Workplace Education Manitoba

NUMERACY:
The Basics Workbook

Set C: Adding & Subtracting Fractions 1

Companion Workbook to Numeracy: The Basics Video Series

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

ACKNOWLEDGMENTS

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.

For more information,
visit www.wem.mb.ca
or contact the Project Coordinator
Lindsay Laidlaw at info@wem.mb.ca

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

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

ADDING & SUBTRACTING FRACTIONS 1

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. $\frac{1}{4}+\frac{1}{4}$ = _____
2. $\frac{7}{8}+\frac{3}{8}$ = _____
3. $\frac{5}{16}+\frac{6}{16}$ = _____
4. $\frac{1}{2}+\frac{1}{2}$ = _____
5. $\frac{13}{16}-\frac{5}{16}$ = _____
6. $\frac{3}{4}-\frac{1}{4}$ = _____
7. $\frac{3}{8}-\frac{1}{8}$ = _____
8. $\frac{28}{32}-\frac{10}{32}$ = _____
9. $\frac{5}{8}-\frac{2}{8}$ = _____
10. $\frac{17}{32}+\frac{3}{32}$ = _____

Practice Section B

Calculate the following. Express your answer in lowest terms.

1. $\frac{1}{8}+\frac{3}{8}+\frac{5}{8}$ = _____

2. $\frac{5}{16}+\frac{1}{16}+\frac{7}{16}$ = _____

3. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$ = _____

4. $\frac{13}{16}-\frac{5}{16}+\frac{1}{16}$ = _____

5. $\frac{5}{8}+\frac{3}{8}-\frac{1}{8}$ = _____

6. $\frac{7}{16}-\frac{6}{16}+\frac{1}{16}$ = _____

7. $\frac{3}{4}-\frac{1}{4}+\frac{5}{4}$ = _____

8. $\frac{7}{8}-\frac{3}{8}-\frac{1}{8}$ = _____

9. $\frac{17}{32}+\frac{3}{32}-\frac{12}{32}$ = _____

10. $\frac{7}{16}-\frac{3}{16}+\frac{1}{16}$ = _____

11. $\frac{22}{32}-\frac{5}{32}-\frac{7}{32}$ = _____

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

13. $\frac{7}{8}+\frac{8}{8}-\frac{1}{8}$ = _____

14. $\frac{11}{16}+\frac{1}{16}-\frac{7}{16}$ = _____

15. $\frac{29}{32}-\frac{5}{32}-\frac{13}{32}$ = _____

16. $\frac{15}{2}-\frac{5}{2}-\frac{7}{2}+\frac{3}{2}$ = _____

17. $\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$ = _____

18. $\frac{5}{8}-\left(\frac{3}{8}-\frac{4}{8}\right)$ = _____

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

20. $\frac{7}{8}+\frac{3}{8}-\left(\frac{1}{8}-\frac{5}{8}\right)-\frac{1}{8}$ = _____

Practice Section C

Calculate the following. Express your answer in lowest terms.

1. $\frac{7}{8}-\frac{1}{8}+\frac{5}{8}-\frac{3}{8}$ = _____

2. $\frac{7}{16}-\frac{3}{16}+\frac{1}{16}-\frac{5}{16}+\frac{9}{16}+\frac{1}{16}$ = _____

3. $\frac{22}{32}-\frac{4}{32}-\frac{17}{32}+\frac{15}{32}$ = _____

4. $\frac{29}{32}-\left(\frac{13}{32}-\frac{5}{32}\right)-\left(\frac{3}{32}+\frac{3}{32}+\frac{1}{32}\right)$ = _____

5. $\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)-\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\frac{13}{16}+\left(\frac{15}{16}-\frac{1}{16}\right)$ = _____

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.

$$\frac{22}{32}-\left(\frac{5}{32}-\frac{17}{32}\right)+\frac{15}{32}$$
$$=\frac{22}{32}-\left(-\frac{12}{32}\right)+\frac{15}{32}$$
$$=\frac{22}{32}-\frac{12}{32}+\frac{15}{32}$$
$$=\frac{10}{32}+\frac{15}{32}$$
$$=\frac{25}{32}$$

= _____

2. Two really keen math students are having an argument about fractions. Joyce says that 'the numerator of a fraction must be smaller than the denominator of the fraction.' Jackson says that the numerator can be any number. Who is correct? Explain your reasoning.

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.

$$\left[\frac{13}{16}+\left(\frac{5}{16}+\frac{3}{16}\right)\right]+\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

= _____

SOLUTIONS

Set C

Adding & Subtracting Fractions 1

ADDING & SUBTRACTING FRACTIONS 1

Practice Section A

1. Solution:

$$\frac{1}{4}+\frac{1}{4}$$
$$=\frac{2}{4}$$
$$=\frac{1}{2}$$

2. Solution:

$$\frac{7}{8}+\frac{3}{8}$$
$$=\frac{10}{8}$$
$$=\frac{5}{4}$$

3. Solution:

$$\frac{5}{16}+\frac{6}{16}$$
$$=\frac{11}{16}$$

4. Solution:

$$\frac{1}{2}+\frac{1}{2}$$
$$=\frac{2}{2}$$
$$=1$$

5. Solution:

$$\frac{13}{16}-\frac{5}{16}$$
$$=\frac{8}{16}$$
$$=\frac{1}{2}$$

6. Solution:

$$\frac{3}{4}-\frac{1}{4}$$
$$=\frac{2}{4}$$
$$=\frac{1}{2}$$

7. Solution:

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

8. Solution:

$$\frac{28}{32}-\frac{10}{32}$$
$$=\frac{18}{32}$$
$$=\frac{9}{16}$$

9. Solution:

$$\frac{5}{8}-\frac{2}{8}$$
$$=\frac{3}{8}$$

10. Solution:

$$\frac{17}{32}+\frac{3}{32}$$
$$=\frac{20}{32}$$
$$=\frac{10}{16}$$
$$=\frac{5}{8}$$

Practice Section B

1. Solution:

$$\frac{1}{8}+\frac{3}{8}+\frac{5}{8}$$
$$=\frac{4}{8}+\frac{5}{8}$$
$$=\frac{9}{8}$$

2. Solution:

$$\frac{5}{16}+\frac{1}{16}+\frac{7}{16}$$
$$=\frac{6}{16}+\frac{7}{16}$$
$$=\frac{13}{16}$$

3. Solution:

$$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$$
$$=\frac{2}{4}+\frac{1}{4}$$
$$=\frac{3}{4}$$

4. Solution:

$$\frac{13}{16}-\frac{5}{16}+\frac{1}{16}$$
$$=\frac{8}{16}+\frac{1}{16}$$
$$=\frac{9}{16}$$

5. Solution:

$$\frac{5}{8}+\frac{3}{8}-\frac{1}{8}$$
$$=\frac{8}{8}-\frac{1}{8}$$
$$=\frac{7}{8}$$

6. Solution:

$$\frac{7}{16}-\frac{6}{16}+\frac{1}{16}$$
$$=\frac{1}{16}+\frac{1}{16}$$
$$=\frac{2}{16}$$
$$=\frac{1}{8}$$

7. Solution:

$$\frac{3}{4}-\frac{1}{4}+\frac{5}{4}$$
$$=\frac{2}{4}+\frac{5}{4}$$
$$=\frac{7}{4}$$

8. Solution:

$$\frac{7}{8}-\frac{3}{8}-\frac{1}{8}$$
$$=\frac{4}{8}-\frac{1}{8}$$
$$=\frac{3}{8}$$

9. Solution:

$$\frac{17}{32}+\frac{3}{32}-\frac{12}{32}$$
$$=\frac{20}{32}-\frac{12}{32}$$
$$=\frac{8}{32}$$
$$=\frac{4}{16}$$
$$=\frac{1}{4}$$

10. Solution:

$$\frac{7}{16}-\frac{3}{16}+\frac{1}{16}$$
$$=\frac{4}{16}+\frac{1}{16}$$
$$=\frac{5}{16}$$

11. Solution:

$$\frac{22}{32}-\frac{5}{32}-\frac{7}{32}$$
$$=\frac{17}{32}-\frac{7}{32}$$
$$=\frac{10}{32}$$
$$=\frac{5}{16}$$

12. Solution:

$$\frac{3}{4}-\frac{2}{4}+\frac{1}{4}$$
$$=\frac{1}{4}+\frac{1}{4}$$
$$=\frac{2}{4}$$
$$=\frac{1}{2}$$

13. Solution:

$$\frac{7}{8}+\frac{8}{8}-\frac{1}{8}$$
$$=\frac{15}{8}-\frac{1}{8}$$
$$=\frac{14}{8}$$
$$=\frac{7}{4}$$

14. Solution:

$$\frac{11}{16}+\frac{1}{16}-\frac{7}{16}$$
$$=\frac{12}{16}-\frac{7}{16}$$
$$=\frac{5}{16}$$

15. Solution:

$$\frac{29}{32}-\frac{5}{32}-\frac{13}{32}$$
$$=\frac{24}{32}-\frac{13}{32}$$
$$=\frac{11}{32}$$

16. Solution:

$$\frac{15}{2}-\frac{5}{2}-\frac{7}{2}+\frac{3}{2}$$
$$=\frac{10}{2}-\frac{7}{2}+\frac{3}{2}$$
$$=\frac{3}{2}+\frac{3}{2}$$
$$=\frac{6}{2}$$
$$=\frac{3}{1}$$
$$=3$$

17. Solution:

$$\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$
$$=\frac{13}{16}-\frac{8}{16}$$
$$=\frac{5}{16}$$

18. Solution:

$$\frac{5}{8}-\left(\frac{3}{8}-\frac{4}{8}\right)$$
$$=\frac{5}{8}-\left(-\frac{1}{8}\right)$$
$$=\frac{5}{8}+\frac{1}{8}$$
$$=\frac{6}{8}$$
$$=\frac{3}{4}$$

19. Solution:

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

20. Solution:

$$\frac{7}{8}+\frac{3}{8}-\left(\frac{1}{8}-\frac{5}{8}\right)-\frac{1}{8}$$
$$=\frac{7}{8}+\frac{3}{8}-\left(-\frac{4}{8}\right)-\frac{1}{8}$$
$$=\frac{7}{8}+\frac{3}{8}+\frac{4}{8}-\frac{1}{8}$$
$$=\frac{10}{8}+\frac{4}{8}-\frac{1}{8}$$
$$=\frac{14}{8}-\frac{1}{8}$$
$$=\frac{13}{8}$$

Practice Section C

1. Solution:

$$\frac{7}{8}-\frac{1}{8}+\frac{5}{8}-\frac{3}{8}$$
$$=\frac{6}{8}+\frac{5}{8}-\frac{3}{8}$$
$$=\frac{11}{8}-\frac{3}{8}$$
$$=\frac{8}{8}$$
$$=1$$

2. Solution:

$$\frac{7}{16}-\frac{3}{16}+\frac{1}{16}-\frac{5}{16}+\frac{9}{16}+\frac{1}{16}$$
$$=\frac{4}{16}+\frac{1}{16}-\frac{5}{16}+\frac{9}{16}+\frac{1}{16}$$
$$=\frac{5}{16}-\frac{5}{16}+\frac{9}{16}+\frac{1}{16}$$
$$=0+\frac{9}{16}+\frac{1}{16}$$
$$=\frac{10}{16}$$
$$=\frac{5}{8}$$

3. Solution:

$$\frac{22}{32}-\frac{4}{32}-\frac{17}{32}+\frac{15}{32}$$
$$=\frac{18}{32}-\frac{17}{32}+\frac{15}{32}$$
$$=\frac{1}{32}+\frac{15}{32}$$
$$=\frac{16}{32}$$
$$=\frac{1}{2}$$

4. Solution:

$$\frac{29}{32}-\left(\frac{13}{32}-\frac{5}{32}\right)-\left(\frac{3}{32}+\frac{3}{32}+\frac{1}{32}\right)$$
$$=\frac{29}{32}-\frac{8}{32}-\left(\frac{3}{32}+\frac{3}{32}+\frac{1}{32}\right)$$
$$=\frac{29}{32}-\frac{8}{32}-\left(\frac{6}{32}+\frac{1}{32}\right)$$
$$=\frac{29}{32}-\frac{8}{32}-\frac{7}{32}$$
$$=\frac{21}{32}-\frac{7}{32}$$
$$=\frac{14}{32}$$
$$=\frac{7}{16}$$

5. Solution:

$$\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)-\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\frac{13}{16}+\left(\frac{15}{16}-\frac{1}{16}\right)$$
$$=\frac{13}{16}-\frac{8}{16}-\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\frac{13}{16}+\left(\frac{15}{16}-\frac{1}{16}\right)$$
$$=\frac{13}{16}-\frac{8}{16}-\left(\frac{4}{16}+\frac{1}{16}\right)-\frac{13}{16}+\left(\frac{15}{16}-\frac{1}{16}\right)$$
$$=\frac{13}{16}-\frac{8}{16}-\frac{5}{16}-\frac{13}{16}+\left(\frac{15}{16}-\frac{1}{16}\right)$$
$$=\frac{13}{16}-\frac{8}{16}-\frac{5}{16}-\frac{13}{16}+\frac{14}{16}$$
$$=\frac{5}{16}-\frac{5}{16}-\frac{13}{16}+\frac{14}{16}$$
$$=0-\frac{13}{16}+\frac{14}{16}$$
$$=\frac{1}{16}$$

Practice Section D

1. Solution:

There is an error in line 3. The double negative (– –) equals $-\left(-\frac{12}{32}\right)=\frac{12}{32}$, but it is written as $-\frac{12}{32}$.

The correct solution is:

$$\begin{aligned}&\frac{22}{32}-\left(\frac{5}{32}-\frac{17}{32}\right)+\frac{15}{32}\\=&\frac{22}{32}-\left(-\frac{12}{32}\right)+\frac{15}{32}\\=&\frac{22}{32}+\frac{12}{32}+\frac{15}{32}\\=&\frac{34}{32}+\frac{15}{32}\\=&\frac{49}{32}\end{aligned}$$

2. Solution:

Jackson is correct. Although it is true that some fractions have a smaller numerator than denominator (for example $\frac{5}{8}$, $\frac{3}{4}$ and $\frac{1}{2}$), there are some fractions that have an equal numerator and denominator (for example $\frac{2}{2}$, $\frac{4}{4}$ and $\frac{16}{16}$). Some fractions that have a numerator that is larger than the denominator, like $\frac{11}{8}$, $\frac{22}{16}$ and $\frac{34}{32}$, are called improper fractions. It may be more common to represent $\frac{11}{8}$, an improper fraction, as $1\frac{3}{8}$, a mixed fraction.

Practice Section E

Solution:

$$\left[\frac{13}{16}+\left(\frac{5}{16}+\frac{3}{16}\right)\right]+\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\left[\frac{13}{16}+\frac{8}{16}\right]+\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\left(\frac{7}{16}-\frac{3}{16}+\frac{1}{16}\right)-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\left(\frac{4}{16}+\frac{1}{16}\right)-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\frac{5}{16}-\left[\frac{13}{16}-\left(\frac{1}{16}+\frac{7}{16}\right)\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\frac{5}{16}-\left[\frac{13}{16}-\frac{8}{16}\right]+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\frac{5}{16}-\frac{5}{16}+\frac{13}{16}-\left(\frac{5}{16}+\frac{3}{16}\right)$$

$$=\frac{21}{16}+\frac{5}{16}-\frac{5}{16}+\frac{13}{16}-\frac{8}{16}$$

$$=\frac{26}{16}-\frac{5}{16}+\frac{13}{16}-\frac{8}{16}$$

$$=\frac{21}{16}+\frac{13}{16}-\frac{8}{16}$$

$$=\frac{34}{16}-\frac{8}{16}$$

$$=\frac{26}{16}$$

$$=\frac{13}{8}$$