Calculate:

1. \((\frac{2}{3} - 1\frac{2}{5}) ÷ (2\frac{1}{2} + \frac{8}{15})\)
   
   \[= \left(\frac{2}{3} - \frac{7}{5}\right) ÷ \left(\frac{5}{2} + \frac{8}{15}\right)\]
   
   \[= \left(\frac{10}{15} - \frac{21}{15}\right) ÷ \left(\frac{75}{30} + \frac{16}{30}\right)\]
   
   \[= \frac{11}{15} ÷ \frac{91}{30}\]
   
   \[= \frac{11}{15} \cdot \frac{30}{91}\]
   
   \[= \frac{-22}{91}\] or approximately \(-0.242\)

2. \(8 - 2\left[\left(\left(8 ÷ 4 \cdot 2\right)^2 + \left(1 + 5\right)^3\right) - \frac{4}{81}\right]\)
   
   \[= 8 - 2\left[\left(4^2 + 6^3\right) - 3\right]\]
   
   \[= 8 - 2\left[16 + 216\right] - 3\]
   
   \[= 8 - 2(229)\]
   
   \[= 8 - 458\]
   
   \[= -450\]

**Wisconsin Geography and Climate**


*Note: The following word problems might be solved through different methods. The solutions provided here are based on the methods taught in the course, MT 050. In particular, the percent proportion is used to solve the percent word problems. Other correct methods that lead to accurate answers will be accepted.*

3. Forty-three percent of Wisconsin’s 72 counties have more than 100 lakes. How many counties have more than 100 lakes?

   Let \(x\) = the number of counties with more than 100 lakes

   \[\frac{x}{72} = \frac{43}{100}, \text{ cross multiply, and } x = 31 \text{ counties with more than 100 lakes}\]

4. “Wisconsin has 15,057 lakes.” Six thousand, forty of these lakes are named. What percent of the total number of lakes are named?

   Let \(x\) = the percent of total lakes that are named

   \[\frac{6,040}{15,057} = \frac{x}{100}, \text{ Cross multiply and } x = 40\% \text{ of the total lakes that are named}\]

5. Two of the “high points” in Wisconsin elevation are Timms Hill with an elevation of 1,952 ft. and Holy Hill with an elevation of 1,332 ft. What is the percent decrease in elevation from Timms Hill to Holy Hill?

   Let \(x\) = the percent decrease in the elevation from Timms Hill to Holy Hill

   \[1952 – 1332 = 620, \text{ which is the actual decrease in feet from Timms Hill to Holy Hill}\]
Applying Mathematical Thinking
Solutions

\[ \frac{620}{1952} = \frac{x}{100}, \quad \text{cross multiply and } x = 31.8\%, \text{ the percent decrease in elevation} \]

6. The ratio of the surface area of Wisconsin lakes to the total land area of the state is \( \frac{3}{100} \).
   If the surface area of the lakes is 982,000 acres, what is the approximate land area of WI?
   Let \( x \) = the total land area in acres
   \[ \left( \frac{\text{surface}}{\text{total}} \right) \frac{3}{100} = \frac{982,000}{x}, \quad \text{cross multiply and } x = 32,733,333 \text{ acres of total land area} \]

7. Comparing the surface area of Lake Winnebago, the state’s largest lake to Green Lake, the state’s deepest lake, is 6 acres to 1 acre. If Lake Winnebago is about 138,000 acres, approximately how many acres is Green Lake?
   Let \( x \) = the approximate size in acres of Green Lake
   \[ \left( \frac{\text{Winnebago}}{\text{Green}} \right) \frac{6}{1} = \frac{138,000}{x}, \quad \text{cross multiply and } x = 23,000 \text{ acres} \]

8. Based on land area, the largest county in Wisconsin is Marathon with 988,744 acres; the smallest county is Ozaukee with 148,448. Ozaukee County is Marathon County?
   \[ 988,744 \div 148,448 = 6.7 \text{ times greater} \]

9. Vilas County has the largest number of lakes with 1,318. With an average size of 71.24 acres per lake, what is the total number of acres for all of the lakes in Vilas County?
   \[ 1318 \times 71.24 = 93,894.32 \text{ or just 93,894 acres} \]

The table below provides information on “high Points” in Wisconsin. Use the information to answer questions # 10,11, and 12.

<table>
<thead>
<tr>
<th>Site</th>
<th>County</th>
<th>Elevation in Feet</th>
<th>Change in elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rib Mountain</td>
<td>Marathon</td>
<td>1,924</td>
<td>XXXXXXXXXXXXXXXXXX</td>
</tr>
<tr>
<td>Holy Hill</td>
<td>Washington</td>
<td>1,332</td>
<td>-592</td>
</tr>
<tr>
<td>Mount Telemark</td>
<td>Bayfield</td>
<td>1,700</td>
<td>+368</td>
</tr>
<tr>
<td>Kettle Moraine</td>
<td>Jefferson</td>
<td>1,020</td>
<td>-680</td>
</tr>
<tr>
<td>Lapham Peak</td>
<td>Waukesha</td>
<td>1,230</td>
<td>+210</td>
</tr>
</tbody>
</table>

10. Complete the change in elevation (table) from one high point to another. Use a positive or a negative sign to indicate a rise or descent in the elevation from one hill to another.

   Practical observation of the direction taken when moving from one elevation to another can help in understanding whether to use a positive or a negative sign. For example, in moving from Rib Mtn. to Holy Hill, the elevation is going down. This loss in elevation indicates a negative sign so you need to set-up the subtraction to obtain a negative answer.

   \[ 1332 \- 1,942 = -592 \]
   \[ 1,700 \- 1,332 = +368 \]
   \[ 1,020 \- 1,700 = -680 \]
   \[ 1,230 \- 1,020 = +210 \]
11. What is the difference in the elevation change for Holy Hill and Kettle Moraine?
   \[-592 - (-680) = 88 \text{ ft}\]

12. What is the average elevation change for these Wisconsin High Points?
   \[\frac{-592 + 368 + (-680) + 210}{4} = -694 \div 4 = -173.5 \text{ ft}\]