Question 1: Over how many years was the unemployment data collected?

Query:

```
{
   "$group": { //Grouped by years
     "_id": null,
     "minYear": { "$min": "$Year" }, //Finds min and max years
     "maxYear": { "$max": "$Year" }
   }
 },
 {
   "$project": {
     "_id": 0,
     "yearDifference": { "$subtract": ["$maxYear", "$minYear"] } //Finds their difference
   }
 }
```

Explanation: First groups the data by years, and then finds the minimum and maximum years. In the second stage, it finds the difference between the max and min years using subtract.

Screenshot:

Question 2: How many states were reported in this survey?

Query:

```
{
   $group: {
     //Grouped by states.
     _id: "$State"}
  },
  {
   $count: "States"} //Counted by states.
```

Explanation: First groups the states by the states, in order to keep them unique and individual, and then counts the number of groups to get the number of unique states.

Screenshot:

```
[
{
    $group: {
      //Grouped by states.
      _id: "$State"}
  },
  {
    $count: "States"} //Counted by states.

]
```

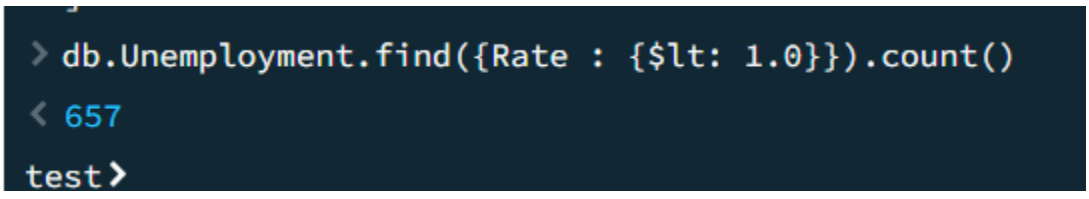
```
States : 47
```

Question 3: What does the query calculate?

Query:**db.Unemployment.find({Rate : {$lt: 1.0}}).count()**

Explanation: The query finds the number of counties with the unemployment rate less than one percent. Lt stands for less than.

Screenshot:



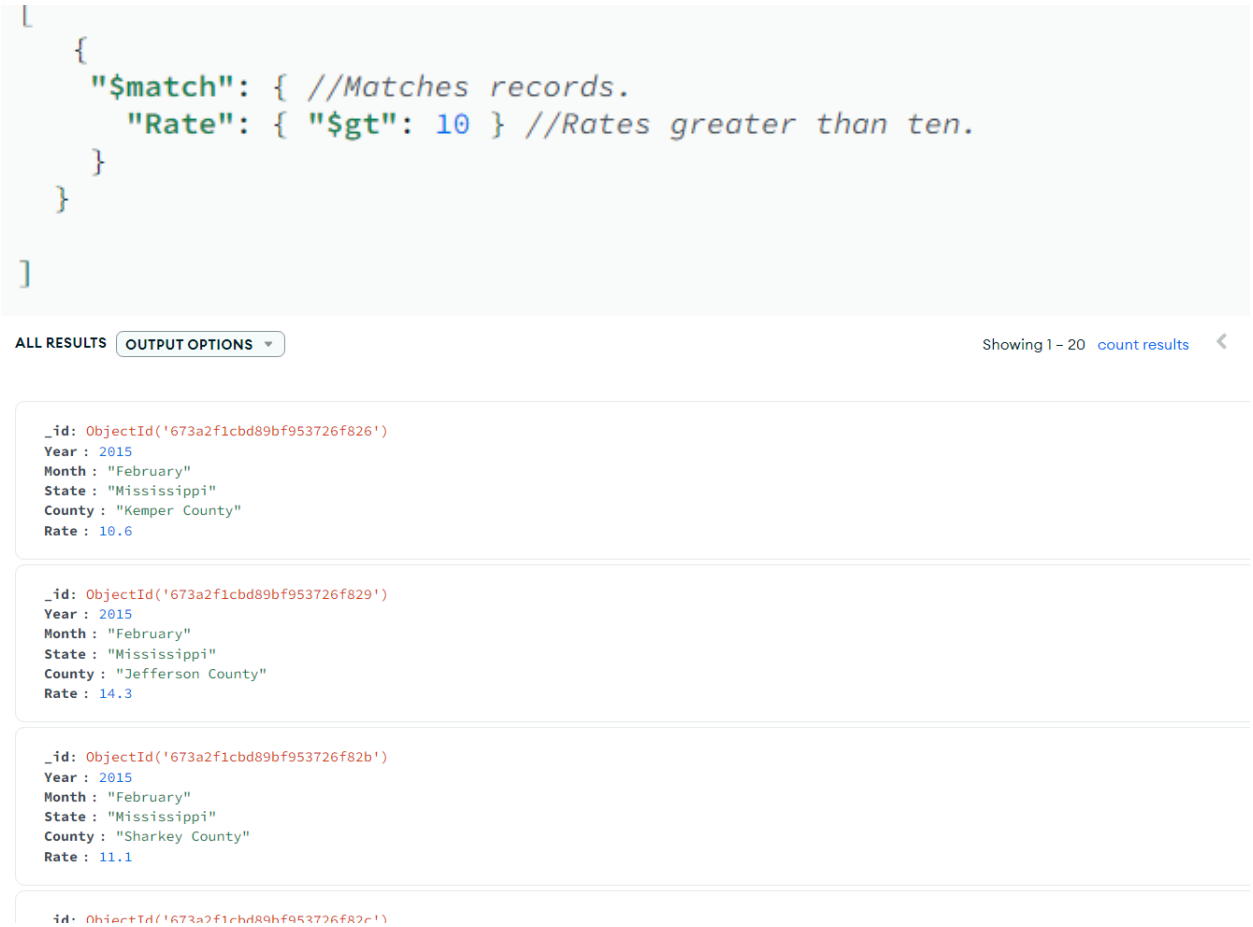
Question 4: Find all counties with unemployment rate higher than 10%

Query:

```
{
  "$match": { //Matches records.
    "Rate": { "$gt": 10 } //Rates greater than ten.
  }
 }
```

Explanation: matches all records where the rate is greater than ten.

Screenshot:



Question 5:Calculate the average employment rate across all states.

Query:

```
{
   $group: {
     _id: null,
     avgRate: {
       $avg: "$Rate"} //Averages rate.
   }
 },
```

```
{
  $project: {
    _id: 0,
    avgRate: 1}
}
```

Explanation: In the first phase, data for average is calculated by using $avg: $Rate. Then, in the project phase, it is outputted to the console by explicitly including avgRate: 1.

Screenshot:

```
[
    {
      $group: {
        _id: null,
        avgRate: {
          $avg: "$Rate"} //Averages rate.
      }
    },
    {
      $project: {
        _id: 0,
        avgRate: 1}
    }


]
```

```
avgRate : 6.1750097115006755
```

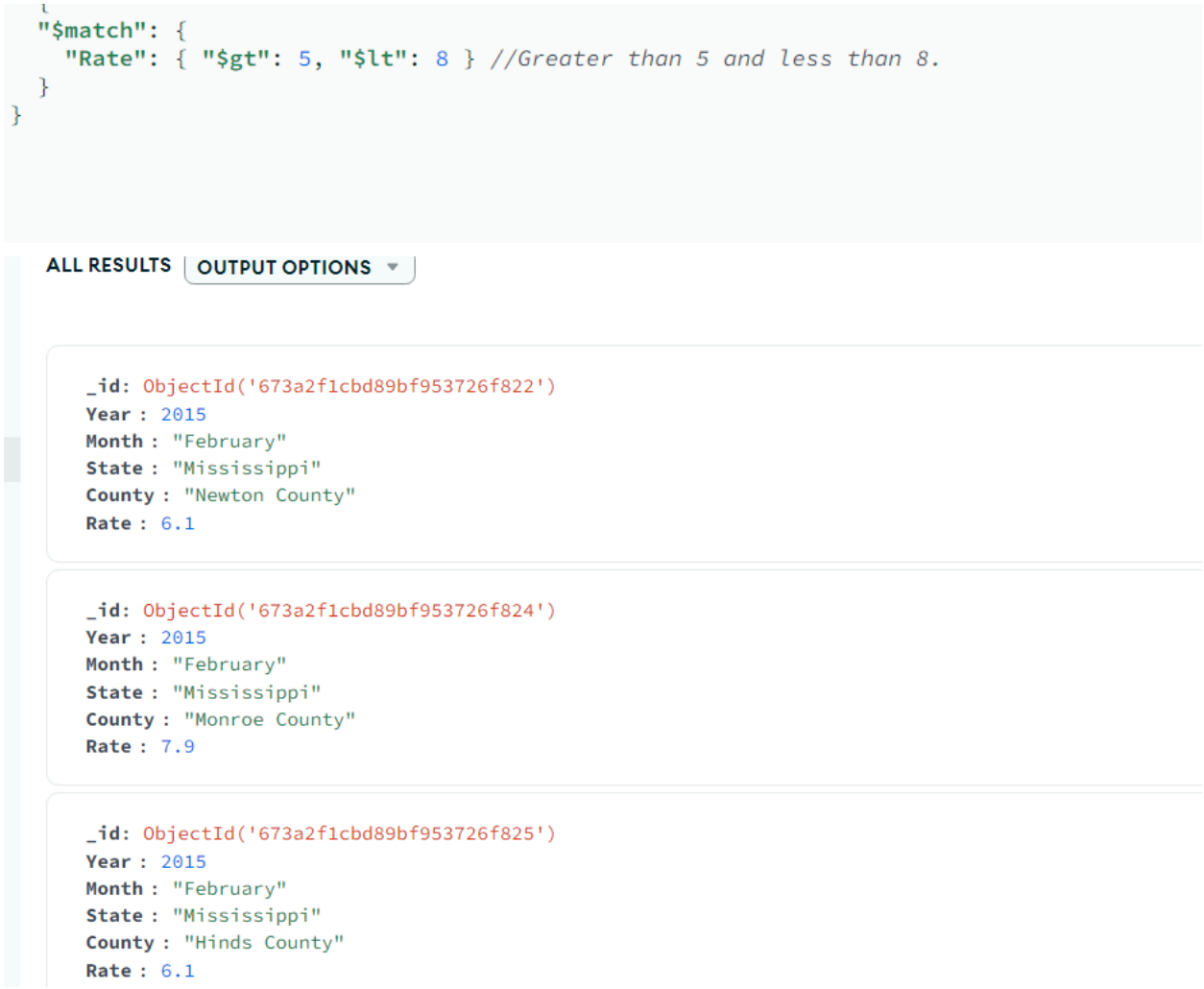
Question 6: Find all counties with a unemployment rate between 5% and 8%.

Query:

```
{
  "$match": {
    "Rate": { "$gt": 5, "$lt": 8 } //Greater than 5 and less than 8.
  }
}
```

Explanation: Matches the records that have their rate greater than 5 and less than 8, with gt being greater than or and lt being less than.

Screenshot:



Question 7: Find the state with the highest unemployment rate

Query:

```
{
   "$group": { //Groups by state and averages rate
     "_id": "$State",
     "avgRate": { "$avg": "$Rate" }
   }
 },
 {
   "$sort": { "avgRate":-1} //Sorts in descending order
 },
 {
   "$limit": 1} //Limited to only the first document in the list.
```

Explanation: The group section groups the states with their rates. The sort section sorts it in descending order, which is sorted via -1. Lastly, the limit statement limits it to one.

Screenshot:

```
[
    {
     "$group": { //Groups by state and averages rate
       "_id": "$State",
       "avgRate": { "$avg": "$Rate" }
     }
    },
    {
      "$sort": { "avgRate":-1} //Sorts in descending order
    },
    {
      "$limit": 1} //Limited to only the first document in the list.


]
```

```
_id: "Arizona"
avgRate : 9.274588477366255
```

Question 8: How many counties have an unemployment rate above 5%?

Query:

```
{
  $match: { //Matches all records with greater than 5
    Rate: { $gt: 5}
  }
},
{
  $group: { //Group by county
    _id: "$County"}
},
{
```

$count: "Results"}

Explanation:
First section matches the documents with a rate greater than 5%. Second section groups the results by county. Last section counts and displays the count as Results.

Screenshot:

```
[
  {
    $match: { //Matches all records with greater than 5
      Rate: { $gt: 5}
    }
  },
  {
    $group: {//Group by county
      _id: "$County"}
  },
  {
    $count: "Results"}
]
```

```
Results : 1736
```

Question 9:Calculate the average unemployment rate per state by year.

Query:

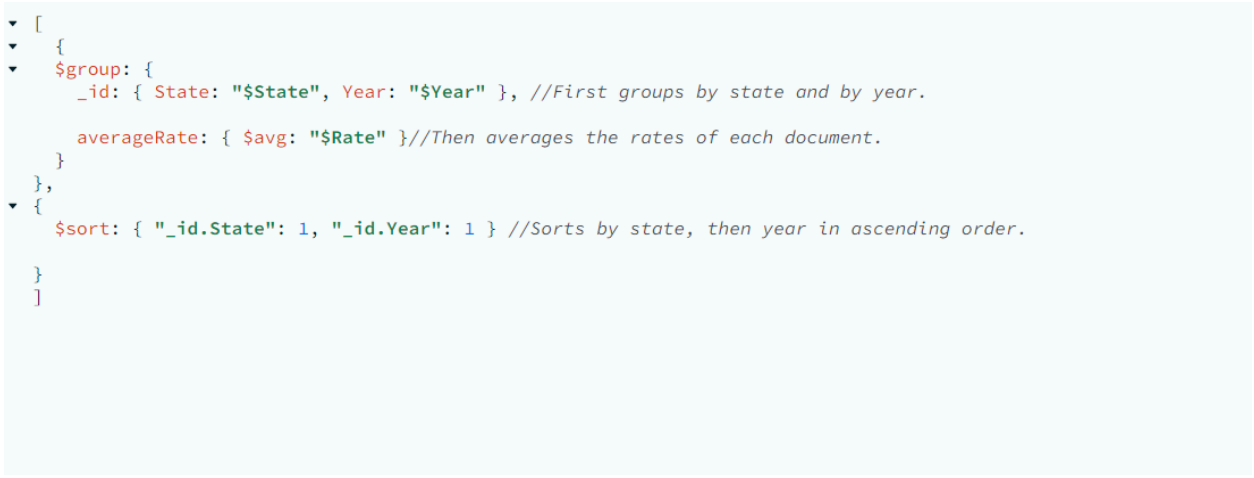
```
{
  $group: {
    _id: { State: "$State", Year: "$Year" }, //First groups by state and by year.

    averageRate: { $avg: "$Rate" }//Then averages the rates of each document.
  }
},
{
  $sort: { "_id.State": 1, "_id.Year": 1 } //Sorts by state, then year in ascending order.

}
```

Explanation:
First the code groups the data by state and year, in one neat id for both parts. Then it averages the rates of all the counties. In the second section, the data is sorted in ascending order by state, and then year, for readability.

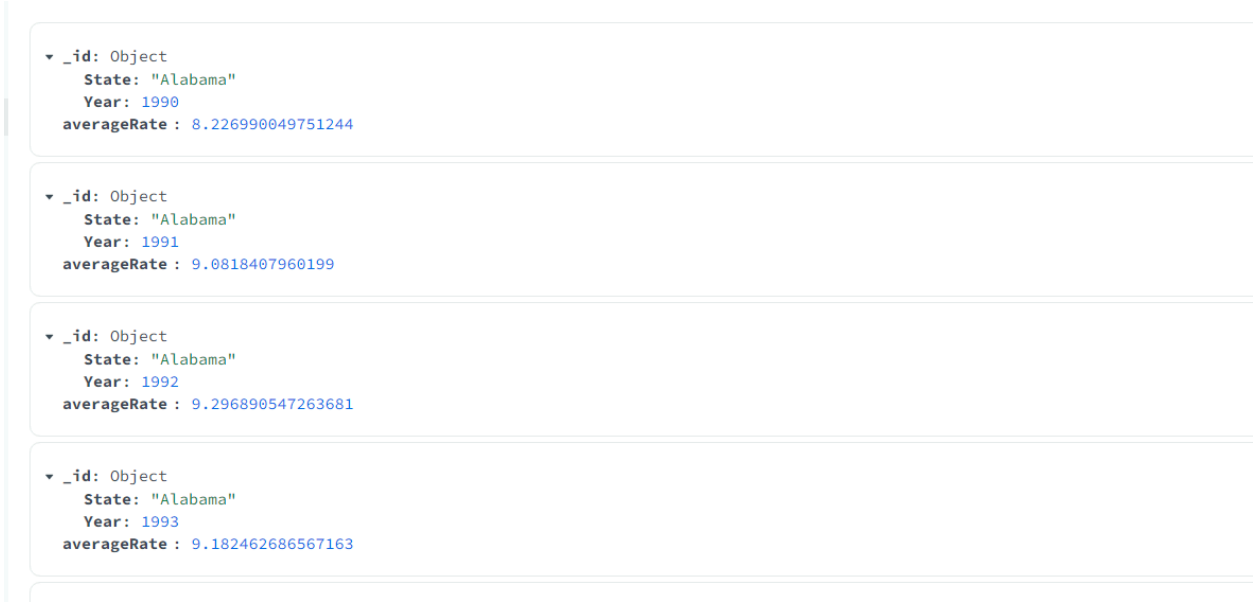
Screenshot:



```
[
  {
  $group: {
    _id: { State: "$State", Year: "$Year" }, //First groups by state and by year.

    averageRate: { $avg: "$Rate" }//Then averages the rates of each document.
  }
},
{
  $sort: { "_id.State": 1, "_id.Year": 1 } //Sorts by state, then year in ascending order.

}
]
```



```
_id: Object
    State: "Alabama"
    Year: 1990
averageRate : 8.226990049751244

_id: Object
    State: "Alabama"
    Year: 1991
averageRate : 9.0818407960199

_id: Object
    State: "Alabama"
    Year: 1992
averageRate : 9.296890547263681

_id: Object
    State: "Alabama"
    Year: 1993
averageRate : 9.182462686567163
```