**Algebra 3-4**

**Unit 1: Expressions, Equations, and Inqualities**

**Conceptual Lens:**

Designer(s): OPS Secondary Math Department Grade Level: Algebra 3-4

Expressions, Equations, and Inequalities

Unit Overview

Chapter 1 expands on students’ understandings and skills related to expressions, equations, and inequalities. In this chapter, students will develop the answers to the Essential Questions posed on the following page as they learn the skills outlined in the objectives.

|  |  |  |
| --- | --- | --- |
| **Unit 1:Real Numbers** | | |
| **Essential Questions** | **Standard** | **Objectives**  **F=Factual C=Conceptual D=Debatable** |
| * 1. How do variables help you model real-situations? | 12.3.2a  12.3.2b | * Students will use an expression to model the nth term of a pattern.(C) * Students will use variables to represent unknown quantities in real-world situations. (C) |
| * 1. How can you use the properties of real numbers to simplify algebraic expressions? | 12.3.2a | * Students will apply the properties of real numbers to simplify algebraic expressions. (C) |
| * 1. How do you solve an equation or inequality? | 12.3.3a | * Students will apply the Properties of Equality to solve an equation. (C) * Students will apply the Properties of Inequality to solve an inequality. (C) * Students will find all of the values of a variable that make an equation or inequality true. (C) |

**Unit 1:Real Numbers**

**Critical Content and Skills:**

|  |  |
| --- | --- |
| *Knowledge Statements*  Students will know…   1. **Vocabulary**: absolute value, algebraic expression, compound inequality, like terms, literal equation, term, variable. 2. Variables use in real-world situations. 3. Properties of real numbers    1. Associative    2. Commutative    3. Identity    4. Inverse    5. Distributive    6. Closure 4. Subsets of real numbers    1. Rational    2. Irrational    3. Integer    4. Whole    5. Natural 5. Difference between an equation and an expression. | *Key Skill Statements*  Students will know how to…   1. Simplify algebraic expression using properties of real numbers and order of operations. 2. Recognize patterns in expressions. 3. Identify the subset(s) of any given real number value. 4. Identify real number properties. 5. Solve equations and inequalities. 6. Solve absolute value equations and inequalities. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Algebra 3-4**  **Real numbers Unit** | | | |
| **Advanced**  **Score 4.0** | In addition to the Proficient (3.0) performance, makes ***indepth*** inferences and extended applications of what was learned, including connections to other experiences. | | * Solve multi-step equations/equations with extraneous solutions. * Solve real life problems with equations. * Describe nth term of a pattern. |
|  | **Proficient +**  **Score 3.5** | In addition to the complex ideas and processes (Proficient 3.0) performance, ***partial success*** at in-depth inferences and extended applications of what was learned, including connections to other experiences. | |
| **Proficient**  **Score 3.0** | ***No major*** errors or omissions regarding any of the information and simple (Basic, 2.0) or complex processes (Proficient, 3.0) that was explicitly taught. | | • Simplify expressions (multi-step).  • Solve equations (multi-step). |
|  | **Basic +**  **Score 2.5** | ***No major*** errors or omissions regarding any of the information and/or simpler details and processes (Basic, 2.0) and ***partial*** knowledge of the more complex ideas and processes (Proficient, 3.0) | |
| **Basic**  **Score 2.0** | ***No major*** errors or omissions regarding the simpler details and processes (Basic, 2.0), but ***major*** errors or omissions regarding the more complex ideas and processes (Proficient, 3.0). | | • Simplify Expressions.  • Solve equations. |
| **Below Basic**  **Score 1.0** | A ***partial*** understanding of ***some*** of the simpler details and processes (Basic, 2.0), but ***major*** errors or omissions regarding the more complex ideas and processes. | | |
| **Failing**  **Score 0** | ***No*** evidence or ***insufficient*** evidence of student learning. | | |

Algebra 3-4 Name

Pd Date

**Unit 1: Real Numbers Assessment**

Calculators are NOT permitted on this exam.

**Multiple Choice**

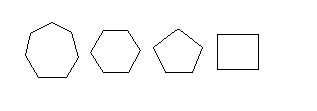
*Identify the choice that best completes the statement or answers the question.*

**Level 2**

**Look at the figures from left to right. What is the pattern?**

**What would the next figure in the pattern look like?**

\_\_\_\_ 1. Look at the figures from left to right. What would the next figure in the pattern look like?



|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

\_\_\_\_ 2. The formula  relates the speed *S* in miles per hour a car was traveling to the length *d* in feet that the car skidded when brakes were applied. The variable *f* is the coefficient of friction, which varies depending on the road surface and the condition of the tires. Which set of numbers contains the value of *S* for *f* = 0.5 and *d* = 63?

|  |  |
| --- | --- |
| a. | integers |
| b. | whole numbers |
| c. | rational numbers |
| d. | irrational numbers |

\_\_\_\_ 3. You start with $15 and save $8 each week. What algebraic expression models the total amount you save?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

**Evaluate the expression for the given value of the variable(s).**

\_\_\_\_ 4. 

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

\_\_\_\_ 5. ; *x* = –3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 3 | b. | –1 | c. | 11 | d. | –17 |

**Combine like terms. What is a simpler form of each expression?**

\_\_\_\_ 6. **

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

\_\_\_\_ 7. **

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

**Solve the equation.**

\_\_\_\_ 8. 

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

\_\_\_\_ 9. **

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | = | b. | = | c. | = | d. | = |

\_\_\_\_ 10. **

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | = | b. | = | c. | = | d. | = |

**Solve the equation or formula for the indicated variable.**

\_\_\_\_ 11. , for *t*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

\_\_\_\_ 12. , for *U*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  |

**Solve the inequality. Graph the solution set.**

\_\_\_\_ 13. 2 + 2*k*  8

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *k*  3 | c. | *k*  3 |
| b. | *k*  | d. | *k*  |

\_\_\_\_ 14. 2*r* – 9  –6

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *r*  | c. | *r*  |
| b. | *r*  | d. | *r*  |

**Solve the absolute value equation.**

\_\_\_\_ 15. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* =  or *x* = | c. | *x* =  or *x* = |
| b. | *x* =  or *x* = | d. | *x* =  or *x* = |

\_\_\_\_ 16. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* =  or *x* = | c. | *x* =  or *x* = |
| b. | *x* =  or *x* = | d. | *x* =  or *x* = |

\_\_\_\_ 17. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* =  or *x* = | c. | *x* =  or *x* = |
| b. | *x* =  or *x* = | d. | *x* =  or *x* = |

**Level 3**

**Is the following *always*, *sometimes*, or *never* true?**

\_\_\_\_ 18. 

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a. | always | b. | sometimes | c. | never |

\_\_\_\_ 19. 

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a. | always | b. | sometimes | c. | never |

**Solve the compound inequality. Graph the solution.**

\_\_\_\_ 20. 4*x* + 3  –17 and 7*x* – 4  10

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x*   or *x*  2 | c. | *x*  –5 and *x*  |
| b. | *x*   or *x*  | d. | *x*  –5 and *x*  2 |

\_\_\_\_ 21. 9*x* – 5 < –41 or 3*x* + 13 > 7

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* <  or *x* > –2 | c. | *x* < –4 or *x* > |
| b. | *x* <  or *x* > | d. | *x* < –4 or *x* > –2 |

\_\_\_\_ 22. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

\_\_\_\_ 23. What is the sum of the solutions of  ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. | -2 | d. |  |

**Solve the equation. Check for extraneous solutions.**

\_\_\_\_ 24. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* =  or *x* = | c. | x = |
| b. | *x* =  or *x =* | d. | *x* = |

\_\_\_\_ 25. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *x* =  or *x* = | c. | *x* = |
| b. | *x* = | d. | x =  or x = |

**Solve the inequality. Graph the solution.**

\_\_\_\_ 26. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

\_\_\_\_ 27. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. | –10  *x*  5 |
| b. | –20  *x*  10 | d. | –10  *x*  5 |

\_\_\_\_ 28. 

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |
|  |  |  |  |

**Level 4**

**Use an algebraic equation to solve the problem.**

\_\_\_\_ 29. Two cars leave Denver at the same time and travel in opposite directions. One car travels 10 mi/h faster than the other car. The cars are 300 mi apart in 3 h. How fast is each car traveling?

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

\_\_\_\_ 30. When Spheres-R-Us ships bags of golf balls, the number of balls in each bag must be within 6 balls of 300. Write a compound inequality and an absolute value inequality for an acceptable number of golf balls *b* in each bag.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Unit 1 Assessment**

**Answer Section**

**MULTIPLE CHOICE**

1. ANS: C PTS: 1 DIF: L2 REF: 1-1 Patterns and Expressions

OBJ: 1-1.1 To identify and describe patterns NAT: CC A.SSE.3| A.1.a

TOP: 1-1 Problem 1 Identifying a Pattern

2. ANS: D PTS: 1 DIF: L3 REF: 1-2 Properties of Real Numbers

OBJ: 1-2.1 To graph and order real numbers NAT: CC N.RN.3| N.1.i| N.5.f

TOP: 1-2 Problem 1 Classifying a Variable

3. ANS: C PTS: 1 DIF: L3 REF: 1-3 Algebraic Expressions

OBJ: 1-3.1 To evaluate algebraic expressions

NAT: CC A.SSE.1.a| N.1.d| N.3.a| N.3.b| A.3.b| A.3.d TOP: 1-3 Problem 2 Modeling a Situation

4. ANS: B PTS: 1 DIF: L4 REF: 1-3 Algebraic Expressions

OBJ: 1-3.1 To evaluate algebraic expressions

NAT: CC A.SSE.1.a| N.1.d| N.3.a| N.3.b| A.3.b| A.3.d

TOP: 1-3 Problem 3 Evaluating Algebraic Expressions KEY: evaluate

5. ANS: B PTS: 1 DIF: L3 REF: 1-3 Algebraic Expressions

OBJ: 1-3.1 To evaluate algebraic expressions

NAT: CC A.SSE.1.a| N.1.d| N.3.a| N.3.b| A.3.b| A.3.d

TOP: 1-3 Problem 3 Evaluating Algebraic Expressions KEY: evaluate

6. ANS: B PTS: 1 DIF: L2 REF: 1-3 Algebraic Expressions

OBJ: 1-3.2 To simplify algebraic expressions

NAT: CC A.SSE.1.a| N.1.d| N.3.a| N.3.b| A.3.b| A.3.d

TOP: 1-3 Problem 5 Simplifying Algebraic Expressions KEY: like terms

7. ANS: A PTS: 1 DIF: L3 REF: 1-3 Algebraic Expressions

OBJ: 1-3.2 To simplify algebraic expressions

NAT: CC A.SSE.1.a| N.1.d| N.3.a| N.3.b| A.3.b| A.3.d

TOP: 1-3 Problem 5 Simplifying Algebraic Expressions KEY: like terms

8. ANS: D PTS: 1 DIF: L3 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 1 Solving a one-step equation

KEY: equation | solution of an equation | inverse operations

9. ANS: A PTS: 1 DIF: L2 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 2 Solving a Multi-Step Equation

KEY: equation | solution of an equation | inverse operations

10. ANS: B PTS: 1 DIF: L2 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 2 Solving a Multi-Step Equation

KEY: equation | solution of an equation | inverse operations

11. ANS: D PTS: 1 DIF: L3 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 5 Solving a Literal Equation KEY: equation | literal equation

12. ANS: D PTS: 1 DIF: L3 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 5 Solving a Literal Equation KEY: equation | literal equation

13. ANS: C PTS: 1 DIF: L2 REF: 1-5 Solving Inequalities

OBJ: 1-5.1 To solve and graph inequalities

NAT: CC A.CED.1| A.2.a| A.3.b| A.3.d| A.4.c

TOP: 1-5 Problem 2 Solving and Graphing an Inequality

14. ANS: C PTS: 1 DIF: L2 REF: 1-5 Solving Inequalities

OBJ: 1-5.1 To solve and graph inequalities

NAT: CC A.CED.1| A.2.a| A.3.b| A.3.d| A.4.c

TOP: 1-5 Problem 2 Solving and Graphing an Inequality

15. ANS: D PTS: 1 DIF: L2

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 1 Solving an Absolute Value Equation KEY: absolute value

16. ANS: B PTS: 1 DIF: L2

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 2 Solving a Multi-Step Absolute Value Equation

KEY: absolute value

17. ANS: C PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 2 Solving a Multi-Step Absolute Value Equation

KEY: absolute value

18. ANS: A PTS: 1 DIF: L3 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 4 Equations with No Solutions and Identities

KEY: equation | identity

19. ANS: C PTS: 1 DIF: L3 REF: 1-4 Solving Equations

OBJ: 1-4.1 To solve equations NAT: CC A.CED.1| CC A.CED.4| A.2.a| A.4.c

TOP: 1-4 Problem 4 Equations with No Solutions and Identities

KEY: equation

20. ANS: D PTS: 1 DIF: L3 REF: 1-5 Solving Inequalities

OBJ: 1-5.2 To write and solve compound inequalities

NAT: CC A.CED.1| A.2.a| A.3.b| A.3.d| A.4.c

TOP: 1-5 Problem 5 Solving an AND Inequality KEY: compound inequality

21. ANS: D PTS: 1 DIF: L3 REF: 1-5 Solving Inequalities

OBJ: 1-5.2 To write and solve compound inequalities

NAT: CC A.CED.1| A.2.a| A.3.b| A.3.d| A.4.c

TOP: 1-5 Problem 6 Solving an OR Inequality KEY: compound inequality

22. ANS: C PTS: 1 DIF: L3 REF: 1-5 Solving Inequalities

OBJ: 1-5.2 To write and solve compound inequalities

NAT: CC A.CED.1| A.2.a| A.3.b| A.3.d| A.4.c

TOP: 1-5 Problem 5 Solving an AND Inequality KEY: compound inequality

23. ANS: C PTS: 1 DIF: L2

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 2 Solving a Multi-Step Absolute Value Equation

KEY: absolute value

24. ANS: B PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 3 Checking for Extraneous Solutions KEY: absolute value | extraneous solution

25. ANS: A PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 3 Checking for Extraneous Solutions KEY: absolute value | extraneous solution

26. ANS: C PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 5 Solving the Absolute Value Inequality; greater than

KEY: absolute value

27. ANS: D PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 4 Solving the Absolute Value Inequality; less than

KEY: absolute value

28. ANS: C PTS: 1 DIF: L3

REF: 1-6 Absolute Value Equations and Inequalities

OBJ: 1-6.1 To write and solve equations and inequalities involving absolute value

NAT: CC A.SSE.1.b| CC A.CED.1| N.1.g| N.3.c| A.2.a| A.4.c

TOP: 1-6 Problem 5 Solving the Absolute Value Inequality; greater than

KEY: absolute value

29.

30.

|  |  |
| --- | --- |
| **Learning Experiences** | **Text Pages/Resources** |
| **Vocabulary**   * Word wall * Foldable – See Glencoe @2010 Foldables by Dinah Zike for more information * Matching the word to the definition, graph, or example * Anticipation guide (pre and post) |  |
| * **Lessons Resources at the end of each section.** * **Online resources at pearsonsuccessnet.com** | Pearson Algebra 2: 1.1-1.6 |
| **General:**  **Test-Taking Strategy**  Be sure to check the reasonableness of your answer. If students are asked for the balance of a bank account where you were dealing with amounts in the hundreds, it is not reasonable to give an answer in the millions. To make sure the answer to a problem is reasonable, you can estimate before you calculate. If the answer is close to your estimate, your answer is probably correct. |  |

**Teacher Notes/Additional Resources**

**General Algebra & Math sites:**

* AlgebraLAB: Making Math & Science Connections [www.algebralab.org](http://www.algebralab.org)
* Classzone from Holt McDougall’s free site includes really cool animations. You and your students will simply need to figure out which chapter in their book relates to what we’re studying. <http://www.classzone.com/cz/books/algebra_1_2011_na/book_home.htm?state=NE>
* Kuta software <http://www.kutasoftware.com> Excellent free worksheets (with answers) <http://www.kutasoftware.com/free.html>
* NCTM’s Figure This! Web site has several challenge problems that are designed for families to do together. <http://figurethis.org/download.htm> These challenges (there are 80 of them!) could be used for daily warm-ups in class (several involve estimation), weekly Problem-of-the-Week, and even a challenge problem along with their homework, if relevant.
* Math is Fun! Includes an illustrated math dictionary and helpful tutorials for students. [www.mathisfun.com](http://www.mathisfun.com)
* Daily Math Review <http://www.aea11.k12.ia.us/E2T2/dmr.html>
* Great online timer: <http://www.online-stopwatch.com>
* Porta Portal’s consolidated resource list <http://guest.portaportal.com/mrburke>
* Algebra2Go <http://www.saddleback.edu/faculty/lperez/algebra2go/index.html>
* About.com Education site has great warm ups <http://712educators.about.com/cs/warmups/l/blwarmmath.htm>
* Southern Regional Education Boards Instructional Resources <http://www.evalutech.sreb.org/InstResources/index.asp>

**Books:**

* Various resources provided by publishers for the book selection process

**Videos:**

* BrainPop [www.brainpop.com](http://www.brainpop.com)
* Teacher Tube [www.teachertube.com](http://www.teachertube.com)