Prealgebra
Chapter 4 Review

Objective [4.1a] Find the LCM of two or more numbers from a list of multiples or by using prime factorizations.

Brief Procedure	Example	Practice Exercises
To find the LCM of two or more numbers using a list of multiples: First determine whether the largest number is a multiple of all the other numbers. If so, it is the least common multiple, or LCM . If not, check consecutive multiples of the largest number until you get one that is a multiple of the others. That number is the LCM.	Find the LCM of 15 and 18 using a list of multiples. First observe that 18 is not a multiple of 15. Then check multiples: $2 \cdot 18 = 36$ Not a multiple of 15 $3 \cdot 18 = 54$ Not a multiple of 15 $4 \cdot 18 = 72$ Not a multiple of 15 $5 \cdot 18 = 90$ A multiple of 15 The LCM is 90.	1. Find the LCM of 12 and 16 using a list of multiples. A. 16 B. 36 C. 48 D. 192
To find the LCM of two or more numbers by using prime factorizations, a) Find the prime factorization of each number. b) Create a product of factors, using each factor the greatest number of times that it occurs in any one factorization.	Find the LCM of 9 and 21. a) $9 = 3 \cdot 3,\ 21 = 3 \cdot 7$ b) Consider the factor 3. The greatest number of times that 3 occurs in any one factorization is two. LCM is $3 \cdot 3 \cdot$? Consider the factor 7. The greatest number of times that 7 occurs in any one factorization is one. LCM is $3 \cdot 3 \cdot 7 \cdot$? Since there are no other prime factors in either factorization, the LCM is $3 \cdot 3 \cdot 7 \cdot$, or 63.	2. Find the LCM of 8 and 20 using prime factorizations. A. 20 B. 40 C. 80 D. 160

Objective [4.2a] Add using fractional notation when denominators are the same.

Brief Procedure	Example	Practice Exercise
Add the numerators, keep the denominator, and simplify, if possible.	Add and simplify: $\frac{-3}{8} + \frac{7}{8}$. $\frac{-3}{8} + \frac{7}{8} = \frac{-3+7}{8} = \frac{4}{8} = \frac{4 \cdot 1}{4 \cdot 2} =$ $\frac{4}{4} \cdot \frac{1}{2} = \frac{1}{2}$	3. Add and simplify: $\frac{1}{12} + \frac{7}{12}$ A. $\frac{1}{3}$ B. $\frac{1}{2}$ C. $\frac{2}{3}$ D. $\frac{7}{144}$

Objective [4.2b] Add using fractional notation when denominators are different.		
Brief Procedure	**Example**	**Practice Exercise**
a) Find the least common multiple of the denominators. That number is the least common denominator, LCD. b) Multiply by 1, writing 1 in the form n/n, to find an equivalent sum in which the LCD appears. c) Add and simplify, if possible.	Add and simplify, if possible: $\frac{2}{9}+\frac{1}{6}$. $9=3\cdot 3$ and $6=2\cdot 3$ so the LCM of 9 and 6 is $2\cdot 3\cdot 3$, or 18. Thus the LCD is 18. $\frac{2}{9}+\frac{1}{6}$ $=\frac{2}{9}\cdot\frac{2}{2}+\frac{1}{6}\cdot\frac{3}{3}$ $=\frac{4}{18}+\frac{3}{18}$ $=\frac{7}{18}$ No simplification is necessary.	4. Add and simplify, if possible: $\frac{3}{4}+\frac{-3}{10}$. A. 0 B. $\frac{3}{14}$ C. $\frac{9}{20}$ D. $\frac{9}{40}$

Objective [4.2c] Use < or > to form a true statement using fractional notation.		
Brief Procedure	**Example**	**Practice Exercise**
Multiply by 1 to make the denominators the same, if necessary. Then compare the numerators. The fraction with the larger numerator is the larger fraction.	Use < or > for □ to write a true sentence: $\frac{3}{5}\ \square\ \frac{5}{8}$. $\frac{3}{5}\cdot\frac{8}{8}=\frac{24}{40}$ $\frac{5}{8}\cdot\frac{5}{5}=\frac{25}{40}$ Since $24<25$, it follows that $\frac{3}{5}<\frac{5}{8}$.	5. Use < or > for □ to write a true sentence: $\frac{2}{3}\ \square\ \frac{5}{9}$. A. < B. >

Objective [4.2d] Solve problems involving addition with fractional notation.		
Brief Procedure	**Example**	**Practice Exercise**
Use the five-step problem solving process.	Morton bought $\frac{1}{2}$ lb of Vermont cheddar cheese and $\frac{2}{3}$ lb of feta cheese. How many pounds of cheese did he buy? 1. *Familiarize.* Let c = the number of pounds of cheese Morton bought. 2. *Translate.* Amount of cheddar plus Amount of feta is Total amount $\frac{1}{2}+\frac{2}{3}=c$ (continued)	6. Renza walked $\frac{3}{4}$ mi to campus and then $\frac{3}{5}$ mi to her parttime job. How far did she walk? A. $\frac{1}{3}$ mi B. $\frac{2}{3}$ mi C. $\frac{9}{20}$ mi D. $\frac{27}{20}$ mi

Objective [4.2d] continued		
Brief Procedure	**Example**	**Practice Exercise**
	3. *Solve.* We carry out the addition. The LCM of the denominators is 6. $\frac{1}{2}\cdot\frac{3}{3}+\frac{2}{3}\cdot\frac{2}{2}=c$ $\frac{3}{6}+\frac{4}{6}=c$ $\frac{7}{6}=c$ 4. *Check.* As a partial check, note that the result is larger than either of the individual amounts, so the answer seems reasonable. We can also repeat the calculation. The answer checks. 5. *State.* Morton bought $\frac{7}{6}$ lb of cheese.	

Objective [4.3a] Subtract using fractional notation.		
Brief Procedure	**Example**	**Practice Exercise**
If denominators are the same, subtract the numerators, keep the denominator, and simplify, if possible. If denominators are different, a) Find the least common multiple of the denominators. That number is the least common denominator, LCD. b) Multiply by 1, writing 1 in the form n/n, to find an equivalent subtraction in which the LCD appears. c) Subtract and, if possible, simplify.	Subtract and simplify, if possible: $\frac{2}{3}-\frac{1}{4}$. The LCM of 3 and 4 is 12, so the LCD is 12. $\frac{2}{3}-\frac{1}{4}=\frac{2}{3}\cdot\frac{4}{4}-\frac{1}{4}\cdot\frac{3}{3}$ $=\frac{8}{12}-\frac{3}{12}$ $=\frac{5}{12}$ No simplification is necessary.	7. Subtract and simplify, if possible: $\frac{3}{8}-\frac{4}{5}$ A. $-\frac{17}{40}$ B. $-\frac{7}{40}$ C. $\frac{3}{10}$ D. $\frac{1}{3}$

Objective [4.3b] Solve equations of the type $x+a=b$ and $a+x=b$, where a and b may be fractions.		
Brief Procedure	**Example**	**Practice Exercise**
Subtract a on both sides of the equation.	Solve: $x+\frac{1}{3}=\frac{4}{5}$. $x+\frac{1}{3}=\frac{4}{5}$ $x+\frac{1}{3}-\frac{1}{3}=\frac{4}{5}-\frac{1}{3}$ $x+0=\frac{4}{5}\cdot\frac{3}{3}-\frac{1}{3}\cdot\frac{5}{5}$ $x=\frac{12}{15}-\frac{5}{15}=\frac{7}{15}$	8. Solve: $x+\frac{5}{6}=\frac{7}{8}$. A. $\frac{1}{24}$ B. $\frac{41}{24}$ C. $\frac{41}{48}$ D. 1

Objective [4.3c] Solve applied problems involving subtraction with fractional notation.

Brief Procedure	Example	Practice Exercise
Use the five-step problem solving process.	Bert spent $\frac{7}{4}$ hr doing his chemistry and English assignments. He spent $\frac{5}{6}$ hr on the chemistry assignment. How long did he spend on the English assignment? 1. *Familiarize.* Let t = the number of hours Bert spent on his English assignment. 2. *Translate.* This is a "how much more" situation. $\underbrace{\text{Chemistry time}}\ \text{plus}\ \underbrace{\text{English time}}\ \text{is}\ \underbrace{\text{Total time}}$ $\frac{5}{6} + t = \frac{7}{4}$ 3. *Solve.* We subtract $\frac{5}{6}$ on both sides of the equation. $\frac{5}{6}+t-\frac{5}{6}=\frac{7}{4}-\frac{5}{6}$ $t+0=\frac{7}{4}\cdot\frac{3}{3}-\frac{5}{6}\cdot\frac{2}{2}$ $t=\frac{21}{12}-\frac{10}{12}=\frac{11}{12}$ 4. *Check.* We return to the original problem and add: $\frac{5}{6}+\frac{11}{12}=\frac{5}{6}\cdot\frac{2}{2}+\frac{11}{12}=\frac{10}{12}+\frac{11}{12}=\frac{21}{12}=\frac{3}{3}\cdot\frac{7}{4}=\frac{7}{4}$. The answer checks. 5. *State.* Bert spent $\frac{11}{12}$ hr on his English assignment.	9. Mary has walked $\frac{3}{4}$ mi and will stop walking when she has walked $\frac{9}{8}$ mi. How much farther does she have to walk? A. $\frac{1}{2}$ mi B. $\frac{3}{8}$ mi C. $\frac{15}{8}$ mi D. $\frac{27}{32}$ mi

Objective [4.4a] Solve equations that require use of both the addition principle and the multiplication principle.

Brief Procedure	Example	Practice Exercise
First use the addition principle to isolate the term that contains the variable. Then use the multiplication principle to get the variable by itself.	Solve: $2x-5=3$. $2x-5=3$ $2x-5+5=3+5$ $2x=8$ $\frac{2x}{2}=\frac{8}{2}$ $x=4$ The solution is 4.	10. Solve: $3y+1=-8$. A. $-\frac{7}{3}$ B. $-\frac{8}{3}$ C. -3 D. -11

Objective [4.5a] Convert from mixed numerals to fractional notation.		
Brief Procedure	Example	Practice Exercises
a) Multiply the whole number by the denominator. b) Add the result to the numerator. c) Keep the denominator.	Convert $5\frac{3}{8}$ to fractional notation. $5 \times 8 = 40$ and $40 + 3 = 43$, so $5\frac{3}{8} = \frac{43}{8}$.	11. Convert $3\frac{4}{5}$ to fractional notation. A. $\frac{7}{5}$ B. $\frac{12}{5}$ C. $\frac{19}{5}$ D. $\frac{34}{5}$

Objective [4.5b] Convert from fractional notation to mixed numerals.		
Brief Procedure	Example	Practice Exercise
Divide the numerator by the denominator The quotient is the whole number part of the mixed numeral. The numerator of the fractional part is the remainder, and the denominator is the denominator of the fractional notation.	Convert $\frac{13}{3}$ to a mixed numeral. $3 \overline{)\,1\,3}$ quotient 4 $1\,2$ 1 $\frac{13}{3} = 4\frac{1}{3}$	12. Convert $\frac{11}{6}$ to a mixed numeral. A. $1\frac{1}{6}$ B. $1\frac{5}{6}$ C. $2\frac{1}{6}$ D. $2\frac{5}{6}$

Objective [4.5c] Divide, writing a mixed numeral for the quotient.		
Brief Procedure	Example	Practice Exercise
Divide as usual. The quotient is the whole number part of the mixed numeral. The numerator of the fractional part is the remainder, and the denominator is the divisor.	Divide. Write a mixed numeral for the quotient. $5 \overline{)\,2\,3\,6\,7}$ We first divide as usual. quotient $4\,7\,3$ $5 \overline{)\,2\,3\,6\,7}$ $2\,0\,0\,0$ $3\,6\,7$ $3\,5\,0$ $1\,7$ $1\,5$ 2 The answer is $473\frac{2}{5}$.	13. Divide. Write a mixed numeral for the quotient. $7 \overline{)\,4\,1\,1\,5}$ A. $523\frac{2}{7}$ B. $568\frac{3}{7}$ C. $578\frac{4}{7}$ D. $587\frac{6}{7}$

Objective [4.6a] Add using mixed numerals.

Brief Procedure

First add the fractions. Then add the whole numbers.

Example

Add: $3\frac{5}{8} + 4\frac{1}{2}$.

The LCD is 8.

$$\begin{array}{rcl} 3\,\frac{5}{8} & = & 3\,\frac{5}{8} \\ +4\,\frac{1}{2}\cdot\frac{4}{4} & = & +4\,\frac{4}{8} \\ \hline & & 7\,\frac{9}{8} = 7 + \frac{9}{8} \\ & & \quad = 7 + 1\frac{1}{8} \\ & & \quad = 8\frac{1}{8} \end{array}$$

Practice Exercise

14. Add: $5\frac{2}{3} + 1\frac{3}{4}$.

A. $7\frac{5}{12}$

B. $6\frac{5}{7}$

C. $6\frac{5}{12}$

D. $6\frac{1}{2}$

Objective [4.6b] Subtract using mixed numerals.

Brief Procedure

First subtract the fractions, borrowing if necessary. Then subtract the whole numbers.

Example

Subtract: $6\frac{1}{3} - 4\frac{1}{2}$.

$$\begin{array}{rcrcr} 6\,\frac{1}{3}\cdot\frac{2}{2} & = & 6\,\frac{2}{6} & = & 5\,\frac{8}{6} \\ -4\,\frac{1}{2}\cdot\frac{3}{3} & = & -4\,\frac{3}{6} & = & -4\,\frac{3}{6} \\ \hline & & & & 1\,\frac{5}{6} \end{array}$$

Practice Exercise

15. Subtract: $9\frac{3}{8} - 3\frac{3}{4}$.

A. $5\frac{3}{8}$

B. $5\frac{5}{8}$

C. $6\frac{3}{8}$

D. $6\frac{5}{8}$

Objective [4.6c] Solve applied problems involving addition and subtraction with mixed numerals.

Brief Procedure

Use the five-step problem solving process.

Example

Melanie bought $1\frac{1}{2}$ lb of apples and $2\frac{3}{4}$ lb of pears. What was the total weight of the fruit?

1. *Familiarize.* Let w = the total weight of the fruit, in pounds.
2. *Translate.*

$$\underbrace{\text{Weight of apples}} \ \text{plus} \ \underbrace{\text{Weight of pears}} \ \text{is} \ \underbrace{\text{Total weight}}$$

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

(continued)

Practice Exercise

16. Sam is $73\frac{1}{4}$ in. tall, and Ray is $70\frac{1}{2}$ in. tall. How much taller is Sam?

A. $3\frac{3}{4}$ in.

B. $3\frac{1}{4}$ in.

C. $2\frac{3}{4}$ in.

D. $2\frac{1}{4}$ in.

Objective [4.6c] continued		
Brief Procedure	Example	Practice Exercise
	3. *Solve*. We carry out the addition. The LCD is 4. $1\,\frac{1}{2}\cdot\frac{2}{2} = 1\,\frac{2}{4}$; $+2\,\frac{3}{4} = +2\,\frac{3}{4}$; $3\,\frac{5}{4} = 4\frac{1}{4}$ 4. *Check*. We repeat the calculation. The answer checks. 5. *State*. The total weight of the fruit was $4\frac{1}{4}$ lb.	

Objective [4.6d] Add and subtract using negative mixed numerals.		
Brief Procedure	Example	Practice Exercise
Given a subtraction, first rewrite it as addition. When adding two negative mixed numerals, add the absolute values and make the answer negative. When adding a positive and a negative mixed numeral, find the difference in absolute values. The answer has the same sign as the number with the larger absolute value.	Subtract: $1\frac{1}{5} - 3\frac{1}{2}$. We rewrite the subtraction as addition: $1\frac{1}{5} + \left(-3\frac{1}{2}\right)$. Now find the difference in absolute values. $3\,\frac{1}{2}\cdot\frac{5}{5} = 3\,\frac{5}{10}$; $-1\,\frac{1}{5}\cdot\frac{2}{2} = -1\,\frac{2}{10}$; $2\,\frac{3}{10}$ Because $-3\frac{1}{2}$ has the larger absolute value, the answer is negative. Thus, $1\frac{1}{5} - 3\frac{1}{2} = -2\frac{3}{10}$.	17. Subtract: $-2\frac{1}{3} - 3\frac{3}{4}$. A. $-6\frac{1}{12}$ B. $-5\frac{3}{7}$ C. $-1\frac{5}{12}$ D. $1\frac{5}{12}$

Objective [4.7a] Multiply using mixed numerals.		
Brief Procedure	Example	Practice Exercise
First convert to fractional notation and multiply. Then convert the result to a mixed numeral, if appropriate.	Multiply: $1\frac{3}{8}\cdot 5\frac{2}{3}$. $1\frac{3}{8}\cdot 5\frac{2}{3} = \frac{11}{8}\cdot\frac{17}{3} = \frac{187}{24} = 7\frac{19}{24}$	18. Multiply: $6\frac{2}{5}\cdot 2\frac{3}{4}$. A. $12\frac{3}{10}$ B. $14\frac{1}{5}$ C. $15\frac{9}{10}$ D. $17\frac{3}{5}$

Objective [4.7b] Divide using mixed numerals.		
Brief Procedure	Example	Practice Exercise
First convert to fractional notation and divide. Then convert the result to a mixed numeral, if appropriate.	Divide: $4\frac{2}{3} \div 2\frac{3}{5}$. $4\frac{2}{3} \div 2\frac{3}{5} = \frac{14}{3} \div \frac{13}{5} = \frac{14}{3} \cdot \frac{5}{13} =$ $\frac{70}{39} = 1\frac{31}{39}$	19. Divide: $9\frac{1}{8} \div 3\frac{1}{4}$. A. $2\frac{5}{8}$ B. $2\frac{21}{26}$ C. $3\frac{5}{26}$ D. $3\frac{1}{2}$

Objective [4.7c] Evaluate expressions using mixed numerals.		
Brief Procedure	Example	Practice Exercise
Substitute and follow the rules for order of operations.	Evaluate $a - bc$ for $a = 1\frac{1}{3}, b = 4\frac{1}{2}$, and $c = 2$. $a - bc$ $= 1\frac{1}{3} - 4\frac{1}{2}(2)$ $= 1\frac{1}{3} - \frac{9}{2}(2)$ $= 1\frac{1}{3} - \frac{9 \cdot 2}{2}$ $= 1\frac{1}{3} - 9$ $= -7\frac{2}{3}$	20. Evaluate wz for $w = -8$ and $z = 5\frac{1}{4}$. A. $-1\frac{11}{21}$ B. $-2\frac{3}{4}$ C. $-40\frac{1}{4}$ D. -42

Objective [4.7d] Solve problems involving multiplication and division with mixed numerals.		
Brief Procedure	**Example**	**Practice Exercise**
Use the five-step problem solving process.	A cookie recipe calls for $1\frac{3}{4}$ cups of sugar. How much is needed for 2 recipes? 1. *Familiarize.* Let s = the number of cups of sugar in 2 recipes. 2. *Translate.* The situation translates to the multiplication sentence $c = 2 \cdot 1\frac{3}{4}$. 3. *Solve.* We carry out the multiplication. $c = 2 \cdot 1\frac{3}{4} = 2 \cdot \frac{7}{4} = \frac{2 \cdot 7}{4}$ $= \frac{2 \cdot 7}{2 \cdot 2} = \frac{2}{2} \cdot \frac{7}{2}$ $= \frac{7}{2} = 3\frac{1}{2}$ 4. *Check.* We can do a partial check by estimating: $2 \cdot 1\frac{3}{4} \approx 2 \cdot 2 = 4 \approx 3\frac{1}{2}$. We can also repeat the calculation. The answer checks. 5. *State.* For 2 recipes, $3\frac{1}{2}$ cups of sugar are needed.	21. A car travels 276 mi on $11\frac{5}{10}$ gal of gas. How many miles per gallon did it get? A. 24 B. 28 C. 30 D. 32