

**Problems from class: January 20, 2023**

Check-In Problem: Find  $A \cup B$  and  $A \cap B$  for the following:  $A = \{1, 4, 5, 9, 13\}$ ,  $B = \{2, 5, 6, 8, 9\}$ .

**Solution** Union means that you create a new set that includes all of the elements that are in A, B, or both.

$$A \cup B = \{1, 2, 4, 5, 6, 8, 9, 13\}$$

Intersection means that you only take elements that are both in A **and** B.

$$A \cap B = \{5, 9\}$$

□

Challenge Problem: Find two sets,  $A$  and  $B$ , such that:  $A \cup B = \{1, 2, 3, 4, 5, 6, 8, 10, 12\}$  and  $A \cap B = \{2, 4, 6\}$ .

**Solution** There are many possible solutions to this problem. The easiest solution is:

$$A = \{1, 2, 3, 4, 5, 6, 8, 10, 12\}, B = \{2, 4, 6\}$$

□

Classwork Problems:

1.  $|29 - 9|$

**Solution**

$$\begin{aligned} |29 - 9| &= |20| \\ &= \boxed{20} \end{aligned}$$

□

2.  $|4 - 7|$

**Solution**

$$\begin{aligned} |4 - 7| &= |-3| \\ &= \boxed{3} \end{aligned}$$

□

3.  $4 - |15 - 12|$

**Solution**

$$\begin{aligned} 4 - |15 - 12| &= 4 - |3| \\ &= 4 - 3 \\ &= \boxed{1} \end{aligned}$$

4.  $-|-7 + 4| + 3$

**Solution**

$$\begin{aligned} -|-7 + 4| + 3 &= -|-3| + 3 \\ &= -3 + 3 \\ &= \boxed{0} \end{aligned}$$

5.  $-\frac{1}{3} \cdot \frac{-9}{5}$

**Solution**

$$\begin{aligned} -\frac{1}{3} \cdot \frac{-9}{5} &= \frac{-1 \cdot -9}{3 \cdot 5} \\ &= \frac{9}{15} \\ &= \frac{\cancel{3} \cdot 3}{\cancel{3} \cdot 5} \\ &= \boxed{\frac{3}{5}} \end{aligned}$$

6.  $\frac{1}{5} \cdot \frac{5}{3} \cdot \frac{7}{2}$

**Solution**

$$\begin{aligned} \frac{1}{5} \cdot \frac{5}{3} \cdot \frac{7}{2} &= \frac{1 \cdot \cancel{5} \cdot 7}{\cancel{5} \cdot 3 \cdot 2} \\ &= \boxed{\frac{7}{6}} \end{aligned}$$

7.  $\frac{4}{25} \div \frac{8}{25}$

**Solution**

$$\begin{aligned}\frac{4}{25} \div \frac{8}{25} &= \frac{4}{25} \cdot \frac{25}{8} \\ &= \frac{4 \cdot \cancel{25}}{\cancel{25} \cdot 8} \\ &= \frac{4}{8} \\ &= \frac{\cancel{4} \cdot 1}{\cancel{4} \cdot 2} \\ &= \boxed{\frac{1}{2}}\end{aligned}$$

□

8.  $\frac{-7}{24} \div \frac{3}{12}$

**Solution**

$$\begin{aligned}\frac{-7}{24} \div \frac{3}{12} &= \frac{-7}{24} \cdot \frac{12}{3} \\ &= \frac{-7 \cdot \cancel{3} \cdot 4}{24 \cdot \cancel{3}} \\ &= \frac{-7 \cdot 4}{24 \cdot 1} \\ &= \frac{-7 \cdot 4}{24 \cdot 1} \\ &= \frac{-28}{24} \\ &= \frac{\cancel{4} \cdot -7}{\cancel{4} \cdot 6} \\ &= \boxed{\frac{-7}{6}}\end{aligned}$$

□

9.  $\frac{1}{3} + \frac{1}{4}$

**Solution**

$$\begin{aligned}\frac{1}{3} + \frac{1}{4} &= \frac{1}{3} \cdot \frac{4}{4} + \frac{1}{4} \cdot \frac{3}{3} \\ &= \frac{4}{12} + \frac{3}{12} \\ &= \frac{4+3}{12} \\ &= \boxed{\frac{7}{12}}\end{aligned}$$

□

10.  $\frac{2}{5} - \frac{1}{2} + \frac{1}{3}$

**Solution**

$$\begin{aligned}\frac{2}{5} - \frac{1}{2} + \frac{1}{3} &= \frac{2}{5} \cdot \frac{6}{6} - \frac{1}{2} \cdot \frac{15}{15} + \frac{1}{3} \cdot \frac{10}{10} \\ &= \frac{12}{30} - \frac{15}{30} + \frac{10}{30} \\ &= \frac{12 - 15 + 10}{30} \\ &= \frac{-3 + 10}{30} \\ &= \boxed{\frac{7}{30}}\end{aligned}$$

□

11.  $\left(\frac{1}{3} + \frac{2}{5}\right) \div \frac{3}{2}$

**Solution**

$$\begin{aligned}\left(\frac{1}{3} + \frac{2}{5}\right) \div \frac{3}{2} &= \left(\frac{1}{3} \cdot \frac{5}{5} + \frac{2}{5} \cdot \frac{3}{3}\right) \div \frac{3}{2} \\ &= \left(\frac{5}{15} + \frac{6}{15}\right) \div \frac{3}{2} \\ &= \frac{11}{15} \div \frac{3}{2} \\ &= \frac{11}{15} \cdot \frac{2}{3} \\ &= \boxed{\frac{22}{45}}\end{aligned}$$

□

12.  $5 + (3 - 5) - (4 - 2) - (-5 - 3)$

**Solution**

$$\begin{aligned}5 + (3 - 5) - (4 - 2) - (-5 - 3) &= 5 + (-2) - (2) - (-8) \\ &= 5 - 2 - 2 + 8 \\ &= \boxed{9}\end{aligned}$$

□

$$13. 5 - \left(1 + \frac{1}{2}\right) + (3 - 4) - \left(7 - \frac{1}{2}\right)$$

**Solution**

$$\begin{aligned} 5 - \left(1 + \frac{1}{2}\right) + (3 - 4) - \left(7 - \frac{1}{2}\right) &= 5 - \left(\frac{1}{1} + \frac{1}{2}\right) + (3 - 4) - \left(\frac{7}{1} - \frac{1}{2}\right) \\ &= 5 - \left(\frac{1}{1} \cdot \frac{2}{2} + \frac{1}{2}\right) + (3 - 4) - \left(\frac{7}{1} \cdot \frac{2}{2} - \frac{1}{2}\right) \\ &= 5 - \left(\frac{2}{2} + \frac{1}{2}\right) + (-1) - \left(\frac{14}{2} - \frac{1}{2}\right) \\ &= 5 - \left(\frac{3}{2}\right) - 1 - \left(\frac{13}{2}\right) \\ &= \frac{5}{1} - \frac{3}{2} - \frac{1}{1} - \frac{13}{2} \\ &= \frac{5}{1} \cdot \frac{2}{2} - \frac{3}{2} - \frac{1}{1} \cdot \frac{2}{2} - \frac{13}{2} \\ &= \frac{10}{2} - \frac{3}{2} - \frac{2}{2} - \frac{13}{2} \\ &= \frac{10 - 3 - 2 - 13}{2} \\ &= \frac{-8}{2} \\ &= \boxed{-4} \end{aligned}$$

□