

#2082 GLA	
Guided Learning Activity Multiplying and Dividing Mixed Numerals Author: Dennis Morrow Σ SIGMA-MAC	This packet contains background information for GLA 2082a, 2082b, etc. It is intended for student and tutor use as needed.

College of the Canyons Mathematics Supplement

Multiplication and Division with Mixed Numerals

Multiplication:

The most common way to multiply mixed numerals is to convert them to improper fractions and execute fractions multiplication, i.e. cancel and multiply straight across. For example:

$$3\frac{3}{4} \times 4\frac{2}{3} = \frac{15}{4} \times \frac{14}{3} = \frac{\overset{5}{\cancel{15}}}{4} \times \frac{14}{\underset{2}{\cancel{3}}} = \frac{5 \times 7}{2 \times 1} = \frac{35}{2}$$

For algebra and beyond the simplified improper fraction, $\frac{35}{2}$, is an acceptable answer to the problem. However, the outside world usually prefers mixed numerals to improper fractions, so $\frac{35}{2}$ is changed to the mixed numeral $17\frac{1}{2}$ by dividing 2 into 35.

Division:

Once multiplication is mastered, division is easy. Division is multiplication by a reciprocal.

$$a \div b = a \times \frac{1}{b}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Just convert the mixed numerals to improper fractions, invert the divisor, and multiply. For example:

$$2\frac{4}{9} \div 2\frac{8}{21} = \frac{22}{9} \div \frac{50}{21} = \frac{22}{9} \times \frac{21}{50} = \frac{\overset{11}{\cancel{22}}}{9} \times \frac{21}{\underset{25}{\cancel{50}}} = \frac{77}{75}$$

(Remember to invert the right one, not the wrong one. The right one is the one on the right, not the left.)

Examples of multiplication and division:

$$6\frac{3}{4} \times 2\frac{4}{9} \div 3\frac{2}{3} = \frac{27}{4} \times \frac{22}{9} \div \frac{11}{3} = \frac{27}{4} \times \frac{22}{9} \times \frac{3}{11}$$

$$= \frac{\overset{3}{\cancel{27}}}{\underset{2}{4}} \times \frac{\overset{1}{\cancel{22}}}{\underset{1}{9}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{11}} = \frac{3 \times 1 \times 3}{2 \times 1 \times 1} = \frac{9}{2}$$

(On the first round of cancelling the factor, 9, was removed from the 27 in the numerator and the 9 in the denominator and 11 was removed from the numerator and denominator. On the second round 2 was cancelled from the numerator and denominator. Notice that the $\div \frac{11}{3}$ was replaced with $\times \frac{3}{11}$, and nothing else changed.)

$$6\frac{3}{4} \div 2\frac{1}{4} \times 3\frac{2}{3} = \frac{27}{4} \div \frac{9}{4} \times \frac{11}{3} = \frac{27}{4} \times \frac{4}{9} \times \frac{11}{3}$$

$$= \frac{\overset{1}{\cancel{27}}}{\underset{1}{4}} \times \frac{\overset{1}{\cancel{4}}}{\underset{1}{9}} \times \frac{\overset{1}{\cancel{11}}}{\underset{1}{3}} = \frac{1 \times 1 \times 11}{1 \times 1 \times 1} = \frac{11}{1} = 11$$

(On the first round of cancelling 9 was removed from the 27 in the numerator and the 9 in the denominator and 4 was removed from the numerator and denominator. On the second round 3 was cancelled from the numerator and denominator. Notice that the $\div 2\frac{1}{4}$ was replaced with $\times \frac{4}{9}$, and nothing else changed. Also, notice that the final answer is 11 and not $\frac{11}{1}$.)

$$1\frac{3}{4} \div 10\frac{1}{5} \div 1\frac{1}{34} = \frac{7}{4} \div \frac{51}{5} \div \frac{35}{34} = \frac{7}{4} \times \frac{5}{51} \times \frac{34}{35}$$

$$= \frac{\overset{1}{\cancel{7}}}{\underset{2}{4}} \times \frac{\overset{1}{\cancel{5}}}{\underset{3}{51}} \times \frac{\overset{1}{\cancel{34}}}{\underset{5}{35}} = \frac{1 \times 1 \times 1}{2 \times 3 \times 1} = \frac{1}{6}$$

(On the first round of cancelling 7 was removed from the 7 in the numerator and the 35 in the denominator and 2 was removed from the 34 in the numerator and the 4 in the denominator. On the second round 17 was cancelled from the 17 in the numerator and

the 51 in the denominator, and 5 was canceled from the numerator and denominator.

Notice that the $\div \frac{51}{5}$ was replaced with $\times \frac{5}{51}$, and $\div \frac{35}{34}$ with $\times \frac{34}{35}$.)

$$3\frac{3}{4} \times 4\frac{2}{3} \times 2\frac{4}{9} \div 2\frac{8}{21} = \frac{15}{4} \times \frac{14}{3} \times \frac{22}{9} \div \frac{50}{21} = \frac{15}{4} \times \frac{14}{3} \times \frac{22}{9} \times \frac{21}{50}$$

$$= \frac{\overset{1}{\cancel{5}} \cancel{15}}{\underset{2}{4}} \times \frac{\overset{7}{\cancel{14}}}{\underset{1}{3}} \times \frac{\overset{11}{\cancel{22}}}{\underset{3}{9}} \times \frac{\overset{7}{\cancel{21}}}{\underset{\cancel{25}}{50}} = \frac{1 \times 7 \times 11 \times 7}{2 \times 1 \times 3 \times 5} = \frac{539}{30}$$

(On the first round of cancelling 2 was cancelled from the 4 and 14 and from the 22 and 50, and 3 was cancelled from the 15 and 9. On the second round of cancelling 5 was cancelled from the 5 and 25. Also, notice that the $\div \frac{50}{21}$ changed to $\times \frac{21}{50}$.)

#2082a GLA	Student: _____
Guided Learning Activity Multiplying and Dividing Mixed Numerals, Exercise Set #1 Author: Dennis Morrow Σ SIGMA-MAC	Course Instructor: _____ Date Completed: _____ Approved: _____

Multiplication and Division with Mixed Numerals, Exercise Set #1

Multiplication:

The most common way to multiply mixed numerals is to convert them to improper fractions and execute fractions multiplication, i.e. cancel and multiply straight across. For example:

$$3\frac{3}{4} \times 4\frac{2}{3} = \frac{15}{4} \times \frac{14}{3} = \frac{\overset{5}{\cancel{15}}}{4} \times \frac{14}{\underset{2}{\cancel{3}}} = \frac{5 \times 7}{2 \times 1} = \frac{35}{2}$$

For algebra and beyond the simplified improper fraction, $\frac{35}{2}$, is an acceptable answer to the problem. However, the outside world usually prefers mixed numerals to improper fractions, so $\frac{35}{2}$ is changed to the mixed numeral $17\frac{1}{2}$ by dividing 2 into 35.

Division:

Once multiplication is mastered, division is easy. Division is multiplication by a reciprocal.

$$a \div b = a \times \frac{1}{b}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Just convert the mixed numerals to improper fractions, invert the divisor, and multiply. For example:

$$2\frac{4}{9} \div 2\frac{8}{21} = \frac{22}{9} \div \frac{50}{21} = \frac{22}{9} \times \frac{21}{50} = \frac{\overset{11}{\cancel{22}}}{9} \times \frac{21}{\underset{25}{\cancel{50}}} = \frac{77}{75}$$

(Remember to invert the right one, not the wrong one. The right one is the one on the right, not the left.)

Exercises:

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

Fill in the blanks and cancel, showing all work and following the examples above.

$$1\frac{3}{5} \div 4\frac{1}{2} \div 1\frac{1}{3} \div 1\frac{1}{2} = \frac{5}{5} \div \frac{2}{2} \div \frac{3}{3} \div \frac{2}{2} = \frac{\quad}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Ans: $\frac{8}{45}$ _____

2. $1\frac{2}{3} \div 1\frac{5}{6} \times 2\frac{1}{16} \times 1\frac{3}{5}$

Fill in the blanks and cancel, showing all work and following the examples above.

$$1\frac{2}{3} \div 1\frac{5}{6} \times 2\frac{1}{16} \times 1\frac{3}{5} = \frac{2}{3} \div \frac{5}{6} \times \frac{1}{16} \times \frac{3}{5} = \frac{2}{3} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Ans: _____

Simplify the following completely. (You must follow the examples above and indicate all cancelations before the final multiplications.)

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

Ans: _____

4. $10\frac{1}{2} \div 1\frac{2}{5}$

Ans: _____

5. $8\frac{4}{9} \div 28\frac{1}{2} \times 3\frac{6}{7}$

Ans: _____

6. $1\frac{3}{4} \times 1\frac{31}{35} \times 1\frac{1}{11}$

Ans: _____

7. $3\frac{3}{5} \div 1\frac{4}{5} \div 6 \times 3\frac{6}{7}$

Ans: _____

8. $1\frac{3}{4} \div 1\frac{1}{6} \times 1\frac{1}{11} \div 1\frac{4}{5}$

Ans: _____

9. $7\frac{1}{5} \times 1\frac{3}{5} \div 2\frac{1}{4} \div 1\frac{3}{5}$

Ans: _____

10. $1\frac{7}{8} \div 1\frac{1}{15} \times 2\frac{2}{7} \times 5\frac{3}{5}$

Ans: _____

11. $2\frac{1}{2} \times 1\frac{2}{5} \div 2\frac{4}{5} \times 1\frac{3}{7}$

Ans: _____

12. $1\frac{1}{3} \div \frac{1}{6} \div 2\frac{1}{7} \div 1\frac{2}{5}$

Ans: _____

#2082b GLA	Student: _____
Guided Learning Activity Multiplying and Dividing Mixed Numerals, Exercise Set #2 Author: Dennis Morrow Σ SIGMA-MAC	Course Instructor: _____ Date Completed: _____ Approved: _____

Multiplication and Division with Mixed Numerals, Exercise Set #2

Multiplication:

The most common way to multiply mixed numerals is to convert them to improper fractions and execute fractions multiplication, i.e. cancel and multiply straight across. For example:

$$3\frac{3}{4} \times 4\frac{2}{3} = \frac{15}{4} \times \frac{14}{3} = \frac{\overset{5}{\cancel{15}}}{\underset{2}{4}} \times \frac{\overset{7}{\cancel{14}}}{\underset{1}{3}} = \frac{5 \times 7}{2 \times 1} = \frac{35}{2}$$

For algebra and beyond the simplified improper fraction, $\frac{35}{2}$, is an acceptable answer to the problem. However, the outside world usually prefers mixed numerals to improper fractions, so $\frac{35}{2}$ is changed to the mixed numeral $17\frac{1}{2}$ by dividing 2 into 35.

Division:

Once multiplication is mastered, division is easy. Division is multiplication by a reciprocal.

$$a \div b = a \times \frac{1}{b}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Just convert the mixed numerals to improper fractions, invert the divisor, and multiply. For example:

$$2\frac{4}{9} \div 2\frac{8}{21} = \frac{22}{9} \div \frac{50}{21} = \frac{22}{9} \times \frac{21}{50} = \frac{\overset{11}{\cancel{22}}}{\underset{3}{9}} \times \frac{\overset{7}{\cancel{21}}}{\underset{25}{50}} = \frac{77}{75}$$

(Remember to invert the right one, not the wrong one. The right one is the one on the right, not the left.)

Exercises:

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

Fill in the blanks and cancel, showing all work and following the examples above.

$$2\frac{1}{3} \times 2\frac{1}{4} \div 2\frac{2}{3} \div 1\frac{1}{4} = \frac{7}{3} \times \frac{9}{4} \div \frac{8}{3} \div \frac{5}{4} = \frac{7}{3} \times \frac{9}{4} \times \frac{3}{8} \times \frac{4}{5} = \frac{63}{40}$$

Ans: _____

2. $1\frac{2}{3} \div \frac{1}{6} \times 2\frac{2}{7} \div 1\frac{3}{5}$

Fill in the blanks and cancel, showing all work and following the examples above.

$$1\frac{2}{3} \div \frac{1}{6} \times 2\frac{2}{7} \div 1\frac{3}{5} = \frac{5}{3} \div \frac{1}{6} \times \frac{16}{7} \div \frac{8}{5} = \frac{5}{3} \times \frac{6}{1} \times \frac{16}{7} \times \frac{5}{8} = \frac{100}{7}$$

Ans: _____

Simplify the following completely. (You must follow the examples above and indicate all cancelations before the final multiplications.)

3. $\frac{7}{24} \div 1\frac{5}{16}$

Ans: _____

4. $10\frac{1}{2} \div 1\frac{2}{5}$

Ans: _____

5. $5\frac{7}{9} \div 39 \times 3\frac{6}{7}$

Ans: _____

6. $14\frac{1}{6} \div 1\frac{5}{12} \times 1\frac{4}{5}$

Ans: _____

7. $1\frac{2}{3} \div 1\frac{11}{14} \times 2\frac{1}{7} \div \frac{4}{5}$

Ans: _____

8. $1\frac{2}{3} \times 36 \times 2\frac{4}{7} \div 4\frac{4}{5}$

Ans: _____

9. $\frac{4}{5} \times 4\frac{1}{6} \times 2\frac{6}{7} \div 3\frac{1}{3}$

Ans: _____

10. $2\frac{1}{7} \times 4 \times 2\frac{1}{3} \div 2\frac{2}{5}$

Ans: _____

11. $1\frac{1}{14} \div 2 \div 2\frac{1}{3} \times 9\frac{4}{5}$

Ans: _____

12. $2\frac{2}{9} \div 1\frac{1}{5} \times 7\frac{1}{2} \div 1\frac{2}{3}$

Ans: _____

#2082c GLA	Student: _____
Guided Learning Activity Multiplying and Dividing Mixed Numerals, Exercise Set #3 Author: Dennis Morrow Σ SIGMA-MAC	Course Instructor: _____ Date Completed: _____ Approved: _____

Multiplication and Division with Mixed Numerals, Exercise Set #3

Multiplication:

The most common way to multiply mixed numerals is to convert them to improper fractions and execute fractions multiplication, i.e. cancel and multiply straight across. For example:

$$3\frac{3}{4} \times 4\frac{2}{3} = \frac{15}{4} \times \frac{14}{3} = \frac{\overset{5}{\cancel{15}}}{4} \times \frac{14}{\underset{2}{\cancel{3}}} = \frac{5 \times 7}{2 \times 1} = \frac{35}{2}$$

For algebra and beyond the simplified improper fraction, $\frac{35}{2}$, is an acceptable answer to the problem. However, the outside world usually prefers mixed numerals to improper fractions, so $\frac{35}{2}$ is changed to the mixed numeral $17\frac{1}{2}$ by dividing 2 into 35.

Division:

Once multiplication is mastered, division is easy. Division is multiplication by a reciprocal.

$$a \div b = a \times \frac{1}{b}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Just convert the mixed numerals to improper fractions, invert the divisor, and multiply. For example:

$$2\frac{4}{9} \div 2\frac{8}{21} = \frac{22}{9} \div \frac{50}{21} = \frac{22}{9} \times \frac{21}{50} = \frac{\overset{11}{\cancel{22}}}{9} \times \frac{21}{\underset{25}{\cancel{50}}} = \frac{77}{75}$$

(Remember to invert the right one, not the wrong one. The right one is the one on the right, not the left.)

Exercises:

1. $1\frac{2}{3} \times 3\frac{3}{7} \div 2\frac{2}{7} \div 1\frac{3}{5}$

Fill in the blanks and cancel, showing all work and following the examples above.

$$1\frac{2}{3} \times 3\frac{3}{7} \div 2\frac{2}{7} \div 1\frac{3}{5} = \frac{5}{3} \times \frac{24}{7} \div \frac{16}{7} \div \frac{8}{5} = \text{---} \times \text{---} \times \text{---} \times \text{---} = \text{---}$$

$\frac{25}{16}$

Ans: _____

2. $10\frac{1}{2} \div 1\frac{2}{5} \div 1\frac{1}{3} \div 2\frac{1}{2}$

Fill in the blanks and cancel, showing all work and following the examples above.

$$10\frac{1}{2} \div 1\frac{2}{5} \div 1\frac{1}{3} \div 2\frac{1}{2} = \frac{21}{2} \div \frac{7}{5} \div \frac{4}{3} \div \frac{5}{2} = \text{---} \times \text{---} \times \text{---} \times \text{---} = \text{---}$$

$\frac{9}{4}$

Ans: _____

Simplify the following completely. (You must follow the examples above and indicate all cancelations before the final multiplications.)

3. $2\frac{7}{9} \div 4\frac{1}{6}$

Ans: _____

4. $1\frac{8}{27} \times 3\frac{3}{5}$

Ans: _____

5. $1\frac{17}{39} \div 7\frac{1}{2} \times 9\frac{2}{7}$

Ans: _____

6. $3\frac{5}{6} \times 1\frac{1}{11} \div 1\frac{13}{33}$

Ans: _____

7. $4\frac{2}{3} \div 2\frac{3}{11} \times 2\frac{1}{7} \times 1\frac{1}{4}$

Ans: _____

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

Ans: _____

9. $2\frac{2}{3} \times 1\frac{4}{5} \div 11\frac{1}{4} \times 3\frac{1}{8}$

Ans: _____

10. $9\frac{3}{5} \div 8\frac{2}{5} \div 2\frac{2}{7} \div 1\frac{4}{5}$

Ans: _____

11. $1\frac{1}{4} \times 2\frac{1}{2} \times 8\frac{1}{3} \div 15\frac{5}{8}$

Ans: _____

12. $9\frac{3}{5} \times \frac{1}{5} \times 1\frac{7}{8} \div 2\frac{2}{5}$

Ans: _____