

MATH PRACTICES FOR ALL: DIFFERENTIATED ASSESSMENTS USING UNIVERSAL DESIGN PRINCIPLES

Jason Colombino, M.Ed./Ph.D. Candidate
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Objectives

1. **Describe** how the guiding principles of Universal Design for Learning (UDL) can support the development of assessments aligned to the Standards for Mathematical Practice.
2. **Collaborate** with colleagues to implement the presented assessments in the classroom (links to all of the assessments presented will be provided)
3. **Apply** principles of UDL to analyze, critique and create differentiated assessments that are accessible to a wide range of learners.

Agenda

- **UDL 101 and Differentiated Assessment**
 - ◆ What's Your Function (Multiple Means of Representation)
 - ◆ Marketing Exponentials and Create Your Own Significant Figures Quiz (Multiple Means of Expression)
 - ◆ Quadratic Quandaries (Multiple Means of Engagement)
- **Reflections and Takeaways**

Differentiated Assessments

Turn and Talk:

1. What does it mean to differentiate assessments?

UDL and Differentiated Assessments

- **Proactive Approach:** UDL is one tool to **proactively** design lessons and assessments that will be accessible to as many learning profiles as possible.
- **Diversity is the norm:** Assume that each and every classroom will have a diverse set of learners who learn and express understanding in very different ways.

What's Your Function
(Multiple Means of Representation)

Multiple Means of Representation

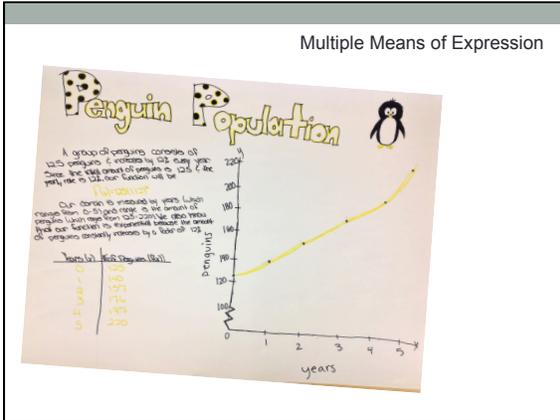
Between months 1 & 3
 $f(x) = -x \cdot 25 \quad 1 \leq x \leq 3$
 Between months 4 & 6
 $f(x) = 0$
 Between months 7 & 10
 $f(x) = x + 50$

Assessment

- Performance Check-List
 - Aligned to content standards
- Rubric
 - Aligned to Practice Standards AND overarching objects

- ◆ Marketing Exponentials and
- ◆ Create Your Own Significant Figures Quiz
 (Multiple Means of Expression)

Multiple Means of Expression



Create your own Significant Figures Quiz

- Create your own quiz on significant figures with at least 5 multiple choice questions. Include an answer key with explanations for each question.
- Exchange your quiz with a partner - review and edit each other's quizzes - ask a third person for their input on any question that you and your partner have different answers.

Identify each significant figures

Question 1: 260
 a. 1
 b. 2
 c. 3

Question 2: 260.1
 a. 3
 b. 4
 c. 5

Question 3: 20.560
 a. 4
 b. 5
 c. 6

Question 4: 54030
 a. 3
 b. 5
 c. 4

Question 5: 78002.
 a. 3
 b. 5
 c. 2

Answer Key: Create your own Significant Figure Quiz

Question #	Correct Answer	Explanation
1	2	Be the 0 is after the two whole ths
2	4	Because 0 is before Decimal.
3	5	Because the 0 are before and after the decimal
4	4	Because there's no decimal point to count the last zero.
5	5	There's a decimal point at the end, so they all count.

◆ Quadratic Quandaries
(Multiple Means of Engagement)

FLAPPY BIRD RAGE

$f(t) = -16t^2 + 50t + 200$

Function One has thrown the plane. The plane started in the air for 1.36 seconds and being the ground at 5.91.

Story

One day a man decided to play Flappy Bird. He was not good at it, but he really liked it. He was so into it that he decided to make a game. He was so into it that he decided to make a game. He was so into it that he decided to make a game.

T	0	1	2	3	4	5	5.91
h(t)	200	239	256	236	164	70	0

Quandary
A player on the volleyball team serves the ball from 3.5 feet off the ground with a beginning speed of 20 feet per second.

The function is quadratic because it looks like a frown and it increases and then decreases. The function is not linear because it does not go up by a constant number. It is not exponential because the function does not go up by a constant factor.

Will the other team be able to spike the ball?

Solution
The other team will be able to spike the ball. We know this because the maximum height of the volleyball will be 9.75 feet, well within the reach of an opposing player. We used the graphing calculator to plot and analyze the graph.

The maximum height is directly over the net. The front center player on the other team has a reach of 11 feet when he jumps.

Time	Height
0	3.5
0.25	7.5
0.50	9.5
* 0.625	9.75
0.75	9.5
1.00	7.5
1.25	3.5
* 1.41	0

FOOTBALL FUNCTION

A Football Player is standing on the field on the 100 yard line. He kicks the ball up and across the field through the goal posts. Question: How long will it take the ball to go through the goal posts?

$h(t) = -16t^2 + 64t + 10$

h = height
t = time
The ball crosses the goal post at approximately 4.75 seconds.

Time	Height
0	0
1	64
2	96
2.5	100
3	96
4	64
4.75	16
5	0

The function is not linear because it's not a straight line and it's not exponential because it introduces both integers and non-integers.

A Special Thanks to . . .

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Other (Free) Resources for Inquiry-Based Learning

- **Mathematics Assessment Project**
 - ✓ Summative Tests and Tasks
 - ✓ Classroom Formative Assessment Challenges
- **Illustrative Mathematics**
- **Engage NY**
- **BetterLesson Master Teacher Project**

Reflections and Takeaways

-Proactively designing assessments that are flexible is hard work, but worthwhile.

-We want assessments that are not only accessible, but unobtrusive, relevant, rigorous and coherent!

-The more students create and own the work and the learning, the more they become engaged in mathematics.

-We need to continue to find ways to share what works!

Thank You!
