Middle Level Mathematics Initiative
August, 2007

Gold Seal Lessons

Creating A Gold Seal Lesson	Gold Seal Lesson Editing Process
1. Review the Knowledge Taxonomy Verb List (Rigor) 2. Review the Application Model (Relevance) 3. Begin with a Big Idea or sub-idea 4. Find an idea in a textbook, workbook, or other resource 5. Brainstorm real-life situations that use the skills described in the Big Idea/sub-idea 6. Search the Internet for ideas, have a discussion with colleagues 7. Develop the lesson a. Write the performance task b. Create assessment c. Create handouts d. Identify instructional focus statements e. Identify essential skills	1. Read through once 2. Identify knowledge taxonomy key words for rigor level 3. Identify relevance. Is the lesson interdisciplinary, a real-world situation that is predictable or un-predictable. 4. Performance task (overview) a. What is the student work (rigor)? b. What is the context (relevance)? c. Under what conditions will the students do the work (the math)? *(If lesson is not up to quadrant D standards, go to step 5 on creating a gold seal lesson list)* 5. Develop assessment rubric 6. Check instructional focus statements, essential skills 7. Development handout if necessary 8. Align with standards (Send to format editor, then to final editor for one last look.)

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Performance Task

The performance task includes an overview and a description.

The overview is a description of how a student is expected to demonstrate learning (understanding, knowledge and skills). The task may be a product, performance or extended writing that requires rigorous thinking and relevance application. It is usually written in the third person describing the learning to other educators.

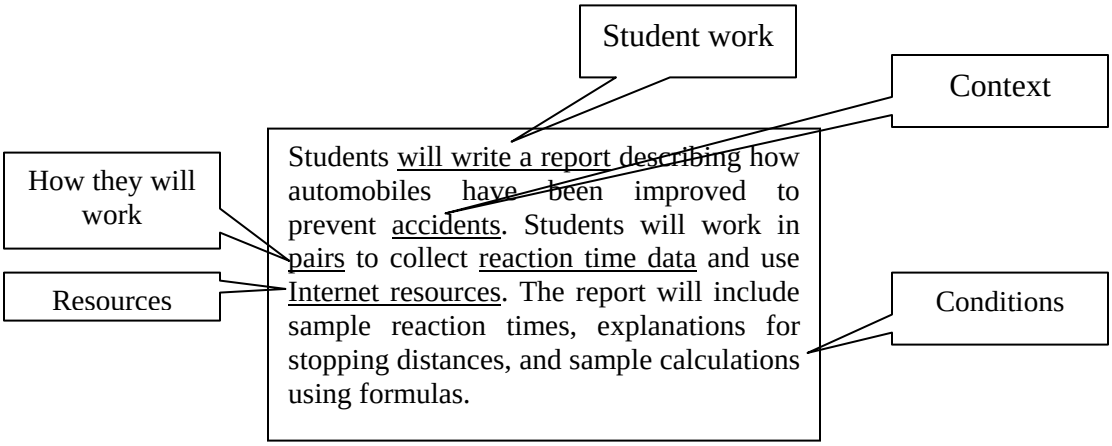
The **overview** includes:

- Student work that will be produced or performed
- Specific learning context
- Whether group or individual (how they will work)
- Resources students will be provided or have to acquire
- Setting where students will complete the work
- Conditions (often real-world) under which the work will be done

The **overview** does not include:

- Assessment. It implies but does not specify
- Specific direction to the student
- Specific equipment list
- Homework or reading assignments

Sample



The **description** of the performance task is the teacher procedures. The procedures can be step-by-step instructions on how to implement the lesson. Embedded in the procedures are instructional strategies and literacy strategies.

Sample

Description

Step One: Set the stage
Ask students if they have ever been in a car accident. Ask a few students to share with the class what happened. If any of them have been in a rear end collision, they are one in 2.5 million that occur each year. Although a rear end collision is the least fatal type of auto accident, they are the most common incidents on the road today. Explain to the students that they will be conducting an experiment related to human reaction time and how this affects automobile safety.

Step Two: Create groups and hold experiment
Students will work in teams of two. Students will use rulers to collect their reaction times. One person will hold a ruler from the top edge while the second student holds his/her thumb and index finger open at the bottom of the ruler. The second student will catch the ruler between his/her fingers when the first student releases it. The distance on the ruler will be recorded, and using a given table of data, converted to a reaction time. Each student should make five drops, recording the distance and reaction time for each drop. Each student should calculate his/her average reaction time (*see attached activity sheet*).

Step Two: Analyze the data
Once the testing is complete. The teacher should ask each student to record their test data and discuss their data and describe what they see. A discussion about the conversion chart should follow. Suggested questions are:

- What method(s) did you use to determine your reaction time?
- What do you notice about the conversion chart data?
- What factors influence the ruler drop?
- How accurate is your data?

Step Three: Using formulas
To generate more accurate data, ask students to use the following formula:

$$y = \frac{1}{2} gt^2$$

In the formulas, t = time (in seconds); y = distance (in cm); g = 980 cm/sec^2 (acceleration due to gravity). [Note: you can also use inches in your distance measurement, but you must change g to equal 385.8 in/sec^2.]
This formula provides the distance an object will fall in a given amount of time.

By rearranging Formula 1, you can get the amount of **time** it takes an object to fall a certain distance. All you have to do is plug in the distance (in either centimeters or inches) that the ruler fell into Formula 2 - this will give you the reaction time.

$$t = \sqrt{\frac{2y}{g}}$$

Ask students to compare their reaction times using the conversion chart and the formulas.

Step Four: Real-World Scenario
Ask students to solve the following problem.
Suppose a person is driving a car at 55 mph (80.67 feet/sec) during the day on a dry, level road. He sees a pedestrian and applies the brakes. What is the shortest stopping distance than can reasonably be expected? Total stopping distance consists of three components:

1. *Reaction Distance*. First. Suppose the reaction time is 1.5 seconds. This means that the car will travel 1.5 x80.67 or 120.9 feet before the brakes are even applied.
2. *Brake Engagement Distance*. Most reaction time studies consider the response completed at the moment the foot touches the brake pedal. However, there is an additional time required for the pedal to depress and for the brakes to engage. This is about .3 second, adding another 24.2 feet.
3. *Physical Force Distance*. Once the brakes engage, the stopping distance is determined by physical forces ($D=S^2/(30*f)$) as 134.4 feet.

Total Stopping Distance = 120.9 ft + 24.2 ft + 134.4 ft = 279.5 ft

Step Five: Research and writing the report
Based on the data and experiences that the students have gathered so far, ask them to write a report responding to the following two questions:

- How have automobiles been improved to help prevent accidents, like rear end collisions from occurring?
- Can you think of a new car design that could help prevent accidents that result from slow human reaction time?