ONPAR® Score Report

Content Area: Algebra

Grade:

Test: Pre-Algebra Operations and Algebraic Reasoning

Student Name: _____

Date: 1/10/2013

Introduction

Thank you for taking the **ONPAR Elementary Mathematics Test** on pre-algebra operations and algebraic reasoning. The ONPAR Elementary Mathematics Test measures students' understanding of these concepts by asking students to show their ability to

- infer, apply, and express implicit and explicit rules governing number and shape patterns as numerical and variable expressions;
- recognize that abstract symbols and variables represent unknown quantities;
- solve real-world problems using the four operations with whole numbers and decimals; and
- explain their reasoning using operations, numbers and symbols;

Overall Student Performance

TASK	POSSIBLE POINTS	STUDENT SCORE
Balance	3	2
Game Stores	6	4
Stars and Hearts	5	2
Input Output	5	4
Apples and Oranges	3	3
TOTAL	22	15

Each of the five multi-part math tasks on this test includes several test items worth multiple points. This score report provides the total score for the test, each of the five tasks, and the items within each task. A summary of what each task is measuring and a brief explanation of scores is also provided.

ONPAR® Score Report

Balance

Balance measures students' understanding of the following pre-algebra operations and algebraic reasoning concepts:

- **Rule identification and application**
- **variables in the form of abstract symbols stand for unknown quantities**

This task measures students' ability to recognize relationships between objects presented in the real-world context of a balance, and to identify, apply, and extend the rules underlying these relationships.

Students who do well on this task can

1. **Identify and reason from relationships among sets of abstract symbols**
2. **Use operations with whole numbers in single- and multi-step problems**

Balance Scoring Summary

	POSSIBLE POINTS	STUDENT SCORE	Interpretive Scoring Information
Item 1	1	**1**	Student recognizes a relationship between sets of abstract symbols (variables) and solves for a unit quantity.
Item 2	1	**1**	Student applies a rule about a relationship between two variables (e.g., 1 green block=2 purple blocks) in a new situation with different quantities of the same variables.
Item 3	1	**0**	Student is unable to use multi-step reasoning about the known relationships between two variables (e.g., green and purple blocks) to determine their relationship with a third variable (e.g., pink block).
TOTAL	3	**2**	

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Game Stores

Game Stores measures the following pre-algebra operations and algebraic reasoning concepts:

- **Identifying rules from sets of ordered pairs**
- **Graphing ordered pairs on the coordinate plane**
- **Translating patterns into expressions with a variable standing for the unknown quantity**

This task measures students' ability to generate a linear pattern, graph ordered pairs in the first quadrant, identify a linear relationship, and produce a variable expression (rule) that fits the relationship.

Students who do well on this task can

1. **Infer and apply an implicit rule**
2. **Perform operations to generate a pattern of ordered pairs**
3. **Express a pattern as a variable expression**

Game Stores Scoring Summary

	POSSIBLE POINTS	STUDENT SCORE	Interpretive Scoring Information
Item 1	4	**3**	In completing a table, student shows some ability to apply a rule to generate a number pattern in the context of a real-world problem using whole numbers and the four operations
Item 2	2	**1**	Student analyzes data in the table and writes an expression representing the linear rate of change (5n) but not the linear pattern (+10).
TOTAL	6	**4**	

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Stars and Hearts

Stars and Hearts measures the following pre-algebra operations concepts:

- variables in the form of abstract symbols stand for unknown quantities
- quantities on both sides of an equation are equal
- operations and substitution can be performed to determine unknown quantities in an equation

Students who do well on **Items 1-3** can

1. **Solve first degree equations in one and two variables**
2. **Substitute values for variables using operations with whole numbers**
3. **Explain their reasoning using operations, numbers, and symbols**

Students who do well on **Item 4** can prove their solution to an equation by using operations, whole numbers, and symbols to express their reasoning.

Full credit responses to Item 4 include both of the following components

- **Student expresses steps used to solve for the value of the star and the heart**
- **Student expresses the linear equation summing stars and hearts <u>and</u> has the correct answer.**

Stars and Hearts Scoring Summary

	POSSIBLE POINTS	STUDENT SCORE	Interpretive Scoring Information
Item 1	1	**1**	Student is able to solve for the value of an unknown quantity in an equation.
Item 2	1	**1**	Student is able to solve for the value of an unknown quantity in an equation.
Item 3	1	**0**	Student is unable to solve for the value of two unknown quantities in an equation using substitution and multi-step operations with whole numbers.
Item 4	2	**0**	Student response does not include any components of a full credit answer.
TOTAL	5	**2**	

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Input Output

Input Output measures students' understanding of the following pre-algebra operations and algebraic reasoning concepts:

- Inferring and applying patterns that underlie ordered pairs of terms
- Applying and expressing these patterns as rules for linear functions

Students who do well on this task can

1. Apply a given rule by performing operations with whole numbers
2. Identify patterns and relationships in sequences of ordered pairs
3. Express relationships between terms in complete and partially complete sequences of ordered pairs

Input Output Scoring Summary

	POSSIBLE POINTS	STUDENT SCORE	Interpretive Scoring Information
Item 1	1	1	Student solves a problem by applying a given rule in the context of a number machine.
Item 2	1	1	Student identifies the pattern in a complete sequence of ordered pairs for a linear function and expresses it as a rule.
Item 3	1	1	Student identifies the pattern in an incomplete sequence of ordered pairs for a linear function and expresses it as a rule.
Items 4-5	2	1	When given two complete and two incomplete ordered pairs, student applies the inferred rule to generate the missing input term but not the missing output term.
TOTAL	5	4	

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Apples And Oranges

Apples And Oranges measures the following pre-algebra operations and algebraic reasoning concepts:

- variables in the form of abstract symbols stand for unknown quantities
- quantities on both sides of an equation are equal
- operations can be performed to determine unknown quantities in an equation

Students who do well on **Item 1** of this task can

1. Solve for two unknown quantities when given a fixed total
2. Use operations with whole numbers and decimals in single- and multi-step problems

Students who do well on **Item 2** of this task can

1. Prove a given statement about the inequality of two units
2. Use operations with whole numbers and decimals to solve for a unit quantity
3. Explain their reasoning using operations, numbers, and symbols

Full credit responses to **Item 2** include all three of the following components:

- Student completely shows all steps in problem-solving process
- Student solves for correct unit price of both apples and oranges
- Student expresses the inequality (apple<orange) in their answer

Apples And Oranges Scoring Summary

	POSSIBLE POINTS	STUDENT SCORE	Interpretive Scoring Information
Item 1	1	**1**	When given a fixed total, student is able to simultaneously solve for two unknown quantities (how many bags of apples and how many bags of oranges).
Item 2	2	**2**	Student response includes all three components of a full credit answer.
TOTAL	3	**3**	

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Timing

	Time (Seconds)
Balance	55
Screen 1	16
Screen 2 (Item 1)	16
Screen 3 (Item 2)	23
Game Stores	32
Screen 1	2
Screen 2 (Item 1)	17
Screen 3 (Item 2)	14
Stars and Hearts	75
Screen 1	2
Screen 2 (Item 1)	42
Screen 3 (Item 2)	5
Screen 4 (Item 3)	25
Input Output	59
Screen 1	10
Screen 2 (Item 1)	11
Screen 3	13
Screen 4 (Item 2)	9
Screen 5 (Items 3 - 4)	16
Apples and Oranges	48
Screen 1	7
Screen 2 (Item 1)	6
Screen 3 (Item 2)	35
TOTAL	**268**