

Sequencing and Instructional Strategies Report

Maresa M. Flood

IDT 5000

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### Sequencing Objectives

Among the students I tutor, several concepts in mathematics repeatedly emerge as problem areas: integer operations, order of operations, converting between fractions, decimals and percents, and word problems. The objectives are sequenced in such a way as to “help the learner achieve the objectives in an efficient and effective manner” (Morrison, Ross, Kalman, & Kemp, 2013, p. 122).

Objectives	Sequence	Domain	Level	Content Structure	Performance
		Psychomotor Affective Cognitive	(Imitation, Manipulation, Precision, and Articulation)  (Receiving, Responding, Valuing, Organizing, and Characterizing)  (Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating)	Fact Concept Rules/Principles Procedures Attitudes Interpersonal	Recall Application
Topic/Task 1: Integer Operations					
1.0 Given any combination of integers and operations, the learner will accurately evaluate the expressions.		Cognitive	Evaluating	Rules / Procedures	Application
1.1 The learner will display a willingness to learn the procedures associated with integer operations.	1	Affective	Receiving / Responding	Attitude	Application

1.2	The learner will define key vocabulary terms: <i>integer, absolute value, sum, difference, product, dividend, divisor, quotient.</i>	2	Cognitive	Remembering	Fact	Recall
1.3	The learner will demonstrate how to solve integer addition problems.	3	Cognitive	Understanding / Applying	Procedures	Application
1.4	The learner will explain how to change integer subtraction problems into integer addition problems.	4	Cognitive	Understanding	Procedures	Recall
1.5	The learner will demonstrate how to solve integer multiplication problems.	5	Cognitive	Understanding / Applying	Procedures	Application
1.6	The learner will demonstrate how to solve integer division problems.	6	Cognitive	Understanding / Applying	Procedures	Application
1.7	The learner will examine eight word problems involving integer operations and will determine the appropriate procedures to use to solve them.	7	Cognitive	Analyzing / Evaluating	Procedures	Application
1.8	The learner will model integer addition and subtraction using counters.	8	Cognitive	Applying	Procedures	Application
1.9	The learner will model integer addition using a number line.	9	Cognitive	Applying	Procedures	Application
1.10	The learner will create four original word problems and accurately solve them using integer operations.	10	Cognitive	Creating	Procedures	Application

Topic/Task 2: Order of Operations						
2.0	Given any combination of numbers and operations, the learner will accurately apply the order of operations to evaluate expressions.		Cognitive	Evaluating	Rules / Procedures	Application
2.1	The learner will display a willingness to learn the procedures associated with the order of operations.	11	Affective	Receiving / Responding	Attitude	Application
2.2	The learner will accurately explain PEMDAS.	12	Cognitive	Understanding	Fact	Recall
2.3	The learner will examine ten word problems involving order of operations and will apply the appropriate procedures to solve them.	13	Cognitive	Analyzing	Procedures	Application
2.4	The learner will compare three solutions and determine which one is correct following the order of operations.	14	Cognitive	Analyzing / Evaluating	Procedures	Application
2.5	The learner will create three original word problems and accurately solve them using the order of operations.	15	Cognitive	Creating	Procedures	Application
Topic/Task 3: Converting between Fractions, Decimals, and Percents						
3.0	Given any fraction, terminating decimal, or percent, the learner will accurately determine its equivalent value in the remaining two formats.		Cognitive	Evaluating	Rules / Procedures	Application

3.1	The learner will display a willingness to learn the procedures associated with converting between equivalent fractions, decimals, and percents.	16	Affective	Receiving / Responding	Attitude	Application
3.2	The learner will define key vocabulary terms: <i>numerator, denominator, reduce to lowest terms, place value, percent, terminating decimal.</i>	17	Cognitive	Remembering	Fact	Recall
3.3	The learner will explain how to convert a fraction to a decimal, and a decimal to a fraction.	18	Cognitive	Understanding	Procedure	Recall
3.4	The learner will explain how to convert a decimal to a percent, and a percent to a decimal.	19	Cognitive	Understanding	Procedure	Recall
3.5	The learner will solve for the missing values in a table of fifteen equivalent fractions, decimals and percents.	20	Cognitive	Applying	Procedure	Application
3.6	The learner will examine word problems involving the conversion between fractions, decimals and percents, and will apply the appropriate procedures to solve them.	21	Cognitive	Analyzing	Procedures	Application
3.7	The learner will create a table of ten equivalent fractions, decimals and percents.	22	Cognitive	Creating	Procedure	Application

## Instructional Strategies

**Objective 2.2:**

The learner will accurately explain PEMDAS. (*Fact/Recall*)

**Initial Presentation:** Show a video (with a catchy tune) that describes the order of operations and the mnemonic PEMDAS: “Please Excuse My Dear Aunt Sally” for Parentheses, Exponents, Multiplication or Division, Addition or Subtraction.

**Generative Strategy:** Mnemonic and practice

The learners will practice saying the PEMDAS mnemonic and will explain what each letter represents. They will include the “left-to-right” rule associated with multiplication/division and with addition/subtraction.

**Objective 2.4:**

The learner will compare three solutions and determine which one is correct following the order of operations. (*Procedure/Application*)

**Initial Presentation:** Present a picture of a math puzzle that depicts different objects, mathematical operations, and resulting values.

**Generative Strategy:** Demonstration, elaboration, and practice

Explain what each object is and demonstrate how to find the first object’s value. The learners will participate in determining the values of each of the remaining objects. Using the objects, a mathematical expression will be presented along with three possible solutions, but only one solution is correct. The learners will examine each of the solutions and follow the step-by-step order of operations provided to determine which solution is correct and identify where the error occurred in the other two solutions.

References

Morrison, G. R., Ross, S. M., Kalman, H. K., & Kemp, J. E. (2013). *Designing effective instruction*. Hoboken, NJ: John Wiley & Sons.