```cpp
#include <iostream>
#include <iomanip>
#include <string> //needed for string variable
#include <limits> //user for numeric_limits

using namespace std;
//functions
char getSentinel(); //Input validation for sentinel.  simple y/n
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int searchArr(const string searchArr[], int arrSize, string searchString);
string getInput(string questionToAsk, string errorMsg);
int getInput(string questionToAsk, string errorMsg, int year);
int getMonth(string months[]);
int getDay(string months[]);
void displayCalendar(string month, int year, int numDays, int day);


int main() {
    //variables
    string months[] =
      { "January","February","March","April","May","June","July","August","Septem
      ber","October","November","December" };
    string daysOfWeek[] =
      { "Sunday","Monday","Tuesday","Wednesday","Thursday","Friday" };
    int daysPerMonth[] = { 31,28,31,30,31,30,31,31,30,31,30,31 };

    //index of string
    int monthIndex, day, year,numDays;

    do {
        monthIndex = getMonth(months);
        year = getInput("Enter year for " + months[monthIndex] + ": " , "Error:
          Enter valid year",1);
        day = getDay(daysOfWeek);
        numDays = daysPerMonth[monthIndex];
        if (year % 4 == 0 && monthIndex == 1)
            numDays++;

        displayCalendar(months[monthIndex], year, numDays,day);


    } while (getSentinel() == 'y');


}


void displayCalendar(string monthName, int year,int numDays,int day) {
    int month[5][7] = { {0} };
    int counter=0;
    //Fill out week one with offset
    for (int i = day; i < 7; i++) {
```

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49          counter++;
50          month[0][i] = counter;
51      }
52      //Populate the rest of the days
53      for (int i = 1; i < 5; i++) {
54          for (int x = 0; x < 7; x++) {
55              counter++;
56              if (counter <= numDays )
57                  month[i][x] = counter;
58          }
59
60      }
61
62      //Print the Calendar
63      cout <<  monthName << "\t" << year << endl;
64      cout << "S  " << "M  " << "T  " << "W  " << "T  " << "F  " << "S  \n";
65      for (int i = 0; i < 5; i++) {
66          for (int x = 0; x < 7; x++) {
67              if (month[i][x] == 0) //Ignore 0 values
68                  cout << "   ";
69              else
70                  cout << setw(3) <<  left << month[i][x];
71          }
72          cout << endl;
73      }
74
75
76
77  }
78
79  //Validates user input for month. Returns int index
80  int getMonth(string months[]) {
81      int month;
82      do {
83          month = searchArr(months, 12, getInput("Enter name of month: ", "Error:
              Enter a valid month"));
84      } while (month == -1);
85      return month;
86
87  }
88
89  //Validates input for day.  returns  int index
90  int getDay(string days[]) {
91      int month;
92      do {
93          month = searchArr(days, 12, getInput("Enter name of day this month starts
               on: ", "Error: Enter a valid day"));
94      } while (month == -1);
95      return month;
96
97  }
98
```

```
 99 //Search String array and return position
100 int searchArr(const string searchArr[],int arrSize, string searchString) {
101     for (int i = 0; i < arrSize; i++) {
102         if (searchArr[i] == searchString)
103             return i;
104     }
105     return -1;
106 }
107
108
109 //Validates input, returns string
110 int getInput(string questionToAsk, string errorMsg, int intVar) {
111     int usrInput;
112     cout << questionToAsk;
113     while (!(cin >> usrInput)) { //Loop until integer in the specified range is
        entered
114         cout << errorMsg << endl;
115         cin.clear();
116         cin.ignore(numeric_limits<streamsize>::max(), '\n');
117     }
118     return usrInput;
119 }
120
121 //Validates input, returns string
122 string getInput(string questionToAsk, string errorMsg) {
123     string usrInput;
124     cout << questionToAsk;
125     while (!(cin >> usrInput)) { //Loop until integer in the specified range is
        entered
126         cout << errorMsg << endl;
127         cin.clear();
128         cin.ignore(numeric_limits<streamsize>::max(), '\n');
129     }
130     return usrInput;
131 }
132
133 //validates sentinel input, then returns char value
134 char getSentinel() {
135     char  varToReturn;
136     bool isValidInput = false;
137
138     // loop until a valid y or n char is entered
139     do {
140         cout << "\nEnter 'y' to enter more data.  Enter 'n' if you are finished:
            ";
141         if (!(cin >> varToReturn) || (tolower(varToReturn) != 'y' && tolower
            (varToReturn) != 'n')) {
142             cout << "\tERROR: Enter 'y' to  enter more data.  Enter 'n' if you
                are finished";
143
144             cin.clear();
145             cin.ignore(numeric_limits<streamsize>::max(), '\n');
```

```
146         }
147         else {
148             isValidInput = true;
149         }
150     } while (!isValidInput);
151
152     return tolower(varToReturn);
153 }
```