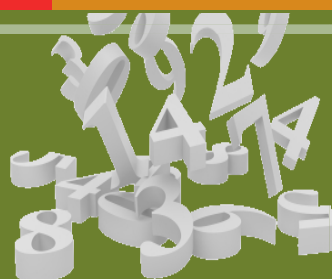


# NUMERACY:

## The Basics Workbook



### Set H: Operations with Mixed Fractions 2

Companion Workbook to Numeracy: The Basics Video Series

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For more information,  
visit [www.wem.mb.ca](http://www.wem.mb.ca)  
or contact the Project Coordinator  
Lindsay Laidlaw at [info@wem.mb.ca](mailto:info@wem.mb.ca)

Workplace Education Manitoba  
1000 Waverley Street  
Winnipeg, MB, R3T 0P3

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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 2

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

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

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

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

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

6.  $1\frac{1}{2} \times 1\frac{3}{4} = \underline{\hspace{2cm}}$

7.  $2\frac{1}{8} \div 1\frac{7}{8} = \underline{\hspace{2cm}}$

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

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

10.  $1\frac{1}{4} \times 6 = \underline{\hspace{2cm}}$

11.  $1\frac{1}{4} \div 8 = \underline{\hspace{2cm}}$



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

13.  $2 \div 1\frac{3}{4} = \underline{\hspace{2cm}}$

14.  $3 \times 1\frac{3}{8} = \underline{\hspace{2cm}}$

15.  $2 \div 1\frac{1}{4} \times 1\frac{7}{16} = \underline{\hspace{2cm}}$

**Practice Section B**

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

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

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

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

4.  $4\frac{13}{16} \times 3\frac{1}{4} = \underline{\hspace{2cm}}$

5.  $4\frac{1}{8} \div 1\frac{3}{16} = \underline{\hspace{2cm}}$

6.  $4\frac{1}{2} \times 1\frac{7}{8} = \underline{\hspace{2cm}}$

7.  $3\frac{5}{16} \times 2\frac{3}{8} = \underline{\hspace{2cm}}$

8.  $5\frac{3}{4} \div 2\frac{9}{16} = \underline{\hspace{2cm}}$



9.  $4\frac{3}{4} \div 3\frac{7}{8} = \underline{\hspace{2cm}}$

10.  $5\frac{11}{16} \div 2\frac{27}{32} = \underline{\hspace{2cm}}$

11.  $2\frac{1}{8} \div \frac{11}{16} \times 3 = \underline{\hspace{2cm}}$

12.  $2\frac{3}{4} \times 2\frac{7}{16} \div 4\frac{3}{8} = \underline{\hspace{2cm}}$

13.  $3\frac{7}{8} \div 1\frac{5}{16} \div 4\frac{1}{2} = \underline{\hspace{2cm}}$

14.  $4 \times 4\frac{1}{4} \div 3\frac{1}{16} = \underline{\hspace{2cm}}$

15.  $6\frac{3}{32} \div \left(4\frac{7}{8} \div 2\frac{1}{4}\right) = \underline{\hspace{2cm}}$

**Practice Section C**

Calculate the following. Express your answer in lowest terms.

1.  $12 \div 2\frac{1}{4} \times 2\frac{3}{8} \div 4\frac{11}{16} \div 2 = \underline{\hspace{2cm}}$

2.  $2\frac{3}{4} \times 1\frac{11}{16} \div 2\frac{17}{32} \times 1\frac{7}{8} \div 2 \div 1\frac{3}{4} = \underline{\hspace{2cm}}$

3.  $6\frac{3}{32} \div 4\frac{7}{8} \div 2\frac{1}{4} \div 2\frac{1}{4} \div 4\frac{1}{2} \times 32 = \underline{\hspace{2cm}}$

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

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

**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.

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

Solution:

$$\begin{aligned}
 & 5 \times 2 \frac{5}{8} \div 3 \frac{3}{4} \div 1 \frac{11}{16} \times \frac{7}{2} \\
 &= 5 \times 2 \frac{5}{8} \times 3 \frac{4}{3} \times 1 \frac{16}{11} \times \frac{7}{2} \\
 &= \frac{5}{1} \times \frac{8 \times 2 + 5}{8} \times \frac{3 \times 3 + 4}{3} \times \frac{11 \times 1 + 16}{11} \times \frac{7}{2} \\
 &= \frac{5}{1} \times \frac{21}{8} \times \frac{13}{3} \times \frac{27}{11} \times \frac{7}{2} \\
 &= \frac{5}{1} \times \frac{3 \cancel{(6)} 21}{8} \times \frac{13}{\cancel{(1)} 3} \times \frac{27}{11} \times \frac{7}{\cancel{(1)} 2} \\
 &= \frac{5 \times 3 \times 13 \times 27 \times 7}{8 \times 11} \\
 &= \frac{36855}{88}
 \end{aligned}$$

2. Alex says that  $\left[ 3 \frac{1}{2} \div 6 \times \left( \frac{7}{8} \times 1 \frac{3}{4} \right) \div \frac{7}{16} \right] - \left[ 6 \times \left( 1 \frac{3}{4} \div \frac{7}{8} \right) \times \frac{1}{4} \right] = 3$ .

Donna says that Alex must be wrong because she already calculated that  $6 \times \left( 1 \frac{3}{4} \div \frac{7}{8} \right) \times \frac{1}{4} = 3$ .

Who is correct? Prove your answer with calculations.

**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.

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

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# SOLUTIONS

## Set H

### Operations with Mixed Fractions 2

**OPERATIONS WITH MIXED FRACTIONS 2****Practice Section A**

1. Solution:

$$\begin{aligned}1\frac{1}{2} \times \frac{1}{2} \\&= \frac{2 \times 1 + 1}{2} \times \frac{1}{2} \\&= \frac{3}{2} \times \frac{1}{2} \\&= \frac{3}{4}\end{aligned}$$

2. Solution:

$$\begin{aligned}1\frac{1}{8} \div \frac{1}{2} \\&= \frac{8 \times 1 + 1}{8} \times \frac{2}{1} \\&= \frac{9}{8} \times \frac{2}{1} \\&= \frac{18}{8} \\&= \frac{9}{4} = 2\frac{1}{4}\end{aligned}$$

3. Solution:

$$\begin{aligned}2\frac{1}{2} \times \frac{7}{8} \\&= \frac{2 \times 2 + 1}{2} \times \frac{7}{8} \\&= \frac{5}{2} \times \frac{7}{8} \\&= \frac{35}{16} = 2\frac{3}{16}\end{aligned}$$

4. Solution:

$$\begin{aligned}1\frac{5}{8} \div \frac{5}{8} \\&= \frac{8 \times 1 + 5}{8} \times \frac{8}{5} \\&= \frac{13}{\cancel{8}} \times \frac{\cancel{8}}{5} \\&= \frac{13}{5} = 2\frac{3}{5}\end{aligned}$$

5. Solution:

$$\begin{aligned}1\frac{1}{4} \times 2\frac{3}{8} \\&= \frac{4 \times 1 + 1}{4} \times \frac{8 \times 2 + 3}{8} \\&= \frac{5}{4} \times \frac{19}{8} \\&= \frac{95}{32} = 2\frac{31}{32}\end{aligned}$$

6. Solution:

$$\begin{aligned}1\frac{1}{2} \times 1\frac{3}{4} \\&= \frac{2 \times 1 + 1}{2} \times \frac{4 \times 1 + 3}{4} \\&= \frac{3}{2} \times \frac{7}{4} \\&= \frac{21}{8} = 2\frac{5}{8}\end{aligned}$$



7. Solution:

$$\begin{aligned}2\frac{1}{8} \div 1\frac{7}{8} &= \frac{8 \times 2 + 1}{8} \times \frac{8}{8 \times 1 + 7} \\&= \frac{17}{8} \times \frac{8}{15} \\&= \frac{17}{(1)\cancel{8}} \times \frac{(1)\cancel{8}}{15} \\&= \frac{17}{15} = 1\frac{2}{15}\end{aligned}$$

8. Solution:

$$\begin{aligned}2\frac{3}{8} \times 3\frac{1}{2} &= \frac{8 \times 2 + 3}{8} \times \frac{2 \times 3 + 1}{2} \\&= \frac{19}{8} \times \frac{7}{2} \\&= \frac{133}{16} = 8\frac{5}{16}\end{aligned}$$

9. Solution:

$$\begin{aligned}2\frac{1}{4} \div 3\frac{1}{2} &= \frac{4 \times 2 + 1}{4} \times \frac{2}{2 \times 3 + 1} \\&= \frac{9}{4} \times \frac{2}{7} \\&= \frac{9}{(2)\cancel{4}} \times \frac{(1)\cancel{2}}{7} \\&= \frac{9}{14}\end{aligned}$$

10. Solution:

$$\begin{aligned}1\frac{1}{4} \times 6 &= \frac{4 \times 1 + 1}{4} \times \frac{6}{1} \\&= \frac{5}{(2)\cancel{4}} \times \frac{(3)\cancel{6}}{1} \\&= \frac{15}{2} = 7\frac{1}{2}\end{aligned}$$

11. Solution:

$$\begin{aligned}1\frac{1}{4} \div 8 &= \frac{4 \times 1 + 1}{4} \div \frac{8}{1} \\&= \frac{5}{4} \times \frac{1}{8} \\&= \frac{5}{32}\end{aligned}$$

12. Solution:

$$\begin{aligned}1\frac{3}{4} \div \frac{9}{16} &= \frac{4 \times 1 + 3}{4} \times \frac{16}{9} \\&= \frac{7}{4} \times \frac{16}{9} \\&= \frac{112}{36} = 3\frac{4}{36} = 3\frac{1}{9}\end{aligned}$$



13. Solution:

$$\begin{aligned}2 \div 1\frac{3}{4} \\&= \frac{2}{1} \times \frac{4}{4 \times 1 + 3} \\&= \frac{2}{1} \times \frac{4}{7} \\&= \frac{8}{7} = 1\frac{1}{7}\end{aligned}$$

14. Solution:

$$\begin{aligned}3 \times 1\frac{3}{8} \\&= \frac{3}{1} \times \frac{8 \times 1 + 3}{8} \\&= \frac{3}{1} \times \frac{11}{8} \\&= \frac{33}{8} = 4\frac{1}{8}\end{aligned}$$

15. Solution:

$$\begin{aligned}2 \div 1\frac{1}{4} \times 1\frac{7}{16} \\&= \frac{2}{1} \times \frac{4}{4 \times 1 + 1} \times \frac{16 \times 1 + 7}{16} \\&= \frac{2}{1} \times \frac{4}{5} \times \frac{23}{16} \\&= \frac{\cancel{(1)}^{\cancel{2}}}{1} \times \frac{\cancel{(1)}^{\cancel{4}}}{5} \times \frac{23}{\cancel{(2)}^{\cancel{4}} \cancel{4} 16} \\&= \frac{23}{5 \times 2} \\&= \frac{23}{10} = 2\frac{3}{10}\end{aligned}$$

**Practice Section B**

1. Solution:

$$\begin{aligned} & 3\frac{1}{2} \div 2\frac{7}{8} \\ &= \frac{2 \times 3 + 1}{2} \times \frac{8}{8 \times 2 + 7} \\ &= \frac{7}{2} \times \frac{8}{23} \\ &= \frac{7}{\cancel{(1)2}} \times \frac{(4)\cancel{8}}{23} \\ &= \frac{7 \times 4}{23} \\ &= \frac{28}{23} = 1\frac{5}{23} \end{aligned}$$

2. Solution:

$$\begin{aligned} & 2\frac{3}{4} \times 1\frac{5}{8} \\ &= \frac{4 \times 2 + 3}{4} \times \frac{8 \times 1 + 5}{8} \\ &= \frac{11}{4} \times \frac{13}{8} \\ &= \frac{143}{32} = 4\frac{15}{32} \end{aligned}$$

3. Solution:

$$\begin{aligned} & 2\frac{3}{4} \times 1\frac{1}{2} \\ &= \frac{4 \times 2 + 3}{4} \times \frac{2 \times 1 + 1}{2} \\ &= \frac{11}{4} \times \frac{3}{2} \\ &= \frac{33}{8} = 4\frac{1}{8} \end{aligned}$$

4. Solution:

$$\begin{aligned} & 4\frac{13}{16} \times 3\frac{1}{4} \\ &= \frac{16 \times 4 + 13}{16} \times \frac{4 \times 3 + 1}{4} \\ &= \frac{77}{16} \times \frac{13}{4} \\ &= \frac{1001}{64} = 15\frac{41}{64} \end{aligned}$$

5. Solution:

$$\begin{aligned} & 4\frac{1}{8} \div 1\frac{3}{16} \\ &= \frac{8 \times 4 + 1}{8} \div \frac{16 \times 1 + 3}{16} \\ &= \frac{33}{8} \times \frac{(2)\cancel{16}}{(1)\cancel{8} \times 19} \\ &= \frac{66}{19} = 3\frac{9}{19} \end{aligned}$$

6. Solution:

$$\begin{aligned} & 4\frac{1}{2} \times 1\frac{7}{8} \\ &= \frac{2 \times 4 + 1}{2} \times \frac{8 \times 1 + 7}{8} \\ &= \frac{9}{2} \times \frac{15}{8} \\ &= \frac{135}{16} = 8\frac{7}{16} \end{aligned}$$



7. Solution:

$$\begin{aligned} & 3\frac{5}{16} \times 2\frac{3}{8} \\ &= \frac{16 \times 3 + 5}{16} \times \frac{8 \times 2 + 3}{8} \\ &= \frac{53}{16} \times \frac{19}{8} \\ &= \frac{1007}{128} = 7\frac{111}{128} \end{aligned}$$

8. Solution:

$$\begin{aligned} & 5\frac{3}{4} \div 2\frac{9}{16} \\ &= \frac{4 \times 5 + 3}{4} \times \frac{16}{16 \times 2 + 9} \\ &= \frac{23}{4} \times \frac{16}{41} \\ &= \frac{23}{(1)\cancel{4}} \times \frac{(4)\cancel{16}}{41} \\ &= \frac{92}{41} = 2\frac{10}{41} \end{aligned}$$

9. Solution:

$$\begin{aligned} & 4\frac{3}{4} \div 3\frac{7}{8} \\ &= \frac{4 \times 4 + 3}{4} \times \frac{8}{8 \times 3 + 7} \\ &= \frac{19}{4} \times \frac{8}{31} \\ &= \frac{19}{(1)\cancel{4}} \times \frac{(2)\cancel{8}}{31} \\ &= \frac{38}{31} = 1\frac{7}{31} \end{aligned}$$

10. Solution:

$$\begin{aligned} & 5\frac{11}{16} \div 2\frac{27}{32} \\ &= \frac{16 \times 5 + 11}{16} \times \frac{8}{32 \times 2 + 27} \\ &= \frac{91}{16} \times \frac{32}{91} \\ &= \frac{(1)\cancel{91}}{(1)\cancel{16}} \times \frac{(2)\cancel{32}}{(1)\cancel{91}} \\ &= 2 \end{aligned}$$

11. Solution:

$$\begin{aligned} & 2\frac{1}{8} \div \frac{11}{16} \times 3 \\ &= \frac{8 \times 2 + 1}{8} \div \frac{11}{16} \times \frac{3}{1} \\ &= \frac{17}{(1)\cancel{8}} \times \frac{(2)\cancel{16}}{11} \times \frac{3}{1} \\ &= \frac{17}{1} \times \frac{2}{11} \times \frac{3}{1} \\ &= \frac{102}{11} = 9\frac{3}{11} \end{aligned}$$

12. Solution:

$$\begin{aligned} & 2\frac{3}{4} \times 2\frac{7}{16} \div 4\frac{3}{8} \\ &= \frac{4 \times 2 + 3}{4} \times \frac{16 \times 2 + 7}{16} \times \frac{8}{8 \times 4 + 3} \\ &= \frac{11}{4} \times \frac{39}{(2)\cancel{16}} \times \frac{(1)\cancel{8}}{35} \\ &= \frac{429}{280} = 1\frac{149}{280} \end{aligned}$$



13. Solution:

$$\begin{aligned} & 3\frac{7}{8} \div 1\frac{5}{16} \div 4\frac{1}{2} \\ &= \frac{8 \times 3 + 7}{8} \times \frac{16}{16 \times 1 + 5} \times \frac{2}{2 \times 4 + 1} \\ &= \frac{31}{(1)\cancel{8}} \times \frac{(2)\cancel{16}}{21} \times \frac{2}{9} \\ &= \frac{124}{189} \end{aligned}$$

14. Solution:

$$\begin{aligned} & 4 \times 4\frac{1}{4} \div 3\frac{1}{16} \\ &= \frac{4}{1} \times \frac{4 \times 4 + 1}{4} \times \frac{16}{16 \times 3 + 1} \\ &= \frac{(1)\cancel{4}}{1} \times \frac{17}{(1)\cancel{4}} \times \frac{16}{49} \\ &= \frac{272}{49} = 5\frac{27}{49} \end{aligned}$$

15. Solution:

$$\begin{aligned} & 6\frac{3}{32} \div \left( 4\frac{7}{8} \div 2\frac{1}{4} \right) \\ &= \frac{32 \times 6 + 3}{32} \div \left( \frac{8 \times 4 + 7}{8} \times \frac{4}{4 \times 2 + 1} \right) \\ &= \frac{195}{32} \div \left( \frac{39}{8} \times \frac{4}{9} \right) \\ &= \frac{195}{32} \div \left( \frac{39}{(2)\cancel{8}} \times \frac{(1)\cancel{4}}{9} \right) \\ &= \frac{195}{32} \div \left( \frac{39}{18} \right) \\ &= \frac{195}{(16)\cancel{32}} \times \frac{(9)\cancel{18}}{39} \\ &= \frac{1755}{624} = 2\frac{507}{624} = 2\frac{13}{16} \end{aligned}$$

**Practice Section C**

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1. Solution:

$$\begin{aligned} & 12 \div 2 \frac{1}{4} \times 2 \frac{3}{8} \div 4 \frac{11}{16} \div 2 \\ &= \frac{12}{1} \times \frac{4}{4 \times 2 + 1} \times \frac{8 \times 2 + 3}{8} \times \frac{16}{16 \times 4 + 11} \times \frac{1}{2} \\ &= \frac{(4)\cancel{12}}{1} \times \frac{(2)\cancel{4}}{(3)\cancel{9}} \times \frac{19}{(1)\cancel{8}} \times \frac{(2)\cancel{16}}{75} \times \frac{1}{(1)\cancel{2}} \\ &= \frac{4 \times 2 \times 19 \times 2}{3 \times 75} \\ &= \frac{304}{225} = 1 \frac{79}{225} \end{aligned}$$

2. Solution:

$$\begin{aligned} & 2 \frac{3}{4} \times 1 \frac{11}{16} \div 2 \frac{17}{32} \times 1 \frac{7}{8} \div 2 \div 1 \frac{3}{4} \\ &= \frac{4 \times 2 + 3}{4} \times \frac{16 \times 1 + 11}{16} \times \frac{32}{32 \times 2 + 17} \times \frac{8 \times 1 + 7}{8} \times \frac{1}{2} \times \frac{4}{4 \times 1 + 3} \\ &= \frac{11}{(1)\cancel{4}} \times \frac{(1)\cancel{27}}{(1)\cancel{16}} \times \frac{(1)(2)\cancel{32}}{(1)(3)\cancel{81}} \times \frac{(5)\cancel{15}}{8} \times \frac{1}{(1)\cancel{2}} \times \frac{(1)\cancel{4}}{7} \\ &= \frac{11 \times 5}{8 \times 7} \\ &= \frac{55}{56} \end{aligned}$$





3. Solution:

$$\begin{aligned}
& 6\frac{3}{32} \div 4\frac{7}{8} \div 2\frac{1}{4} \div 2\frac{1}{4} \div 4\frac{1}{2} \times 32 \\
&= \frac{32 \times 6 + 3}{32} \times \frac{8}{8 \times 4 + 7} \times \frac{4}{4 \times 2 + 1} \times \frac{4}{4 \times 2 + 1} \times \frac{2}{2 \times 4 + 1} \times \frac{32}{1} \\
&= \frac{195}{32} \times \frac{8}{39} \times \frac{4}{9} \times \frac{4}{9} \times \frac{2}{9} \times \frac{32}{1} \\
&= \frac{\cancel{(5)}19\cancel{5}}{\cancel{(1)}\cancel{32}} \times \frac{8}{\cancel{(1)}\cancel{39}} \times \frac{4}{9} \times \frac{4}{9} \times \frac{2}{9} \times \frac{\cancel{(1)}\cancel{32}}{1} \\
&= \frac{5 \times 8 \times 4 \times 4 \times 2}{9 \times 9 \times 9} \\
&= \frac{1280}{729} = 1\frac{551}{729}
\end{aligned}$$

4. Solution:

$$\begin{aligned}
& 6\frac{3}{32} \div \left( 4\frac{7}{8} \div 2\frac{1}{4} \right) \div \left( 2\frac{1}{4} \div 4\frac{1}{2} \right) \times 32 \\
&= \frac{32 \times 6 + 3}{32} \div \left( \frac{8 \times 4 + 7}{8} \times \frac{4}{4 \times 2 + 1} \right) \div \left( \frac{4 \times 2 + 1}{4} \times \frac{2}{2 \times 4 + 1} \right) \times \frac{32}{1} \\
&= \frac{195}{32} \div \left( \frac{39}{8} \times \frac{4}{9} \right) \div \left( \frac{9}{4} \times \frac{2}{9} \right) \times \frac{32}{1} \\
&= \frac{195}{32} \div \left( \frac{39}{\cancel{(2)}\cancel{8}} \times \frac{\cancel{(1)}\cancel{4}}{9} \right) \div \left( \frac{\cancel{(1)}\cancel{9}}{\cancel{(2)}\cancel{4}} \times \frac{\cancel{(1)}\cancel{2}}{\cancel{(1)}\cancel{9}} \right) \times \frac{32}{1} \\
&= \frac{195}{32} \div \left( \frac{39}{18} \right) \div \left( \frac{1}{2} \right) \times \frac{32}{1} \\
&= \frac{195}{32} \times \frac{18}{39} \times \frac{2}{1} \times \frac{32}{1} \\
&= \frac{\cancel{(5)}19\cancel{5}}{\cancel{(1)}\cancel{32}} \times \frac{18}{\cancel{(1)}\cancel{39}} \times \frac{2}{1} \times \frac{\cancel{(1)}\cancel{32}}{1} \\
&= 180
\end{aligned}$$



5. Solution:

$$\begin{aligned} & \left( 2\frac{1}{4} \div 5\frac{3}{16} \right) \times \left[ 4\frac{7}{8} \div \left( 3\frac{1}{8} \div 2\frac{1}{4} \right) \right] \div \left[ 4\frac{1}{2} \times \left( 6 \div 4\frac{11}{32} \right) \right] \\ &= \left( \frac{4 \times 2 + 1}{4} \times \frac{16}{16 \times 5 + 3} \right) \times \left[ \frac{8 \times 4 + 7}{8} \div \left( \frac{8 \times 3 + 1}{8} \times \frac{4}{4 \times 2 + 1} \right) \right] \div \left[ \frac{2 \times 4 + 1}{2} \times \left( \frac{6}{1} \times \frac{32}{32 \times 4 + 11} \right) \right] \\ &= \left( \frac{9}{4} \times \frac{16}{83} \right) \times \left[ \frac{39}{8} \div \left( \frac{25}{8} \times \frac{4}{9} \right) \right] \div \left[ \frac{9}{2} \times \left( \frac{6}{1} \times \frac{32}{139} \right) \right] \\ &= \left( \frac{9}{\cancel{(1)4}} \times \frac{\cancel{(4)16}}{83} \right) \times \left[ \frac{39}{8} \div \left( \frac{25}{\cancel{(2)8}} \times \frac{\cancel{(1)4}}{9} \right) \right] \div \left[ \frac{9}{\cancel{(1)2}} \times \frac{\cancel{(3)6}}{1} \times \frac{32}{139} \right] \\ &= \frac{36}{83} \times \left[ \frac{39}{8} \div \frac{25}{18} \right] \div \left[ \frac{864}{139} \right] \\ &= \frac{36}{83} \times \frac{39}{8} \times \frac{18}{25} \times \frac{139}{864} \\ &= \frac{\cancel{(1)9} \cancel{36}}{83} \times \frac{39}{\cancel{(1)4} \cancel{8}} \times \frac{\cancel{(9)18}}{25} \times \frac{139}{\cancel{96} \cancel{864}} \\ &= \frac{39 \times 9 \times 139}{83 \times 25 \times 96} \\ &= \frac{48789}{199200} = 4\frac{150411}{199200} \end{aligned}$$

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

In line 2, the two mixed fractions that are divided,  $3\frac{3}{4}$  and  $1\frac{11}{16}$ , were flipped before being changed to improper fractions. There is also an error made in line 5 when reducing the fractions where  $21 \div 3 = 7$  instead of 6.

The correct answer is:

$$\begin{aligned}
 & 5 \times 2 \frac{5}{8} \div 3 \frac{3}{4} \div 1 \frac{11}{16} \times \frac{7}{2} \\
 &= \frac{5}{1} \times \frac{8 \times 2 + 5}{8} \times \frac{4}{4 \times 3 + 3} \times \frac{16}{16 \times 1 + 11} \times \frac{7}{2} \\
 &= \frac{5}{1} \times \frac{21}{8} \times \frac{4}{15} \times \frac{16}{27} \times \frac{7}{2} \\
 &= \frac{(1)\cancel{5}}{1} \times \frac{(7)\cancel{21}}{(1)\cancel{8}} \times \frac{(2)\cancel{4}}{(1)(3)\cancel{15}} \times \frac{(2)\cancel{16}}{27} \times \frac{7}{(1)\cancel{2}} \\
 &= \frac{7 \times 2 \times 2 \times 7}{27} \\
 &= \frac{196}{27} = 7\frac{7}{27}
 \end{aligned}$$

**2. Solution:**

Alex is incorrect because the expression does not equal 3. (See below.)

Donna is correct in saying that  $6 \times \left(1\frac{3}{4} \div \frac{7}{8}\right) \times \frac{1}{4} = 3$ , but this does not mean that Alex must be wrong.

The correct answer is:



$$\begin{aligned}
& \left[ 3\frac{1}{2} \div 6 \times \left( \frac{7}{8} \times 1\frac{3}{4} \right) \div \frac{7}{16} \right] - \left[ 6 \times \left( 1\frac{3}{4} \div \frac{7}{8} \right) \times \frac{1}{4} \right] \\
&= \left[ \frac{2 \times 3 + 1}{2} \times \frac{1}{6} \times \left( \frac{7}{8} \times \frac{4 \times 1 + 3}{4} \right) \times \frac{16}{7} \right] - \left[ \frac{6}{1} \times \left( \frac{4 \times 1 + 3}{4} \times \frac{8}{7} \right) \times \frac{1}{4} \right] \\
&= \left[ \frac{7}{2} \times \frac{1}{6} \times \left( \frac{7}{8} \times \frac{7}{4} \right) \times \frac{16}{7} \right] - \left[ \frac{6}{1} \times \left( \frac{7}{4} \times \frac{8}{7} \right) \times \frac{1}{4} \right] \\
&= \left[ \frac{7}{(1)\cancel{2}} \times \frac{1}{6} \times \frac{7}{(1)\cancel{8}} \times \frac{(1)\cancel{7}}{4} \times \frac{(1)(\cancel{2})\cancel{16}}{(1)\cancel{7}} \right] - \left[ \frac{(3)\cancel{6}}{1} \times \frac{(1)\cancel{7}}{(1)(\cancel{2})\cancel{4}} \times \frac{(1)(\cancel{2})\cancel{8}}{(1)\cancel{7}} \times \frac{1}{(1)\cancel{4}} \right] \\
&= \frac{7 \times 7}{6 \times 4} - 3 \\
&= \frac{49}{24} - 3 \left( \frac{24}{24} \right) \\
&= \frac{49 - 72}{24} \\
&= -\frac{23}{24}
\end{aligned}$$

### Practice Section E

Solution:

$$\begin{aligned}
& \left[ \left( 4\frac{1}{2} \times 2\frac{1}{4} \div 5\frac{3}{16} \right) \div \left( \frac{5}{8} \right) \right] \div 5 \times 4\frac{7}{8} \div \left( 3\frac{1}{8} \div 2\frac{1}{4} \right) \times \left( 4\frac{1}{2} \times 6 \div 4\frac{11}{32} \right) \times 6 \\
&= \left[ \left( \frac{2 \times 4 + 1}{2} \times \frac{4 \times 2 + 1}{4} \times \frac{16}{16 \times 5 + 3} \right) \times \frac{8}{5} \right] \times \frac{1}{5} \times \frac{8 \times 4 + 7}{8} \div \left( \frac{8 \times 3 + 1}{8} \times \frac{4}{4 \times 2 + 1} \right) \times \left( \frac{2 \times 4 + 1}{2} \times \frac{6}{1} \times \frac{32}{32 \times 4 + 11} \right) \times \frac{6}{1} \\
&= \left[ \left( \frac{9}{2} \times \frac{9}{4} \times \frac{16}{83} \right) \times \frac{8}{5} \right] \times \frac{1}{5} \times \frac{39}{8} \div \left( \frac{25}{8} \times \frac{4}{9} \right) \times \left( \frac{9}{2} \times \frac{6}{1} \times \frac{32}{139} \right) \times \frac{6}{1} \\
&= \left[ \left( \frac{9}{(1)\cancel{2}} \times \frac{9}{(1)\cancel{4}} \times \frac{(2)(\cancel{4})\cancel{16}}{83} \right) \times \frac{8}{5} \right] \times \frac{1}{5} \times \frac{39}{8} \div \left( \frac{25}{(2)\cancel{8}} \times \frac{(1)\cancel{4}}{9} \right) \times \left( \frac{9}{(1)\cancel{2}} \times \frac{(3)\cancel{6}}{1} \times \frac{32}{139} \right) \times \frac{6}{1} \\
&= \frac{162}{83} \times \frac{8}{5} \times \frac{1}{5} \times \frac{39}{8} \times \frac{18}{25} \times \frac{864}{139} \times \frac{6}{1} \\
&= \frac{162}{83} \times \frac{(1)\cancel{8}}{5} \times \frac{1}{5} \times \frac{39}{(1)\cancel{8}} \times \frac{18}{25} \times \frac{864}{139} \times \frac{6}{1} \\
&= \frac{589545216}{7210625} = 81\frac{5484591}{7210625}
\end{aligned}$$

This is the simplest form for this fraction.