Math Connections Worksheets

MAT0028C Developmental Math II

Chapter 1

Foundations of Algebra

Name: Date:
Instructor: Section:

Chapter 1   FOUNDATIONS OF ALGEBRA

1.3 Adding and Subtracting Real Numbers; Properties of Real Numbers

KEY VOCABULARY

Term	Definition	Example
Additive inverses		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Additive Identity

In the Language of Math	In Your Own Words

Commutative Property of Addition

In the Language of Math	In Your Own Words

Associative Property of Addition

In the Language of Math	In Your Own Words

Adding Numbers with the Same Sign

In the Language of Math	In Your Own Words

Adding Numbers with Different Signs

In the Language of Math	In Your Own Words

Adding Fractions

In the Language of Math	In Your Own Words

Rewriting Subtraction

In the Language of Math	In Your Own Words

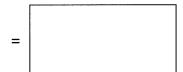## GUIDED EXAMPLE

Subtract.

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

Solution

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

= [ ]   **Write the subtraction as an equivalent addition.**

= [ ]   **Write equivalent fractions with a common denominator.**

= [ ]   **Simplify.**

PRACTICE PROBLEMS

Indicate whether each equation illustrates the additive identity, commutative property of addition, associative property of addition, or additive inverse.

1. $0.9 + (-0.9) = 0$

1._____

2. $0.2 + 0 = 0.2$

2._____

3. $-11 + (5 + 12) = (-11 + 5) + 12$

3._____

Add.

4. $-26 + 62$

4._____

5. $\dfrac{2}{3} + \dfrac{5}{6}$

5._____

6. $-46.8 + (-4.2)$

6._____

Find the additive inverse.

7. 8

7._____

8. $-\dfrac{1}{2}$

8._____

9. a

9._____

Simplify.

10. $-(-15)$

10._____

11. $-|7|$ **11.**_____

12. $-|-92|$ **12.**_____

Subtract.

13. $-5-6$ **13.**_____

14. $-3-(-4)$ **14.**_____

15. $1.6-5.4$ **15.**_____

Chapter 1   FOUNDATIONS OF ALGEBRA

1.4 Multiplying and Dividing Real Numbers; Properties of Real Numbers

KEY VOCABULARY

Term	Definition	Example
Multiplicative inverses		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Properties of Multiplication	In the Language of Math	In Your Own Words
Multiplicative Property of 0		
Multiplicative Identity		
Commutative Property of Multiplication		
Associative Property of Multiplication		
Distributive Property of Multiplication over Addition		
Multiplying Signed Numbers		
Multiplying Fractions		
Multiplying Decimal Numbers		

Properties of Division	In the Language of Math	In Your Own Words
Dividing Signed Numbers		
Division Involving 0		
Dividing Fractions		
Dividing Decimal Numbers		

GUIDED EXAMPLE

Multiply.

$$\frac{7}{3}\cdot\left(-\frac{1}{28}\right)$$

Solution

$$\frac{7}{3}\cdot\left(-\frac{1}{28}\right) = \boxed{}$$ **Divide out the common factor.**

$$= \boxed{}$$ **There is an [even / odd] number of negative factors, so the product is [positive / negative].**

PRACTICE PROBLEMS

Indicate whether each equation illustrates the multiplicative property of 0, the multiplicative identity, the commutative property of multiplication, the associative property of multiplication, or the distributive property.

1. $7 \cdot (8 \cdot 56) = (7 \cdot 8) \cdot 56$

1._____

2. $9(x + y) = 9x + 9y$

2._____

3. $1 \cdot \left(-\dfrac{3}{4}\right) = -\dfrac{3}{4}$

3._____

Multiply.

4. $-7 \cdot (-4) \cdot (-7)$

4._____

5. $\dfrac{2}{7} \cdot \left(-\dfrac{1}{2}\right)$

5._____

6. $-\dfrac{11}{9} \cdot \dfrac{3}{10}$

6._____

7. $(-6.2)(6.8)$

7._____

Find the multiplicative inverse.

8. $\dfrac{4}{5}$

8._____

9. 8

9._____

Divide.

10. $-18 \div (-6)$

10._____

11. $7 \div 0$

11._____

12. $-\dfrac{6}{5} \div \dfrac{3}{2}$

12._____

13. $7.2 \div 0.12$

13._____

Solve.

14. Planet A has an average surface temperature of $-150°$ F. Planet B has an average surface temperature that is $\dfrac{3}{2}$ times that of planet A. Find the average surface temperature on planet B.

14._____

15. In a poll where respondents can agree, disagree, or have no opinion, $\dfrac{5}{14}$ of the respondents said they agreed and $\dfrac{4}{5}$ of those that agreed were women. What fraction of all respondents were women who agreed with the statement in the poll?

15._____

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1.5 Exponents, Roots, and Order of Operations

KEY VOCABULARY

Term	Definition	Example
Exponent		
Base		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Evaluating an Exponential Form

In the Language of Math	In Your Own Words

Properties of Square Roots	In the Language of Math	In Your Own Words
Square Roots Involving the Radical Sign		
Square Root of a Product or Quotient		
Square Root of a Sum or Difference		

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Order-of-Operations Agreement

Finding the Arithmetic Mean

In the Language of Math	In Your Own Words

GUIDED EXAMPLE

Simplify using the order of operations.

$$4^2 - 135 \div (19 - 4)$$

Solution

$$4^2 - 135 \div (19 - 4)$$

= [   ]   **Calculate within the parentheses.**

= [   ]   **Evaluate the exponential form.**

= [   ]   **Perform the division.**

= [   ]   **Subtract.**

PRACTICE PROBLEMS

Evaluate.

1. 2^8

1.＿＿＿＿＿＿＿＿＿

2. $\left(-7\right)^3$

2.＿＿＿＿＿＿＿＿＿

3. $\left(0.28\right)^3$

3.＿＿＿＿＿＿＿＿＿

Find all square roots of each number.

4. 144

4.＿＿＿＿＿＿＿＿＿

5. 289

5.＿＿＿＿＿＿＿＿＿

Evaluate the square roots.

6. $\sqrt{0.64}$

6.＿＿＿＿＿＿＿＿＿

7. $\sqrt{-25}$

7.＿＿＿＿＿＿＿＿＿

8. $\sqrt{\dfrac{49}{25}}$

8.＿＿＿＿＿＿＿＿＿

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Simplify using the order of operations.

9. $19 \cdot 26 + 44$

9._____

10. $5 - (-4)(-7)^2$

10._____

11. $5.9 + (2.2)^2 - 9(7 - 9)$

11._____

12. $-7|6 - 8| + 2^2$

12._____

13. $-30 \div (-3)(8) + \sqrt{169 - 144} + 14$

13._____

14. $-36 \cdot \dfrac{2}{3} \div (-4) + |9 - 4(5 + 2)|$

14._____

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1.6 Translating Word Phrases to Expressions

Operation	Variable Expression	Word Phrases
Addition		
Subtraction		
Multiplication		
Division		

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GUIDED EXAMPLES
Translate each phrase to an algebraic expression.

    a) the difference of some number and nine
    Solution

Select a variable to represent the unknown number.

_____

Subtraction is not commutative, so translate the subtraction in the correct order.

    b) the sum of thirty-four and z
    Solution

The commutative property of addition allows us to write the expression in either order.

_____

    c) the ratio of twelve to y, all raised to the fifth power
    Solution

When coupled with the word *ratio*, the word *to* translates to the fraction line.

_____

The word *all* indicates that we should use parentheses to group the expression.

    d) A driver drove at a speed of 51 mph for y hours. Write an algebraic expression for the distance the driver drove.
    Solution

_____

Distance equals rate times time.

NOTES

PRACTICE PROBLEMS

Translate each phrase to an algebraic expression.

1. eight times c 1._____

2. six more than two times a number   2._____

3. seventy-five increased by d 3._____

4. the ratio of twelve to a nonzero number y 4._____

5. five less than three times a number   5._____

6. a divided by nine   6._____

7. one-fourth subtracted from the product of two and y 7._____

8. the product of negative four and the difference of a   8._____
    number and one

9. a number minus seven times the difference between
the number and sixteen

9._____

10. the difference of ten and *b*, all raised to the fourth
power

10._____

11. the quotient of six and a number, decreased by eight

11._____

12. the product of two and a number, increased by nine

12._____

13. negative nineteen increased by the sum of *a* and *b*

13._____

14. a number minus four times the sum of the number
and sixty

14._____

15. The length of a rectangle is four more than the
width. If the width is represented by *x*, write an
algebraic expression that describes the length.

15._____

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1.7 Evaluating and Rewriting Expressions

KEY VOCABULARY

Term	Definition	Example
Terms		
Coefficient		
Like terms		

KEY PROPERTIES, PROCEDURES, OR STRATEGIES

Evaluating an Algebraic Expression

In the Language of Math	In Your Own Words

Combining Like Terms

In the Language of Math	In Your Own Words

GUIDED EXAMPLES

1. Evaluate $\left| 2x^2 - 3y \right|$ when $x = 3$ and $y = 6$.

    Solution

    $\left| 2x^2 - 3y \right|$

    = [   ]   **Replace x with 3 and y with 6.**

    = [   ]   **Simplify the exponential form.**

    = [   ]   **Multiply.**

    = [   ]   **Subtract.**

    = [   ]   **Find the absolute value.**

2. Combine like terms.
    $1.2p + 0.4q - 0.18p + 0.2q$

    Solution

    $1.2p + 0.4q - 0.18p + 0.2q$

    = [   ] + [   ]   **Collect the like terms.**

    = [   ]   **Combine like terms.**

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PRACTICE PROBLEMS

Evaluate the expressions using the given values.

1. $4(c+6)-5d$; $c=5$, $d=4$ 1._____

2. $3x^2-4x+7$; $x=-4$ 2._____

3. $-7\sqrt{x}+4\sqrt{y}$; $x=36$, $y=9$ 3._____

Determine all values that cause each expression to be undefined.

4. $\dfrac{6}{y-4}$ 4._____

5. $\dfrac{9}{6y+5}$ 5._____

Use the distributive property to write an equivalent expression and simplify.

6. $4(c+7)$ 6._____

7. $-2(b-5)$ 7._____

Identify the coefficient of each term.

8. $-8w^5$

8._____

9. $-x^7$

9._____

10. $\dfrac{c}{3}$

10._____

Simplify by combining like terms.

11. $3d - 18d$

11._____

12. $4.7x - 8.9x$

12._____

13. $3p + 13 - 20p + 34$

13._____

14. $-36 - 4x + 3y - 93 - y + 8x$

14._____

15. $\dfrac{20}{11}r + \dfrac{3}{11}s - \dfrac{5}{11}r + \dfrac{16}{11}s$

15._____

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1.3 Adding and Subtracting Real Numbers; Properties of Real Numbers

1. additive inverse   2. additive identity   3. associative property of addition

4. 36   5. $\dfrac{3}{2}$ 6. -51 7. -8 8. $\dfrac{1}{2}$ 9. $-a$ 10. 15

11. -7 12. -92 13. -11 14. 1   15. -3.8

1.4 Multiplying and Dividing Real Numbers; Properties of Real Numbers

1. associative property of multiplication   2. distributive property

3. multiplicative identity   4. -196 5. $-\dfrac{1}{7}$ 6. $-\dfrac{11}{30}$

7. -42.16 8. $\dfrac{5}{4}$ 9. $\dfrac{1}{8}$ 10. 3   11. undefined   12. $-\dfrac{4}{5}$

13. 60   14. $-225°\,\text{F}$ 15. $\dfrac{2}{7}$

1.5 Exponents, Roots, and Order of Operations

1. 256   2. -343 3. 0.021952   4. ± 12 5. ± 17

6. 0.8   7. not a real number   8. $\dfrac{7}{5}$ 9. 538   10. 201   11. 28.74

12. -10 13. 99   14. 25

1.6 Translating Word Phrases to Expressions

1. $8c$ 2. $2x+6$ 3. $75+d$ 4. $\dfrac{12}{y}$ 5. $3x-5$ 6. $\dfrac{a}{9}$

7. $2y-\dfrac{1}{4}$ 8. $-4(x-1)$ 9. $x-7(x-16)$ 10. $(10-b)^4$

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11. $\dfrac{6}{x}-8$ 　12. $2x+9$ 　13. $-19+(a+b)$ 　14. $x-4(x+60)$

15. $x+4$

1.7 Evaluating and Rewriting Expressions

1. 24 　2. 71 　3. -30 　4. 4 　5. $-\dfrac{5}{6}$ 　6. $4c+28$

7. $-2b+10$ 　8. -8 　9. -1 　10. $\dfrac{1}{3}$ 　11. $-15d$ 　12. $-4.2x$

13. $-17p+47$ 　14. $4x+2y-129$ 　15. $\dfrac{15}{11}r+\dfrac{19}{11}s$