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

df = pd.read_csv('students_scores.csv')
print(df.head(5))
```

```
   Unnamed: 0  Gender EthnicGroup          ParentEduc     LunchType
TestPrep  \
0           0  female         NaN   bachelor's degree      standard
none
1           1  female     group C        some college      standard
NaN
2           2  female     group B     master's degree      standard
none
3           3    male     group A  associate's degree  free/reduced
none
4           4    male     group C        some college      standard
none

  ParentMaritalStatus PracticeSport IsFirstChild  NrSiblings
TransportMeans  \
0             married     regularly          yes         3.0
school_bus
1             married     sometimes          yes         0.0
NaN
2              single     sometimes          yes         4.0
school_bus
3             married         never           no         1.0
NaN
4             married     sometimes          yes         0.0
school_bus

  WklyStudyHours  MathScore  ReadingScore  WritingScore
0            < 5         71            71            74
1         05-Oct         69            90            88
2            < 5         87            93            91
3         05-Oct         45            56            42
4         05-Oct         76            78            75
```

```
df.describe()
```

```
         Unnamed: 0    NrSiblings     MathScore  ReadingScore
WritingScore
count  30641.000000  29069.000000  30641.000000  30641.000000
30641.000000
mean     499.556607      2.145894     66.558402     69.377533
68.418622
std      288.747894      1.458242     15.361616     14.758952
```

```
15.443525
min        0.000000      0.000000       0.000000     10.000000
4.000000
25%      249.000000      1.000000      56.000000     59.000000
58.000000
50%      500.000000      2.000000      67.000000     70.000000
69.000000
75%      750.000000      3.000000      78.000000     80.000000
79.000000
max      999.000000      7.000000     100.000000    100.000000
100.000000
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 30641 entries, 0 to 30640
Data columns (total 15 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   Unnamed: 0           30641 non-null  int64
 1   Gender               30641 non-null  object
 2   EthnicGroup          28801 non-null  object
 3   ParentEduc           28796 non-null  object
 4   LunchType            30641 non-null  object
 5   TestPrep             28811 non-null  object
 6   ParentMaritalStatus  29451 non-null  object
 7   PracticeSport        30010 non-null  object
 8   IsFirstChild         29737 non-null  object
 9   NrSiblings           29069 non-null  float64
 10  TransportMeans       27507 non-null  object
 11  WklyStudyHours       29686 non-null  object
 12  MathScore            30641 non-null  int64
 13  ReadingScore         30641 non-null  int64
 14  WritingScore         30641 non-null  int64
dtypes: float64(1), int64(4), object(10)
memory usage: 3.5+ MB
```

#how many null values are there ?

```
df.isnull().sum()
```

```
Unnamed: 0                0
Gender                    0
EthnicGroup            1840
ParentEduc             1845
LunchType                 0
TestPrep               1830
ParentMaritalStatus    1190
PracticeSport           631
IsFirstChild            904
```

```
NrSiblings              1572
TransportMeans          3134
WklyStudyHours           955
MathScore                  0
ReadingScore               0
WritingScore               0
dtype: int64
```

drop unnamed column

```
df = df.drop('Unnamed: 0', axis = 1)
print(df.head())
```

```
   Gender EthnicGroup          ParentEduc     LunchType TestPrep  \
0  female         NaN   bachelor's degree      standard     none
1  female     group C        some college      standard      NaN
2  female     group B     master's degree      standard     none
3    male     group A  associate's degree  free/reduced     none
4    male     group C        some college      standard     none

  ParentMaritalStatus PracticeSport IsFirstChild  NrSiblings
TransportMeans  \
0             married     regularly          yes         3.0
school_bus
1             married     sometimes          yes         0.0
NaN
2              single     sometimes          yes         4.0
school_bus
3             married         never           no         1.0
NaN
4             married     sometimes          yes         0.0
school_bus

  WklyStudyHours  MathScore  ReadingScore  WritingScore
0            < 5         71            71            74
1         05-Oct         69            90            88
2            < 5         87            93            91
3         05-Oct         45            56            42
4         05-Oct         76            78            75
```

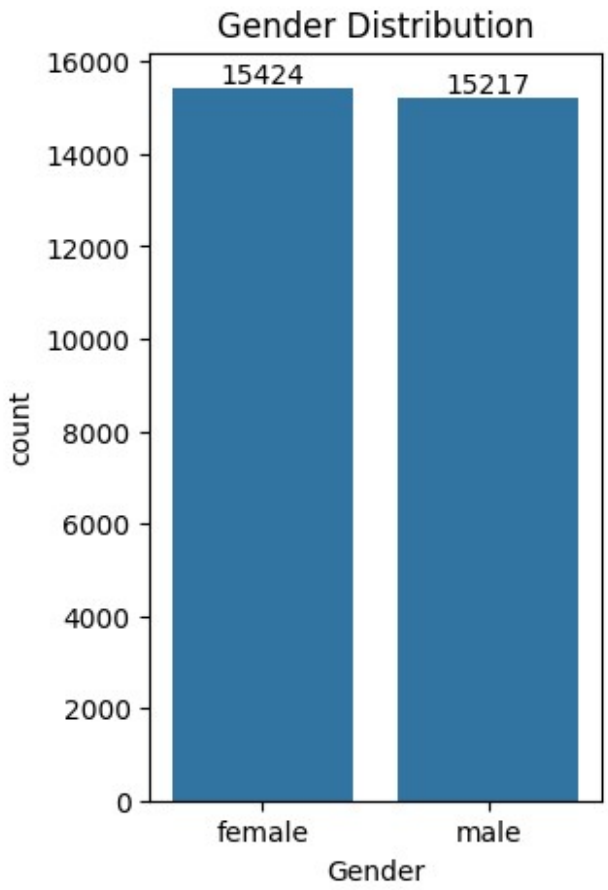
change weekly study hours column

```
df['WklyStudyHours'] = df['WklyStudyHours'].str.replace('05-Oct', '5-
10')
df.head()
```

```
   Gender EthnicGroup          ParentEduc     LunchType TestPrep  \
0  female         NaN   bachelor's degree      standard     none
1  female     group C        some college      standard      NaN
2  female     group B     master's degree      standard     none
3    male     group A  associate's degree  free/reduced     none
4    male     group C        some college      standard     none

  ParentMaritalStatus PracticeSport IsFirstChild  NrSiblings
TransportMeans  \
0             married     regularly          yes         3.0
school_bus
1             married     sometimes          yes         0.0
NaN
2              single     sometimes          yes         4.0
school_bus
3             married         never           no         1.0
NaN
4             married     sometimes          yes         0.0
school_bus

  WklyStudyHours  MathScore  ReadingScore  WritingScore
0            < 5         71            71            74
1           5-10         69            90            88
2            < 5         87            93            91
3           5-10         45            56            42
4           5-10         76            78            75
```

#gender distribution

```
plt.figure(figsize = (3,5))
ax = sns.countplot(data =df, x='Gender')
ax.bar_label(ax.containers[0])
plt.title('Gender Distribution')
plt.show()
```



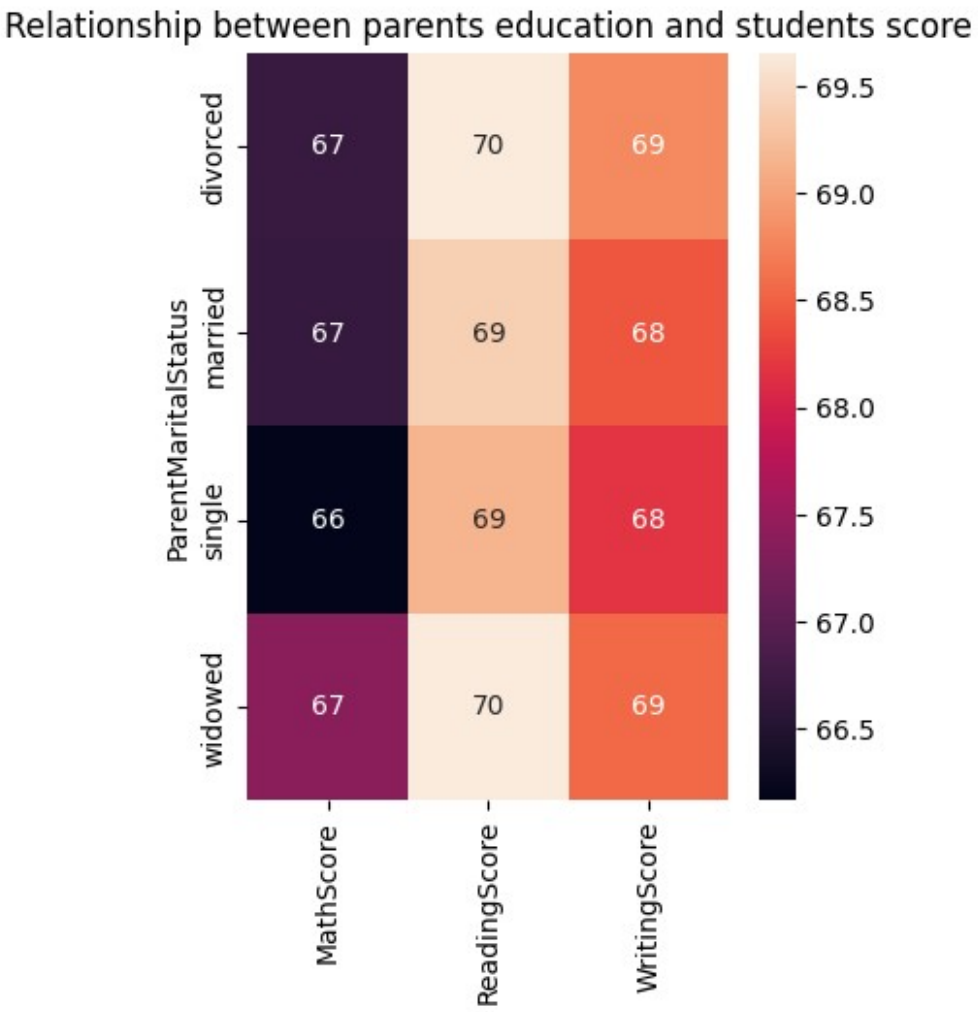
from the above code we analysed that:

the number of females in the data is more than the number of males

```
gb = df.groupby('ParentEduc').agg({'MathScore':'mean',
'ReadingScore':'mean', 'WritingScore':'mean'})
print(gb)
```

```
                    MathScore  ReadingScore  WritingScore
ParentEduc
associate's degree  68.365586     71.124324     70.299099
bachelor's degree   70.466627     73.062020     73.331069
high school         64.435731     67.213997     65.421136
master's degree     72.336134     75.832921     76.356896
some college        66.390472     69.179708     68.501432
some high school    62.584013     65.510785     63.632409
```

```
plt.figure(figsize = (4,5))
sns.heatmap(gb, annot=True)
plt.title('Relationship between parents education and students score')
plt.show()
```

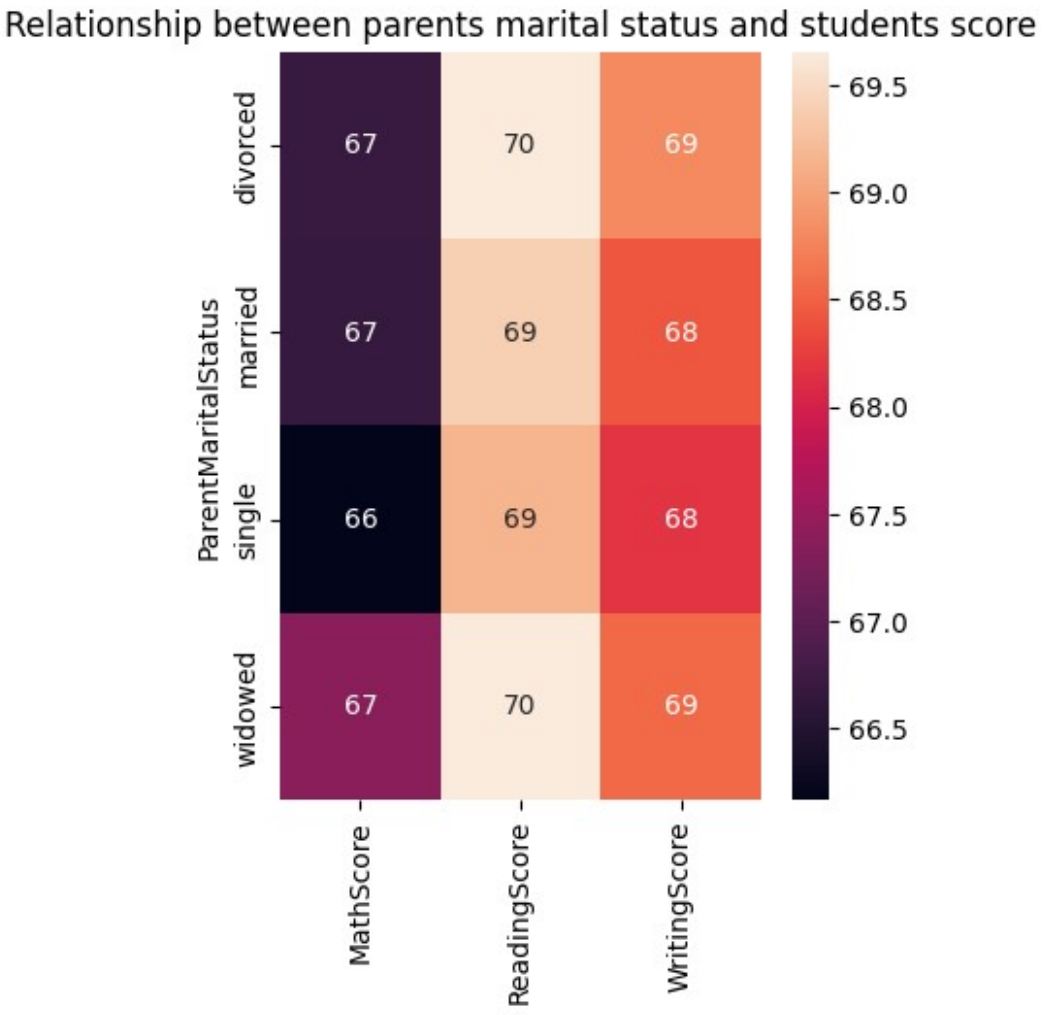


from the above chart we analysed that education of a parents have a good impact on there scores

```
maritalstatus =
df.groupby('ParentMaritalStatus').agg({'MathScore':'mean',
'ReadingScore':'mean', 'WritingScore':'mean'})
print(maritalstatus)
```

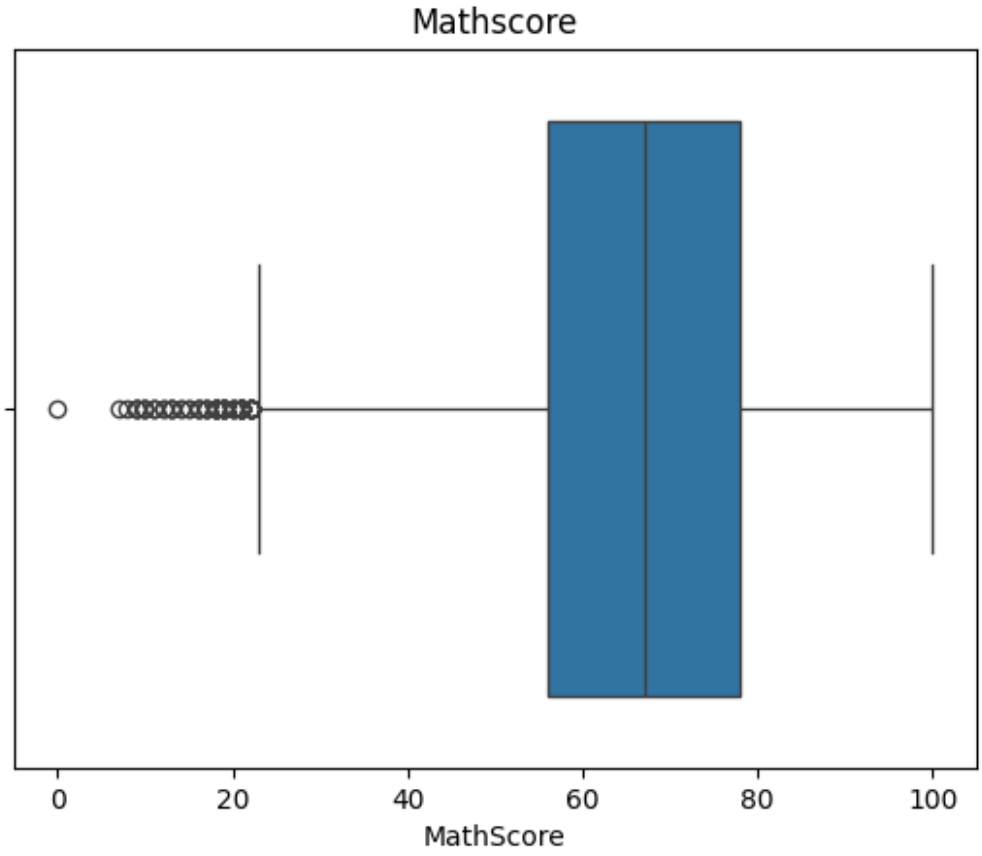
ParentMaritalStatus	MathScore	ReadingScore	WritingScore
divorced	66.691197	69.655011	68.799146
married	66.657326	69.389575	68.420981
single	66.165704	69.157250	68.174440
widowed	67.368866	69.651438	68.563452

```
plt.figure(figsize = (4,5))
sns.heatmap(maritalstatus, annot=True)
plt.title('Relationship between parents marital status and students score')
plt.show()
```

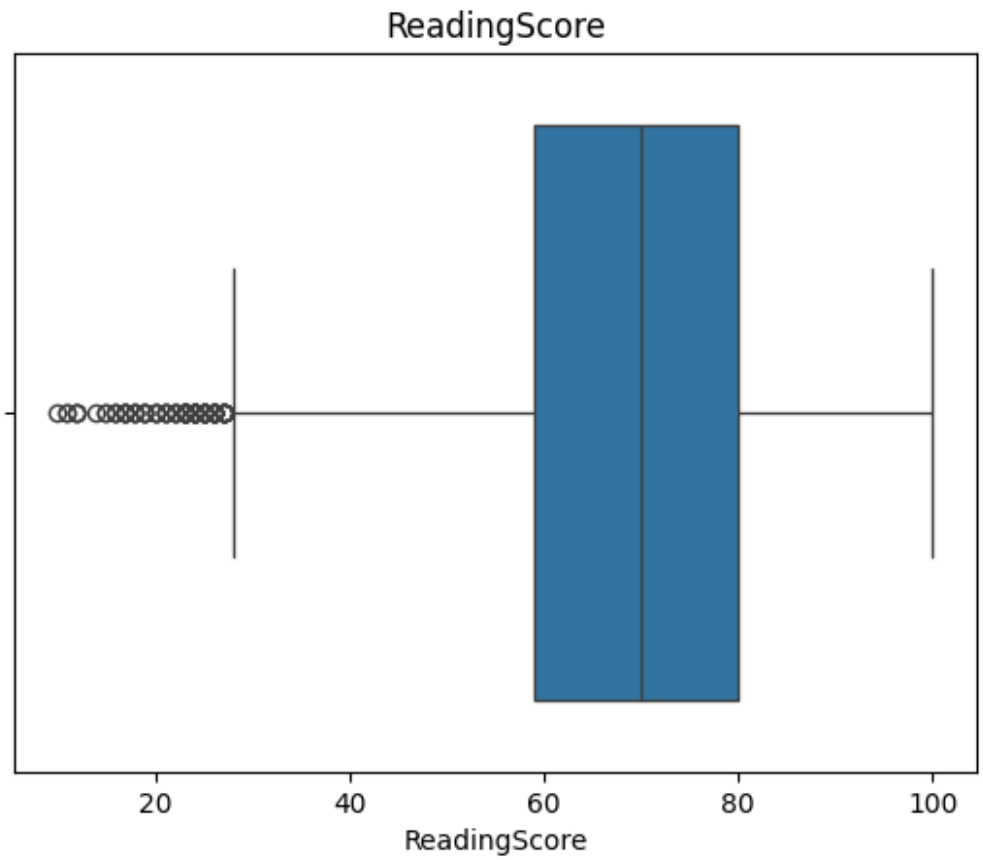


from the above chart we concluded that there is no\negligible impact on students score due to their parents marital status

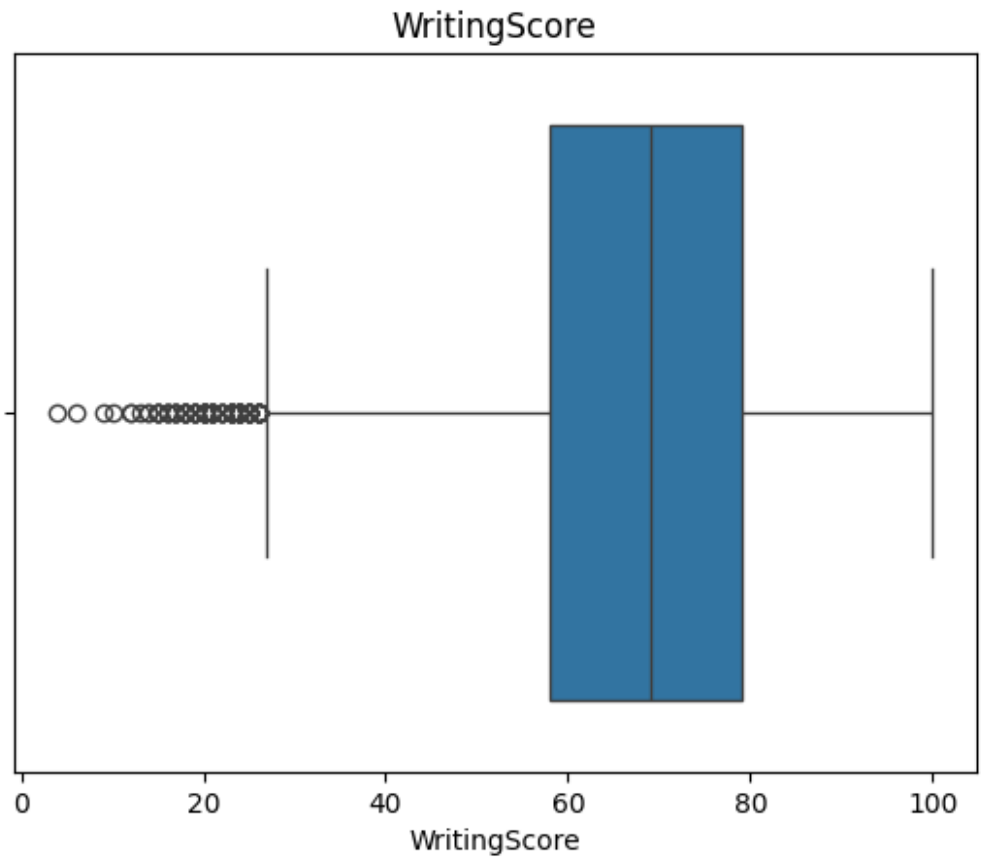
```
sns.boxplot(data = df, x='MathScore')
plt.title('Mathscore')
plt.show()
```




```
sns.boxplot(data = df, x='ReadingScore')
plt.title('ReadingScore')
plt.show()
```




```
sns.boxplot(data = df, x='WritingScore')
plt.title('WritingScore')
plt.show()
```



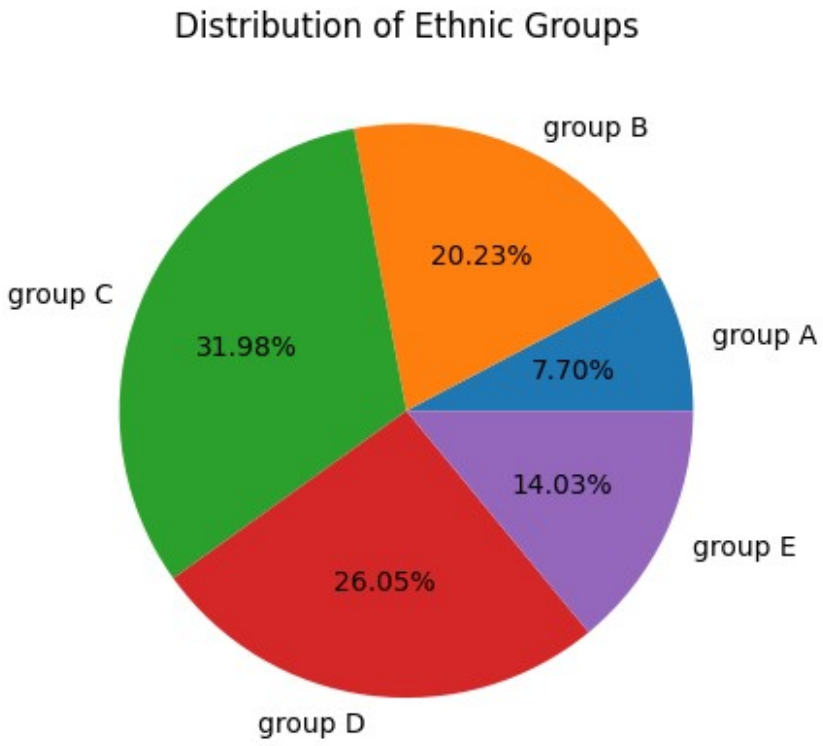

```
# from the above 3 charts we analysed that the minimum range of
MathScore is lesser than ReadingScore and WritingScore
# minimum range of MathScore is around 22 to 23
# minimum range of ReadingScore is around 28 to 30
# minimum range of WritingScore is around 26 to 28

print(df['EthnicGroup'].unique())
```

```
[nan 'group C' 'group B' 'group A' 'group D' 'group E']
```

Distribution of Ethnic Groups

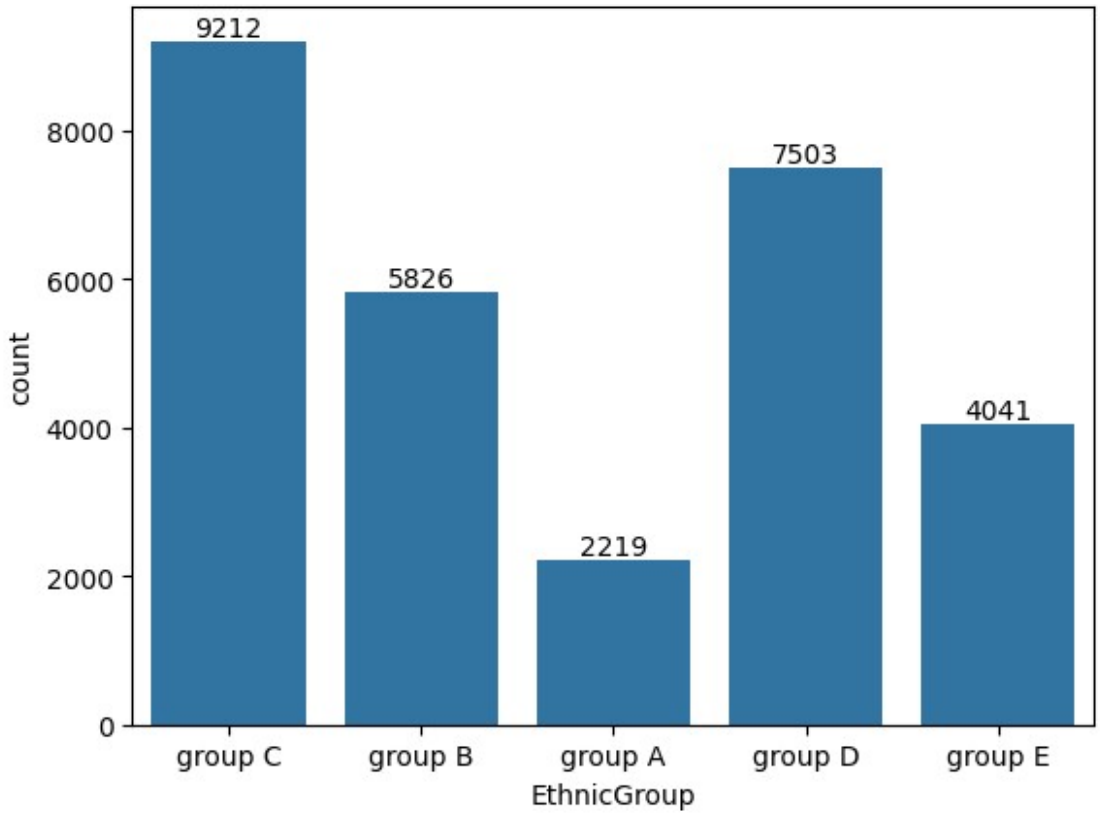
```
groupA = df.loc[(df['EthnicGroup']== 'group A')].count()
groupB = df.loc[(df['EthnicGroup']== 'group B')].count()
groupC = df.loc[(df['EthnicGroup']== 'group C')].count()
groupD = df.loc[(df['EthnicGroup']== 'group D')].count()
groupE = df.loc[(df['EthnicGroup']== 'group E')].count()
l = ['group A', 'group B','group C','group D','group E']
mlist = [groupA['EthnicGroup'],groupB['EthnicGroup'],
groupC['EthnicGroup'], groupD['EthnicGroup'], groupE['EthnicGroup']]
plt.pie(mlist, labels = l, autopct = '%1.2f%%')
plt.title('Distribution of Ethnic Groups')
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```




```
ax = sns.countplot(data = df, x = 'EthnicGroup')
ax.bar_label(ax.containers[0])
```

```
[Text(0, 0, '9212'),
 Text(0, 0, '5826'),
 Text(0, 0, '2219'),
 Text(0, 0, '7503'),
 Text(0, 0, '4041')]
```


9212
5826
2219
7503
4041
8000
6000
4000
2000
0
count
group C
group B
group A
group D
group E
EthnicGroup