In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

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

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

Out[3]:

	Unnamed: 0	Gender	EthnicGroup	ParentEduc	LunchType	TestPrep	ParentMaritalStatus	PracticeSport	IsFirstChild	NrSiblings
0	0	female	NaN	bachelor's degree	standard	none	married	regularly	yes	3.0
1	1	female	group C	some college	standard	NaN	married	sometimes	yes	0.0
2	2	female	group B	master's degree	standard	none	single	sometimes	yes	4.0
3	3	male	group A	associate's degree	free/reduced	none	married	never	no	1.0
4	4	male	group C	some college	standard	none	married	sometimes	yes	0.0

In [4]:
```
df.describe()
```

Out[4]:

	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

In [5]:
```
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
```

In [6]:
```
df.isnull().sum()
```

Out[6]:
```
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
```

DATA REDUCTION

In [7]:
```
#drop unnamed column
df=df.drop("Unnamed: 0",axis=1)
df.head()
```

Out[7]:

	Gender	EthnicGroup	ParentEduc	LunchType	TestPrep	ParentMaritalStatus	PracticeSport	IsFirstChild	NrSiblings	TransportM
0	female	NaN	bachelor's degree	standard	none	married	regularly	yes	3.0	school
1	female	group C	some college	standard	NaN	married	sometimes	yes	0.0	
2	female	group B	master's degree	standard	none	single	sometimes	yes	4.0	school
3	male	group A	associate's degree	free/reduced	none	married	never	no	1.0	
4	male	group C	some college	standard	none	married	sometimes	yes	0.0	school

DATA CLEANING

In [8]:
```
# change weekly study hours column
df["WklyStudyHours"]=df["WklyStudyHours"].str.replace("05-Oct","5-10")
df.head()
```

Out[8]:

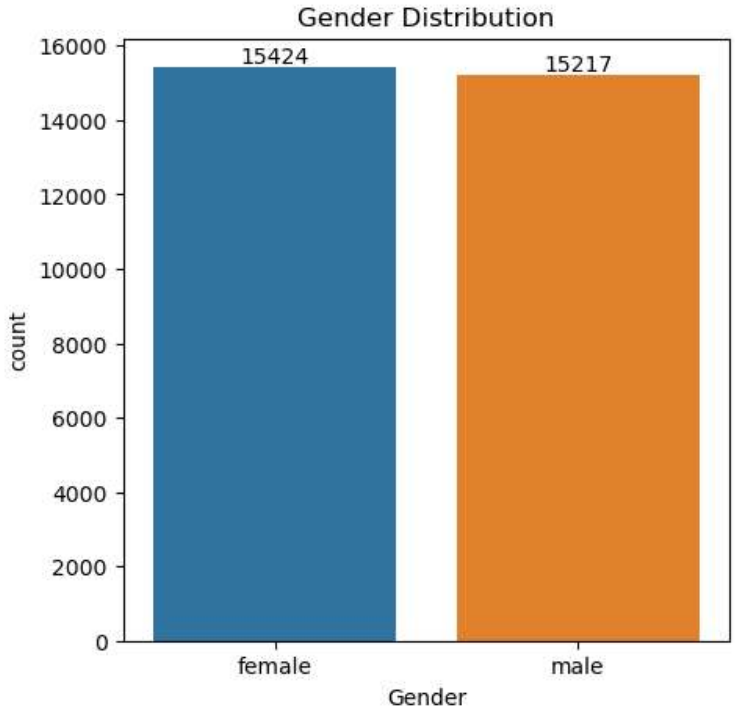
	Gender	EthnicGroup	ParentEduc	LunchType	TestPrep	ParentMaritalStatus	PracticeSport	IsFirstChild	NrSiblings	TransportM
0	female	NaN	bachelor's degree	standard	none	married	regularly	yes	3.0	school
1	female	group C	some college	standard	NaN	married	sometimes	yes	0.0	
2	female	group B	master's degree	standard	none	single	sometimes	yes	4.0	school
3	male	group A	associate's degree	free/reduced	none	married	never	no	1.0	
4	male	group C	some college	standard	none	married	sometimes	yes	0.0	school

In [9]:
```
df["Gender"].value_counts()
```

Out[9]:
```
female    15424
male      15217
Name: Gender, dtype: int64
```

Exploratory Data Analysis

In [10]:
```
#Gender distribution
plt.figure(figsize=(5,5))
ax = sns.countplot(data=df,x="Gender")
ax.bar_label(ax.containers[0])
plt.title("Gender Distribution")
plt.show()
```



From the above chart ,we have analyzed that:-

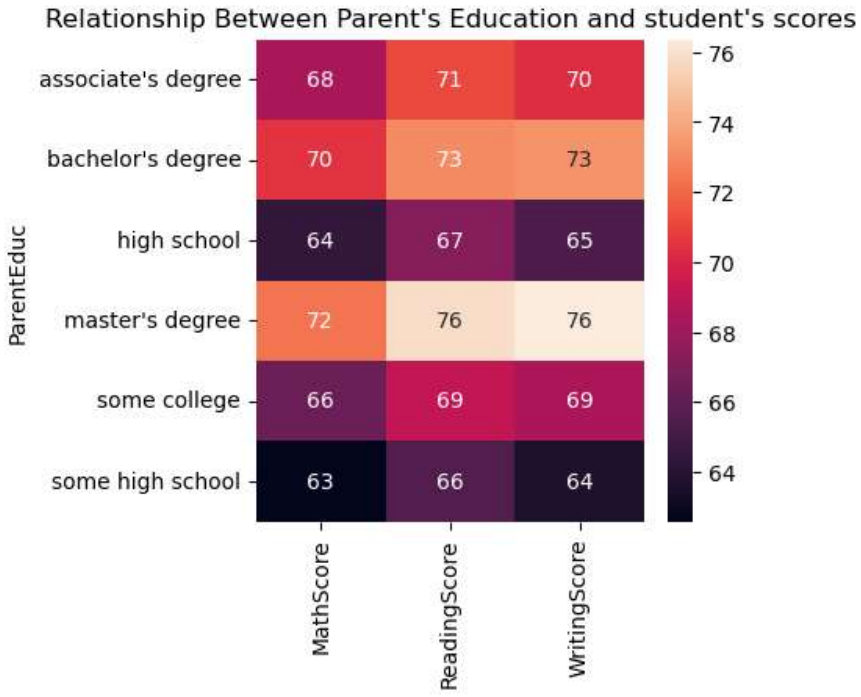
The number of females in the data is more than the number of males

In [11]:
```
gb=df.groupby("ParentEduc").agg({"MathScore":"mean","ReadingScore":"mean","WritingScore":"mean"})
gb
```

Out[11]:

ParentEduc	MathScore	ReadingScore	WritingScore
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

In [12]:
```
plt.figure(figsize=(4,4))

sns.heatmap(gb,annot=True)
plt.title("Relationship Between Parent's Education and student's scores")
plt.show()
```



From the above chart,we have concluded that :-

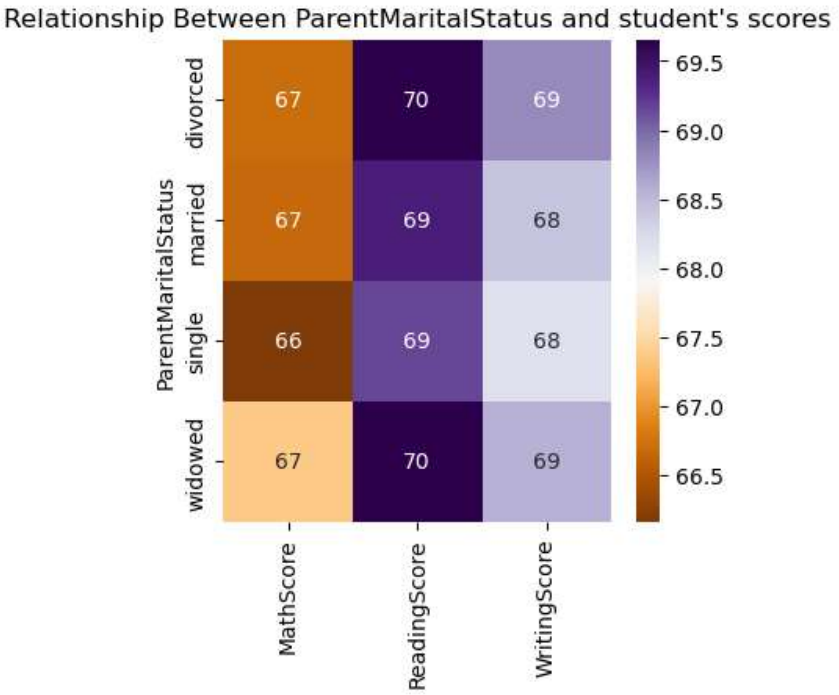
Education of parents have a good impact on their children scores

In [13]:
```
gb=df.groupby("ParentMaritalStatus").agg({"MathScore":"mean","ReadingScore":"mean","WritingScore":"mean"})
gb
```

Out[13]:

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

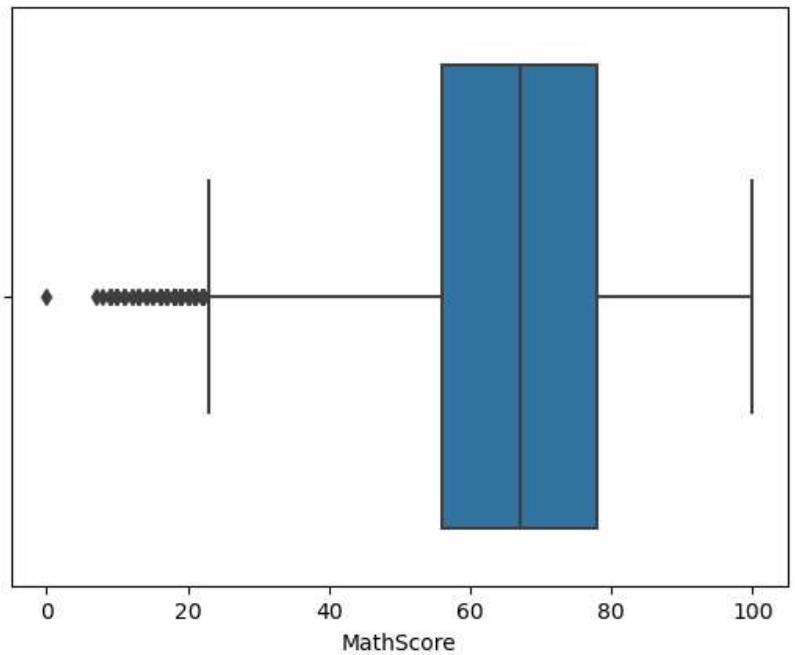
In [14]:
```
plt.figure(figsize=(4,4))

sns.heatmap(gb,annot=True,cmap="PuOr")
plt.title("Relationship Between ParentMaritalStatus and student's scores")
plt.show()
```



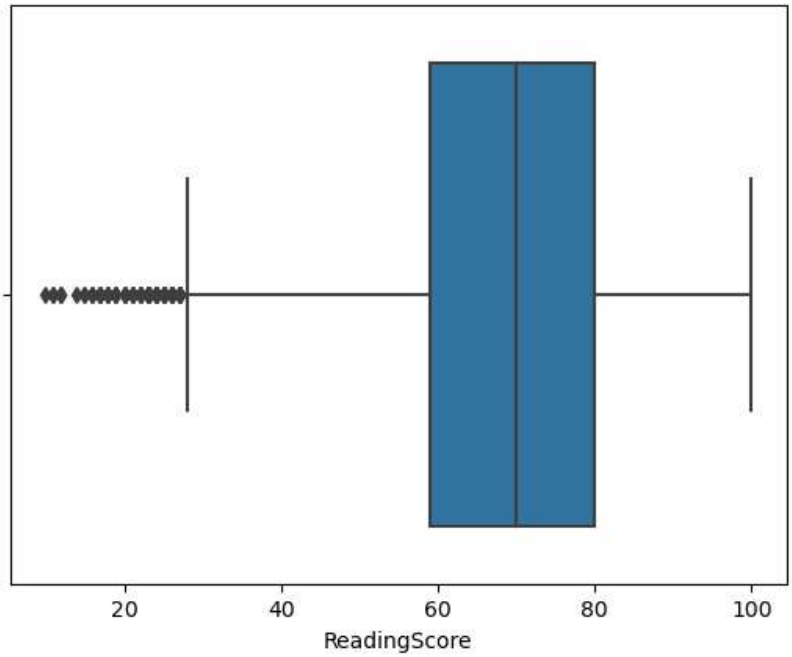
From the above chart we have concluded that:-

ParentMaritalStatus has neglegible impact on their children scores

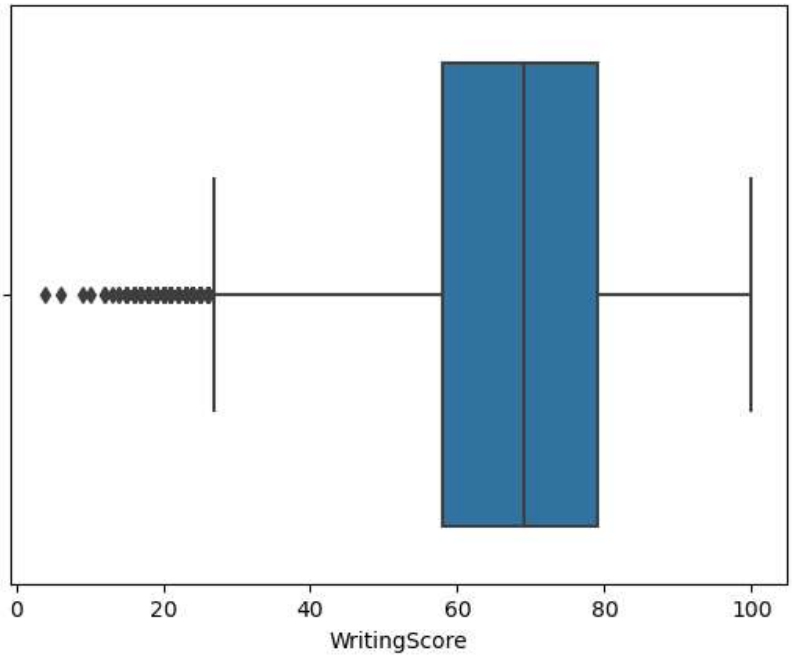
In [15]:
```
sns.boxplot(data=df,x="MathScore")
plt.show()
```



In [16]:
```
sns.boxplot(data=df,x="ReadingScore")
plt.show()
```



In [17]:
```
sns.boxplot(data=df,x="WritingScore")
plt.show()
```

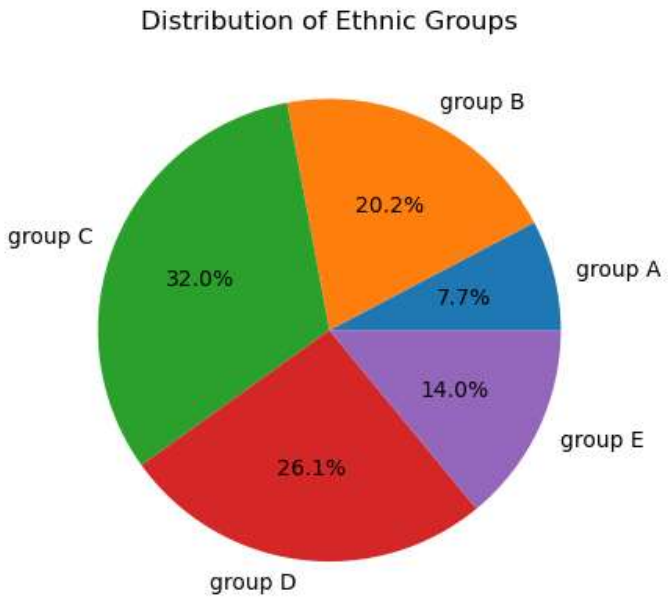


In [18]:
```
#Distribution of Ethnic Groups
```

In [19]:
```
df["EthnicGroup"].unique()
```

Out[19]:
```
array([nan, 'group C', 'group B', 'group A', 'group D', 'group E'],
      dtype=object)
```

In [20]:
```
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 = "%0.1f%%")
plt.title("Distribution of Ethnic Groups")
plt.show()
```



In [21]:
```
df["EthnicGroup"].value_counts()
```

Out[21]:
```
group C    9212
group D    7503
group B    5826
group E    4041
group A    2219
Name: EthnicGroup, dtype: int64
```

In [22]:
```
ax = sns.countplot(data=df,x="EthnicGroup")
ax.bar_label(ax.containers[0])
```

Out[22]:
```
[Text(0, 0, '9212'),
 Text(0, 0, '5826'),
 Text(0, 0, '2219'),
 Text(0, 0, '7503'),
 Text(0, 0, '4041')]
```