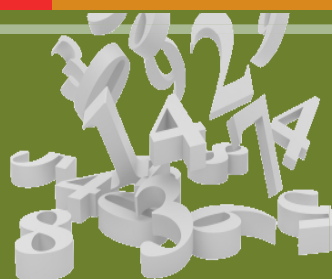


# NUMERACY:

## The Basics Workbook



### Set I: Operations with Mixed Fractions 3

Companion Workbook to Numeracy: The Basics Video Series

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## INTRODUCTION

### What is Numeracy: The Basics Workbook?

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This workbook is intended to accompany Workplace Education Manitoba's (WEM) Numeracy: The Basics Video Series, a set of 50 videos that explain essential numeracy concepts.

The refresher videos cover 25 critical numeracy topics, each broken into concept and practice.

The video series and accompanying downloadable workbooks can be found on the WEM website at [http://www.wem.mb.ca/learning\\_on\\_demand.aspx](http://www.wem.mb.ca/learning_on_demand.aspx)

These Numeracy: The Basics workbooks provide an opportunity for additional skill-building practice.

### Numeracy: The Basics topics are:

- Order of Operations 1
- Order of Operations 2
- Adding & Subtracting Fractions 1
- Adding & Subtracting Fractions 2
- Multiplying & Dividing Fractions
- Mixed & Improper Fractions
- Operations with Mixed Fractions 1
- Operations with Mixed Fractions 2
- Operations with Mixed Fractions 3
- Adding & Subtracting Decimals
- Multiplying Decimals
- Dividing Decimals
- Order of Operations & Decimals
- Decimals, Fractions & Percent 1
- Decimals, Fractions & Percent 2
- Imperial Conversions
- Metric Conversions
- Metric and Imperial Conversions
- Geometry 1 – Perimeter
- Geometry 2 – Area
- Geometry 3- Volume
- Solving Equations 1
- Solving Equations 2
- Ratio & Proportion
- Averages

**OPERATIONS WITH MIXED FRACTIONS 3**

This workbook contains five skill-building practice sections. Solutions can be found at the end of the workbook.

**Practice Section A**

Calculate the following. Express your answer as a mixed fraction in lowest terms.

1.  $1\frac{1}{2} + \frac{1}{4} \times \frac{1}{2} = \underline{\hspace{2cm}}$

2.  $\frac{1}{8} \div \frac{1}{2} + 2 = \underline{\hspace{2cm}}$

3.  $\frac{3}{4} \times 2\frac{1}{2} - 1\frac{1}{4} = \underline{\hspace{2cm}}$

4.  $3\frac{3}{8} - 1\frac{1}{2} \times 2\frac{1}{4} = \underline{\hspace{2cm}}$

5.  $2\frac{7}{8} + 1\frac{3}{8} \div 1\frac{1}{4} = \underline{\hspace{2cm}}$

6.  $2\frac{1}{8} + 1\frac{1}{4} \div 1\frac{1}{2} = \underline{\hspace{2cm}}$

7.  $2\frac{7}{8} \times 4\frac{1}{2} + 1\frac{3}{4} = \underline{\hspace{2cm}}$

8.  $2\frac{1}{8} \div 1\frac{1}{4} - \frac{3}{4} = \underline{\hspace{2cm}}$

9.  $2\frac{1}{4} \div 3\frac{1}{2} + 1\frac{3}{8} = \underline{\hspace{2cm}}$

10.  $5 + 1\frac{7}{16} \div 4\frac{1}{8} = \underline{\hspace{2cm}}$

11.  $2\frac{7}{8} \times 4\frac{1}{2} + 1\frac{3}{4} \div 1\frac{5}{8} = \underline{\hspace{2cm}}$



$$12. \quad 2\frac{9}{16} \div 4\frac{1}{4} \times 2\frac{3}{4} + 1\frac{3}{8} = \underline{\hspace{2cm}}$$

$$13. \quad 3\frac{7}{8} - 2\frac{9}{16} \times 2\frac{1}{2} \div 2\frac{3}{4} = \underline{\hspace{2cm}}$$

$$14. \quad 3\frac{11}{16} + 2\frac{1}{4} + 2\frac{1}{2} \times 5\frac{3}{8} = \underline{\hspace{2cm}}$$

$$15. \quad \left(3\frac{11}{16} + 2\frac{1}{4}\right) - \frac{1}{2} \times 5\frac{3}{8} = \underline{\hspace{2cm}}$$

### Practice Section B

Calculate the following. Express your answer as a mixed fraction in lowest terms.

$$1. \quad 3\frac{11}{16} + \left(2\frac{1}{4} - 2\frac{1}{2}\right) \times 5\frac{3}{8} = \underline{\hspace{2cm}}$$

$$2. \quad \left(2\frac{7}{8} + 1\frac{3}{8}\right) \div 1\frac{1}{4} + \frac{7}{8} = \underline{\hspace{2cm}}$$

$$3. \quad \left(3\frac{11}{16} + 2\frac{1}{4} - \frac{1}{2}\right) \div 5\frac{3}{8} = \underline{\hspace{2cm}}$$

$$4. \quad 3\frac{1}{4} + \left(2\frac{1}{4} + 2\frac{3}{8}\right) \times 1\frac{1}{2} = \underline{\hspace{2cm}}$$

$$5. \quad 1\frac{5}{8} \div 2\frac{1}{16} + 4\frac{1}{2} \times 2\frac{1}{4} = \underline{\hspace{2cm}}$$

$$6. \quad \left(2 \div 3\frac{1}{4} + 4\frac{1}{2}\right) \times 2\frac{1}{4} = \underline{\hspace{2cm}}$$

$$7. \quad \left(4 \div 2\frac{3}{8} + 1\frac{1}{4}\right) - 2\frac{1}{2} = \underline{\hspace{2cm}}$$



$$8. \quad 2\frac{9}{16} \div \left(4\frac{1}{4} \times 2\frac{3}{4} + 1\frac{3}{8}\right) = \underline{\hspace{2cm}}$$

$$9. \quad 3\frac{5}{8} + \left(2\frac{1}{4} - 2\frac{1}{2}\right) \div 5\frac{1}{4} = \underline{\hspace{2cm}}$$

$$10. \quad \left(2\frac{7}{8} - 1\frac{1}{4}\right) \div \frac{3}{16} \times 4\frac{22}{32} - 2\frac{1}{2} = \underline{\hspace{2cm}}$$

$$11. \quad \left(2\frac{1}{8} + 1\frac{3}{4}\right) \div \left(1\frac{1}{2} + \frac{7}{8}\right) = \underline{\hspace{2cm}}$$

$$12. \quad \left(3\frac{7}{8} - 2\frac{9}{16}\right) \times \left(2\frac{1}{2} \div 2\frac{3}{4}\right) = \underline{\hspace{2cm}}$$

$$13. \quad 4\frac{1}{8} - 1\frac{3}{4} \div \left(1\frac{1}{2} + \frac{7}{8} \times 2\frac{1}{4}\right) = \underline{\hspace{2cm}}$$

$$14. \quad \left(2\frac{7}{16} - 1\frac{3}{8}\right) \times \left(1\frac{1}{4} + \frac{21}{32}\right) \div 2\frac{1}{2} = \underline{\hspace{2cm}}$$

$$15. \quad \left(3\frac{11}{16} + 2\frac{1}{4}\right) - 2\frac{1}{2} \times 5\frac{3}{8} \div \left(1\frac{7}{8} - \frac{1}{2} \times 4\right) = \underline{\hspace{2cm}}$$

### Practice Section C

Calculate the following. Express your answer in lowest terms.

$$1. \quad \left(3\frac{3}{8} + 2\frac{11}{16} - 3\frac{1}{2}\right) \div 5\frac{3}{4} + \left(1\frac{7}{8} \div \frac{1}{2} + 4\right) = \underline{\hspace{2cm}}$$

$$2. \quad 1\frac{11}{32} - \left(3\frac{5}{16} - 3\frac{1}{2}\right) \div \left(5\frac{3}{4} + 1\frac{7}{8}\right) \times 6 + \frac{11}{16} = \underline{\hspace{2cm}}$$

$$3. \quad 4\frac{3}{16} \div 1\frac{22}{32} + 2\frac{1}{2} \times \left[\left(3\frac{11}{16} + 2\frac{1}{4}\right) \div 2\frac{1}{2} \times 5\frac{3}{8}\right] = \underline{\hspace{2cm}}$$



$$4. \quad \left(2\frac{7}{8} - 1\frac{1}{4}\right) \div \frac{3}{16} \times 4\frac{22}{32} - 2\frac{1}{2} \div \left(3\frac{11}{16} + 2\frac{1}{4} - 2\frac{1}{2} \times 5\frac{3}{8}\right) = \underline{\hspace{2cm}}$$

$$5. \quad 6 \times \left[4\frac{1}{8} - 1\frac{3}{4} \div \left(1\frac{1}{2} + \frac{7}{8} \times 2\frac{1}{4}\right)\right] \div \left[\left(3\frac{7}{8} - 2\frac{9}{16}\right) \times 2\frac{1}{2}\right] \times 2\frac{3}{4} = \underline{\hspace{2cm}}$$

### Practice Section D

In this section, solutions for the practice questions contain commonly-made errors. For each question, circle the error(s) and give a correct solution.

- Calculate the answer by performing the correct order of operations.  
Express your answer as a mixed fraction in lowest terms.

$$\begin{aligned} & 1\frac{11}{32} - \left(3\frac{5}{16} - 3\frac{1}{2}\right) \div \left(5\frac{3}{4} + 1\frac{7}{8}\right) \times 6 + \frac{11}{16} \\ &= \frac{32 \times 1 + 11}{32} - \left(\frac{16 \times 3 + 5}{16} - \frac{2 \times 3 + 1}{2}\right) \div \left(\frac{5 \times 4 + 3}{4} + \frac{8 \times 1 + 7}{8}\right) \times \frac{6}{1} + \frac{11}{16} \\ &= \frac{43}{32} - \left(\frac{53}{16} - \frac{7}{2}\right) \div \left(\frac{23}{4} + \frac{15}{8}\right) \times \frac{6}{1} + \frac{11}{16} \\ &= \frac{43}{32} - \left(\frac{53}{16} \left(\frac{2}{2}\right) - \frac{7}{2} \left(\frac{16}{16}\right)\right) \div \left(\frac{23}{4} \left(\frac{8}{8}\right) + \frac{15}{8} \left(\frac{4}{4}\right)\right) \times \frac{6}{1} \left(\frac{32}{32}\right) + \frac{11}{16} \left(\frac{2}{2}\right) \\ &= \frac{43}{32} - \left(\frac{106}{32} - \frac{112}{32}\right) \div \left(\frac{184}{32} + \frac{60}{32}\right) \times \frac{192}{32} + \frac{22}{32} \\ &= \frac{43}{32} - \left(-\frac{6}{32}\right) \div \frac{244}{32} \times \frac{192}{32} + \frac{22}{32} \\ &= \frac{43}{32} - \frac{6}{32} \times \frac{244}{32} \times \frac{192}{32} + \frac{22}{32} \\ &= \frac{37}{(8)\cancel{32}} \times \frac{(61)\cancel{244}}{32} \times \frac{(107)\cancel{214}}{(16)\cancel{32}} \\ &= \frac{37 \times 61 \times 107}{8 \times 32 \times 16} = \frac{241499}{4096} = 58\frac{3931}{4096} \end{aligned}$$

**Practice Section E**

Challenge Question. If you can do this one, then you get an A<sup>+</sup>. 😊

Calculate the answer by following the correct order of operations. Give your answer as a mixed fraction in lowest terms.

$$\left[ 1\frac{11}{32} - \left( \left( 3\frac{5}{16} - 3\frac{1}{2} \right) \div 4\frac{7}{8} \right) \right] \div \left[ \left( 3\frac{3}{8} - 2\frac{1}{2} \right) + \left( 5\frac{3}{4} + 1\frac{7}{8} \right) \times 6 \right] + \frac{11}{16}$$

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# SOLUTIONS

## Set I

### Operations with Mixed Fractions 3

**OPERATIONS WITH MIXED FRACTIONS 3****Practice Section A**

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1. Solution:

$$\begin{aligned} & 1\frac{1}{2} + \frac{1}{4} \times \frac{1}{2} \\ &= \frac{3}{2} + \frac{1}{4} \times \frac{1}{2} \\ &= \frac{3}{2} + \frac{1}{8} \\ &= \frac{3}{2} \left( \frac{4}{4} \right) + \frac{1}{8} \\ &= \frac{12}{8} + \frac{1}{8} \\ &= \frac{13}{8} = 1\frac{5}{8} \end{aligned}$$

2. Solution:

$$\begin{aligned} & \frac{1}{8} \div \frac{1}{2} + 2 \\ &= \frac{1}{8} \times \frac{2}{1} + 2 \\ &= \frac{2}{8} + 2 \\ &= 2\frac{2}{8} = 2\frac{1}{4} \end{aligned}$$

3. Solution:

$$\begin{aligned} & \frac{3}{4} \times 2\frac{1}{2} - 1\frac{1}{4} \\ &= \frac{3}{4} \times \frac{5}{2} - \frac{5}{4} \\ &= \frac{15}{8} - \frac{5}{4} \left( \frac{2}{2} \right) \\ &= \frac{15}{8} - \frac{10}{8} \\ &= \frac{5}{8} \end{aligned}$$

4. Solution:

$$\begin{aligned} & 3\frac{3}{8} - 1\frac{1}{2} \times 2\frac{1}{4} \\ &= \frac{27}{8} - \frac{3}{2} \times \frac{9}{4} \\ &= \frac{27}{8} - \frac{27}{8} \\ &= 0 \end{aligned}$$



5. Solution:

$$\begin{aligned} & 2\frac{7}{8} + 1\frac{3}{8} \div 1\frac{1}{4} \\ &= \frac{23}{8} + \frac{11}{8} \div \frac{5}{4} \\ &= \frac{23}{8} + \frac{11}{8} \times \frac{4}{5} \\ &= \frac{23}{8} \left(\frac{5}{5}\right) + \frac{44}{40} \\ &= \frac{159}{40} = 3\frac{39}{40} \end{aligned}$$

6. Solution:

$$\begin{aligned} & 2\frac{1}{8} + 1\frac{1}{4} \div 1\frac{1}{2} \\ &= \frac{17}{8} + \frac{5}{4} \div \frac{3}{2} \\ &= \frac{17}{8} + \frac{5}{4} \times \frac{2}{3} \\ &= \frac{17}{8} + \frac{10}{12} \\ &= \frac{17}{8} \left(\frac{12}{12}\right) + \frac{10}{12} \left(\frac{8}{8}\right) \\ &= \frac{204}{96} + \frac{80}{96} \\ &= \frac{284}{96} = 2\frac{92}{96} = 2\frac{23}{24} \end{aligned}$$

7. Solution:

$$\begin{aligned} & 2\frac{7}{8} \times 4\frac{1}{2} + 1\frac{3}{4} \\ &= 2\frac{7}{8} \times 4\frac{1}{2} + 1\frac{3}{4} \\ &= \frac{23}{8} \times \frac{9}{2} + \frac{7}{4} \\ &= \frac{207}{16} + \frac{7}{4} \left(\frac{4}{4}\right) \\ &= \frac{207}{16} + \frac{28}{16} \\ &= \frac{235}{16} = 14\frac{11}{16} \end{aligned}$$

8. Solution:

$$\begin{aligned} & 2\frac{1}{8} \div 1\frac{1}{4} - \frac{3}{4} \\ &= \frac{17}{8} \times \frac{4}{5} - \frac{3}{4} \\ &= \frac{68}{40} - \frac{3}{4} \left(\frac{10}{10}\right) \\ &= \frac{68-30}{40} \\ &= \frac{38}{40} = \frac{19}{20} \end{aligned}$$



9. Solution:

$$\begin{aligned} & 2\frac{1}{4} \div 3\frac{1}{2} + 1\frac{3}{8} \\ &= 2\frac{1}{4} \div 3\frac{1}{2} + 1\frac{3}{8} \\ &= \frac{9}{4} \div \frac{7}{2} + \frac{11}{8} \\ &= \frac{9}{4} \times \frac{2}{7} + \frac{11}{8} \\ &= \frac{9}{(2)\cancel{4}} \times \frac{(1)\cancel{2}}{7} + \frac{11}{8} \\ &= \frac{9}{14} \left( \frac{8}{8} \right) + \frac{11}{8} \left( \frac{14}{14} \right) \\ &= \frac{72 + 154}{112} \\ &= \frac{226}{112} = 2\frac{1}{56} \end{aligned}$$

10. Solution:

$$\begin{aligned} & 5 + 1\frac{7}{16} \div 4\frac{1}{8} \\ &= 5 + \frac{23}{16} \div \frac{33}{8} \\ &= 5 + \frac{23}{(2)\cancel{16}} \times \frac{(1)\cancel{8}}{33} \\ &= \frac{5}{1} \left( \frac{66}{66} \right) + \frac{23}{66} \\ &= \frac{330}{66} + \frac{23}{66} \\ &= \frac{353}{66} = 5\frac{23}{66} \end{aligned}$$

11. Solution:

$$\begin{aligned} & 2\frac{7}{8} \times 4\frac{1}{2} + 1\frac{3}{4} \div 1\frac{5}{8} \\ &= \frac{23}{8} \times \frac{9}{2} + \frac{7}{4} \div \frac{13}{8} \\ &= \frac{207}{16} + \frac{7}{4} \times \frac{8}{13} \\ &= \frac{207}{16} + \frac{7}{(1)\cancel{4}} \times \frac{(2)\cancel{8}}{13} \\ &= \frac{207}{16} + \frac{14}{13} \\ &= \frac{207}{16} \left( \frac{13}{13} \right) + \frac{14}{13} \left( \frac{16}{16} \right) \\ &= \frac{2691}{208} + \frac{224}{208} \\ &= \frac{2915}{208} = 14\frac{3}{208} \end{aligned}$$

12. Solution:

$$\begin{aligned} & 2\frac{9}{16} \div 4\frac{1}{4} \times 2\frac{3}{4} + 1\frac{3}{8} \\ &= \frac{41}{16} \div \frac{17}{4} \times \frac{11}{4} + \frac{11}{8} \\ &= \frac{41}{16} \times \frac{(1)\cancel{4}}{17} \times \frac{11}{(1)\cancel{4}} + \frac{11}{8} \\ &= \frac{451}{272} + \frac{11}{8} \left( \frac{34}{34} \right) \\ &= \frac{451 + 374}{272} = \frac{825}{272} = 3\frac{9}{272} \end{aligned}$$



13. Solution:

$$\begin{aligned} & 3\frac{7}{8} - 2\frac{9}{16} \times 2\frac{1}{2} \div 2\frac{3}{4} \\ &= \frac{31}{8} - \frac{41}{16} \times \frac{5}{2} \div \frac{11}{4} \\ &= \frac{31}{8} - \frac{205}{32} \div \frac{11}{4} \\ &= \frac{31}{8} - \frac{205}{32} \times \frac{4}{11} \\ &= \frac{31}{8} - \frac{205}{(8)\cancel{32}} \times \frac{(1)\cancel{4}}{11} \\ &= \frac{31}{8} - \frac{205}{88} \\ &= \frac{31}{8} \left( \frac{11}{11} \right) - \frac{205}{88} \\ &= \frac{341}{88} - \frac{205}{88} \\ &= \frac{136}{88} = 1\frac{48}{88} = 1\frac{6}{11} \end{aligned}$$

14. Solution:

$$\begin{aligned} & 3\frac{11}{16} + 2\frac{1}{4} + 2\frac{1}{2} \times 5\frac{3}{8} \\ &= \frac{59}{16} + \frac{9}{4} + \frac{5}{2} \times \frac{43}{8} \\ &= \frac{59}{16} + \frac{9}{4} \left( \frac{4}{4} \right) + \frac{215}{16} \\ &= \frac{59 + 36 + 215}{16} \\ &= \frac{310}{16} = 19\frac{3}{8} \end{aligned}$$

15. Solution:

$$\begin{aligned} & \left( 3\frac{11}{16} + 2\frac{1}{4} \right) - \frac{1}{2} \times 5\frac{3}{8} \\ &= \left( \frac{59}{16} + \frac{9}{4} \left( \frac{4}{4} \right) \right) - \frac{1}{2} \times \frac{43}{8} \\ &= \left( \frac{59}{16} + \frac{36}{16} \right) - \frac{43}{16} \\ &= \frac{59 + 36 - 43}{16} \\ &= \frac{52}{16} = 3\frac{1}{4} \end{aligned}$$

**Practice Section B****1.** Solution:

$$\begin{aligned} & 3\frac{11}{16} + \left(2\frac{1}{4} - 2\frac{1}{2}\right) \times 5\frac{3}{8} \\ &= \frac{59}{16} + \left(\frac{9}{4} - \frac{5\left(\frac{2}{2}\right)}{2}\right) \times \frac{43}{8} \\ &= \frac{59}{16} + \left(-\frac{1}{4}\right) \times \frac{43}{8} \\ &= \frac{59}{16} - \frac{43}{32} \\ &= \frac{59\left(\frac{2}{2}\right) - 43}{32} \\ &= \frac{118 - 43}{32} \\ &= \frac{75}{32} = 2\frac{11}{32} \end{aligned}$$

**2.** Solution:

$$\begin{aligned} & \left(2\frac{7}{8} + 1\frac{3}{8}\right) \div 1\frac{1}{4} + \frac{7}{8} \\ &= \left(\frac{23}{8} + \frac{11}{8}\right) \div \frac{5}{4} + \frac{7}{8} \\ &= \frac{34}{8} \times \frac{4}{5} + \frac{7}{8} \\ &= \frac{(17)\cancel{34}}{(1)(\cancel{2})\cancel{8}} \times \frac{(1)\cancel{4}}{5} + \frac{7}{8} \\ &= \frac{17\left(\frac{8}{8}\right) + 7\left(\frac{5}{5}\right)}{5} \\ &= \frac{136 + 35}{40} \\ &= \frac{171}{40} = 4\frac{11}{40} \end{aligned}$$

**3.** Solution:

$$\begin{aligned} & \left(3\frac{11}{16} + 2\frac{1}{4} - \frac{1}{2}\right) \div 5\frac{3}{8} \\ &= \left(\frac{59}{16} + \frac{9\left(\frac{4}{4}\right)}{4} - \frac{1\left(\frac{8}{8}\right)}{2}\right) \div \frac{43}{8} \\ &= \left(\frac{59 + 36 - 8}{16}\right) \times \frac{8}{43} \\ &= \frac{87}{16} \times \frac{(1)\cancel{8}}{43} \\ &= \frac{87}{16} = 1\frac{1}{16} \end{aligned}$$

**4.** Solution:

$$\begin{aligned} & 3\frac{1}{4} + \left(2\frac{1}{4} + 2\frac{3}{8}\right) \times 1\frac{1}{2} \\ &= \frac{13}{4} + \left(\frac{9\left(\frac{2}{2}\right) + 19}{8}\right) \times \frac{3}{2} \\ &= \frac{13}{4} + \left(\frac{18 + 19}{8}\right) \times \frac{3}{2} \\ &= \frac{13}{4} + \frac{37}{8} \times \frac{3}{2} \\ &= \frac{13\left(\frac{4}{4}\right) + \frac{111}{16}}{16} \\ &= \frac{52 + 111}{16} \\ &= \frac{163}{16} = 10\frac{3}{16} \end{aligned}$$



5. Solution:

$$\begin{aligned} & 1\frac{5}{8} \div 2\frac{1}{16} + 4\frac{1}{2} \times 2\frac{1}{4} \\ &= \frac{13}{8} \div \frac{33}{16} + \frac{9}{2} \times \frac{9}{4} \\ &= \frac{13}{8} \times \frac{16}{33} + \frac{9}{2} \times \frac{9}{4} \\ &= \frac{13}{(1)\cancel{8}} \times \frac{(2)\cancel{16}}{33} + \frac{81}{8} \\ &= \frac{26}{33} \left(\frac{8}{8}\right) + \frac{81}{8} \left(\frac{33}{33}\right) \\ &= \frac{208 + 2673}{264} \\ &= \frac{2881}{264} = 10\frac{241}{264} \end{aligned}$$

6. Solution:

$$\begin{aligned} & \left(2 \div 3\frac{1}{4} + 4\frac{1}{2}\right) \times 2\frac{1}{4} \\ &= \left(2 \div \frac{13}{4} + \frac{9}{2}\right) \times \frac{9}{4} \\ &= \left(\frac{2}{1} \times \frac{4}{13} + \frac{9}{2}\right) \times \frac{9}{4} \\ &= \left(\frac{8}{13} \left(\frac{2}{2}\right) + \frac{9}{2} \left(\frac{13}{13}\right)\right) \times \frac{9}{4} \\ &= \left(\frac{16}{26} + \frac{117}{26}\right) \times \frac{9}{4} \\ &= \frac{133}{26} \times \frac{9}{4} \\ &= \frac{1197}{104} = 11\frac{53}{104} \end{aligned}$$

7. Solution:

$$\begin{aligned} & \left(4 \div 2\frac{3}{8} + 1\frac{1}{4}\right) - 2\frac{1}{2} \\ &= \left(\frac{4}{1} \div \frac{19}{8} + \frac{5}{4}\right) - \frac{5}{2} \\ &= \left(\frac{4}{1} \times \frac{8}{19} + \frac{5}{4}\right) - \frac{5}{2} \\ &= \left(\frac{32}{19} \left(\frac{4}{4}\right) + \frac{5}{4} \left(\frac{19}{19}\right)\right) - \frac{5}{2} \\ &= \left(\frac{128}{76} + \frac{95}{76}\right) - \frac{5}{2} \left(\frac{38}{38}\right) \\ &= \frac{128 + 95 - 190}{76} \\ &= \frac{33}{76} \end{aligned}$$

8. Solution:

$$\begin{aligned} & 2\frac{9}{16} \div \left(4\frac{1}{4} \times 2\frac{3}{4} + 1\frac{3}{8}\right) \\ &= \frac{41}{16} \div \left(\frac{17}{4} \times \frac{11}{4} + \frac{11}{8}\right) \\ &= \frac{41}{16} \div \left(\frac{187}{16} + \frac{11}{8} \left(\frac{2}{2}\right)\right) \\ &= \frac{41}{16} \div \left(\frac{187}{16} + \frac{22}{16}\right) \\ &= \frac{41}{16} \div \frac{209}{16} \\ &= \frac{41}{(1)\cancel{16}} \times \frac{(1)\cancel{16}}{209} \\ &= \frac{41}{209} \end{aligned}$$



9

Solution:

$$\begin{aligned}
 & 3\frac{5}{8} + \left(2\frac{1}{4} - 2\frac{1}{2}\right) \div 5\frac{1}{4} \\
 &= \frac{29}{8} + \left(\frac{9}{4} - \frac{5\left(\frac{2}{2}\right)}{2}\right) \div \frac{21}{4} \\
 &= \frac{29}{8} + \left(\frac{9}{4} - \frac{10}{4}\right) \times \frac{4}{21} \\
 &= \frac{29}{8} + \left(-\frac{1}{(1)\cancel{4}}\right) \times \frac{(1)\cancel{4}}{21} \\
 &= \frac{29}{8} + \left(-\frac{1}{21}\right) \\
 &= \frac{29}{8} \left(\frac{21}{21}\right) - \frac{1}{21} \left(\frac{8}{8}\right) \\
 &= \frac{609}{168} - \frac{8}{168} \\
 &= \frac{601}{168} = 5\frac{97}{168}
 \end{aligned}$$

10.

Solution:

$$\begin{aligned}
 & \left(2\frac{7}{8} - 1\frac{1}{4}\right) \div \frac{3}{16} \times 4\frac{22}{32} - 2\frac{1}{2} \\
 &= \left(\frac{23}{8} - \frac{5\left(\frac{2}{2}\right)}{4}\right) \times \frac{16}{3} \times \frac{150}{32} - \frac{5}{2} \\
 &= \left(\frac{23}{8} - \frac{10}{8}\right) \times \frac{16}{3} \times \frac{150}{32} - \frac{5}{2} \\
 &= \frac{13}{8} \times \frac{16}{3} \times \frac{150}{32} - \frac{5}{2} \\
 &= \frac{31200}{768} - \frac{5\left(\frac{384}{384}\right)}{2} \\
 &= \frac{31200}{768} - \frac{1920}{768} \\
 &= \frac{29280}{768} = 38\frac{96}{768} = 38\frac{1}{8}
 \end{aligned}$$

11. Solution:

$$\begin{aligned}
 & \left(2\frac{1}{8} + 1\frac{3}{4}\right) \div \left(1\frac{1}{2} + \frac{7}{8}\right) \\
 &= \left(\frac{17}{8} + \frac{7}{4}\right) \div \left(\frac{3}{2} + \frac{7}{8}\right) \\
 &= \left(\frac{17}{8} + \frac{7\left(\frac{2}{2}\right)}{4}\right) \div \left(\frac{3\left(\frac{4}{4}\right)}{2} + \frac{7}{8}\right) \\
 &= \left(\frac{17}{8} + \frac{14}{8}\right) \div \left(\frac{12}{8} + \frac{7}{8}\right) \\
 &= \frac{31}{8} \div \frac{19}{8} \\
 &= \frac{31}{(1)\cancel{8}} \times \frac{(1)\cancel{8}}{19} \\
 &= \frac{31}{19} = 1\frac{12}{19}
 \end{aligned}$$

12.

Solution:

$$\begin{aligned}
 & \left(3\frac{7}{8} - 2\frac{9}{16}\right) \times \left(2\frac{1}{2} \div 2\frac{3}{4}\right) \\
 &= \left(\frac{31}{8} - \frac{41}{16}\right) \times \left(\frac{5}{2} \div \frac{11}{4}\right) \\
 &= \left(\frac{31\left(\frac{2}{2}\right) - 41}{16}\right) \times \left(\frac{5}{(1)\cancel{2}} \times \frac{(2)\cancel{4}}{11}\right) \\
 &= \left(\frac{62}{16} - \frac{41}{16}\right) \times \left(\frac{10}{11}\right) \\
 &= \frac{21}{(8)\cancel{16}} \times \frac{(5)\cancel{10}}{11} \\
 &= \frac{105}{88} = 1\frac{17}{88}
 \end{aligned}$$





13. Solution:

$$\begin{aligned} & 4\frac{1}{8} - 1\frac{3}{4} \div \left( 1\frac{1}{2} + \frac{7}{8} \times 2\frac{1}{4} \right) \\ &= \frac{33}{8} - \frac{7}{4} \div \left( \frac{3}{2} + \frac{7}{8} \times \frac{9}{4} \right) \\ &= \frac{33}{8} - \frac{7}{4} \div \left( \frac{3}{2} + \frac{63}{32} \right) \\ &= \frac{33}{8} - \frac{7}{4} \div \left( \frac{3}{2} \left( \frac{16}{16} \right) + \frac{63}{32} \right) \\ &= \frac{33}{8} - \frac{7}{4} \div \left( \frac{48}{32} + \frac{63}{32} \right) \\ &= \frac{33}{8} - \frac{7}{4} \div \left( \frac{111}{32} \right) \\ &= \frac{33}{8} - \frac{7}{(1)\cancel{4}} \times \frac{(8)\cancel{32}}{111} \\ &= \frac{33}{8} \left( \frac{111}{111} \right) - \frac{56}{111} \left( \frac{8}{8} \right) \\ &= \frac{3663}{888} - \frac{448}{888} \\ &= \frac{3215}{888} = 3\frac{551}{888} \end{aligned}$$

14. Solution:

$$\begin{aligned} & \left( 2\frac{7}{16} - 1\frac{3}{8} \right) \times \left( 1\frac{1}{4} + \frac{21}{32} \right) \div 2\frac{1}{2} \\ &= \left( \frac{39}{16} - \frac{11}{8} \right) \times \left( \frac{5}{4} + \frac{21}{32} \right) \div \frac{5}{2} \\ &= \left( \frac{39}{16} - \frac{11}{8} \left( \frac{2}{2} \right) \right) \times \left( \frac{5}{4} \left( \frac{8}{8} \right) + \frac{21}{32} \right) \div \frac{5}{2} \\ &= \left( \frac{39}{16} - \frac{22}{16} \right) \times \left( \frac{40}{32} + \frac{21}{32} \right) \times \frac{2}{5} \\ &= \frac{17}{16} \times \frac{61}{32} \times \frac{2}{5} \\ &= \frac{2074}{2560} \\ &= \frac{1037}{1280} \end{aligned}$$



15. Solution:

$$\begin{aligned} & \left( 3\frac{11}{16} + 2\frac{1}{4} \right) - 2\frac{1}{2} \times 5\frac{3}{8} \div \left( 1\frac{7}{8} - \frac{1}{2} \times 4 \right) \\ &= \left( \frac{59}{16} + \frac{9}{4} \right) - \frac{5}{2} \times \frac{43}{8} \div \left( \frac{15}{8} - \frac{1}{2} \times \frac{4}{1} \right) \\ &= \left( \frac{59}{16} + \frac{9\left(\frac{4}{4}\right)}{4\left(\frac{4}{4}\right)} \right) - \frac{5}{2} \times \frac{43}{8} \div \left( \frac{15}{8} - \frac{4}{2} \right) \\ &= \left( \frac{59}{16} + \frac{36}{16} \right) - \frac{5}{2} \times \frac{43}{8} \div \left( \frac{15}{8} - \frac{4\left(\frac{4}{4}\right)}{2\left(\frac{4}{4}\right)} \right) \\ &= \frac{95}{16} - \frac{215}{16} \div \left( \frac{15}{8} - \frac{16}{8} \right) \\ &= \frac{95}{16} - \frac{215}{16} \div \left( -\frac{1}{8} \right) \\ &= \frac{95}{16} - \frac{215}{16} \times \left( -\frac{8}{1} \right) \\ &= \frac{95}{16} - \frac{215}{\cancel{(2)16}} \times \left( -\frac{\cancel{(1)8}}{1} \right) \\ &= \frac{95}{16} + \frac{215}{2} \\ &= \frac{95}{16} + \frac{215\left(\frac{8}{8}\right)}{2\left(\frac{8}{8}\right)} \\ &= \frac{95}{16} + \frac{1720}{16} \\ &= \frac{1815}{16} = 113\frac{7}{16} \end{aligned}$$

**Practice Section C****1. Solution:**

$$\begin{aligned}
& \left( 3\frac{3}{8} + 2\frac{11}{16} - 3\frac{1}{2} \right) \div 5\frac{3}{4} + \left( 1\frac{7}{8} \div \frac{1}{2} + 4 \right) \\
&= \left( \frac{27}{8} + \frac{43}{16} - \frac{7}{2} \right) \div \frac{23}{4} + \left( \frac{15}{8} \div \frac{1}{2} + \frac{4}{1} \right) \\
&= \left( \frac{27}{8} \left( \frac{2}{2} \right) + \frac{43}{16} - \frac{7}{2} \left( \frac{8}{8} \right) \right) \div \frac{23}{4} + \left( \frac{15}{8} \times \frac{2}{1} + \frac{4}{1} \right) \\
&= \left( \frac{54}{16} + \frac{43}{16} - \frac{56}{16} \right) \times \frac{4}{23} + \left( \frac{15}{(4)\cancel{8}} \times \frac{(1)\cancel{2}}{1} + \frac{4}{1} \right) \\
&= \frac{41}{16} \times \frac{4}{23} + \left( \frac{15}{4} + \frac{4}{1} \left( \frac{4}{4} \right) \right) \\
&= \frac{41}{(4)\cancel{16}} \times \frac{(1)\cancel{4}}{23} + \left( \frac{15}{4} + \frac{16}{4} \right) \\
&= \frac{41}{92} + \frac{31}{4} \left( \frac{23}{23} \right) \\
&= \frac{41}{92} + \frac{713}{92} \\
&= \frac{754}{92} = 8\frac{18}{92} = 8\frac{9}{46}
\end{aligned}$$

**2. Solution:**

$$\begin{aligned}
& 1\frac{11}{32} - \left( 3\frac{5}{16} - 3\frac{1}{2} \right) \div \left( 5\frac{3}{4} + 1\frac{7}{8} \right) \times 6 + \frac{11}{16} \\
&= \frac{43}{32} - \left( \frac{53}{16} - \frac{7}{2} \left( \frac{8}{8} \right) \right) \div \left( \frac{23}{4} \left( \frac{2}{2} \right) + \frac{15}{8} \right) \times \frac{6}{1} + \frac{11}{16} \\
&= \frac{43}{32} - \left( \frac{53}{16} - \frac{56}{16} \right) \div \left( \frac{46}{8} + \frac{15}{8} \right) \times \frac{6}{1} + \frac{11}{16} \\
&= \frac{43}{32} - \left( -\frac{3}{16} \right) \div \frac{61}{8} \times \frac{6}{1} + \frac{11}{16} \\
&= \frac{43}{32} + \frac{3}{16} \times \frac{8}{61} \times \frac{6}{1} + \frac{11}{16} \\
&= \frac{43}{32} + \frac{3}{(1)(2)\cancel{16}} \times \frac{(1)\cancel{8}}{61} \times \frac{(3)\cancel{6}}{1} + \frac{11}{16} \\
&= \frac{43}{32} + \frac{9}{61} + \frac{11}{16} \\
&= \frac{43}{32} \left( \frac{61}{61} \right) + \frac{9}{61} \left( \frac{32}{32} \right) + \frac{11}{16} \left( \frac{122}{122} \right) \\
&= \frac{2623}{1952} + \frac{288}{1952} + \frac{1342}{1952} \\
&= \frac{4253}{1952} = 2\frac{349}{1952}
\end{aligned}$$



3. Solution:

$$\begin{aligned} & 4\frac{3}{16} \div 1\frac{22}{32} + 2\frac{1}{2} \times \left[ \left( 3\frac{11}{16} + 2\frac{1}{4} \right) \div 2\frac{1}{2} \times 5\frac{3}{8} \right] \\ &= \frac{67}{16} \div \frac{54}{32} + \frac{5}{2} \times \left[ \left( \frac{59}{16} + \frac{9}{4} \right) \div \frac{5}{2} \times \frac{43}{8} \right] \\ &= \frac{67}{(1)\cancel{16}} \times \frac{(2)\cancel{32}}{54} + \frac{5}{2} \times \left[ \left( \frac{59}{16} + \frac{9(4)}{4(4)} \right) \times \frac{2}{5} \times \frac{43}{8} \right] \\ &= \frac{134}{54} + \frac{5}{2} \times \left[ \left( \frac{59}{16} + \frac{36}{16} \right) \times \frac{(1)\cancel{2}}{5} \times \frac{43}{(4)\cancel{8}} \right] \\ &= \frac{134}{54} + \frac{5}{2} \times \frac{(19)\cancel{95}}{16} \times \frac{43}{(4)\cancel{20}} \\ &= \frac{134}{54} + \frac{5 \times 19 \times 43}{2 \times 16 \times 4} \\ &= \frac{134}{54} + \frac{4085}{128} \\ &= \frac{134}{54} \left( \frac{128}{128} \right) + \frac{4085}{128} \left( \frac{54}{54} \right) \\ &= \frac{17152}{6912} + \frac{220590}{6912} \\ &= \frac{237742}{6912} = 34\frac{2734}{6912} = 34\frac{1367}{3456} \end{aligned}$$



4. Solution:

$$\begin{aligned} & \left(2\frac{7}{8} - 1\frac{1}{4}\right) \div \frac{3}{16} \times 4\frac{22}{32} - 2\frac{1}{2} \div \left(3\frac{11}{16} + 2\frac{1}{4} - 2\frac{1}{2} \times 5\frac{3}{8}\right) \\ &= \left(\frac{23}{8} - \frac{5}{4}\right) \times \frac{16}{3} \times \frac{150}{32} - \frac{5}{2} \div \left(\frac{59}{16} + \frac{9}{4} - \frac{5}{2} \times \frac{43}{8}\right) \\ &= \left(\frac{23}{8} - \frac{5}{4}\left(\frac{2}{2}\right)\right) \times \frac{(1)\cancel{16}}{(1)\cancel{2}} \times \frac{(25)\cancel{(50)}\cancel{150}}{(1)\cancel{(2)}\cancel{32}} - \frac{5}{2} \div \left(\frac{59}{16} + \frac{9}{4}\left(\frac{4}{4}\right) - \frac{215}{16}\right) \\ &= \left(\frac{23}{8} - \frac{10}{8}\right) \times \frac{25}{1} - \frac{5}{2} \div \left(\frac{59}{16} + \frac{36}{16} - \frac{215}{16}\right) \\ &= \frac{13}{8} \times \frac{25}{1} - \frac{5}{2} \div \left(-\frac{120}{16}\right) \\ &= \frac{13}{8} \times \frac{25}{1} - \frac{(1)\cancel{5}}{(1)\cancel{2}} \times \left(-\frac{(1)\cancel{(8)}\cancel{16}}{(3)\cancel{(24)}\cancel{120}}\right) \\ &= \frac{13}{8} \times \frac{25}{1} - \frac{1}{1} \times \left(-\frac{1}{3}\right) \\ &= \frac{13}{8} \times \frac{25}{1} + \frac{1}{3} \\ &= \frac{325}{8} \left(\frac{3}{3}\right) + \frac{1}{3} \left(\frac{8}{8}\right) \\ &= \frac{983}{24} = 40\frac{23}{24} \end{aligned}$$



5. Solution:

$$\begin{aligned}
 & 6 \times \left[ 4\frac{1}{8} - 1\frac{3}{4} \div \left( 1\frac{1}{2} + \frac{7}{8} \times 2\frac{1}{4} \right) \right] \div \left[ \left( 3\frac{7}{8} - 2\frac{9}{16} \right) \times 2\frac{1}{2} \right] \times 2\frac{3}{4} \\
 &= 6 \times \left[ \frac{33}{8} - \frac{7}{4} \div \left( \frac{3}{2} + \frac{7}{8} \times \frac{9}{4} \right) \right] \div \left[ \left( \frac{31}{8} - \frac{41}{16} \right) \times \frac{5}{2} \right] \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{33}{8} - \frac{7}{4} \div \left( \frac{3}{2} \left( \frac{16}{16} \right) + \frac{63}{32} \right) \right] \div \left[ \left( \frac{31}{8} \left( \frac{2}{2} \right) - \frac{41}{16} \right) \times \frac{5}{2} \right] \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{33}{8} - \frac{7}{4} \div \left( \frac{48+63}{32} \right) \right] \div \left[ \left( \frac{62-41}{16} \right) \times \frac{5}{2} \right] \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{33}{8} - \frac{7}{4} \div \frac{111}{32} \right] \div \left[ \frac{21}{16} \times \frac{5}{2} \right] \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{33}{8} - \frac{7}{(1)\cancel{4}} \times \frac{(8)\cancel{32}}{111} \right] \div \left[ \frac{21}{16} \times \frac{5}{2} \right] \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{33}{8} \left( \frac{111}{111} \right) - \frac{56}{111} \left( \frac{8}{8} \right) \right] \div \frac{105}{32} \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{3663-448}{888} \right] \times \frac{32}{105} \times \frac{11}{4} \\
 &= 6 \times \left[ \frac{3215}{888} \right] \times \frac{(8)\cancel{32}}{105} \times \frac{11}{(1)\cancel{4}} \\
 &= 6 \times \frac{3215}{888} \times \frac{88}{105} \\
 &= \frac{6}{1} \times \frac{(643)\cancel{3215}}{888} \times \frac{88}{(21)\cancel{105}} \\
 &= \frac{339504}{18648} = 18\frac{3840}{18648} = 18\frac{160}{177}
 \end{aligned}$$

**Practice Section D****1. Solution:**

There are two errors in line 7 and one error in line 8.

There is a double negative that is mis-calculated:  $\frac{43}{32} - \frac{6}{32}$  instead of  $\frac{43}{32} + \frac{6}{32}$ , and the  $\div \frac{244}{32}$  is

changed to  $\times \frac{244}{32}$  when it should be  $\times \frac{32}{244}$ . The final error is that the incorrect order of

operations is followed in line 8 because the subtraction  $\frac{43}{32} - \frac{6}{32}$  is done before the  $\frac{6}{32} \times \frac{32}{244}$ .

The rest of the question is correct.

The correct solution is:

$$\begin{aligned}
 & 1\frac{11}{32} - \left(3\frac{5}{16} - 3\frac{1}{2}\right) \div \left(5\frac{3}{4} + 1\frac{7}{8}\right) \times 6 + \frac{11}{16} \\
 &= \frac{32 \times 1 + 11}{32} - \left(\frac{16 \times 3 + 5}{16} - \frac{2 \times 3 + 1}{2}\right) \div \left(\frac{5 \times 4 + 3}{4} + \frac{8 \times 1 + 7}{8}\right) \times \frac{6}{1} + \frac{11}{16} \\
 &= \frac{43}{32} - \left(\frac{53}{16} - \frac{7}{2}\right) \div \left(\frac{23}{4} + \frac{15}{8}\right) \times \frac{6}{1} + \frac{11}{16} \\
 &= \frac{43}{32} - \left(\frac{53\left(\frac{2}{2}\right) - 7\left(\frac{16}{16}\right)}{\frac{16}{2}}\right) \div \left(\frac{23\left(\frac{8}{8}\right) + 15\left(\frac{4}{4}\right)}{\frac{8}{4}}\right) \times \frac{6\left(\frac{32}{32}\right)}{1} + \frac{11\left(\frac{2}{2}\right)}{16} \\
 &= \frac{43}{32} - \left(\frac{106}{32} - \frac{112}{32}\right) \div \left(\frac{184}{32} + \frac{60}{32}\right) \times \frac{192}{32} + \frac{22}{32} \\
 &= \frac{43}{32} - \left(-\frac{6}{32}\right) \div \frac{244}{32} \times \frac{192}{32} + \frac{22}{32} \\
 &= \frac{43}{32} + \frac{6}{32} \times \frac{32}{244} \times \frac{192}{32} + \frac{22}{32} \\
 &= \frac{43}{32} + \left(\frac{(3)\cancel{6}}{(1)\cancel{32}} \times \frac{(1)\cancel{32}}{(61)\cancel{244}} \times \frac{(3)(\cancel{48})\cancel{192}}{(1)(\cancel{16})\cancel{32}}\right) + \frac{22}{32} \\
 &= \frac{43}{32} \left(\frac{61}{61}\right) + \frac{9}{61} \left(\frac{32}{32}\right) + \frac{22}{32} \left(\frac{61}{61}\right) \\
 &= \frac{2623}{1952} + \frac{288}{1952} + \frac{1342}{1952} \\
 &= \frac{4253}{1952} = 2\frac{349}{1952}
 \end{aligned}$$

**Practice Section E**

Solution:

$$\begin{aligned}
& \left[ 1\frac{11}{32} - \left( \left( 3\frac{5}{16} - 3\frac{1}{2} \right) \div 4\frac{7}{8} \right) \right] \div \left[ \left( 3\frac{3}{8} - 2\frac{1}{2} \right) + \left( 5\frac{3}{4} + 1\frac{7}{8} \right) \times 6 \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} - \left( \left( \frac{53}{16} - \frac{56}{16} \right) \div \frac{39}{8} \right) \right] \div \left[ \left( \frac{27}{8} - \frac{20}{8} \right) + \left( \frac{46}{8} + \frac{15}{8} \right) \times 6 \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} - \left( -\frac{3}{16} \times \frac{8}{39} \right) \right] \div \left[ \frac{7}{8} + \frac{61}{8} \times \frac{6}{1} \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} - \left( -\frac{(1)\cancel{3}}{(2)\cancel{16}} \times \frac{(1)\cancel{8}}{(13)\cancel{39}} \right) \right] \div \left[ \frac{7}{8} + \frac{61}{(4)\cancel{8}} \times \frac{(3)\cancel{6}}{1} \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} - \left( -\frac{1}{26} \right) \right] \div \left[ \frac{7}{8} + \frac{183}{4} \left( \frac{2}{2} \right) \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} + \frac{1}{26} \right] \div \left[ \frac{7}{8} + \frac{366}{8} \right] + \frac{11}{16} \\
&= \left[ \frac{43}{32} \left( \frac{26}{26} \right) + \frac{1}{26} \left( \frac{32}{32} \right) \right] \div \left[ \frac{373}{8} \right] + \frac{11}{16} \\
&= \left[ \frac{1118}{832} + \frac{32}{832} \right] \times \frac{8}{373} + \frac{11}{16} \\
&= \frac{1150}{832} \times \frac{8}{373} + \frac{11}{16} \\
&= \frac{(575)\cancel{1150}}{(52)(416)\cancel{832}} \times \frac{(1)\cancel{8}}{373} + \frac{11}{16} \\
&= \frac{575}{19396} \left( \frac{16}{16} \right) + \frac{11}{16} \left( \frac{19396}{19396} \right) \\
&= \frac{9200}{310336} + \frac{213356}{310336} \\
&= \frac{222556}{310336} = \frac{111278}{155168} = \frac{55639}{77584}
\end{aligned}$$