Lesson 6: Collecting Rational Number Like Terms

Student Outcomes

- Students rewrite rational number expressions by collecting like terms and combining them by repeated use of the distributive property.

Related Topics: More Lesson Plans for Grade 7 Common Core Math

Classwork

Opening Exercise (10 minutes)

Students work in pairs to write and simplify the expressions. Reconvene as a class and review with students the steps taken to rewrite the expressions, justifying each step verbally as you go.

Opening Exercise

Do the computations, leaving your answers in simplest/standard form. Show your steps.

1. **Terry weighs 40 kg. Janice weighs $2\frac{3}{4}$ kg less than Terry. What is their combined weight?**

   $40+\left(40-2\frac{3}{4}\right)=80-2-\frac{3}{4}=78-\frac{3}{4}=77\frac{1}{4}$. *Their combined weight is $77\frac{1}{4}$ kg.*

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

   $\frac{8}{3}-\frac{3}{2}-\frac{4}{5}$

   $\frac{80}{30}-\frac{45}{30}-\frac{24}{30}$

   $\frac{11}{30}$

3. $\frac{1}{5}+(-4)$

   $-3\frac{4}{5}$

4. $4\left(\frac{3}{5}\right)$

   $\frac{4}{1}\left(\frac{3}{5}\right)$

   $\frac{12}{5}$

   $2\frac{2}{5}$

5. **Mr. Jackson bought $1\frac{3}{5}$ lb. of beef. He cooked $\frac{3}{4}$ of it for lunch. How much does he have left?**

Answer: If he cooked $\frac{3}{4}$ of it for lunch, he had $\frac{1}{4}$ of the original amount left. Since $\left(1\frac{3}{5}\right)\left(\frac{1}{4}\right) = \frac{8}{5}\cdot\frac{1}{4} = \frac{2}{5}$, he had $\frac{2}{5}$ lb. left. Teachers: you can also show your students how to write the answer as one expression:

$$\left(1\frac{3}{5}\right)\left(1-\frac{3}{4}\right)$$

6. $\frac{2}{3}n - \frac{3}{4}n + \frac{1}{6}n + 2\frac{2}{9}n$

$\frac{24}{36}n - \frac{27}{36}n + \frac{6}{36}n + 2\frac{8}{36}n$

$2\frac{11}{36}n$

- How is the process of writing equivalent expressions by combining like terms in Opening Exercise 6 different from the previous lesson?
  - *There are additional steps to find common denominators, convert mixed numbers to improper numbers (in some cases), and convert back.*

Example 1 (5 minutes)

Scaffolding:

For the struggling student, choose simpler examples to begin with such as $\frac{1}{2} + \frac{1}{2}x + \frac{1}{4}$ and $\frac{2}{3}b + a - \frac{1}{3}b - \frac{1}{5}a$.

Example 1

Rewrite the expression in standard form by collecting like terms.

$\frac{1}{2}a + 2\frac{2}{3}b + \frac{1}{5} - \frac{1}{4}a - 1\frac{1}{2}b + \frac{3}{5} + \frac{3}{4}a - 4 - \frac{4}{5}b$

$\frac{1}{2}a + 2\frac{2}{3}b + \frac{1}{5} + \left(-\frac{1}{4}a\right) + \left(-1\frac{1}{2}b\right) + \frac{3}{5} + \frac{3}{4}a + (-4) + \left(-\frac{4}{5}b\right)$ **Subtraction as adding the inverse**

$\frac{1}{2}a + \left(-\frac{1}{4}a\right) + \frac{3}{4}a + 2\frac{2}{3}b + \left(-1\frac{1}{2}b\right) + \left(-\frac{4}{5}b\right) + \frac{1}{5} + \frac{3}{5} + (-4)$ **Any order property (commutative property)**

$\left(\frac{1}{2} + \left(-\frac{1}{4}\right) + \frac{3}{4}\right)a + \left(2\frac{2}{3} + \left(-1\frac{1}{2}\right) + \left(-\frac{4}{5}\right)\right)b + \left(\frac{4}{5} + (-4)\right)$ **Collecting like terms by applying distributive property**

$a + \frac{11}{30}b - \frac{16}{5}$ **Arithmetic rules for rational numbers**

The expression with eight terms can be rewritten with a minimum of three terms.

Discuss:

- What are various strategies for adding, subtracting, multiplying, and dividing rational numbers?
  - *Find common denominators; change from mixed numbers and whole numbers to improper fractions, and then convert back.*

Exercise 1 (or Exercises) (5 minutes)

Walk around as students work independently. Have students check their answers with a partner. Address any unresolved questions.

Exercise 1

For the following exercises, predict how many terms the resulting expression will have after collecting like terms. Then, write the expression in standard form by collecting like terms.

a. $\frac{2}{5}g - \frac{1}{6} - g + \frac{3}{10}g - \frac{4}{5}$

There will be two terms.

$$\frac{2}{5}g - 1g + \frac{3}{10}g - \frac{1}{6} - \frac{4}{5}$$
$$\left(\frac{2}{5} - 1 + \frac{3}{10}\right)g - \left(\frac{1}{6} + \frac{4}{5}\right)$$
$$-\frac{3}{10}g - \frac{29}{30}$$

b. $i + 6i - \frac{3}{7}i + \frac{1}{3}h + \frac{1}{2}i - h + \frac{1}{4}h$

There will be two terms.

$$\frac{1}{3}h + \frac{1}{4}h - h + i - \frac{3}{7}i + 6i + \frac{1}{2}i$$
$$\left(\frac{1}{3} + \frac{1}{4} + (-1)\right)h + \left(1 - \frac{3}{7} + 6 + \frac{1}{2}\right)i$$
$$-\frac{5}{12}h + 7\frac{1}{14}i$$

Example 2 (5 minutes)

Read the problem as a class and give students time to set up their own expressions. Reconvene as a class to address each expression.

Example 2

At a store, a shirt was marked down in price by ten dollars. A pair of pants doubled in price. Following these changes, the price of every item in the store was cut in half. Write two different expressions that represent the new cost of the items, using s for the cost of each shirt and p for the cost of a pair of pants. Explain the different information each one shows.

For the cost of a shirt:

$\frac{1}{2}(s - 10)$; *The cost of each shirt is* $\frac{1}{2}$ *of the quantity of the original cost of the shirt, minus* 10.

$\frac{1}{2}s - 5$; *The cost of each shirt is half off the original price, minus* 5*, since half of* 10 *is* 5.

For the cost of a pair of pants:

$\frac{1}{2}(2p)$; *The cost of each pair of pants is half off double the price.*

p; *The cost of each pair of pants is the original cost because* $\frac{1}{2}$ *is the multiplicative inverse of* 2.

- Describe a situation in which either of the two expressions in each case would be more useful.
  - *Answers may vary. For example, p would be more useful than $\frac{1}{2}(2p)$ because it is converted back to an isolated variable, in this case the original cost.*

Exercise 2 (3 minutes)

Exercise 2

Continuing with Example 2, write two different expressions that represent the total cost of the items if tax was $\frac{1}{10}$ of the original price. Explain the different information each shows.

For the cost of a shirt:

$\frac{1}{2}(s-10)+\frac{1}{10}s$; The cost of each shirt is $\frac{1}{2}$ of the quantity of the original cost of the shirt, minus 10, plus $\frac{1}{10}$ of the cost of the shirt.

$\frac{3}{5}s-5$; The cost of each shirt is $\frac{3}{5}$ of the original price (because it is $\frac{1}{2}s+\frac{1}{10}s=\frac{6}{10}$), minus 5, since half of 10 is 5.

For the cost of a pair of pants:

$\frac{1}{2}(2p)+\frac{1}{10}p$; The cost of each pair of pants is half off double the price plus $\frac{1}{10}$ of the cost of a pair of pants.

$1\frac{1}{10}p$; The cost of each pair of pants is $1\frac{1}{10}$ (because $1p+\frac{1}{10}p=1\frac{1}{10}p$) times the number of pair of pants.

Example 3 (5 minutes)

Example 3

As a class, write each expression in standard form by collecting like terms. Justify each step.

$$5\frac{1}{3}-\left(3\frac{1}{3}\right)\left(\frac{1}{2}x-\frac{1}{4}\right)$$

$\frac{16}{3}+\left(-\frac{10}{3}\right)\left(\frac{1}{2}x\right)+\left(-\frac{10}{3}\right)\left(-\frac{1}{4}\right)$	**Write mixed numbers as improper fractions, then distribute.**
$\frac{16}{3}+\left(-\frac{5}{3}x\right)+\frac{5}{6}$	**Any grouping (associative) and arithmetic rules for multiplying rational numbers**
$-\frac{5}{3}x+\left(\frac{32}{6}+\frac{5}{6}\right)$	**Commutative property and associative property of addition, collect like terms**
$-\frac{5}{3}x+\frac{37}{6}$	**Apply arithmetic rule for adding rational numbers**

Discuss:

- Peter says he created an equivalent expression by first finding this difference: $5\frac{1}{3} - 3\frac{1}{3}$. Is he correct? Why or why not?
  - *Although they do appear to be like terms, taking the difference would be incorrect. The expression $\left(3\frac{1}{3}\right)\left(\frac{1}{2}x - \frac{1}{4}\right)$ is one term, and $3\frac{1}{3}$ must be distributed before applying any other operation in this problem.*
- How should $3\frac{1}{3}$ be written before being distributed?
  - *The mixed number can be rewritten as an improper fraction $\frac{10}{3}$. It is not necessary to convert the mixed number, but it makes the process more efficient and increases the likelihood of getting a correct answer.*

Exercise 3 (5 minutes)

Walk around as students work independently. Have students check their answers with a partner. Address any unresolved questions.

Exercise 3

Rewrite the following expressions in standard form by finding the product and collecting like terms.

a. $-6\frac{1}{3} - \frac{1}{2}\left(\frac{1}{2} + y\right)$

$-6\frac{1}{3} + \left(-\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(-\frac{1}{2}\right)y$

$-6\frac{1}{3} + \left(-\frac{1}{4}\right) + \left(-\frac{1}{2}y\right)$

$-\frac{1}{2}y - \left(6\frac{1}{3} + \frac{1}{4}\right)$

$-\frac{1}{2}y - \left(6\frac{4}{12} + \frac{3}{12}\right)$

$-\frac{1}{2}y - 6\frac{7}{12}$

b. $\frac{2}{3} + \frac{1}{3}\left(\frac{1}{4}f - 1\frac{1}{3}\right)$

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

$\frac{2}{3} + \frac{1}{12}f - \frac{4}{9}$

$\frac{1}{12}f + \frac{2}{9}$

Example 4 (5 minutes)

Example 4

Model how to write the expression in standard form using rules of rational numbers.

$$\frac{x}{20}+\frac{2x}{5}+\frac{x+1}{2}+\frac{3x-1}{10}$$

- What are other equivalent expressions of $\frac{x}{20}$? How do you know?
  - *For example,* $\frac{1x}{20}$ *and* $\frac{1}{20}x$. *Because of the arithmetic rules of rational numbers.*
- What about $\frac{1}{20x}$? How do you know?
  - *It is not equivalent because if* $x=2$, *the value of the expression is* $\frac{1}{40}$, *which does not equal* $\frac{1}{10}$.
- How can the distributive property be used in this problem?
  - *For example, it can be used to factor out* $\frac{1}{20}$ *from each term. Or, for example, it can be used to distribute* $\frac{1}{10}$: $\frac{3x-1}{10}=\frac{1}{10}(3x-1)=\frac{3x}{10}-\frac{1}{10}$.

Below are two solutions. Explore both with the class:

$\frac{x}{20}+\frac{4(2x)}{20}+\frac{10(x+1)}{20}+\frac{2(3x-1)}{20}$ $\frac{x+8x+10x+10+6x-2}{20}$ $\frac{25x+8}{20}$ $\frac{5}{4}x+\frac{2}{5}$	$\frac{1}{20}x+\frac{2}{5}x+\frac{1}{2}x+\frac{1}{2}+\frac{3}{10}x-\frac{1}{10}$ $\left(\frac{1}{20}+\frac{2}{5}+\frac{1}{2}+\frac{3}{10}\right)x+\left(\frac{1}{2}-\frac{1}{10}\right)$ $\left(\frac{1}{20}+\frac{8}{20}+\frac{10}{20}+\frac{6}{20}\right)x+\left(\frac{5}{10}-\frac{1}{10}\right)$ $\frac{5}{4}x+\frac{2}{5}$

Ask students to evaluate the original expression and their answers when $x=20$ to see if they get the same number.

Evaluate the original expression and their answers when $x=20$. Do you get the same number?

$\frac{x}{20}+\frac{2x}{5}+\frac{x+1}{2}+\frac{3x-1}{10}$ $\frac{20}{20}+\frac{2(20)}{5}+\frac{20+1}{2}+\frac{3(20)-1}{10}$ $1+8+\frac{21}{2}+\frac{59}{10}$ $9+\frac{105}{10}+\frac{59}{10}$ $9+\frac{164}{10}$ $9+16\frac{4}{10}$ $25\frac{2}{5}$	$\frac{5}{4}x+\frac{2}{5}$ $\frac{5}{4}(20)+\frac{2}{5}$ $25+\frac{2}{5}$ $25\frac{2}{5}$

IMPORTANT: After students evaluate both expressions for $x = 20$, ask them which expression was easier. (The expression in standard form, of course.) Explain to students: when you are asked on a standardized test to "simplify an expression," you must put the expression in standard form because standard form is often much simpler to evaluate and read. This curriculum is specific and will often tell you the form (such as standard form) it wants you to write the expression in for an answer.

Exercise 4 (3 minutes)

Allow students to work independently.

Exercise 4

Rewrite the following expression in standard form by finding common denominators and collecting like terms.

$$\frac{2h}{3}-\frac{h}{9}+\frac{h-4}{6}$$

$$\frac{6(2h)}{18}-\frac{2(h)}{18}+\frac{3(h-4)}{18}$$

$$\frac{12h-2h+3h-12}{18}$$

$$\frac{(13h-12)}{18}$$

$$\frac{13}{18}h-\frac{2}{3}$$

Example 5 (Optional, 5 minutes)

Give students a minute to observe the expression and decide how to begin rewriting it in standard form.

Example 5

Rewrite the following expression in standard form.

$$\frac{2(3x-4)}{6}-\frac{5x+2}{8}$$

- How can we start to rewrite this problem?
  - *There are various ways to start rewriting this expression, including using the distributive property, reducing* $\frac{2}{6}$, *rewriting the subtraction as an addition, distributing the negative in the second term, rewriting each term as a fraction (e.g.,* $\frac{2}{6}(3x-4)-\left(\frac{5x}{8}+\frac{2}{8}\right)$*), and/or finding the lowest common denominator.*

Method 1:	Method 2a:	Method 2b:	Method 3:
$\frac{1(3x-4)}{3}-\frac{5x+2}{8}$ $\frac{8(3x-4)}{24}-\frac{3(5x+2)}{24}$ $\frac{((24x-32)-(15x+6))}{24}$ $\frac{(24x-32-15x-6)}{24}$ $\frac{9x-38}{24}$ $\frac{9x}{24}-\frac{38}{24}$ $\frac{3}{8}x-\frac{19}{12}$	$\frac{6x-8}{6}-\frac{5x+2}{8}$ $\frac{4(6x-8)}{24}-\frac{3(5x+2)}{8}$ $\frac{(24x-32-15x-6)}{24}$ $\frac{9x-38}{24}$ $\frac{9x}{24}-\frac{38}{24}$ $\frac{3}{8}x-\frac{19}{12}$	$\frac{6}{6}x-\frac{8}{6}-\frac{5}{8}x-\frac{2}{8}$ $x-\frac{4}{3}-\frac{5x}{8}-\frac{1}{4}$ $1x-\frac{5}{8}x-\frac{4}{3}-\frac{1}{4}$ $\frac{3}{8}x-\frac{16}{12}-\frac{3}{12}$ $\frac{3}{8}x-\frac{19}{12}$	$\frac{1}{3}(3x-4)-\left(\frac{5x}{8}+\frac{1}{4}\right)$ $x-\frac{4}{3}-\frac{5}{8}x-\frac{1}{4}$ $1x-\frac{5}{8}x-\frac{4}{3}-\frac{1}{4}$ $\frac{3}{8}x-\frac{16}{12}-\frac{3}{12}$ $\frac{3}{8}x-\frac{19}{12}$

- Which method(s) keep(s) the numbers in the expression in integer form? Why would this be important to note?
  - *Finding the lowest common denominator would keep the number in integer form; this is important because the terms would be more convenient to work with.*
- Is one method better than the rest of the methods?
  - *No, it is by preference; however, the properties of addition and multiplication must be used properly.*
- Are these expressions equivalent: $\frac{3}{8}x, \frac{3x}{8}$, and $\frac{3}{8x}$? How do you know?
  - *The first two expressions are equivalent, but the third one,* $\frac{3}{8x}$, *is not. If you substitute a value other than zero or one (such as* $x = 2$*), the values of the first expressions are the same,* $\frac{2}{3}$. *The value of the third expression is* $\frac{3}{16}$.
- What are some common errors that could occur when rewriting this expression in standard form?
  - *Some common errors may include distributing only to one term in the parentheses, forgetting to multiply the negative sign to all the terms in the parentheses, incorrectly reducing fractions, and/or adjusting the common denominator but not the numerator.*

Exercise 5 (Optional, 3 minutes)

Allow students to work independently. Have students share the various ways they started to rewrite the problem.

Exercise 5

Write the following expression in standard form.

$$\frac{2x-11}{4}-\frac{3(x-2)}{10}$$

Sample response:

$$\frac{5(2x-11)}{20}-\frac{2\cdot 3(x-2)}{20}$$

$$\frac{(10x-55)-6(x-2)}{20}$$

$$\frac{10x-55-6x+12}{20}$$

$$\frac{4x-43}{20}$$

$$\frac{1}{5}x-2\frac{3}{20}$$

Closing (3 minutes)

- Jane says combining like terms is much harder to do when the coefficients and constant terms are not integers. Why do you think Jane feels this way?
  - *There are usually more steps, including finding common denominators, converting mixed numbers to improper fractions, etc.*

Exit Ticket (5 minutes)

Name ____ Date____________________

Lesson 6: Collecting Rational Number Like Terms

Exit Ticket

For the problem $\frac{1}{5}g - \frac{1}{10} - g + 1\frac{3}{10}g - \frac{1}{10}$, Tyson created an equivalent expression to the problem using the following steps:

$$\frac{1}{5}g + -1g + 1\frac{3}{10}g + -\frac{1}{10} + -\frac{1}{10}$$

$$-\frac{4}{5}g + 1\frac{1}{10}$$

Is his final expression equivalent to the initial expression? Show how you know. If the two expressions are not equivalent, find Tyson's mistake and correct it.

Exit Ticket Sample Solutions

For the problem $\frac{1}{5}g - \frac{1}{10} - g + 1\frac{3}{10}g - \frac{1}{10}$, Tyson created an equivalent expression to the problem using the following steps:

$$\frac{1}{5}g + -1g + 1\frac{3}{10}g + -\frac{1}{10} + -\frac{1}{10}$$

$$-\frac{4}{5}g + 1\frac{1}{10}$$

Is his final expression equivalent to the initial expression? Show how you know. If the two expressions are not equivalent, find Tyson's mistake and correct it.

No, he added the first two terms correctly, but he forgot the third term and added to the other like terms.

If $g = 10$,

$$\frac{1}{5}g + -1g + 1\frac{3}{10}g + -\frac{1}{10} + -\frac{1}{10}$$

$$\frac{1}{5}(10) + -1(10) + 1\frac{3}{10}(10) + -\frac{1}{10} + -\frac{1}{10}$$

$$2 + (-10) + 13 + \left(-\frac{2}{10}\right)$$

$$4\frac{4}{5}$$

$$-\frac{4}{5}g + 1\frac{1}{10}$$

$$-\frac{4}{5}(10) + 1\frac{1}{10}$$

$$-8 + 1\frac{1}{10}$$

$$-6\frac{9}{10}$$

The expressions are not equal.

He should factor out the g and place parentheses around the values using the distributive property, in order to make it obvious which rational numbers need to be combined.

$$\frac{1}{5}g + -1g + 1\frac{3}{10}g + -\frac{1}{10} + -\frac{1}{10}$$

$$\left(\frac{1}{5}g + -1g + 1\frac{3}{10g}\right) + \left(-\frac{1}{10} + -\frac{1}{10}\right)$$

$$\left(\frac{1}{5} + -1 + 1\frac{3}{10}\right)g + \left(-\frac{2}{10}\right)$$

$$\left(\frac{2}{10} + \frac{3}{10}\right)g + (-\frac{1}{5})$$

$$\frac{1}{2}g - \frac{1}{5}$$

Problem Set Sample Solutions

1. Write the indicated expressions.

   a. $\frac{1}{2}m$ inches in feet.

   $\frac{1}{2}m \times \frac{1}{12} = \frac{1}{24}m$. *It is* $\frac{1}{24}m$ *ft.*

b. The perimeter of a square with $\frac{2}{3}g$ cm sides.

$4 \times \frac{2}{3}g = \frac{8}{3}g$. The perimeter is $\frac{8}{3}g$ cm.

c. The number of pounds in 9 oz.

$9 \times \frac{1}{16} = \frac{9}{16}$. It is $\frac{9}{16}$ pounds.

d. The average speed of a train that travels x miles in $\frac{3}{4}$ hour.

$R = \frac{D}{T}$; $\frac{\frac{x}{3}}{4} = \frac{4}{3}x$. The average speed of the train is $\frac{4}{3}x$ miles per hour.

e. Devin is $1\frac{1}{4}$ years younger than Eli. April is $\frac{1}{5}$ as old as Devin. Jill is 5 years older than April. If Eli is E years old, what is Jill's age in terms of E?

$D = E - 1\frac{1}{4}$, $A = \frac{D}{5}$, $A + 5 = J$, so $J = \left(\frac{D}{5}\right) + 5$. $J = \left(\frac{E}{5} + 4\frac{3}{4}\right)$

2. Rewrite the expressions by collecting like terms.

a. $\frac{1}{2}k - \frac{3}{8}k$

$\frac{1}{8}k$

b. $\frac{2r}{5} + \frac{7r}{15}$

$\frac{13r}{15}$

c. $-\frac{1}{3}a - \frac{1}{2}b - \frac{3}{4} + \frac{1}{2}b - \frac{2}{3}b + \frac{5}{6}a$

$\frac{1}{2}a - \frac{2}{3}b - \frac{3}{4}$

d. $-p + \frac{3}{5}q - \frac{1}{10}q + \frac{1}{9} - \frac{1}{9}p + 2\frac{1}{3}p$

$1\frac{2}{9}p + \frac{1}{2}q + \frac{1}{9}$

e. $\frac{5}{7}y - \frac{y}{14}$

$\frac{9}{14}y$

f. $\frac{3n}{8} - \frac{n}{4} + 2\frac{n}{2}$

$2\frac{5n}{8}$

3. Rewrite the expressions by using the distributive property and collecting like terms.

a. $\frac{4}{5}(15x - 5)$

$12x - 4$

b. $\frac{4}{5}\left(\frac{1}{4}c - 5\right)$

$\frac{1}{5}c - 4$

c. $2\frac{4}{5}v - \frac{2}{3}\left(4v + 1\frac{1}{6}\right)$

$\frac{2}{15}v - \frac{7}{9}$

d. $8 - 4\left(\frac{1}{8}r - 3\frac{1}{2}\right)$

$-\frac{1}{2}r + 22$

e. $\frac{1}{7}(14x + 7) - 5$

$2x - 4$

f. $\frac{1}{5}(5x - 15) - 2x$

$-x - 3$

g. $\frac{1}{4}(p+4)+\frac{3}{5}(p-1)$

$\frac{17}{20}p+\frac{2}{5}$

h. $\frac{7}{8}(w+1)+\frac{5}{6}(w-3)$

$\frac{41}{24}w-\frac{39}{24}$ *or* $\frac{41}{24}w-\frac{13}{8}$

i. $\frac{4}{5}(c-1)-\frac{1}{8}(2c+1)$

$\frac{11}{20}c-\frac{37}{40}$

j. $\frac{2}{3}\left(h+\frac{3}{4}\right)-\frac{1}{3}\left(h+\frac{3}{4}\right)$

$\frac{1}{3}h+\frac{1}{4}$

k. $\frac{2}{3}\left(h+\frac{3}{4}\right)-\frac{2}{3}\left(h-\frac{3}{4}\right)$

1

l. $\frac{2}{3}\left(h+\frac{3}{4}\right)+\frac{2}{3}\left(h-\frac{3}{4}\right)$

$\frac{4}{3}h$

m. $\frac{k}{2}-\frac{4k}{5}-3$

$-\frac{3k}{10}-3$

n. $\frac{3t+2}{7}+\frac{t-4}{14}$

$\frac{1}{2}t$

o. $\frac{9x-4}{10}+\frac{3x+2}{5}$

$\frac{3x}{2}$ *or* $1\frac{1}{2}x$

p. $\frac{3(5g-1)}{4}-\frac{2g+7}{6}$

$3\frac{5}{12}g-1\frac{11}{12}$

q. $-\frac{3d+1}{5}+\frac{d-5}{2}+\frac{7}{10}$

$\frac{-d}{10}-2$

r. $\frac{9w}{6}+\frac{2w-7}{3}-\frac{w-5}{4}$

$\frac{23w-13}{12}$

s. $\frac{1+f}{5}-\frac{1+f}{3}+\frac{3-f}{6}$

$\frac{11}{30}-\frac{3}{10}f$