

NUMERACY:

The Basics Workbook



Set E: Multiplying & Dividing Fractions

Companion Workbook to Numeracy: The Basics Video Series

Workplace Education Manitoba would like to express appreciation to the following for supporting the development of this curriculum:

The Government of Canada
Human Resource Skills Development Canada (HRSDC)

and

The Manitoba Government
Industry Workforce Development (IWD), Entrepreneurship,
Training and Trade (ETT)

Workplace Education Manitoba would also like to thank the individuals from across Manitoba who provided consultation, content, and feedback.

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ACKNOWLEDGMENTS





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



MULTIPLYING & DIVIDING FRACTIONS

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 in lowest terms.

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

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

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

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

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

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

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

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

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

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

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



12. $\frac{1}{2} \div \frac{3}{16}$ = _____

13. $\frac{5}{16} \times 8$ = _____

14. $\frac{5}{16} \div 8$ = _____

15. $8 \div \frac{5}{16}$ = _____

16. $\frac{5}{8} \times \frac{3}{4}$ = _____

17. $\frac{3}{8} \times \frac{3}{4}$ = _____

18. $\frac{3}{8} \div \frac{3}{4}$ = _____

19. $\frac{3}{8} \times 3$ = _____

20. $\frac{3}{8} \div 3$ = _____

21. $3 \times \frac{9}{16}$ = _____

22. $3 \div \frac{9}{16}$ = _____

23. $\frac{1}{2} \div \frac{7}{8} \times 4$ = _____

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

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

**Practice Section B**

Calculate the following. Express your answer in lowest terms.

1. $\frac{1}{2} \times \frac{3}{16} \div \frac{3}{4}$

2. $\frac{1}{2} \div \frac{7}{8} \div \frac{3}{4}$

3. $\frac{9}{16} \div \frac{1}{2} \times \frac{5}{8}$

4. $\frac{3}{4} \times \frac{5}{8} \div \frac{1}{4}$

5. $\frac{3}{4} \div \frac{7}{8} \times \frac{1}{4}$

6. $\frac{13}{16} \div \frac{3}{4} \times \frac{1}{8}$

7. $\frac{15}{16} \div \frac{1}{4} \div \frac{1}{2}$

8. $\frac{3}{8} \div \frac{3}{4} \times \frac{5}{16}$

9. $\frac{3}{8} \div \frac{1}{8} \div \frac{1}{2}$

10. $\frac{9}{32} \div \frac{9}{16} \times \frac{1}{4}$

11. $\frac{11}{16} \div \frac{3}{8} \times \frac{1}{16}$

12. $\frac{3}{16} \times 4 \div \frac{1}{2}$

13. $\frac{3}{16} \div \left(\frac{1}{4} \times \frac{1}{2} \right)$



14. $\frac{3}{8} \div \left(\frac{3}{4} \times \frac{5}{16} \right)$

15. $8 \div \left(\frac{9}{16} \times \frac{1}{4} \right)$

16. $\frac{5}{16} \div \left(\frac{3}{8} \times \frac{1}{4} \right)$

17. $\frac{3}{8} \div \frac{3}{4} \div \frac{5}{32} \div \frac{1}{2}$

18. $\frac{9}{16} \times \frac{1}{2} \div \frac{3}{32} \times \frac{1}{8}$

19. $\frac{9}{16} \times \left(\frac{1}{2} \div \frac{3}{32} \right) \times \frac{1}{8}$

20. $\frac{3}{4} \div \left(\frac{3}{4} \times \frac{5}{8} \right) \div 4$

Practice Section C

Calculate the following. Express your answer in lowest terms.

1. $\frac{3}{8} - \frac{1}{16} + \frac{1}{4} + \frac{5}{8} - \frac{7}{16} - \frac{1}{4} + \frac{3}{4} + \frac{1}{8} - \frac{3}{4} + \frac{1}{32} - \frac{5}{16} + \frac{1}{4} + \frac{3}{8} - \frac{1}{2} = \underline{\hspace{2cm}}$

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

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

4. $\left(\frac{15}{16} - \frac{3}{4} + \frac{1}{8} \right) + \left[\frac{3}{4} - \left(\frac{3}{16} - \frac{1}{2} \right) + \frac{3}{4} - \left(\frac{1}{8} - \frac{1}{2} \right) \right] = \underline{\hspace{2cm}}$

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

**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.

$$\begin{aligned} & \frac{5}{8} - \left(\frac{7}{16} - \frac{22}{32} \right) - \frac{3}{4} \\ &= \frac{5}{8} \left(\frac{4}{4} \right) - \left(\frac{7}{16} \left(\frac{2}{2} \right) - \frac{22}{32} \right) - \frac{3}{4} \left(\frac{8}{8} \right) \\ &= \frac{20}{32} - \left(\frac{14}{32} - \frac{22}{32} \right) - \frac{21}{32} \\ &= \frac{20}{32} - \left(\frac{8}{32} \right) - \frac{21}{32} \\ &= \frac{20}{32} - \frac{8}{32} - \frac{21}{32} \\ &= -\frac{9}{32} \end{aligned}$$

= _____

Practice Section E

Challenge Question. If you can do this one, then you get an A⁺. ☺

Calculate the answer to each of the questions below by following the ‘rules’ of fractions. Give your answer in lowest terms.

$$\left\{ \left(\frac{3}{4} - \frac{15}{16} - \frac{1}{8} \right) + \left[\frac{3}{4} - \left(\frac{3}{16} - \frac{1}{2} \right) + \frac{3}{4} - \left(\frac{1}{8} - \frac{1}{2} \right) \right] \right\} - \left[\frac{1}{2} - \left(\frac{1}{4} - \frac{7}{16} \right) - \left(\frac{5}{32} - \frac{7}{8} \right) \right] + \left[\frac{5}{32} - \left(\frac{1}{4} - \frac{1}{2} \right) \right]$$

= _____



SOLUTIONS

Set E

Multiplying & Dividing Fractions

**MULTIPLYING & DIVIDING FRACTIONS****Practice Section A**

1. Solution:

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

2. Solution:

$$\begin{aligned}\frac{3}{4} \div \frac{1}{2} \\ &= \frac{3}{4} \times \frac{2}{1} \\ &= \frac{3 \times 2}{4 \times 1} \\ &= \frac{6}{4} \\ &= \frac{3}{2}\end{aligned}$$

3. Solution:

$$\begin{aligned}\frac{3}{4} \times \frac{1}{8} \\ &= \frac{3 \times 1}{4 \times 8} \\ &= \frac{3}{32}\end{aligned}$$

4. Solution:

$$\begin{aligned}\frac{3}{4} \div \frac{1}{8} \\ &= \frac{3}{4} \times \frac{8}{1} \\ &= \frac{3 \times 8}{4 \times 1} \\ &= \frac{24}{4} \\ &= 6\end{aligned}$$

5. Solution:

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

6. Solution:

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



7. Solution:

$$\begin{aligned}\frac{7}{8} \times \frac{1}{4} \\ &= \frac{7 \times 1}{8 \times 4} \\ &= \frac{7}{32}\end{aligned}$$

8. Solution:

$$\begin{aligned}\frac{7}{8} \div \frac{1}{4} \\ &= \frac{7}{8} \times \frac{4}{1} \\ &= \frac{28}{8} \\ &= \frac{14}{4} \\ &= \frac{7}{2}\end{aligned}$$

9. Solution:

$$\begin{aligned}\frac{3}{4} \times 2 \\ &= \frac{3}{4} \times \frac{2}{1} \\ &= \frac{3 \times 2}{4 \times 1} \\ &= \frac{6}{4} \\ &= \frac{3}{2}\end{aligned}$$

10. Solution:

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

11. Solution:

$$\begin{aligned}\frac{1}{2} \times \frac{3}{16} \\ &= \frac{1 \times 3}{2 \times 16} \\ &= \frac{3}{32}\end{aligned}$$

12. Solution:

$$\begin{aligned}\frac{1}{2} \div \frac{3}{16} \\ &= \frac{1}{2} \times \frac{16}{3} \\ &= \frac{1 \times 16}{2 \times 3} \\ &= \frac{16}{6} \\ &= \frac{8}{3}\end{aligned}$$



13. Solution:

$$\begin{aligned}\frac{5}{16} \times 8 \\ &= \frac{5}{16} \times \frac{8}{1} \\ &= \frac{5 \times 8}{16 \times 1} \\ &= \frac{40}{16} \\ &= \frac{20}{8} \\ &= \frac{10}{4} \\ &= \frac{5}{2}\end{aligned}$$

14. Solution:

$$\begin{aligned}\frac{5}{16} \div 8 \\ &= \frac{5}{16} \times \frac{1}{8} \\ &= \frac{5 \times 1}{16 \times 8} \\ &= \frac{5}{128}\end{aligned}$$

15. Solution:

$$\begin{aligned}8 \div \frac{5}{16} \\ &= \frac{8}{1} \times \frac{16}{5} \\ &= \frac{8 \times 16}{1 \times 5} \\ &= \frac{128}{5}\end{aligned}$$

16. Solution:

$$\begin{aligned}\frac{5}{8} \times \frac{3}{4} \\ &= \frac{5 \times 3}{8 \times 4} \\ &= \frac{15}{32}\end{aligned}$$

17. Solution:

$$\begin{aligned}\frac{3}{8} \times \frac{3}{4} \\ &= \frac{3 \times 3}{8 \times 4} \\ &= \frac{9}{32}\end{aligned}$$

18. Solution:

$$\begin{aligned}\frac{3}{8} \div \frac{3}{4} \\ &= \frac{3}{8} \times \frac{4}{3} \\ &= \frac{3 \times 4}{8 \times 3} \\ &= \frac{12}{24} \\ &= \frac{1}{2}\end{aligned}$$



19. Solution:

$$\begin{aligned}\frac{3}{8} \times 3 \\ &= \frac{3}{8} \times \frac{3}{1} \\ &= \frac{3 \times 3}{8 \times 1} \\ &= \frac{9}{8}\end{aligned}$$

20. Solution:

$$\begin{aligned}\frac{3}{8} \div 3 \\ &= \frac{3}{8} \times \frac{1}{3} \\ &= \frac{3 \times 1}{8 \times 3} \\ &= \frac{3}{24} \\ &= \frac{1}{8}\end{aligned}$$

21. Solution:

$$\begin{aligned}3 \times \frac{9}{16} \\ &= \frac{3}{1} \times \frac{9}{16} \\ &= \frac{3 \times 9}{1 \times 16} \\ &= \frac{27}{16}\end{aligned}$$

22. Solution:

$$\begin{aligned}3 \div \frac{9}{16} \\ &= \frac{3}{1} \div \frac{9}{16} \\ &= \frac{3}{1} \times \frac{16}{9} \\ &= \frac{(1)\cancel{3}}{1} \times \frac{16}{(3)\cancel{9}} \\ &= \frac{16}{3}\end{aligned}$$

23. Solution:

$$\begin{aligned}\frac{1}{2} \div \frac{7}{8} \times 4 \\ &= \frac{1}{2} \times \frac{8}{7} \times \frac{4}{1} \\ &= \frac{1}{(1)\cancel{2}} \times \frac{8}{7} \times \frac{(2)\cancel{4}}{1} \\ &= \frac{8 \times 2}{7 \times 1} \\ &= \frac{16}{7}\end{aligned}$$

24. Solution:

$$\begin{aligned}\left(\frac{1}{2} \div \frac{7}{8}\right) \times 4 \\ &= \left(\frac{1}{2} \times \frac{8}{7}\right) \times \frac{4}{1} \\ &= \left(\frac{8}{14}\right) \times \frac{4}{1} \\ &= \frac{8}{(7)\cancel{14}} \times \frac{\cancel{4}(2)}{1} \\ &= \frac{8 \times 2}{7 \times 1} \\ &= \frac{16}{7}\end{aligned}$$



25. Solution:

$$\begin{aligned} & \frac{1}{2} \div \left(\frac{7}{8} \times 4 \right) \\ &= \frac{1}{2} \div \left(\frac{7}{\cancel{(2)}8} \times \frac{\cancel{(1)}4}{1} \right) \\ &= \frac{1}{2} \div \left(\frac{7 \times 1}{2 \times 1} \right) \\ &= \frac{1}{2} \div \frac{7}{2} \\ &= \frac{1}{2} \times \frac{2}{7} \\ &= \frac{1}{\cancel{(1)}2} \times \frac{\cancel{(1)}2}{7} \\ &= \frac{1}{7} \end{aligned}$$

Practice Section B

1. Solution:

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

2. Solution:

$$\begin{aligned} & \frac{1}{2} \div \frac{7}{8} \div \frac{3}{4} \\ &= \frac{1}{2} \times \frac{8}{7} \times \frac{4}{3} \\ &= \frac{1}{\cancel{(1)}2} \times \frac{8}{7} \times \frac{\cancel{(2)}4}{3} \\ &= \frac{1 \times 8 \times 2}{1 \times 7 \times 3} \\ &= \frac{16}{21} \end{aligned}$$



3. Solution:

$$\begin{aligned}\frac{9}{16} \div \frac{1}{2} \times \frac{5}{8} \\&= \frac{9}{16} \times \frac{2}{1} \times \frac{5}{8} \\&= \frac{9}{16} \times \frac{(1)\cancel{2}}{1} \times \frac{5}{(4)\cancel{8}} \\&= \frac{9 \times 1 \times 5}{16 \times 1 \times 4} \\&= \frac{45}{64}\end{aligned}$$

4. Solution:

$$\begin{aligned}\frac{3}{4} \times \frac{5}{8} \div \frac{1}{4} \\&= \frac{3}{4} \times \frac{5}{8} \times \frac{4}{1} \\&= \frac{3}{(1)\cancel{4}} \times \frac{5}{8} \times \frac{(1)\cancel{4}}{1} \\&= \frac{3 \times 5 \times 1}{1 \times 8 \times 1} \\&= \frac{15}{8}\end{aligned}$$

5. Solution:

$$\begin{aligned}\frac{3}{4} \div \frac{7}{8} \times \frac{1}{4} \\&= \frac{3}{4} \times \frac{8}{7} \times \frac{1}{4} \\&= \frac{3}{(1)\cancel{4}} \times \frac{(2)\cancel{8}}{7} \times \frac{1}{4} \\&= \frac{3 \times 2 \times 1}{1 \times 7 \times 4} \\&= \frac{6}{28} \\&= \frac{3}{14}\end{aligned}$$

6. Solution:

$$\begin{aligned}\frac{13}{16} \div \frac{3}{4} \times \frac{1}{8} \\&= \frac{13}{16} \times \frac{4}{3} \times \frac{1}{8} \\&= \frac{13}{16} \times \frac{(1)\cancel{4}}{3} \times \frac{1}{(2)\cancel{8}} \\&= \frac{13 \times 1 \times 1}{16 \times 3 \times 2} \\&= \frac{13}{96}\end{aligned}$$

7. Solution:

$$\begin{aligned}\frac{15}{16} \div \frac{1}{4} \div \frac{1}{2} \\&= \frac{15}{16} \times \frac{4}{1} \times \frac{2}{1} \\&= \frac{15}{(4)\cancel{16}} \times \frac{(1)\cancel{4}}{1} \times \frac{2}{1} \\&= \frac{15}{(2)\cancel{4}} \times \frac{1}{1} \times \frac{(1)\cancel{2}}{1} \\&= \frac{15 \times 1 \times 1}{2 \times 1 \times 1} \\&= \frac{15}{2}\end{aligned}$$

8. Solution:

$$\begin{aligned}\frac{3}{8} \div \frac{3}{4} \times \frac{5}{16} \\&= \frac{3}{8} \times \frac{4}{3} \times \frac{5}{16} \\&= \frac{(1)\cancel{3}}{8} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \times \frac{5}{(4)\cancel{16}} \\&= \frac{1 \times 1 \times 5}{8 \times 1 \times 4} \\&= \frac{5}{32}\end{aligned}$$



9. Solution:

$$\begin{aligned}\frac{3}{8} \div \frac{1}{8} \div \frac{1}{2} \\&= \frac{3}{8} \times \frac{8}{1} \times \frac{2}{1} \\&= \frac{3}{\cancel{(1)}} \times \frac{\cancel{(1)}}{1} \times \frac{2}{1} \\&= \frac{3 \times 1 \times 2}{1 \times 1 \times 1} \\&= \frac{6}{1} \\&= 6\end{aligned}$$

10. Solution:

$$\begin{aligned}\frac{9}{32} \div \frac{9}{16} \times \frac{1}{4} \\&= \frac{9}{32} \times \frac{16}{9} \times \frac{1}{4} \\&= \frac{\cancel{(1)}}{32} \times \frac{\cancel{(4)}}{\cancel{(1)}} \times \frac{1}{\cancel{(1)}} \\&= \frac{1}{\cancel{(8)}} \times \frac{\cancel{(1)}}{1} \times \frac{1}{1} \\&= \frac{1 \times 1 \times 1}{8 \times 1 \times 1} \\&= \frac{1}{8}\end{aligned}$$

11. Solution:

$$\begin{aligned}\frac{11}{16} \div \frac{3}{8} \times \frac{1}{16} \\&= \frac{11}{16} \times \frac{8}{3} \times \frac{1}{16} \\&= \frac{11}{\cancel{(2)}} \times \frac{\cancel{(1)}}{3} \times \frac{1}{16} \\&= \frac{11 \times 1 \times 1}{2 \times 3 \times 16} \\&= \frac{11}{96}\end{aligned}$$

12. Solution:

$$\begin{aligned}\frac{3}{16} \times 4 \div \frac{1}{2} \\&= \frac{3}{16} \times \frac{4}{1} \times \frac{2}{1} \\&= \frac{3}{\cancel{(4)}} \times \frac{\cancel{(1)}}{1} \times \frac{2}{1} \\&= \frac{3}{\cancel{(2)}} \times \frac{1}{1} \times \frac{\cancel{(1)}}{1} \\&= \frac{3 \times 1 \times 1}{2 \times 1 \times 1} \\&= \frac{3}{2}\end{aligned}$$

13. Solution:

$$\begin{aligned}\frac{3}{16} \div \left(\frac{1}{4} \times \frac{1}{2} \right) \\&= \frac{3}{16} \div \left(\frac{1}{8} \right) \\&= \frac{3}{16} \times \frac{8}{1} \\&= \frac{3}{\cancel{(2)}} \times \frac{\cancel{(1)}}{1} \\&= \frac{3 \times 1}{2 \times 1} \\&= \frac{3}{2}\end{aligned}$$



14. Solution:

$$\begin{aligned} & \frac{3}{8} \div \left(\frac{3}{4} \times \frac{5}{16} \right) \\ &= \frac{3}{8} \div \left(\frac{15}{64} \right) \\ &= \frac{3}{8} \times \frac{64}{15} \\ &= \frac{(1)\cancel{3}}{(1)\cancel{3}} \times \frac{(8)\cancel{64}}{(5)\cancel{15}} \\ &= \frac{1 \times 8}{1 \times 5} \\ &= \frac{8}{5} \end{aligned}$$

15. Solution:

$$\begin{aligned} & 8 \div \left(\frac{9}{16} \times \frac{1}{4} \right) \\ &= 8 \div \left(\frac{9}{64} \right) \\ &= \frac{8}{1} \times \frac{64}{9} \\ &= \frac{512}{9} \end{aligned}$$

16. Solution:

$$\begin{aligned} & \frac{5}{16} \div \left(\frac{3}{8} \times \frac{1}{4} \right) \\ &= \frac{5}{16} \div \left(\frac{3}{32} \right) \\ &= \frac{5}{16} \times \frac{32}{3} \\ &= \frac{5}{(1)\cancel{16}} \times \frac{(2)\cancel{32}}{3} \\ &= \frac{5 \times 2}{1 \times 3} \\ &= \frac{10}{3} \end{aligned}$$

17. Solution:

$$\begin{aligned} & \frac{3}{8} \div \frac{3}{4} \div \frac{5}{32} \div \frac{1}{2} \\ &= \frac{3}{8} \times \frac{4}{3} \times \frac{32}{5} \times \frac{2}{1} \\ &= \frac{(1)\cancel{3}}{(2)\cancel{3}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \times \frac{32}{5} \times \frac{2}{1} \\ &= \frac{1}{(1)\cancel{2}} \times \frac{1}{1} \times \frac{32}{5} \times \frac{(1)\cancel{2}}{1} \\ &= \frac{1 \times 1 \times 32 \times 1}{1 \times 1 \times 5 \times 1} \\ &= \frac{32}{5} \end{aligned}$$



18. Solution:

$$\begin{aligned} & \frac{9}{16} \times \frac{1}{2} \div \frac{3}{32} \times \frac{1}{8} \\ &= \frac{9}{16} \times \frac{1}{2} \times \frac{32}{3} \times \frac{1}{8} \\ &= \frac{(3)\cancel{9}}{(1)\cancel{16}} \times \frac{1}{2} \times \frac{(2)\cancel{32}}{(1)\cancel{3}} \times \frac{1}{8} \\ &= \frac{3}{1} \times \frac{1}{(1)\cancel{2}} \times \frac{(1)\cancel{2}}{1} \times \frac{1}{8} \\ &= \frac{3 \times 1 \times 1 \times 1}{1 \times 1 \times 1 \times 8} \\ &= \frac{3}{8} \end{aligned}$$

19. Solution:

$$\begin{aligned} & \frac{9}{16} \times \left(\frac{1}{2} \div \frac{3}{32} \right) \times \frac{1}{8} \\ &= \frac{9}{16} \times \left(\frac{1}{2} \times \frac{32}{3} \right) \times \frac{1}{8} \\ &= \frac{9}{16} \times \left(\frac{32}{6} \right) \times \frac{1}{8} \\ &= \frac{(3)\cancel{9}}{(1)\cancel{16}} \times \frac{(2)\cancel{32}}{(2)\cancel{6}} \times \frac{1}{8} \\ &= \frac{3}{1} \times \frac{(1)\cancel{2}}{(1)\cancel{2}} \times \frac{1}{8} \\ &= \frac{3 \times 1 \times 1}{1 \times 1 \times 8} \\ &= \frac{3}{8} \end{aligned}$$

20. Solution:

$$\begin{aligned} & \frac{3}{4} \div \left(\frac{3}{4} \times \frac{5}{8} \right) \div 4 \\ &= \frac{3}{4} \div \frac{15}{32} \div 4 \\ &= \frac{3}{4} \times \frac{32}{15} \times \frac{1}{4} \\ &= \frac{(1)\cancel{3}}{(1)\cancel{4}} \times \frac{(8)\cancel{32}}{(5)\cancel{15}} \times \frac{1}{4} \\ &= \frac{1}{1} \times \frac{(2)\cancel{8}}{5} \times \frac{1}{(1)\cancel{4}} \\ &= \frac{1 \times 2 \times 1}{1 \times 5 \times 1} \\ &= \frac{2}{5} \end{aligned}$$

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

$$\begin{aligned} & \frac{3}{8} \div \frac{3}{4} \times \frac{5}{16} \div \frac{5}{32} \div \frac{1}{2} \\ &= \frac{3}{8} \times \frac{4}{3} \times \frac{5}{16} \times \frac{32}{5} \times \frac{2}{1} \\ &= \frac{\cancel{(1)}^1}{\cancel{(2)}^1} \times \frac{\cancel{(1)}^1}{\cancel{(1)}^1} \times \frac{\cancel{(1)}^1}{\cancel{(1)}^1} \times \frac{\cancel{(2)}^2}{\cancel{(1)}^1} \times \frac{2}{1} \\ &= \frac{1}{\cancel{(1)}^1} \times \frac{1}{1} \times \frac{1}{1} \times \frac{\cancel{(1)}^1}{1} \times \frac{2}{1} \\ &= \frac{1 \times 1 \times 1 \times 1 \times 2}{1 \times 1 \times 1 \times 1 \times 1} \\ &= \frac{2}{1} \\ &= 2 \end{aligned}$$

2. Solution:

$$\begin{aligned} & \frac{3}{4} \div \left(\frac{1}{2} \times 3 \right) \div \left(\frac{3}{8} \div \frac{1}{2} \right) \\ &= \frac{3}{4} \div \left(\frac{1}{2} \times \frac{3}{1} \right) \div \left(\frac{3}{8} \times \frac{2}{1} \right) \\ &= \frac{3}{4} \div \left(\frac{3}{2} \right) \div \left(\frac{6}{8} \right) \\ &= \frac{3}{4} \times \frac{2}{3} \times \frac{8}{6} \\ &= \frac{\cancel{(1)}^1}{\cancel{(1)}^1} \times \frac{\cancel{(1)}^1}{\cancel{(1)}^1} \times \frac{\cancel{(2)}^2}{\cancel{(3)}^1} \\ &= \frac{1 \times 1 \times 2}{1 \times 1 \times 3} \\ &= \frac{2}{3} \end{aligned}$$

3. Solution:

$$\begin{aligned} & \left(\frac{7}{16} \div \frac{3}{4} \right) \times \left(\frac{3}{4} \div \frac{5}{8} \right) \div \frac{1}{2} \\ &= \left(\frac{7}{16} \times \frac{4}{3} \right) \times \left(\frac{3}{4} \times \frac{8}{5} \right) \times \frac{2}{1} \\ &= \frac{28}{48} \times \frac{24}{20} \times \frac{2}{1} \\ &= \frac{\cancel{(7)}^7}{\cancel{(12)}^4} \times \frac{\cancel{(6)}^6}{\cancel{(5)}^5} \times \frac{2}{1} \\ &= \frac{7}{12} \times \frac{6}{5} \times \frac{2}{1} \\ &= \frac{7}{\cancel{(2)}^1} \times \frac{\cancel{(1)}^1}{5} \times \frac{2}{1} \\ &= \frac{7}{\cancel{(1)}^1} \times \frac{1}{5} \times \frac{\cancel{(1)}^1}{1} \\ &= \frac{7 \times 1 \times 1}{1 \times 5 \times 1} \\ &= \frac{7}{5} \end{aligned}$$



4. Solution:

$$\begin{aligned}
& \left(\frac{3}{8} \div \frac{3}{4}\right) \times \left(\frac{5}{16} \div \frac{5}{32}\right) \div \left(6 \times \frac{3}{16}\right) \\
&= \left(\frac{3}{8} \times \frac{4}{3}\right) \times \left(\frac{5}{16} \times \frac{32}{5}\right) \div \left(\frac{6}{1} \times \frac{3}{16}\right) \\
&= \left(\frac{(1)\cancel{3}}{(2)\cancel{3}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}}\right) \times \left(\frac{(1)\cancel{5}}{(1)\cancel{16}} \times \frac{(2)\cancel{32}}{(1)\cancel{5}}\right) \div \left(\frac{6}{1} \times \frac{3}{16}\right) \\
&= \left(\frac{1}{2}\right) \times \left(\frac{2}{1}\right) \div \left(\frac{(3)\cancel{6}}{1} \times \frac{3}{(8)\cancel{16}}\right) \\
&= \frac{1}{2} \times \frac{2}{1} \div \frac{9}{8} \\
&= \frac{1}{2} \times \frac{2}{1} \times \frac{8}{9} \\
&= \frac{1}{(1)\cancel{2}} \times \frac{(1)\cancel{2}}{1} \times \frac{8}{9} \\
&= \frac{1 \times 1 \times 8}{1 \times 1 \times 9} \\
&= \frac{8}{9}
\end{aligned}$$

5. Solution:

$$\begin{aligned}
& 4 \times \frac{3}{16} \div \left[\left(\frac{3}{4} \times \frac{5}{32}\right) \times \frac{5}{32}\right] \times \left(\frac{25}{64} \times \frac{5}{16}\right) \\
&= \frac{(1)\cancel{4}}{1} \times \frac{3}{(4)\cancel{16}} \div \left[\left(\frac{15}{128}\right) \times \frac{5}{32}\right] \times \left(\frac{125}{1024}\right) \\
&= \frac{3}{4} \div \left[\frac{75}{4096}\right] \times \left(\frac{125}{1024}\right) \\
&= \frac{3}{4} \times \frac{4096}{75} \times \frac{125}{1024} \\
&= \frac{3}{4} \times \frac{(4)\cancel{4096}}{(3)\cancel{75}} \times \frac{(5)\cancel{125}}{(1)\cancel{1024}} \\
&= \frac{3}{4} \times \frac{4}{3} \times \frac{5}{1} \\
&= \frac{(1)\cancel{3}}{(1)\cancel{4}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \times \frac{5}{1} \\
&= \frac{1 \times 1 \times 5}{1 \times 1 \times 1} \\
&= \frac{5}{1} \\
&= 5
\end{aligned}$$

**Practice Section D**

1. Solution:

Although the brackets in B mean that the division is done before the multiplication, all three expressions are equal to $\frac{1}{8}$. This means that Jim is correct. (Note that the brackets in C make it no different than A.)

$$\begin{aligned} \text{A. } & \frac{1}{2} \times \frac{3}{16} \div \frac{3}{4} \\ & = \frac{1}{2} \times \frac{3}{16} \times \frac{4}{3} \\ & = \frac{1}{2} \times \frac{(1)\cancel{3}}{(4)\cancel{16}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \\ & = \frac{1 \times 1 \times 1}{2 \times 4 \times 1} \\ & = \frac{1}{8} \end{aligned}$$

$$\begin{aligned} \text{B. } & \frac{1}{2} \times \left(\frac{3}{16} \div \frac{3}{4} \right) \\ & = \frac{1}{2} \times \left(\frac{3}{16} \times \frac{4}{3} \right) \\ & = \frac{1}{2} \times \left(\frac{(1)\cancel{3}}{(4)\cancel{16}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \right) \\ & = \frac{1 \times 1 \times 1}{2 \times 4 \times 1} \\ & = \frac{1}{8} \end{aligned}$$

$$\begin{aligned} \text{C. } & \left(\frac{1}{2} \times \frac{3}{16} \right) \div \frac{3}{4} \\ & = \left(\frac{3}{32} \right) \times \frac{4}{3} \\ & = \frac{(1)\cancel{3}}{(8)\cancel{32}} \times \frac{(1)\cancel{4}}{(1)\cancel{3}} \\ & = \frac{1 \times 1}{8 \times 1} \\ & = \frac{1}{8} \end{aligned}$$

Practice Section E

Solution:

$$\begin{aligned} \text{Hannah} \\ 40 \times 7 \frac{1}{4} \\ & = (40 \times 7) + \left(40 \times \frac{1}{4} \right) \\ & = 280 + 10 \\ & = \$290 \end{aligned}$$

$$\begin{aligned} \text{Jack} \\ 40 \times 6 \frac{1}{2} \\ & = (40 \times 6) + \left(40 \times \frac{1}{2} \right) \\ & = 240 + 20 \\ & = \$260 \end{aligned}$$

If Jack makes \$260 a week, he earns $\$290 - \$260 = \$30$ less than Hannah. If Jack works an extra 4 hours, he will make \$26 which will total \$286. If he works $4\frac{1}{2}$ hours, he will still not have enough since an extra $4\frac{1}{2}$ hours is \$29.25 yielding \$289.25. Jack will have to work 5 extra hours a week to earn.