Math Performance Tasks & Associated Rubrics

EDEC 303: Mathematics Theory & Instruction

What is a Performance Assessment?

Examples from Daily Life:

Swimming tests, Auditions or Try outs

The Driving test (not the written part, the practical)

Definition: This assessment measures how well people apply their knowledge, skills, and abilities to authentic problems. The key feature is that it requires the person to produce something, such as a report, experiment, or performance, which is scored against specific criteria*.

- Adapted from: https://www.edweek.org/ew/articles/2019/02/06/what-is-performance-assessment.html

Why do we use Math Performance Tasks & Assessments?

- Performance Tasks/Assessments are authentic.
  - Rooted in a real world problem or situation
  - Provide a good opportunity for students to “show what they know.”
  - Because they are rooted in a real-world content, the tasks tend to be
    - Interesting
    - Complex
    - Motivating

GRASPS - a Format for Performance Tasks

G: Goal - Your goal (or task) is to ...

R: Role - Your job is to ...

A: Audience - You need to convince ...

S: Situation - The challenge/context is ...

P: Performance/Product and Purpose - You will create a _____ in order to ...

S: Standards (or Criteria for Success) - Your product must meet the following standards ...

Many Standards-based Math Tasks exist.

Where can you find them? Consult professional and reputable sources, like….

- NCTM journals (*Mathematics Teacher: Learning & Teaching PK-12* and *Teaching Children Mathematics*)
- Math-related Websites:
  - You Cubed
  - Achieve the Core
  - Illustrative Mathematics
  - Inside Mathematics (Apple Farm Field Trip & other problems)
  - Math Assessment Project

Teachers can design their own math tasks.

It helps to ask some questions to focus your task design:

- What is the math content that you want to embed in this task?
- What are the math practices that you want students to use?
- What is a developmentally appropriate context for the task?
- What would be a familiar or engaging context for students?
- What will students produce as a result of completing this task?
- How will you assess student work?

A Math Example: Shipping M&Ms

Goal: to minimize costs for shipping bulk quantities of M&Ms.

Role: You are an engineer in the packaging department of the M&M

Candy Company.

Audience: The target audience is non-engineer company executives.

Situation: You need to convince the company officers that your container design will provide cost-effective use of the given materials, maximize shipping volume of bulk quantities of M&Ms, and be safe to transport.

Product/Performance and Purpose: You need to design a shipping container from given materials for the safe and cost-effective shipping of the M&Ms. Then you will prepare a written proposal in which you include a diagram and show mathematically how your container design provides effective use of the given materials and maximizes the shipping volume of the M&Ms.

Shipping M&Ms (Standards & Criteria for Success)

Standards & Criteria for Success: Your container proposal should...

- provide cost-effective use of the given materials

- maximize shipping volume of bulk quantities of M&Ms

- be safe to transport

• Your models must make the mathematical case.

PA Core Standards Reference: CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Criteria	Ready to Go 3	Slight Delay in Manufacturing 2	Factory closed 1
Provide cost effective use of given materials	Provide cost effective use of given materials	Provides cost effective use of some materials	Does not provide cost effective use of given materials
Maximize shipping volume of bulk quantities of M&M's	Maximize shipping volume of bulk quantities of M&M's	Less than maximum shipping volume of bulk quantities of M&M's	Minimum shipping volume of bulk quantities of M&M's
Be safe to transport	Be safe to transport	NA	Not safe to transport
Model must make the mathematical case	Model must make the mathematical case	Model is missing some steps in the mathematical case	Model does not make a mathematical case

4	Provides s cost effective use of given materials Maximize shipping volume of bulk quantities of M&M's, Be safe to transport, models make the mathematical case
3	Provides cost effective use of given materials. Shipping volume of bulk quantities of M&M's does not reach maximum level. Safe to transport. Does not model mathematical case
2	Provides cost effective use of given materials. Shipping volume of bulk quantities of M&M's does not reach maximum level. Not safe to transport. Does not model mathematical case.
1	Does not provide cost effective use of given materials. Shipping volume of bulk quantities of M&M's does not reach maximum level. Not safe to transport. Does not model mathematical case.

Advanced	Meets Standard	Needs Help
	Provide cost effective use of given materials	
	Maximize shipping volume of bulk quantities of M&M’s	
	Be safe to transport	
	Your models must make the mathematical case	

Let’s try one together!

Choose one of the standards below and identify the grade level, math content & math practices you want to build your performance task around.

Develop a rubric to assess student work for this task.

CC.2.4.2.A.3 Solve problems and make change using coins and paper currency with appropriate symbols.

CC.2.4.1.A.2 Tell and write time to the nearest half hour using both analog and digital clocks

CC.2.4.3.A.4 Represent and interpret data using tally charts, tables, pictographs, line plots, and bar graphs.

CC.2.4.4.A.2 Translate information from one type of data display to another.