

Learning Objective: Students will be able to factor numerical and algebraic expressions.

Warm Up

Find the value of each expression in lowest terms.

1. $3 \div \frac{17}{4} \div \frac{18}{5}$

4. $2 \div \left(\frac{12}{7} \div \frac{20}{3} \right)$

7. $\frac{19}{7} \div \frac{1}{3} \div \frac{5}{3}$

2. $\frac{1}{2} \div \frac{2}{7} \div 11$

5. $\frac{4}{5} \div \left(\frac{7}{5} \div 10 \right)$

8. $4 \div \frac{9}{2} \div \frac{17}{6}$

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Warm Up Answers

Find the value of each expression in lowest terms.

$$\begin{aligned} 1. \quad & 3 \div \frac{17}{4} \div \frac{18}{5} \\ & = \frac{10}{51} \end{aligned}$$

$$\begin{aligned} 4. \quad & 2 \div \left(\frac{12}{7} \div \frac{20}{3} \right) \\ & = \frac{70}{9} = 7\frac{7}{9} \end{aligned}$$

$$\begin{aligned} 7. \quad & \frac{19}{7} \div \frac{1}{3} \div \frac{5}{3} \\ & = \frac{171}{35} = 4\frac{31}{35} \end{aligned}$$

$$\begin{aligned} 2. \quad & \frac{1}{2} \div \frac{2}{7} \div 11 \\ & = \frac{7}{44} \end{aligned}$$

$$\begin{aligned} 5. \quad & \frac{4}{5} \div \left(\frac{7}{5} \div 10 \right) \\ & = \frac{40}{7} = 5\frac{5}{7} \end{aligned}$$

$$\begin{aligned} 8. \quad & 4 \div \frac{9}{2} \div \frac{17}{6} \\ & = \frac{16}{51} \end{aligned}$$

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Homework Answers

3.4 Record and Practice Journal

Use the Distributive Property and mental math to find the product.

1. 4×31

124

2. 7×49

343

3. $16(38)$

608

Use the Distributive Property to simplify the expression.

4. $8(5 + w)$

$40 + 8w$

5. $11(9 + d)$

$99 + 11d$

6. $15(p - 4 + 2)$

$15p - 30$

Simplify the expression.

7. $2x - 4 + 3x$

$5x - 4$

8. $4y - 1 - 3y + 2$

$y + 1$

9. $x + 2(x - 4)$

$3x - 8$

10. A jazz band sells 31 large boxes of fruit and 74 small boxes of fruit for a fundraiser.

- a. Use the Distributive Property to write and simplify an expression for the profit.



Profit = Price - Cost

**$31(20 - x) + 74(10 - y)$;
 $1360 - 31x - 74y$**

- b. A large box of fruit costs \$9 and a small box of fruit costs \$4. What is the jazz band's profit?

\$785

$$15(p + -4 + 2)$$

$$15p + -60 + 30$$

$$15p + -30$$

Good thing \rightarrow Good person = +

Bad thing \rightarrow Good person = -

Good thing \rightarrow Bad person = -

Bad thing \rightarrow Bad person = +

$$-1^1 = -1$$

$$-1^2 = 1$$

$$-1^3 = -1$$

$$-1^4 = 1$$

$$-1^5 = -1$$

STEPS + Add + Sub

- ① Identify operation
 - if add move to step 3
 - if sub move to step 2
- ② Change to add → Change to opposite of 2nd #
- ③ if signs are same: add absolute values
keep sign
- b if signs diff: find difference of A.V.
 keep sign of higher A.V.

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Self-Evaluation Scale

Score	Description
4	I can teach other students how to factor numerical and algebraic expressions.
3	I can factor numerical and algebraic expressions.
2	I recognize, but still need help to factor numerical and algebraic expressions.
1	I do not know how to factor numerical and algebraic expressions.

Key Idea

Factoring an Expression

Words Writing a numerical expression or algebraic expression as a product of factors is called **factoring the expression**. You can use the Distributive Property to factor expressions.

Numbers $3 \cdot 7 + 3 \cdot 2 = 3(7 + 2)$

$$3 \cdot 7 - 3 \cdot 2 = 3(7 - 2)$$

Algebra $ab + ac = a(b + c)$

$$ab - ac = a(b - c)$$

1

Factoring a Numerical Expression

Factor $20 - 12$ using the GCF.

$$4(5 - 3)$$

Find the GCF of 20 and 12 by listing their factors.

Factors of 20: ①, ②, ④, 5, 10, 20

Factors of 12: ①, ②, 3, ④, 6, 12

Circle the common factors.

The GCF of 20 and 12 is 4.

Write each term of the expression as a product of the GCF and the remaining factor. Then use the Distributive Property to factor the expression.

$$20 - 12 = 4(5) - 4(3)$$

Rewrite using GCF.

$$= 4(5 - 3)$$

Distributive Property

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2

Identifying Equivalent Expressions

Which expression is not equivalent to $16x + 24$?

- (A) $2(8x + 12)$ (B) $4(4x + 6)$ (C) $6(3x + 4)$ (D) $(2x + 3)8$

$8(2x + 3)$

Each choice is a product of two factors in which one is a whole number and the other is the sum of two terms. For an expression to be equivalent to $16x + 24$, its whole number factor must be a common factor of 16 and 24.

Factors of 16: ①, ②, ④, ⑧, 16

Factors of 24: ①, ②, 3, ④, 6, ⑧, 12, 24

Circle the common factors.

The common factors of 16 and 24 are 1, 2, 4, and 8. Because 6 is not a common factor of 16 and 24, Choice C cannot be equivalent to $16x + 24$.

Check: $6(3x + 4) = 6(3x) + 6(4) = 18x + 24 \neq 16x + 24$ **X**

❖ So, the correct answer is (C).

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$$5(x-3)$$

3 Factoring an Algebraic Expression

You receive a discount on each book you buy for your electronic reader. The original price of each book is x dollars. You buy 5 books for a total of $(5x - 15)$ dollars. Factor the expression. What can you conclude about the discount?

Find the GCF of $5x$ and 15 by writing their prime factorizations.

$$5x = 5 \cdot x$$

$$15 = 5 \cdot 3$$

Circle the common prime factor.

So, the GCF of $5x$ and 15 is 5 . Use the GCF to factor the expression.

$$5x - 15 = 5(x) - 5(3) \quad \text{Rewrite using GCF.}$$

$$= 5(x - 3) \quad \text{Distributive Property}$$

The factor 5 represents the number of books purchased. The factor $(x - 3)$ represents the price of each book. This factor is a difference of two terms, showing that the price x of each book is decreased by $\$3$.

- ❖ So, the factored expression shows a $\$3$ discount for every book you buy. The original expression shows a total savings of $\$15$.



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Assignment

Complete problems 2, 6, 8, 10, 12, 14, 16, 18, & 19
on page 141 in your Big Ideas Text Book.

$$\begin{array}{r} 44-11 \\ \hline 11(4-1) \end{array}$$

$$\frac{15x + 6}{3(5x + 2)}$$

$$24y + 88x$$

$$8 \overline{) 24 \ 88}$$

3 11

$$8(3y + 11x)$$

Assignment Answers

2. $11(4 - 1)$

4. $5(14 + 19)$

6. $20(5 - 4)$

8. $16(3 + 5)$

10. $3(5x + 2)$

12. $10(5x - 6)$

14. $14(x - 7)$

16. $8(3y + 11x)$

18. *Sample answer:* $16 + 8x$,
 $8(x + 2)$, $4(2x + 4)$,
 $2(4x + 8)$, $(4x + 8)2$

19. $(x + 4)$ ft

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Homework

In your Big Ideas Record and Practice Journal
page 73 & 74.