.corr()
```

Out[13]:

	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

split the data inot x and y

In [14]:
```
x=df.iloc[:,:-2]
y=df.iloc[:,-2]
```

In [15]:
```
x
```

Out[15]:

	Hours
0	2.5
1	5.1
2	3.2
3	8.5
4	3.5
5	1.5
6	9.2
7	5.5
8	8.3
9	2.7
10	7.7
11	5.9
12	4.5
13	3.3
14	1.1
15	8.9
16	2.5
17	1.9
18	6.1
19	7.4
20	2.7
21	4.8
22	3.8
23	6.9
24	7.8

In [16]:
```
y
```

Out[16]:
```
0     21
1     47
2     27
3     75
4     30
5     20
6     88
7     60
8     81
9     25
10    85
11    62
12    41
13    42
14    17
15    95
16    30
17    24
18    67
19    69
20    30
21    54
22    35
23    76
24    86
Name: Scores, dtype: int64
```

In [17]:
```
from sklearn.model_selection import train_test_split
xtrain,xtest,ytrain,ytest=train_test_split(x,y,random_state=1,test_size=0.2)
```

In [18]:
```
from sklearn.linear_model import LinearRegression
linreg=LinearRegression()
linreg.fit(xtrain,ytrain)
ypred=linreg.predict(xtest)
```

In [19]:
```
linreg.coef_
```

Out[19]:
```
array([10.46110829])
```

In [20]:
```
linreg.intercept_
```

Out[20]:
```
-1.5369573315500702
```

In [21]:
```
from sklearn.metrics import mean_absolute_error,mean_squared_error,r2_score

mae = mean_absolute_error(ytest,ypred)
mse = mean_squared_error(ytest,ypred)
rmse = np.sqrt(mse)
r2 = r2_score(ytest,ypred)

print(f"MAE :- {mae}\n MSE :- {mse}\n RMSE :- {rmse}\n Accuracy:- {r2}")
```

```
MAE :- 7.882398086270432
 MSE :- 68.88092074277635
 RMSE :- 8.299453038771674
 Accuracy:- 0.8421031525243527
```

Model Testing On New Observation

In [22]:
```
def makeprediction():
    newob = float(input("Enter No of Hrs You Study:- "))
    yp = linreg.predict([[newob]])[0]
    print(f"If You Study of {newob} hrs, you will score around {yp:.2f} marks"
    return yp
```

In [23]:
```
makeprediction()
```

```
Enter No of Hrs You Study:- 7
If You Study of 7.0 hrs, you will score around 71.69 marks
```

Out[23]:
```
71.69080072348314
```

In [ ]:
```

```