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| **Pencil Collections- 6.EE.3** | |
| **Domain** | **Expressions and Equations** |
| **Cluster** | **Apply and extend previous understandings of numbers to the system of rational numbers.** |
| **Standard(s)** | **6.EE.3** Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.  **6.EE.4** Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. |
| **Materials** | Activity sheet |
| **Task** | **Pencil Collections**  Abby, Bill, Carol, D’Angelo and Ethan are comparing the amount of pencils that they each have.  Abby has *A* pencils.  Bill has 3 less than twice as many as Abby.  Carol has 4 less than the number of Abby’s pencils squared.  D’Angelo has 8 more than half as many pencils as Abby.  Ethan has half as many as Abby’s pencils squared.  Part 1:  Write an expression for each child to show their number of pencils in terms of the number of pencils that Abby has (*A*).  Part 2:  Write an expression for the total number of pencils that all of the students have. After you write the expression, simplify it.  Part 3:  If Abby had 4 pencils how many pencils does each student have? How many pencils are there total? Show your work.  Part 4: If each student doubled their amount of pencils, write an expression to show the total number of pencils in terms of the number of pencils that Abby has (*A*). After you write the expression, simplify it. Then find the total number of pencils.  Part 5:  Write an explanation about how you solved Part 4. |

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| **Rubric** | | |
| **Level I** | 1. **Level II** | **Level III** |
| Developing Proficiency   * Student uses inappropriate solution strategy and does not get the correct answer. | Not Yet Proficient   * There are one or two errors. | Proficient in Performance   * Accurately solves problem. * Part 1: Abby: *A*; Bill: *A*-3; Carol: *A*2-4; D’Angelo: (*A*/2)+8; Ethan: (*A*2/2) * Part 2: *A* + (*A*-3) + (*A*2-4) + ((*A*/2)+8) + (*A*2/2);   Simplified: (3/2)*A*2 + 2 ½ *A* + 1   * Part 3: Abby: 4; Bill: 1; Carol: 12; D’Angelo: 10; Total: 27. * Part 4: 2 (*A* + (*A*-3) + (*A*2-4) + ((*A*/2)+8) + (*A*2/2));   Simplified:2((3/2)*A*2 + 2 ½ *A* + 1); Total: 54.   * Part 5: The explanation is clear and accurate. |

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| **Standards for Mathematical Practice** |
| **1. Makes sense and perseveres in solving problems.** |
| **2. Reasons abstractly and quantitatively.** |
| 3. Constructs viable arguments and critiques the reasoning of others. |
| **4. Models with mathematics.** |
| 5. Uses appropriate tools strategically. |
| **6. Attends to precision.** |
| 7. Looks for and makes use of structure. |
| 8. Looks for and expresses regularity in repeated reasoning. |

**Pencil Collections**

Abby, Bill, Carol, D’Angelo and Ethan are comparing the amount of pencils that they each have.

Abby has *A* pencils.

Bill has 3 less than twice as many as Abby.

Carol has 4 less than the number of Abby’s pencils squared.

D’Angelo has 8 more than half as many pencils as Abby.

Ethan has half as many as Abby’s pencils squared.

Part 1:

Write an expression for each child to show their number of pencils in terms of the number of pencils that Abby has (*A*).

Part 2:

Write an expression for the total number of pencils that all of the students have. After you write the expression, simplify it.

Part 3:

If Abby had 4 pencils how many pencils does each student have? How many pencils are there total? Show your work.

Part 4:  
If each student doubled their amount of pencils, write an expression to show the total number of pencils in terms of the number of pencils that Abby has (*A*). After you write the expression, simplify it. Then find the total number of pencils.

Part 5:

Write an explanation about how you solved Part 4.