Workplace Education Manitoba

NUMERACY:
The Basics Workbook

Set I: Operations with Mixed Fractions 3

Companion Workbook to Numeracy: The Basics Video Series

Watch the video for this workbook at
www.wem.mb.ca/learning_on_demand.aspx

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INTRODUCTION

What is Numeracy: The Basics Workbook?

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

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. $1\frac{1}{2}+\frac{1}{4}\times\frac{1}{2}$ = _____

2. $\frac{1}{8}\div\frac{1}{2}+2$ = _____

3. $\frac{3}{4}\times 2\frac{1}{2}-1\frac{1}{4}$ = _____

4. $3\frac{3}{8}-1\frac{1}{2}\times 2\frac{1}{4}$ = _____

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

6. $2\frac{1}{8}+1\frac{1}{4}\div 1\frac{1}{2}$ = _____

7. $2\frac{7}{8}\times 4\frac{1}{2}+1\frac{3}{4}$ = _____

8. $2\frac{1}{8}\div 1\frac{1}{4}-\frac{3}{4}$ = _____

9. $2\frac{1}{4}\div 3\frac{1}{2}+1\frac{3}{8}$ = _____

10. $5+1\frac{7}{16}\div 4\frac{1}{8}$ = _____

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

12. $2\frac{9}{16} \div 4\frac{1}{4} \times 2\frac{3}{4} + 1\frac{3}{8}$ = _____

13. $3\frac{7}{8} - 2\frac{9}{16} \times 2\frac{1}{2} \div 2\frac{3}{4}$ = _____

14. $3\frac{11}{16} + 2\frac{1}{4} + 2\frac{1}{2} \times 5\frac{3}{8}$ = _____

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

Practice Section B

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

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

2. $\left(2\frac{7}{8} + 1\frac{3}{8}\right) \div 1\frac{1}{4} + \frac{7}{8}$ = _____

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

4. $3\frac{1}{4} + \left(2\frac{1}{4} + 2\frac{3}{8}\right) \times 1\frac{1}{2}$ = _____

5. $1\frac{5}{8} \div 2\frac{1}{16} + 4\frac{1}{2} \times 2\frac{1}{4}$ = _____

6. $\left(2 \div 3\frac{1}{4} + 4\frac{1}{2}\right) \times 2\frac{1}{4}$ = _____

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

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

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

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

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

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

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

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

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

Practice Section C

Calculate the following. Express your answer in lowest terms.

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

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

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

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

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

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.

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

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

$$=\frac{43}{32}-\left(\frac{53}{16}-\frac{7}{2}\right)\div\left(\frac{23}{4}+\frac{15}{8}\right)\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}-\left(\frac{53}{16}\left(\frac{2}{2}\right)-\frac{7}{2}\left(\frac{16}{16}\right)\right)\div\left(\frac{23}{4}\left(\frac{8}{8}\right)+\frac{15}{8}\left(\frac{4}{4}\right)\right)\times\frac{6}{1}\left(\frac{32}{32}\right)+\frac{11}{16}\left(\frac{2}{2}\right)$$

$$=\frac{43}{32}-\left(\frac{106}{32}-\frac{112}{32}\right)\div\left(\frac{184}{32}+\frac{60}{32}\right)\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{43}{32}-\left(-\frac{6}{32}\right)\div\frac{244}{32}\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{43}{32}-\frac{6}{32}\times\frac{244}{32}\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{37}{(8)\cancel{32}}\times\frac{(61)\cancel{244}}{32}\times\frac{(107)\cancel{214}}{(16)\cancel{32}}$$

$$=\frac{37\times 61\times 107}{8\times 32\times 16}=\frac{241499}{4096}=58\frac{3931}{4096}$$

Practice Section E
Challenge Question. If you can do this one, then you get an A^{+}. ☺

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

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

= _____

SOLUTIONS

Set I

Operations with Mixed Fractions 3

OPERATIONS WITH MIXED FRACTIONS 3

Practice Section A

1. Solution:

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

2. Solution:

$$\frac{1}{8}\div\frac{1}{2}+2$$
$$=\frac{1}{8}\times\frac{2}{1}+2$$
$$=\frac{2}{8}+2$$
$$=2\frac{2}{8}=2\frac{1}{4}$$

3. Solution:

$$\frac{3}{4}\times2\frac{1}{2}-1\frac{1}{4}$$
$$=\frac{3}{4}\times\frac{5}{2}-\frac{5}{4}$$
$$=\frac{15}{8}-\frac{5}{4}\left(\frac{2}{2}\right)$$
$$=\frac{15}{8}-\frac{10}{8}$$
$$=\frac{5}{8}$$

4. Solution:

$$3\frac{3}{8}-1\frac{1}{2}\times2\frac{1}{4}$$
$$=\frac{27}{8}-\frac{3}{2}\times\frac{9}{4}$$
$$=\frac{27}{8}-\frac{27}{8}$$
$$=0$$

5. Solution:

$$2\frac{7}{8}+1\frac{3}{8}\div1\frac{1}{4}$$
$$=\frac{23}{8}+\frac{11}{8}\div\frac{5}{4}$$
$$=\frac{23}{8}+\frac{11}{8}\times\frac{4}{5}$$
$$=\frac{23}{8}\left(\frac{5}{5}\right)+\frac{44}{40}$$
$$=\frac{159}{40}=3\frac{39}{40}$$

6. Solution:

$$2\frac{1}{8}+1\frac{1}{4}\div1\frac{1}{2}$$
$$=\frac{17}{8}+\frac{5}{4}\div\frac{3}{2}$$
$$=\frac{17}{8}+\frac{5}{4}\times\frac{2}{3}$$
$$=\frac{17}{8}+\frac{10}{12}$$
$$=\frac{17}{8}\left(\frac{12}{12}\right)+\frac{10}{12}\left(\frac{8}{8}\right)$$
$$=\frac{204}{96}+\frac{80}{96}$$
$$=\frac{284}{96}=2\frac{92}{96}=2\frac{23}{24}$$

7. Solution:

$$2\frac{7}{8}\times4\frac{1}{2}+1\frac{3}{4}$$
$$=2\frac{7}{8}\times4\frac{1}{2}+1\frac{3}{4}$$
$$=\frac{23}{8}\times\frac{9}{2}+\frac{7}{4}$$
$$=\frac{207}{16}+\frac{7}{4}\left(\frac{4}{4}\right)$$
$$=\frac{207}{16}+\frac{28}{16}$$
$$=\frac{235}{16}=14\frac{11}{16}$$

8. Solution:

$$2\frac{1}{8}\div1\frac{1}{4}-\frac{3}{4}$$
$$=\frac{17}{8}\times\frac{4}{5}-\frac{3}{4}$$
$$=\frac{68}{40}-\frac{3}{4}\left(\frac{10}{10}\right)$$
$$=\frac{68-30}{40}$$
$$=\frac{38}{40}=\frac{19}{20}$$

9. Solution:

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

10. Solution:

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

11. Solution:

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

12. Solution:

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

13. Solution:

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

14. Solution:

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

15. Solution:

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

Practice Section B

1. Solution:

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

2. Solution:

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

3. Solution:

$$\left(3\frac{11}{16}+2\frac{1}{4}-\frac{1}{2}\right)\div 5\frac{3}{8}$$
$$=\left(\frac{59}{16}+\frac{9}{4}\left(\frac{4}{4}\right)-\frac{1}{2}\left(\frac{8}{8}\right)\right)\div\frac{43}{8}$$
$$=\left(\frac{59+36-8}{16}\right)\times\frac{8}{43}$$
$$=\frac{87}{(2)\cancel{16}}\times\frac{(1)\cancel{8}}{43}$$
$$=\frac{87}{86}=1\frac{1}{86}$$

4. Solution:

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

5. Solution:

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

6. Solution:

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

7. Solution:

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

8. Solution:

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

9. Solution:

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

10. Solution:

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

11. Solution:

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

12. Solution:

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

13. Solution:

$$4\frac{1}{8}-1\frac{3}{4}\div\left(1\frac{1}{2}+\frac{7}{8}\times 2\frac{1}{4}\right)$$

$$=\frac{33}{8}-\frac{7}{4}\div\left(\frac{3}{2}+\frac{7}{8}\times\frac{9}{4}\right)$$

$$=\frac{33}{8}-\frac{7}{4}\div\left(\frac{3}{2}+\frac{63}{32}\right)$$

$$=\frac{33}{8}-\frac{7}{4}\div\left(\frac{3}{2}\left(\frac{16}{16}\right)+\frac{63}{32}\right)$$

$$=\frac{33}{8}-\frac{7}{4}\div\left(\frac{48}{32}+\frac{63}{32}\right)$$

$$=\frac{33}{8}-\frac{7}{4}\div\left(\frac{111}{32}\right)$$

$$=\frac{33}{8}-\frac{7}{(1)\cancel{4}}\times\frac{(8)\cancel{32}}{111}$$

$$=\frac{33}{8}\left(\frac{111}{111}\right)-\frac{56}{111}\left(\frac{8}{8}\right)$$

$$=\frac{3663}{888}-\frac{448}{888}$$

$$=\frac{3215}{888}=3\frac{551}{888}$$

14. Solution:

$$\left(2\frac{7}{16}-1\frac{3}{8}\right)\times\left(1\frac{1}{4}+\frac{21}{32}\right)\div 2\frac{1}{2}$$

$$=\left(\frac{39}{16}-\frac{11}{8}\right)\times\left(\frac{5}{4}+\frac{21}{32}\right)\div\frac{5}{2}$$

$$=\left(\frac{39}{16}-\frac{11}{8}\left(\frac{2}{2}\right)\right)\times\left(\frac{5}{4}\left(\frac{8}{8}\right)+\frac{21}{32}\right)\div\frac{5}{2}$$

$$=\left(\frac{39}{16}-\frac{22}{16}\right)\times\left(\frac{40}{32}+\frac{21}{32}\right)\times\frac{2}{5}$$

$$=\frac{17}{16}\times\frac{61}{32}\times\frac{2}{5}$$

$$=\frac{2074}{2560}$$

$$=\frac{1037}{1280}$$

15. Solution:

$$\left(3\frac{11}{16}+2\frac{1}{4}\right)-2\frac{1}{2}\times5\frac{3}{8}\div\left(1\frac{7}{8}-\frac{1}{2}\times4\right)$$

$$=\left(\frac{59}{16}+\frac{9}{4}\right)-\frac{5}{2}\times\frac{43}{8}\div\left(\frac{15}{8}-\frac{1}{2}\times\frac{4}{1}\right)$$

$$=\left(\frac{59}{16}+\frac{9}{4}\left(\frac{4}{4}\right)\right)-\frac{5}{2}\times\frac{43}{8}\div\left(\frac{15}{8}-\frac{4}{2}\right)$$

$$=\left(\frac{59}{16}+\frac{36}{16}\right)-\frac{5}{2}\times\frac{43}{8}\div\left(\frac{15}{8}-\frac{4}{2}\left(\frac{4}{4}\right)\right)$$

$$=\frac{95}{16}-\frac{215}{16}\div\left(\frac{15}{8}-\frac{16}{8}\right)$$

$$=\frac{95}{16}-\frac{215}{16}\div\left(-\frac{1}{8}\right)$$

$$=\frac{95}{16}-\frac{215}{16}\times\left(-\frac{8}{1}\right)$$

$$=\frac{95}{16}-\frac{215}{(2)\cancel{16}}\times\left(-\frac{(1)\cancel{8}}{1}\right)$$

$$=\frac{95}{16}+\frac{215}{2}$$

$$=\frac{95}{16}+\frac{215}{2}\left(\frac{8}{8}\right)$$

$$=\frac{95}{16}+\frac{1720}{16}$$

$$=\frac{1815}{16}=113\frac{7}{16}$$

Practice Section C

1. Solution:

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

$$=\left(\frac{27}{8}+\frac{43}{16}-\frac{7}{2}\right)\div\frac{23}{4}+\left(\frac{15}{8}\div\frac{1}{2}+\frac{4}{1}\right)$$

$$=\left(\frac{27}{8}\left(\frac{2}{2}\right)+\frac{43}{16}-\frac{7}{2}\left(\frac{8}{8}\right)\right)\div\frac{23}{4}+\left(\frac{15}{8}\times\frac{2}{1}+\frac{4}{1}\right)$$

$$=\left(\frac{54}{16}+\frac{43}{16}-\frac{56}{16}\right)\times\frac{4}{23}+\left(\frac{15}{(4)\cancel{8}}\times\frac{(1)\cancel{2}}{1}+\frac{4}{1}\right)$$

$$=\frac{41}{16}\times\frac{4}{23}+\left(\frac{15}{4}+\frac{4}{1}\left(\frac{4}{4}\right)\right)$$

$$=\frac{41}{(4)\cancel{16}}\times\frac{(1)\cancel{4}}{23}+\left(\frac{15}{4}+\frac{16}{4}\right)$$

$$=\frac{41}{92}+\frac{31}{4}\left(\frac{23}{23}\right)$$

$$=\frac{41}{92}+\frac{713}{92}$$

$$=\frac{754}{92}=8\frac{18}{92}=8\frac{9}{46}$$

2. Solution:

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

$$=\frac{43}{32}-\left(\frac{53}{16}-\frac{7}{2}\left(\frac{8}{8}\right)\right)\div\left(\frac{23}{4}\left(\frac{2}{2}\right)+\frac{15}{8}\right)\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}-\left(\frac{53}{16}-\frac{56}{16}\right)\div\left(\frac{46}{8}+\frac{15}{8}\right)\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}-\left(-\frac{3}{16}\right)\div\frac{61}{8}\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}+\frac{3}{16}\times\frac{8}{61}\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}+\frac{3}{(1)\cancel{(2)}\cancel{16}}\times\frac{(1)\cancel{8}}{61}\times\frac{(3)\cancel{6}}{1}+\frac{11}{16}$$

$$=\frac{43}{32}+\frac{9}{61}+\frac{11}{16}$$

$$=\frac{43}{32}\left(\frac{61}{61}\right)+\frac{9}{61}\left(\frac{32}{32}\right)+\frac{11}{16}\left(\frac{122}{122}\right)$$

$$=\frac{2623}{1952}+\frac{288}{1952}+\frac{1342}{1952}$$

$$=\frac{4253}{1952}=2\frac{349}{1952}$$

3. Solution:

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

$$=\frac{67}{16}\div\frac{54}{32}+\frac{5}{2}\times\left[\left(\frac{59}{16}+\frac{9}{4}\right)\div\frac{5}{2}\times\frac{43}{8}\right]$$

$$=\frac{67}{(1)\cancel{16}}\times\frac{(2)\cancel{32}}{54}+\frac{5}{2}\times\left[\left(\frac{59}{16}+\frac{9}{4}\left(\frac{4}{4}\right)\right)\times\frac{2}{5}\times\frac{43}{8}\right]$$

$$=\frac{134}{54}+\frac{5}{2}\times\left[\left(\frac{59}{16}+\frac{36}{16}\right)\times\frac{(1)\cancel{2}}{5}\times\frac{43}{(4)\cancel{8}}\right]$$

$$=\frac{134}{54}+\frac{5}{2}\times\frac{(19)\cancel{95}}{16}\times\frac{43}{(4)\cancel{20}}$$

$$=\frac{134}{54}+\frac{5\times 19\times 43}{2\times 16\times 4}$$

$$=\frac{134}{54}+\frac{4085}{128}$$

$$=\frac{134}{54}\left(\frac{128}{128}\right)+\frac{4085}{128}\left(\frac{54}{54}\right)$$

$$=\frac{17152}{6912}+\frac{220590}{6912}$$

$$=\frac{237742}{6912}=34\frac{2734}{6912}=34\frac{1367}{3456}$$

4. Solution:

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

$$=\left(\frac{23}{8}-\frac{5}{4}\right)\times\frac{16}{3}\times\frac{150}{32}-\frac{5}{2}\div\left(\frac{59}{16}+\frac{9}{4}-\frac{5}{2}\times\frac{43}{8}\right)$$

$$=\left(\frac{23}{8}-\frac{5}{4}\left(\frac{2}{2}\right)\right)\times\frac{(1)\cancel{16}}{(1)\cancel{3}}\times\frac{(25)\,(\cancel{50})\,\cancel{150}}{(1)\,(\cancel{2})\,\cancel{32}}-\frac{5}{2}\div\left(\frac{59}{16}+\frac{9}{4}\left(\frac{4}{4}\right)-\frac{215}{16}\right)$$

$$=\left(\frac{23}{8}-\frac{10}{8}\right)\times\frac{25}{1}-\frac{5}{2}\div\left(\frac{59}{16}+\frac{36}{16}-\frac{215}{16}\right)$$

$$=\frac{13}{8}\times\frac{25}{1}-\frac{5}{2}\div\left(-\frac{120}{16}\right)$$

$$=\frac{13}{8}\times\frac{25}{1}-\frac{(1)\cancel{5}}{(1)\cancel{2}}\times\left(-\frac{(1)\,(\cancel{8})\,\cancel{16}}{(3)\,(\cancel{24})\,\cancel{120}}\right)$$

$$=\frac{13}{8}\times\frac{25}{1}-\frac{1}{1}\times\left(-\frac{1}{3}\right)$$

$$=\frac{13}{8}\times\frac{25}{1}+\frac{1}{3}$$

$$=\frac{325}{8}\left(\frac{3}{3}\right)+\frac{1}{3}\left(\frac{8}{8}\right)$$

$$=\frac{983}{24}=40\frac{23}{24}$$

5. Solution:

$$6\times\left[4\frac{1}{8}-1\frac{3}{4}\div\left(1\frac{1}{2}+\frac{7}{8}\times2\frac{1}{4}\right)\right]\div\left[\left(3\frac{7}{8}-2\frac{9}{16}\right)\times2\frac{1}{2}\right]\times2\frac{3}{4}$$

$$=6\times\left[\frac{33}{8}-\frac{7}{4}\div\left(\frac{3}{2}+\frac{7}{8}\times\frac{9}{4}\right)\right]\div\left[\left(\frac{31}{8}-\frac{41}{16}\right)\times\frac{5}{2}\right]\times\frac{11}{4}$$

$$=6\times\left[\frac{33}{8}-\frac{7}{4}\div\left(\frac{3}{2}\left(\frac{16}{16}\right)+\frac{63}{32}\right)\right]\div\left[\left(\frac{31}{8}\left(\frac{2}{2}\right)-\frac{41}{16}\right)\times\frac{5}{2}\right]\times\frac{11}{4}$$

$$=6\times\left[\frac{33}{8}-\frac{7}{4}\div\left(\frac{48+63}{32}\right)\right]\div\left[\left(\frac{62-41}{16}\right)\times\frac{5}{2}\right]\times\frac{11}{4}$$

$$=6\times\left[\frac{33}{8}-\frac{7}{4}\div\frac{111}{32}\right]\div\left[\frac{21}{16}\times\frac{5}{2}\right]\times\frac{11}{4}$$

$$=6\times\left[\frac{33}{8}-\frac{7}{(1)\cancel{4}}\times\frac{(8)\cancel{32}}{111}\right]\div\left[\frac{21}{16}\times\frac{5}{2}\right]\times\frac{11}{4}$$

$$=6\times\left[\frac{33}{8}\left(\frac{111}{111}\right)-\frac{56}{111}\left(\frac{8}{8}\right)\right]\div\frac{105}{32}\times\frac{11}{4}$$

$$=6\times\left[\frac{3663-448}{888}\right]\times\frac{32}{105}\times\frac{11}{4}$$

$$=6\times\left[\frac{3215}{888}\right]\times\frac{(8)\cancel{32}}{105}\times\frac{11}{(1)\cancel{4}}$$

$$=6\times\frac{3215}{888}\times\frac{88}{105}$$

$$=\frac{6}{1}\times\frac{(643)\cancel{3215}}{888}\times\frac{88}{(21)\cancel{105}}$$

$$=\frac{339504}{18648}=18\frac{3840}{18648}=18\frac{160}{177}$$

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:

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

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

$$=\frac{43}{32}-\left(\frac{53}{16}-\frac{7}{2}\right)\div\left(\frac{23}{4}+\frac{15}{8}\right)\times\frac{6}{1}+\frac{11}{16}$$

$$=\frac{43}{32}-\left(\frac{53}{16}\left(\frac{2}{2}\right)-\frac{7}{2}\left(\frac{16}{16}\right)\right)\div\left(\frac{23}{4}\left(\frac{8}{8}\right)+\frac{15}{8}\left(\frac{4}{4}\right)\right)\times\frac{6}{1}\left(\frac{32}{32}\right)+\frac{11}{16}\left(\frac{2}{2}\right)$$

$$=\frac{43}{32}-\left(\frac{106}{32}-\frac{112}{32}\right)\div\left(\frac{184}{32}+\frac{60}{32}\right)\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{43}{32}-\left(-\frac{6}{32}\right)\div\frac{244}{32}\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{43}{32}+\frac{6}{32}\times\frac{32}{244}\times\frac{192}{32}+\frac{22}{32}$$

$$=\frac{43}{32}+\left(\frac{(3)\cancel{6}}{(1)\cancel{32}}\times\frac{(1)\cancel{32}}{(61)\cancel{244}}\times\frac{(3)(\cancel{48})\cancel{192}}{(1)(\cancel{16})\cancel{32}}\right)+\frac{22}{32}$$

$$=\frac{43}{32}\left(\frac{61}{61}\right)+\frac{9}{61}\left(\frac{32}{32}\right)+\frac{22}{32}\left(\frac{61}{61}\right)$$

$$=\frac{2623}{1952}+\frac{288}{1952}+\frac{1342}{1952}$$

$$=\frac{4253}{1952}=2\frac{349}{1952}$$

Practice Section E

Solution:

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

$$=\left[\frac{43}{32}-\left(\left(\frac{53}{16}-\frac{56}{16}\right)\div\frac{39}{8}\right)\right]\div\left[\left(\frac{27}{8}-\frac{20}{8}\right)+\left(\frac{46}{8}+\frac{15}{8}\right)\times 6\right]+\frac{11}{16}$$

$$=\left[\frac{43}{32}-\left(-\frac{3}{16}\times\frac{8}{39}\right)\right]\div\left[\frac{7}{8}+\frac{61}{8}\times\frac{6}{1}\right]+\frac{11}{16}$$

$$=\left[\frac{43}{32}-\left(-\frac{(1)\cancel{3}}{(2)\cancel{16}}\times\frac{(1)\cancel{8}}{(13)\cancel{39}}\right)\right]\div\left[\frac{7}{8}+\frac{61}{(4)\cancel{8}}\times\frac{(3)\cancel{6}}{1}\right]+\frac{11}{16}$$

$$=\left[\frac{43}{32}-\left(-\frac{1}{26}\right)\right]\div\left[\frac{7}{8}+\frac{183}{4}\left(\frac{2}{2}\right)\right]+\frac{11}{16}$$

$$=\left[\frac{43}{32}+\frac{1}{26}\right]\div\left[\frac{7}{8}+\frac{366}{8}\right]+\frac{11}{16}$$

$$=\left[\frac{43}{32}\left(\frac{26}{26}\right)+\frac{1}{26}\left(\frac{32}{32}\right)\right]\div\left[\frac{373}{8}\right]+\frac{11}{16}$$

$$=\left[\frac{1118}{832}+\frac{32}{832}\right]\times\frac{8}{373}+\frac{11}{16}$$

$$=\frac{1150}{832}\times\frac{8}{373}+\frac{11}{16}$$

$$=\frac{(575)\cancel{1150}}{(52)\cancel{(416)}\ \cancel{832}}\times\frac{(1)\cancel{8}}{373}+\frac{11}{16}$$

$$=\frac{575}{19396}\left(\frac{16}{16}\right)+\frac{11}{16}\left(\frac{19396}{19396}\right)$$

$$=\frac{9200}{310336}+\frac{213356}{310336}$$

$$=\frac{222556}{310336}=\frac{111278}{155168}=\frac{55639}{77584}$$