Lake Opeongo

Over the past 50+ years, the average ice out date for Lake Opeongo, Algonquin's largest lake, is April 28. Given variations in winter and spring conditions, the ice out dates for Lake Opeongo have ranged from March 29 (2012) to as late as May 15 (1972). During 2022, the ice out date for Lake Opeongo was April 25.

Technically, the official ice out date for Algonquin Park is recorded when a boat can safely navigate from the Lake Opeongo Access Point (labelled 1 on the map) to the Happy Isle Portage in the North Arm of Lake Opeongo (labelled 2 on the map).

The ice off dates are a concern for environmentalists. Earlier ice off dates mean warmer waters and many Algonquin species are not suited to those weather conditions. Below is the data for the ice off dates from 1964-2021.

Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Ice Off Date	27-Apr	10-May	14-May	1-May	14-Apr	30-Apr	1-May	6-May	15-May	22-Apr	5-May	7-May
Days Jan to Ice Off	116	129	133	120	103	119	120	125	134	111	124	126
Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Ice Off Date	20-Apr	20-Apr	11-May	27-Apr	29-Apr	11-Apr	27-Apr	30-Apr	26-Apr	30-Apr	18-Apr	17-Apr
Days Jan to Ice Off	109	109	130	116	118	100	116	119	115	119	107	106
Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Ice Off Date	29-Apr	3-May	29-Apr	10-May	30-Apr	29-Apr	20-Apr	8-May	5-May	17-Apr	25-Apr	27-Apr
Days Jan to Ice Off	118	122	118	129	119	118	109	127	124	106	114	116
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ice Off Date	25-Apr	24-Apr	29-Apr	20-Apr	21-Apr	29-Apr	25-Apr	6-Apr	29-Apr	29-Mar	30-Apr	6-May
Days Jan to Ice Off	114	113	118	109	110	118	114	95	118	87	119	125
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Ice Off Date	29-Mar	30-Apr	7-May	1-May	1-May	25-Apr	10-May	10-May	30-Apr	10-Apr		
Days Jan to Ice Off	87	119	126	120	120	114	129	129	119	99		

In the last row, I calculated the number of days from Jan 1 to the ice off date. Higher numbers would be better for the eco-systems. Lower numbers are worse, they mean the lake is warming.

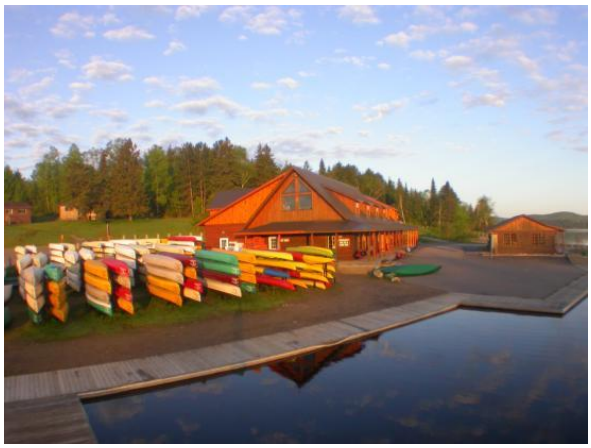
Opeongo Task 1

Here are two arrays:

```
int iceDays [] = {116, 129, 133, 120, 103, 119, 120, 125, 134, 111,
124, 126, 109, 109, 130, 116, 118, 100, 116, 119, 115, 119, 107, 106,
118, 122, 118, 129, 119, 118, 109, 127, 124, 106, 114, 116, 114, 113,
118, 109, 110, 118, 114, 95, 118, 87, 119, 125, 87, 119, 126, 120, 120,
114, 129, 129, 119, 99};
```

```
int years[] ={1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972,
1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996,
1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008,
2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020,
2021};
```

'iceDays' holds the number of days between Jan 1st and the ice off date. 'years' holds the corresponding year. In 1964, for example, there were 116 days between Jan 1st and the ice off date of April 27.



To Do:

Using the code in the int template to help,
http://www.gorskicompsci.ca/ICS4C/2_Arrays/intArrayFormula.java

1. Print out the iceDays array. Provide a title.
2. Find the average number of iceDays. Print it out with a prompt.
3. Find the minimum number of iceDays. Print it out with a prompt.
4. Find the maximum number of iceDays. Print it out with a prompt.

Opeongo Task 2

Using the same arrays from Task 2:

```
int iceDays [] = {116, 129, 133, 120, 103, 119, 120, 125, 134, 111,
124, 126, 109, 109, 130, 116, 118, 100, 116, 119, 115, 119, 107, 106,
118, 122, 118, 129, 119, 118, 109, 127, 124, 106, 114, 116, 114, 113,
118, 109, 110, 118, 114, 95, 118, 87, 119, 125, 87, 119, 126, 120, 120,
114, 129, 129, 119, 99};
```

```
int years[] ={1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972,
1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996,
1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008,
2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020,
2021};
```

'iceDays' holds the number of days between Jan 1st and the ice off date. 'years' holds the corresponding year. In 1964, for example, there were 116 days between Jan 1st and the ice off date of April 27.

To Do:

1. Print out a chart with the year, followed by it's iceDays array. Provide a title.
2. What year did the minimum number of iceDays occur? Print it out with a prompt.
3. What year did the maximum number of iceDays occur? Print it out with a prompt.
4. Print out the years that were under the average iceDays. Provide a title.
5. Print out the years that were over the average iceDays. Provide a title.

Opeongo Task 3

These arrays have been put in order by the iceDays:

```
int yrsIceOrder[]={2009, 2012, 2007, 2021, 1981, 1968, 1987, 1997,
1986, 1976, 1977, 1994, 2003, 2004, 1973, 2001, 1998, 2000, 2006, 2017,
1984, 1964, 1979, 1982, 1999, 1980, 1988, 1990, 1993, 2002, 2005, 2008,
1969, 1983, 1985, 1992, 2010, 2013, 2020, 1967, 1970, 2015, 2016, 1989,
1974, 1996, 1971, 2011, 1975, 2014, 1995, 1965, 1991, 2018, 2019, 1978,
1966, 1972};
```

```
int iceDaysOrder[]={87, 87, 95, 99, 100, 103, 106, 106, 107, 109, 109,
109, 109, 110, 111, 113, 114, 114, 114, 114, 115, 116, 116, 116, 116,
118, 118, 118, 118, 118, 118, 118, 119, 119, 119, 119, 119, 119, 119,
120, 120, 120, 120, 122, 124, 124, 125, 125, 126, 126, 127, 129, 129,
129, 129, 130, 133, 134};
```

To Do:

1. What year did the minimum number of iceDays occur? Print it out with a prompt.
   *This should not be coded the same way as Task 2. The arrays are sorted, use this information to help you find the minimum.
2. What year did the maximum number of iceDays occur? Print it out with a prompt.
   *This should not be coded the same way as Task 2. The arrays are sorted, use this information to help you find the maximum.
3. Print out the years that were under the average iceDays. Provide a title.
   *This should not be coded the same way as Task 2. The arrays are sorted, use this information to build a different for loop.
4. Find the median number of iceDays. Print out the corresponding year. Provide a title.
   *You do not need a loop to complete this.