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# Interpreting and Graphing Inequalities

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## Subjects and Domains

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- Math - Expressions & Equations - Content

## Common Core State Standards

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- CCSS.Math.Content.6.EE.B.8

## Grades

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- 6 - Sixth Grade
- 7 - Seventh Grade

## Intended End Users

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- Student

## Intended Student Populations

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- English Language Learners (ELL)

## Media Types

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- Document
- Presentation

## Educational Use

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- Cooperative Learning
- Guided Questions
- Note Taking
- Presentation
- Reciprocal Teaching

## Technologies Required for use in Classroom

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## Summary

The lesson is designed as a universal access piece to support English Learners in interpreting and writing inequalities. The lesson has scaffolds in place to facilitate student talk and understanding. The graphic organizer provides a way for students to look at the language of the inequality and interpret which inequality applies to the situation.

## Attributes of the Formative Assessment Process

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- Clarify Intended Learning
- Elicit Evidence
- Interpret Evidence
- Act on Evidence

## Specific Connection to the Formative Assessment Process

The lesson begins with note-taking and moves to guided practice, group practice and finally independent practice. Throughout the lesson students are practicing interpreting verbal phrases, writing and graphing inequalities. The lesson follows a gradual release model with multiple opportunities for evaluating student understanding with the option to adjust instruction accordingly.

## Student Engagement to the Formative Assessment Process

Students participate in group discussions and practice writing and graphing inequalities in a team. During team practice students can critique the reasoning of their peers and receive additional support from their team members as well as the teacher, who is serving as a facilitator.

## Specific Connection to the Common Core State Standards

This resource allows students to demonstrate their ability to interpret inequality statements and graph the

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- Tablets/Computers for Teacher
  - LCD Projector

### **Geographics Settings**

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- Urban
- Suburban
- Rural

### **License For Primary Material**

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- Smarter Balanced Copyright Clearance Form (signed by the owner)

### **Licenses For Secondary Material**

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solutions. The resource begins with a guided whole group structure and gradually moves students to a team teach activity and independent practice.

## **Learning Goals**

Students can graph the solution set of an inequality and interpret it in the context of the problem.

## **Success Criteria**

I can write inequalities and graph them from verbal descriptions and explain my reasoning.

## **Context(s) in Which the Resource Could Be Used**

This resource is designed to be used in a 6 grade classroom with a high number of English Learners who require language scaffolds for interpreting inequalities. It can also be used for English Learners in 7th grade classrooms as a review or for remediation so that students have adequate background to achieve the 7th grade standards.

## **Supporting Evidence**

This resource was used in a seventh grade classroom with a high population of English Learners. Students were able to write inequalities from verbal descriptions and were able to graph the inequalities. Students were also able to explain their reasoning.

## **Principles, Literature, or Research**

Research based best practices for English Learners were used throughout the lesson including modeling, note-taking, graphic organizer, sentence frames, and student collaboration and discussion.

# Graphing Inequalities

## Common Core State Standards

### M.6.EE B

8. Write an inequality of the form  $x > c$  or  $x < c$  to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form  $x > c$  or  $x < c$  have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

### Learning Target:

Students can graph the solution set of an inequality and interpret it in the context of the problem.

### Success Criteria:

I can write inequalities and graph them from verbal descriptions and explain my reasoning.

### Lesson Plan:

Review the learning target and success criteria with the students. Briefly review the inequality symbols and check for prior knowledge.

Using the PowerPoint on understanding inequalities, work with students to identify words that can represent the inequality symbols and show how these would be graphed. Have students take notes on the note-taking section of the team practice document. For the first inequality, the teacher models creating a sentence to fit the inequality such as, "I have more than three jelly beans". Next, the teacher models graphing the inequality. Ask students to consider words that could match the second inequality and to write them in their notes. Using the sentence frame provided, have partner A read their answer to partner B. Call on students randomly to share their answers. Working with their partner, have the students graph the inequality. Call on students to explain their graph.

## Understanding Inequalities

>

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:



## Understanding Inequalities

<

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:



# Graphing Inequalities

Continue following the same process for the next two slides, eliciting student responses in between.

## Understanding Inequalities

$\leq$

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph: 

## Understanding Inequalities

$\geq$

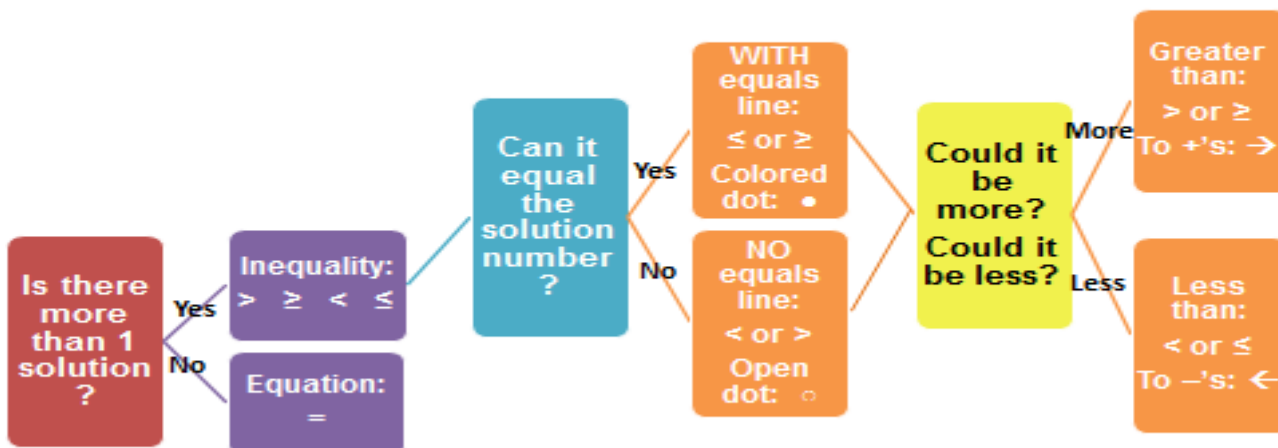
Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph: 

Review the equation and inequality flow chart to assist students in determining which inequality should be used for a given verbal phrase.

## How do I know which to use???



## Graphing Inequalities

The teacher should model the first few problems on the team practice document, asking for student input. It is very important that the teacher models using the sentence frames. For number 1 the teacher might say, “The dot is on 2 because that is the quantity stated. The dot is open because more than means greater than but not equal to 2. The arrow points toward the positive because that is the direction of the greater values.”

1.) Mary has more than 2 pennies in her pocket:



Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

Continue guided practice, having students work with partners to decipher the language, write the inequality, and complete the statements. Monitor student work for misconceptions. Common issues for English Learners are misinterpreting the verbal statements.

Word or phrase	Common misconception	Suggested Teacher action
At least vs less than At most vs more than	English Learners may not understand that least and less though related have different meanings Students may not understand that more than and at most though related are not the same	Discuss the relationship and meaning of the terms with students, provide examples and have students match to term( I have at least 5 stars vs I have less than 5 stars-6 stars would fall into at least, 4 stars would be less than 5)
No more than No less than No lower than	Students may not understand that the no in front of the verbal phrase reverses the direction of the arrow in an inequality and would include the stated value	Provide students with examples to clarify the effect of no on a verbal phrase. More than 5 would include all numbers greater than five. No more than 5 would include five and everything less.

After each problem, call on students to provide answers, requiring that each student speak in complete sentences. Continue with guided practice until most students are able to interpret the problem successfully. At this point struggling students can be pulled aside for additional support. For additional support, activity cards are provided for students to match words and verbal phrases to the appropriate inequality symbol. For struggling students this is best done in a small group format so students can draw on the knowledge of other students. If all students are able to move on to partner

## Graphing Inequalities

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work, allow students to continue through problem 8. The teacher needs to actively monitor student progress and talk, and interject appropriate questions to address misunderstandings and errors.

Guide students through problems 9 and 10. Allow students individual time to think and write both their answers and their explanations. Since the sentence frames are removed, provide students with time to share their answer with others prior to calling on students. Some students may continue to use the frames for answers. Monitor student work and conversations and select both correct and incorrect responses for class review. Allow students time to review the work of peers and to reach a consensus on whether answers and explanations are correct or incorrect. Support students working with peers by asking appropriate questions “How do you know that the arrow will point to the right?” “Why is it that this point is colored in and this one is not?”

Allow students to work either with partners or in small groups to complete problems 11-16. Monitor students during this time and revisit language issues as needed.

Students will complete 17-22 independently. For students with lower English proficiency, provide answer frames if needed. Continue to monitor student work and provide support and feedback as needed. For students who continue to struggle, this would be a good point to pull a small group for additional instruction.


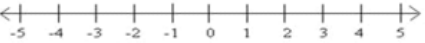
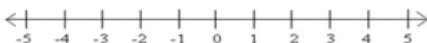
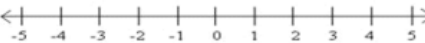
Problems 23 and 24 can be used as an exit slip for the lesson to determine whether or not students have met the success criteria.

# Graphing Inequalities

Name \_\_\_\_\_

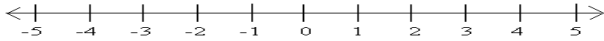
Date \_\_\_\_\_

## Inequalities Notes and Team Practice

<p style="font-size: 2em; margin: 0;"><b>&gt;</b></p> <p>Words:</p>  <p>Example: I have _____ 3 jellybeans.</p> <p>Graph:</p> 	<p style="font-size: 2em; margin: 0;"><b>&lt;</b></p> <p>Words:</p>  <p>Example: I have _____ 3 jellybeans.</p> <p>Graph:</p> 
<p style="font-size: 2em; margin: 0;"><b>≥</b></p> <p>Words:</p>  <p>Example: I have _____ 3 jellybeans.</p> <p>Graph:</p> 	<p style="font-size: 2em; margin: 0;"><b>≤</b></p> <p>Words:</p>  <p>Example: I have _____ 3 jellybeans.</p> <p>Graph:</p> 
<p>Equation and Inequality Flow Chart:</p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 15%;"> <p style="text-align: center;">Is there more than one solution?</p> </div> <div style="border: 1px solid black; border-radius: 15px; width: 15%; height: 40px;"></div> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 15%;"> <p style="text-align: center;">Can it equal the solution number?</p> </div> <div style="border: 1px solid black; border-radius: 15px; width: 15%; height: 40px;"></div> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 15%;"> <p style="text-align: center;">Could it be more? Could it be less?</p> </div> <div style="border: 1px solid black; border-radius: 15px; width: 15%; height: 40px;"></div> <div style="border: 1px solid black; border-radius: 15px; width: 15%; height: 40px;"></div> </div>	

# Graphing Inequalities

1.) Mary has more than 2 pennies in her pocket:



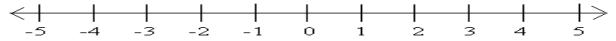
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

2.) John has less than 3 dollars in his account:



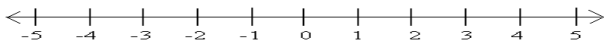
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

3.) Simon has at least 1 friend:



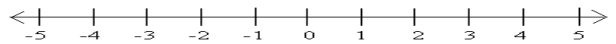
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

4.) Jesus can spend up to \$5.



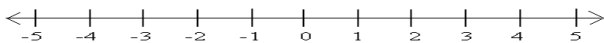
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

5.) Yajaira can get a maximum of 4 dresses.



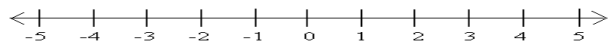
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

6.) The minimum account balance is - 4 dollars.



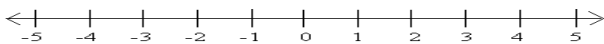
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

7.) Juan can get at most 3 penalties.



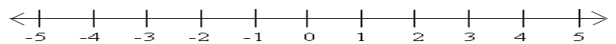
Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

8.) Catalina is taller than 2 feet.



Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

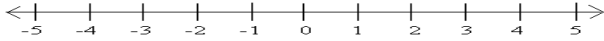
The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_



# Graphing Inequalities

9.) The number of pennies is greater than 1:



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

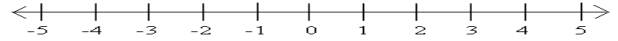
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10.) John has fewer than 5 dollars in his account:



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

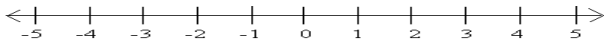
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11.) The temperature stayed at or above  $-3$  degrees:



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

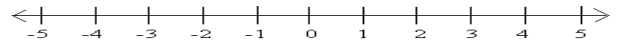
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12.) Jesus wants to spend no more than \$3.



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

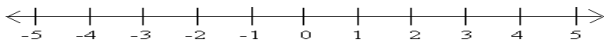
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13.) The maximum number of points is 2.



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

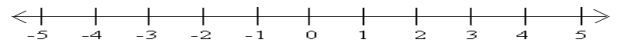
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14.) The elevation of the desert is at least  $-5$  feet.



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

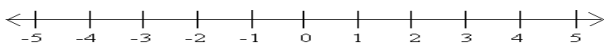
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15.) The minimum GPA for sports is 2.0



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

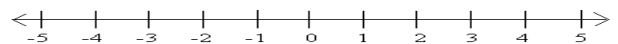
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16.) The bill can't go over \$5.



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

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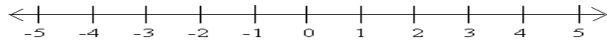
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# Graphing Inequalities

17.) There are more than 3 people on the bus:



Inequality: \_\_\_\_\_

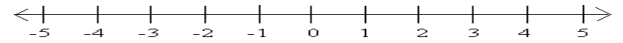
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

18.) John has less than 0 dollars in his account:



Inequality: \_\_\_\_\_

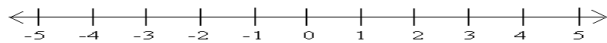
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

19.) The temperature is lower than 0 degrees:



Inequality: \_\_\_\_\_

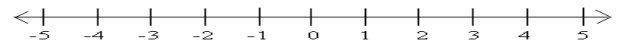
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

20.) Jenny is shorter than 5 feet tall.



Inequality: \_\_\_\_\_

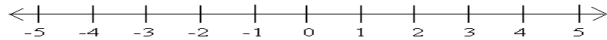
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

21.) The elevation of the canyon is more than -2 miles



Inequality: \_\_\_\_\_

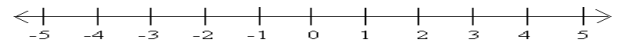
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

22.) I like at least 3 flavors of ice cream:



Inequality: \_\_\_\_\_

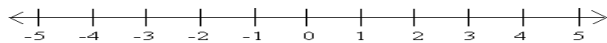
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

23.) Your allowance is at most \$5:



Inequality: \_\_\_\_\_

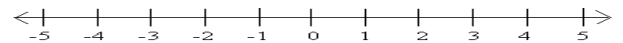
Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

24.) The daily minimum temperature is - 5 degrees:



Inequality: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Graphing Inequalities

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more than	less than	at least	up to
is	a maximum of	at most	is taller than
greater than	fewer than	at or above	no more than
maximum	no less than	minimum	can't go over
shorter than	lower than	at most	no lower than

## Graphing Inequalities

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Words or phrases that mean < less than	Words or phrases that mean > greater than

## Graphing Inequalities

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Words or phrases that mean $\leq$ less than or equal to	Words or phrases that mean $\geq$ greater than or equal to

## Unit 2: Expressions and Equations Week 6: Inequalities

Day 2: Understanding Inequalities

### Warm Up

1.) Kelly has \$50 to spend for her birthday. She goes out to dinner and the total bill was \$25.50. She also wants to buy herself some shirts, which cost \$8 each. How many shirts could she buy?

### Learning Target

- I will understand and graph inequalities

### Inequalities

**Inequality: Inequalities have more than one solution**

$>$   $\geq$   $<$   $\leq$

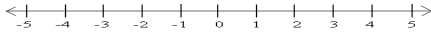
### Understanding Inequalities

$>$

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:



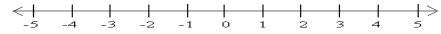
### Understanding Inequalities

$<$

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:



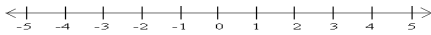
### Understanding Inequalities

$\geq$

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:



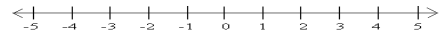
### Understanding Inequalities

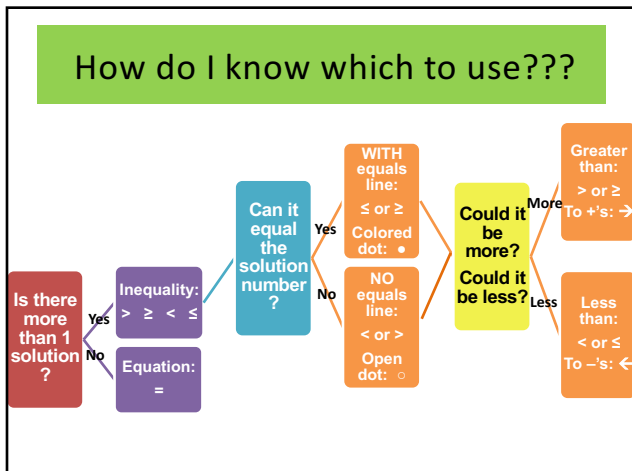
$\leq$

Words:

Example: I have \_\_\_\_\_ 3 jellybeans.

Graph:





### Practice

1.) Mary has more than 2 pennies in her pocket:

Inequality: \_\_\_\_\_

The dot is on \_\_\_\_\_ because \_\_\_\_\_

The dot is open/colored because \_\_\_\_\_

The arrow points toward the positives/negatives because \_\_\_\_\_

### Closure

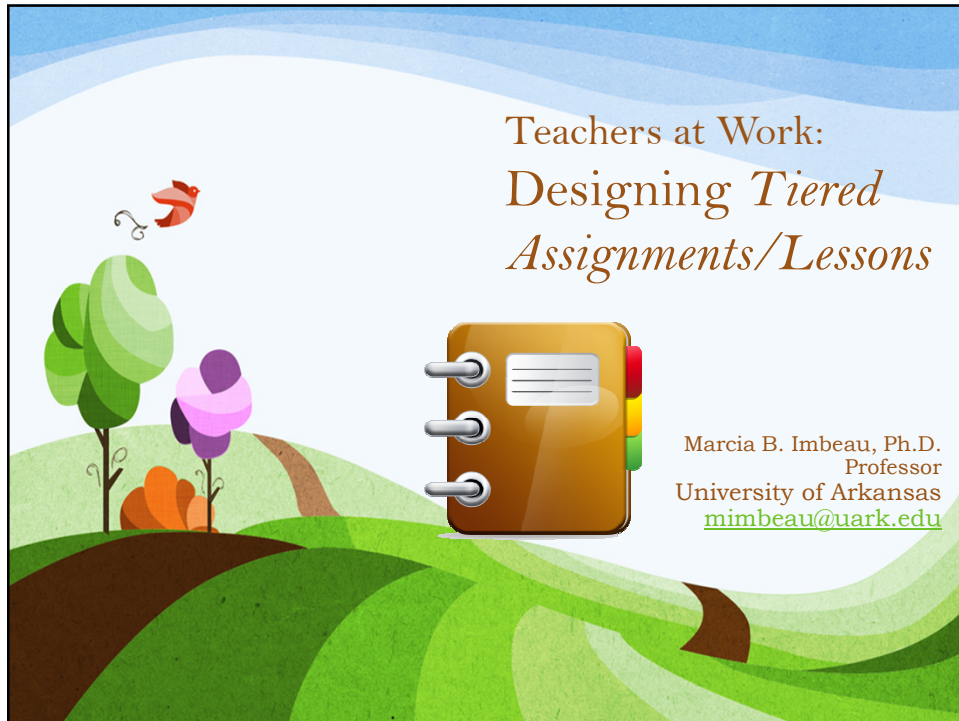
**Complete explanation/reflection:**

1.) The most important thing to remember from this lesson is \_\_\_\_\_ because \_\_\_\_\_.

2.) An example of what we did today is:

3.) I still don't understand \_\_\_\_\_.





### Tiered Assignments

In a heterogeneous classroom, a teacher uses varied levels of activities to ensure that students explore ideas at a level that builds on their prior knowledge and prompts continued growth. Student groups use varied approaches to exploration of essential ideas.

The slide has a light blue background with a yellow header bar containing the title 'Tiered Assignments'. Below the title are three horizontal bars in teal, purple, and pink. The main text is on a pink background. In the bottom right corner, there is a small illustration of a desk with a chalkboard showing 'ABC' and a math symbol, a green chair, and a red apple.

## Tiered Assignments

### • To begin.....

- What information can be tiered?
  - Content?
  - Process?
  - Product?
- On what student trait are tiered lessons primarily based?
  - Readiness?
  - Interest?
  - Learning Profile?
- Should tiered lessons be assigned to learners or should students be given a choice?

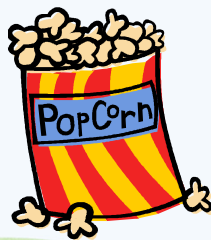


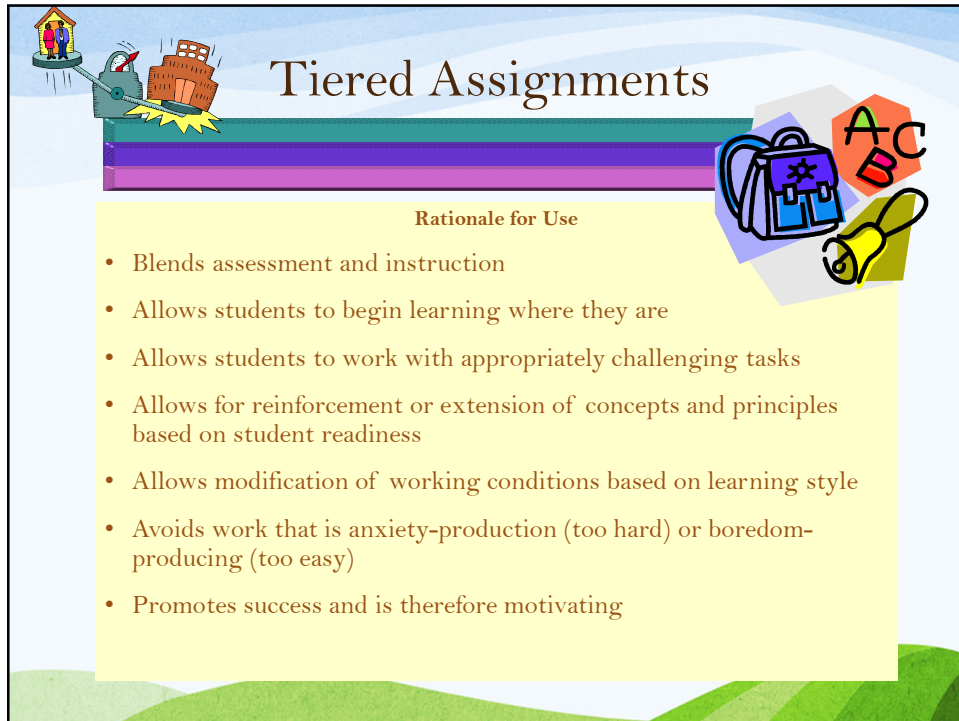
## Movie Time....



### Look For the Following in Rick's Classroom:

- How he planned his unit and moved to a tiered assignment
- How students were grouped for the lesson
- Evidence of preparation
- Implementation ideas
- Questions or concerns



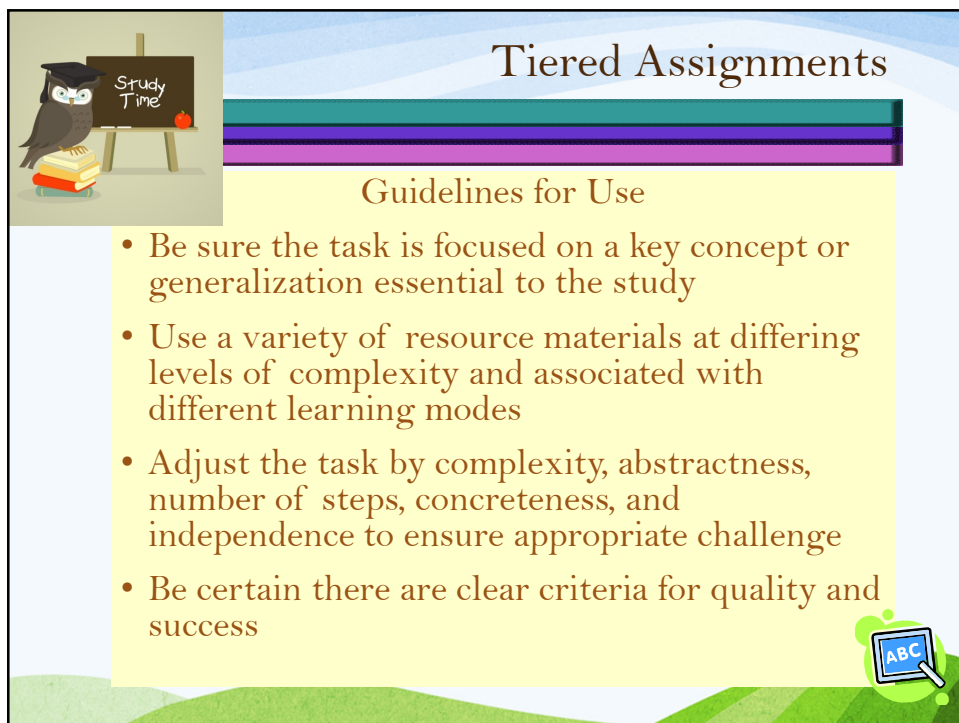


**Tiered Assignments**

**Rationale for Use**

- Blends assessment and instruction
- Allows students to begin learning where they are
- Allows students to work with appropriately challenging tasks
- Allows for reinforcement or extension of concepts and principles based on student readiness
- Allows modification of working conditions based on learning style
- Avoids work that is anxiety-producing (too hard) or boredom-producing (too easy)
- Promotes success and is therefore motivating

This slide features a title 'Tiered Assignments' at the top. Below the title is a graphic of three horizontal bars in teal, purple, and pink. To the right of these bars are icons of a blue backpack, a yellow bell, and a red hexagon with the letters 'A', 'B', and 'C' inside. The main content is a yellow box with the heading 'Rationale for Use' and a bulleted list of seven points. The background includes a small illustration of a house on a hill and a building with a crane.



**Tiered Assignments**

**Guidelines for Use**

- Be sure the task is focused on a key concept or generalization essential to the study
- Use a variety of resource materials at differing levels of complexity and associated with different learning modes
- Adjust the task by complexity, abstractness, number of steps, concreteness, and independence to ensure appropriate challenge
- Be certain there are clear criteria for quality and success

This slide features a title 'Tiered Assignments' at the top. Below the title is a graphic of three horizontal bars in teal, purple, and pink. To the left of these bars is an illustration of an owl wearing a graduation cap, sitting on a stack of books next to a chalkboard that says 'Study Time'. To the right of the bars is a blue square with the letters 'ABC' and a white arrow pointing to the right. The main content is a yellow box with the heading 'Guidelines for Use' and a bulleted list of four points. The background includes a small illustration of a house on a hill and a building with a crane.



## Tiered Assignments

- In a differentiated classroom, a teacher uses varied levels of tasks to ensure that students explore ideas and use skills at a level that builds on their prior knowledge and prompts continued growth.
- While students work at varied degrees of difficulty on their tasks, they all explore the essential ideas and work at high levels of thought.
- Assessment-based tiering allows students to work in their "Zones of Proximal Development" or in a state of "moderate challenge."

## What Zone Am I In?

### Too Easy

- I get it right away...
- I already know how...
- This is a cinch...
- I'm sure to make an A...
- I'm coasting...
- I feel relaxed...
- I'm bored...
- No big effort necessary...



### On Target

- I know some things...
- I have to think...
- I have to work...
- I have to persist...
- I hit some walls...
- I'm on my toes...
- I have to re-group...
- I feel challenged...
- Effort leads to success...



### Too Hard

- I don't know where to start...
- I can't figure it out...
- I'm spinning my wheels...
- I'm missing key skills...
- I feel frustrated...
- I feel angry
- This makes no sense...
- Effort doesn't pay off...



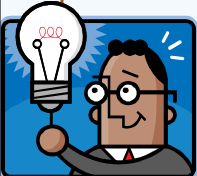
THIS is the place to be... THIS is the achievement zone...

*When challenges and skills are in balance, the activity becomes its own reward.*

Talented Teenagers by Csikszentimihalyi, Rathunde and Whalen

## Tiering a Lesson

What range of learning needs are you likely to address?   	What should students know, understand, and be able to do as a result of the lesson?  Know:  Understand:  Be Able to Do:	What's your "starting point lesson?" How will you hook the students?
What's your first cloned version?	What's your second cloned version of this activity?	What's your third cloned version of this activity?



## New World Explorers

### KNOW

- Names of New World Explorers
- Key events of contribution

### UNDERSTAND

- Exploration involves
  - risk
  - costs and benefits
  - success and failure

### DO

- Use resource materials to illustrate & support ideas



## New World Explorers

Using a teacher-provided list of resources and list of product options, show how 2 key explorers took chances, experienced success and failure, and brought about both positive and negative change. Provide proof/evidence.

Using reliable and defensible research, develop a way to show how New World Explorers were paradoxes. Include and go beyond the unit principles.



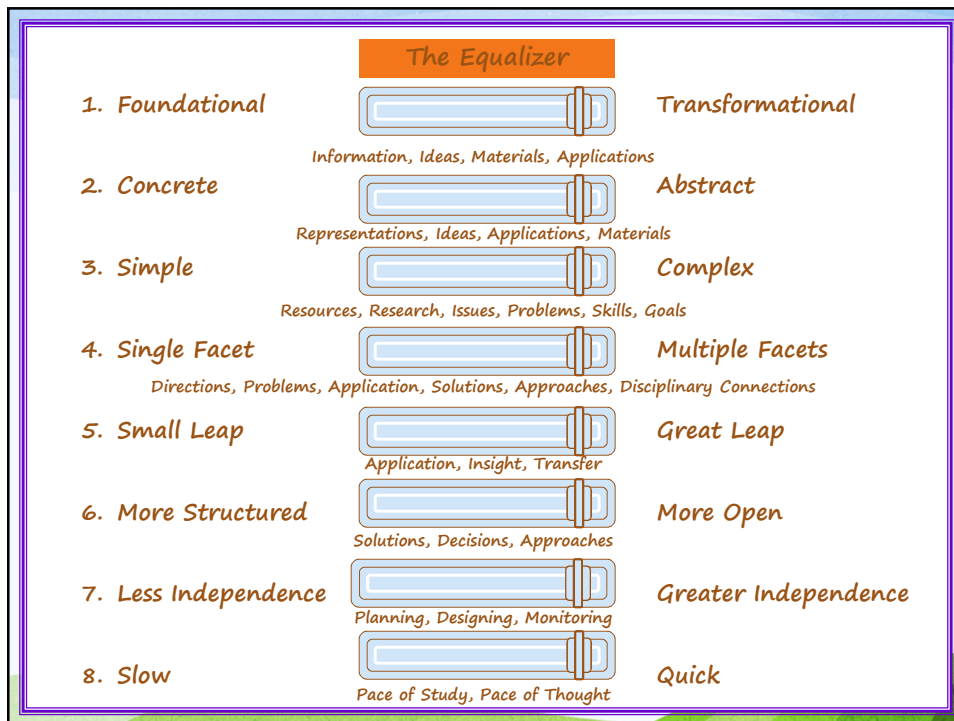


How do we adjust the degree of challenge and/or support in a Tiered Activity?



1. "The Equalizer"
2. "Ascending Intellectual Demand" (from the Parallel Curriculum model)

K.J. Doubet - UVa - 2005



## 6<sup>th</sup> Grade Math

- Concept – Perspective
- Lesson Topic – Graphs
- As a result of this lesson, students will...
  - ...know– line graphs, bar graphs, pie graphs
  - ...understand – that graphs are visual representations of information which can make data easier to digest.
  - ...be able to do – examine various graphs; compare and contrast different types of graphs

K.J. Doubet - UVa - 2005

*Adapted From The "Jersey Girls"*

## Sequence of Events

- Pre-assessment: Draw a visual representation of the number of different colors represented in our classmates' clothing. You may include labels, but your primary mode of representation must be visual. If you can think of more than one way to do so, include your additional ideas.
- Divide students into readiness based groups:
  - Blue: Those who demonstrate sophistication with the skill – even utilizing graphing skills or multiple representations
  - Red: Those who have a handle on representing numbers visually, but lack fluency and sophistication
  - Green: Those who struggle to depict data visually

K.J. Doubet - UVa - 2005



## Group Tasks

- Divide students into readiness based groups:
  - **Blue:** Those who demonstrate sophistication with the skill – even utilizing graphing skills or multiple representations
- Blue Learning Task:
  - Examine 3 different graphs (line, bar, pie) taken from the business section of a major newspaper. Discuss the merits and drawbacks of each type. Given a set of data, create 3 different graphs for three different audiences. Be prepared to defend your decisions

K.J. Doubet - UVa - 2005

## Group Tasks

- Divide students into readiness based groups:
  - **Red:** Those who have a handle on representing numbers visually, but lack fluency and sophistication
- Red Learning Task:
  - Examine 3 different graphs (line, bar, pie) taken from the “life” or weather section of a newspaper such as *USA Today*.
  - For each graph, explain... 1) How it is alike and different from the other 2 types, 2) What makes it easy to understand, and 3) What makes it confusing
  - Given a set of data, create 3 different graphs – one for businessmen, one for your classmates, and one for students in grade 3. Tell why you made these choices.

K.J. Doubet - UVa - 2005

## Group Tasks

- Divide students into readiness based groups:
  - **Green:** Those who struggle to depict data visually
- Green Learning Task:
  - Examine 3 different graphs (line, bar, pie) taken from teen magazines.
  - With the teacher, 1) discuss each graph in terms of its helpfulness and its confusing aspects, 2) personal and group preferences, etc., 3) Given a set of data, subdivide and make three different graphs depicting the same information 3 ways. Compare, contrast, and evaluate results.

K.J. Doubet - UVa - 2005

## Use “The Equalizer” to discuss how these three activities differ.

- Blue Learning Task: Examine 3 different graphs (line, bar, pie) taken from the business section of a major newspaper. Discuss the merits and drawbacks of each type. Given a set of data, create 3 different graphs for three different audiences. Be prepared to defend your decisions.
- Red Learning Task:
  - Examine 3 different graphs (line, bar, pie) taken from the “life” or weather section of a newspaper such as *USA Today*.
  - For each graph, explain... 1) How it is alike and different from the other 2 types, 2) What makes it easy to understand, and 3) What makes it confusing
  - Given a set of data, create 3 different graphs – one for businessmen, one for your classmates, and one for students in grade 3. Tell why you made these choices.
- Green Learning Task:
  - Examine 3 different graphs (line, bar, pie) taken from teen magazines.
  - With the teacher, 1) discuss each graph in terms of its helpfulness and its confusing aspects, 2) personal and group preferences, etc., 3) Given a set of data, subdivide and make three different graphs depicting the same information 3 ways. Compare, contrast, and evaluate results.

K.J. Doubet - UVa - 2005

# Do All 3 Maintain Fidelity to the KUDs?

(Adapted From The "Jersey Girls")

- As a result of this lesson, students will...
  - ...know– line graphs, bar graphs, pie graphs
  - ...understand – that graphs are visual representations of information which can make data easier to digest.
  - ...be able to do – examine various graphs; compare and contrast different types of graphs

K.J. Doubet - UVa - 2005

## Character Map

**Character Name** \_\_\_\_\_

**How the character looks**

---

---

---

---

---

---



**How the character thinks or acts**

---

---

---

---

---

**Most important thing to know about the character**

---

---

---

---

*Character Map*

**Character Name** \_\_\_\_\_

**Clues the author gives us about the character**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**Why the author gives THESE clues**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**The author's bottom line about this character**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Character Map*

**Character Name** \_\_\_\_\_

**What the character says or does**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**What the character really MEANS to say or do**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**What the character would mostly like us to know about him or her**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 2<sup>nd</sup> Grade Tiered Lesson *Pioneers*



### Pioneer Group

(Work alone or in groups of 2,3,4)

1. Use books, pictures, and the CD-ROM to
  - a. Figure out what a trading post was for.
  - b. Make a list of things found in a trading post and how much they may have cost. Be sure to include some things we don't have in our stores today.
  - c. Figure out who used trading posts.
  - d. Find out where goods for a trading post came from.
2. Build or draw a trading post and a modern convenience store.
3. Compare and contrast the trading post and convenience store on at least the four categories identified in questions 1a-1d.
4. Be ready to share with the class what a trading post and convenience store tell us about how we are like and different from the pioneers.



Examples are from *Handout 10* ASCD  
*Facilitator's Guide for Differentiating  
Instruction*

## 2<sup>nd</sup> Grade Tiered Lesson *Pioneers*

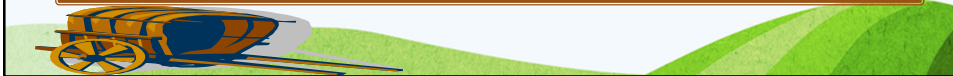


### Trailblazer Group

(Work alone or in groups of 2 or 3)



1. Read *Going West* (stop at the bookmark). Also use the encyclopedia, CD-ROM and books in the exploration center to
  - a. Learn about the size of a covered wagon and figure out how many people and supplies it would hold.
  - b. Find out how covered wagons were built and how they work.
  - c. Figure out the positives and negatives of going west in a covered wagon.
  - d. Figure out how much a covered wagon might cost and why it cost so much—for example, costs for materials, labor, and horses.
  - e. Learn what pioneers took in the covered wagons, what they left behind, and why.
2. Build or draw a model of a covered ways used in pioneer days and station wagon or van used today.
3. Compare and contrast the two vehicles on at least the five categories identified in questions 1a-1e.
4. Be ready to share with the class what a covered wagon and a station wagon (or van) tell us about how we are like and different from the pioneers.





## 2<sup>nd</sup> Grade Tiered Lesson *Pioneers*

### Wagoneer Group

(Work alone or in groups of 2 or 3)

Use books and records in the exploration center, plus encyclopedias and the CD-ROM to learn about leisure and recreation during pioneer times. Select at least four categories from this list or add categories of your own (with teacher approval): songs, games, dances, literature, gatherings, contests, crafts. In each category you select, be ready to fully illustrate an example of “then” and a contrasting example from “now” to show the class how we are like and different from the pioneers in what we do for recreation (and why).



## 2<sup>nd</sup> Grade Tiered Lesson *Pioneers*

### Adventurer Group

(Work alone or in pairs)

Use books in the exploration center, the article in the Medicine West folder, encyclopedias, and the CD-ROM to find out what the medical problems were during the westward movement and what the practice of medicine was like. Figure out important questions to ask and answer in order to compare and contrast health problems and the practice of medicine then and now. Get your categories and questions approved by the teacher. Figure out a way to help the class see how we are like and different from the pioneers in health issues and the practice of medicine.





## Tiered Activity

Subject: Science

Concepts: Density & Buoyancy

Introduction: All students take part in an introductory discussion, read the chapter, and watch a lab activity on floating toys.

Activities Common to All Three Groups

- Explore the relationship between density and buoyancy
- Determine density
- Conduct an experiment
- Write a lab report
- Work at a high level of thinking
- Share findings with the class



## The Soda Group

- Given four cans of different kinds of soda, students determined whether each would float by measuring the density of each can.
- They completed a lab procedure form by stating the materials, procedures, and conclusions. In an analysis section, they included an explanation of why the cans floated and sank, and stated the relationship between density and buoyancy.



## The Brine & Egg Group



- Students developed a prescribed procedure for measuring salt, heating water, dissolving the salt in the water, cooling the brine, determining the mass of water, determining the mass of an egg, recording all data in a data table, pouring the egg on the cool mixture, stirring the solution and observing.
- They answered questions about their procedures and observations, as well as questions about why a person can float in water, whether it is easier to float in fresh or seawater, why a helium filled balloon floats in air, and the relationship between density and buoyancy.

## The Boat Group




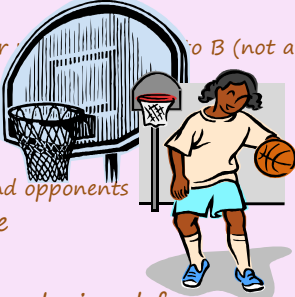
- Students first wrote advice to college students building concrete boats to enter in a boat race.
- They then determined the density of a ball of clay, drew a boat design for a clay boat, noting its dimensions and its density.
- They used cylinders of aluminum, brass, and steel as well as aluminum nails for cargo, and determined the maximum amount of cargo their boat could hold.
- They built and tested the boat and its projected load.
- They wrote a descriptive lab report to include explanations of why the clay ball sank, and the boat was able to float, the relationship between density and buoyancy, and how freighters made of steel can carry iron ore and other metal cargo.



# Tiered Lesson

Elementary  
Physical Education

## Skill: Dribbling and Basketball

- 1) Dribble from point A to point B in a straight line with one hand
  - Switch to the other hand and repeat.
  - Use either hand and develop a new floor to B (not a straight line)
- 2) Zigzag
  - One hand
  - Other hand
  - Increase speed
  - Change pattern to simulate going around opponents
- 3) In and out of pylons as fast as possible
  - Change hand
  - Increase speed
- 4) Dribble with one hand—and a partner playing defense.
  - Increase speed and use other hand
  - Trade roles
- 5) Through pylons, alternating hands, & partner playing defense
  - Increase speed
  - Trade roles

Judy Roll-Hilton Central Schools - Hilton, NY

## A High School Tiered Lesson PHYSICS

As a result of the Lab, students should:



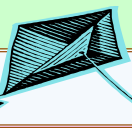
**Know**  
Key vocabulary (thrust, drag, lift, fluid, pressure, velocity, camber, airfoil, chord, trailing edge, leading edge)

**Understand**  
Bernoulli's Principle—As the velocity of a fluid increases, its pressure decreases. (Moving fluid creates an area of low pressure. Decrease in pressure on the top of the airfoil causes lift.)  
Newton's Third Law of Motion (For every action, there is an equal and opposite reaction)  
Aerodynamics is the study of forces acting on an object because air or another gas is moving.

**Be Able to Do**  
Construct objects that project themselves through space, in different ways as a demonstration of student knowledge of key information and understanding of key principles.  
Great opportunity to make teams of theoretician/scholars and designer/builders

*In the lab students make*

<p><b>Paper Airplanes</b> that fly for Maximum Distance Maximum Hang Time Tricks</p> <p style="text-align: center;">easiest ↓ Hardest</p>	<p><b>Kites</b></p> <p style="text-align: center;">easiest ↓ hardest</p> <p>Diamond Box Triangle-Lay</p>	<p><b>Pinwheels</b></p> <p style="text-align: center;">easiest ↓ hardest</p> <p>Forward Motion Backward Motion Upward Motion</p>
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## Secondary Tiered Assignment

Concept: Responsibility

Generalizations:

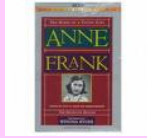
- We are responsible for ourselves.
- We “write” our own lives.
- We have responsibility for those we “tame.”
- Our actions have a ripple effect.
- Responsibility may require sacrifice and may result in fulfillment.
- Our work bears our hallmark.

Skills/Key Vocabulary:

Argument and support, Effective use of figurative language, Editing skills, Literary analysis, Elements of literature, Genre traits, Voice

Sample Literature:

- The Little Prince--Anne Frank by Miep Gies
- 'Bloodstain'--'I Will Create'--'To Be' Soliloquy
- News Articles



Samples of Differentiation

- Both teacher assigned and student selected reading.
- Both teacher assigned and student selected journal prompts.
- Use of literature circles to discuss books/readings assigned by readiness.
- Use of small group, teacher-led focus groups on student-choice readings/
- Optional review groups on key vocabulary and skills.
- In-common and “negotiated” criteria for key writing.
- Product options.
- Use of tape recordings, shared reading on complex pieces.
- Varied work groups.
- Tiered lesson.



## Secondary Tiered Assignment

Students will analyze parallel pieces of writing to explore the premise that we are responsible for those we tame. Students will frame an argument to support their position.

### Group 1

Read pages from The Little Prince

- Complete an analysis matrix that specifies the fox’s feelings about responsibility toward those we tame and why he believes what he does.

Read Bloodstain

- Complete an analysis matrix on the beliefs of the main character on the same topic.
- Select a newspaper article from the folder--Write a paragraph or two that compares beliefs of people in the article with the two characters.
- What advice would you give children about responsibility toward people we tame?
- Brainstorm on paper and then either:
  - Write a letter to a child giving your advice.
  - Write guidelines for adults who affect children’s lives.
  - Draw and explain a blueprint for becoming a responsible person.
- Peer revise and then peer edit your work.

### Group 2

Read pages from The Little Prince

- Find at least one piece of writing that shares the fox’s view on responsibility for those we tame.
- Find at least 2 contrasting pieces.
- Your selections must include at least 2 genre.
- Develop notes on 2 views of responsibility with reasons and illustrations from your selections.
- Be sure you are thoughtful about each view.

Then either:

- Write an editorial about the implications of the two approaches for our school.
- Write an interior monologue of a teen at a point of decision about responsibility for someone he/she has tamed.
- Create a series of editorial cartoons that look at the ripple effect of such decisions in history, science, and our community.



## Novel Think-Tac-Toe *basic version*

Directions: Select and complete one activity from each horizontal row to help you and others think about your novel. Remember to make your work thoughtful, original, accurate, and detailed.

<b>Character</b>	Create a pair of collages that compares you and a character from the book. Compare and contrast physical and personality traits. Label your collages so viewers understand your thinking	Write a bio-poem about yourself and another about a main character in the book so your readers see how you and the characters are alike and different. Be sure to included the most important traits in each poem.	Write a recipe or set of directions for how you would solve a problem and another for how a main character in the book would solve a problem. Your list should help us know you and the character.
<b>Setting</b>	Draw/paint and write a greeting card that invites us into the scenery and mood of an important part of the book. Be sure the verse helps us understand what is important in the scene and why.	Make a model or map of a key place in your life, and an important one in the novel. Find a way to help viewers understand both what the places are like and why they are important in your life and the characters'.	Make 2 timelines. The first should illustrate and describe at least 6-8 shifts in settings in the book. The second should explain and illustrate how the mood changes with the change in setting.
<b>Theme</b>	Using books of proverbs and/or quotations, find at least 6-8 that you feel reflect what's important about the novel's theme. Find at least 6-8 that do the same for your life. Display them and explain your choices.	Interview a key character from the book to find out what lessons he/she thinks we should learn from events in the book. Use a Parade magazine for material. Be sure the interview is thorough.	Find several songs you think reflect an important message from the book. Prepare an audio collage. Write an exhibit card that helps your listener understand how you think these songs express the book's meaning.

**Know:** theme, setting, characterization    **Do:** Relate elements of fiction to their own lives.

**Understand:** Good fiction is often about the reader too. Good fiction helps readers try on different lives.

## Novel Think Tac-Toe

### *advanced version*

Directions: Select and complete one activity from each horizontal row to help you and others think about your novel. Remember to make your work thoughtful, original, insightful, and elegant in expression.

<b>Character</b>	Write a bio-poem about yourself and another about a main character in the book so your readers see how you and the character are alike and different. Be sure to include the most important traits in each poem.	A character in the book is being written up in the paper 20 years after the novel ends. Write the piece. Where has life taken him/her? Why? Now, do the same for yourself 20 years from now. Make sure both pieces are interesting feature articles.	You're a "profiler." Write and illustrate a full and useful profile of an interesting character from the book with emphasis on personality traits and mode of operating. While you're at it, profile yourself too.
<b>Setting</b>	Research a town/place you feel is equivalent to the one in which the novel is set. Use maps, sketches, population and other demographic data to help you make comparisons and contrasts.	Make a model or a map of a key place in your life, and in important one in the novel. Find a way to help viewers understand both what the places are like and why they are important in your life and the characters'.	The time and place in which people find themselves and when events happen shape those people and events in important ways. Find a way to convincingly prove that idea using this book.
<b>Theme</b>	Find out about famous people in history or current events whose experiences and lives reflect the essential themes of this novel. Show us what you've learned.	Create a multi-media presentation that fully explores a key theme from the novel. Use at least 3 media (for example painting, music, poetry, photography, drama, sculpture, calligraphy, etc.) in your exploration.	Find several songs you think reflect an important message from the book. Prepare an audio collage. Write an exhibit card that helps your listener understand how you think these songs express the book's meaning.

**Know:** theme, setting, characterization    **Do:** Relate elements of fiction to their own lives.

**Understand:** Good fiction is often about the reader too. Good fiction helps readers try on different lives.

## Unpacking a Standard: Making Dinner with Student Differences in Mind

Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot).

Grade 7 Reading Standards for Literature

**Essential Question:** What makes a story tick?

**Transfer Goal:** Explain the architecture of a story or drama, showing how the elements of fiction interact to shape events.

Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot).

Grade 7 Reading Standards for Literature

### **Know (Essential Knowledge)**

Elements of fiction (plot, setting, character, theme)  
Analysis, evidence, interaction, supporting a position

### **Understand (Essential Understanding)**

Elements in our lives affect us and affect one another.

The people we associate with help shape us—and we help shape them.

Time of day, weather, where we are, the music we hear all impact our mood, thoughts, and actions.

The “themes” of our lives that most strongly represent who we are and what we stand for shape our thoughts, lives, and actions.

Authors use the elements of fiction in purposeful ways to guide readers’ thinking.

Stories are representations of life and in that way, act like our lives do.

Each element in a story shapes every other element in the story.

### **Do (Essential Skills)**

Recognize the elements in a story.

Analyze and explain how the story elements interact—and why.

Provide evidence from the story to support your explanation.

Making dinner vs. serving ingredients

Name \_\_\_\_\_

Class Period \_\_\_\_\_

1. Explain in words or words and images how you think our lives are like the lives of characters in a story or a movie or a play.
2. What are the elements of fiction? Please define or describe the elements you list.
3. How would you explain to a fourth grader what you do when you analyze something?
4. What do you think the most important theme in your life is? In other words, what theme does the best job of capturing who you are and what you stand for?

A pre-assessment to determine students' entry points with critical knowledge, understanding, and skill related to interaction among elements of fiction

### Patterns from the Pre-Assessment

#### How our lives are like the lives of characters in movies or plays:

Some students provided shallow, evident, concrete answers  
Other students provided more thoughtful and abstract answers, generally making either more connections that were meaningful or more elaborated and deeper connections.

#### Elements of Fiction

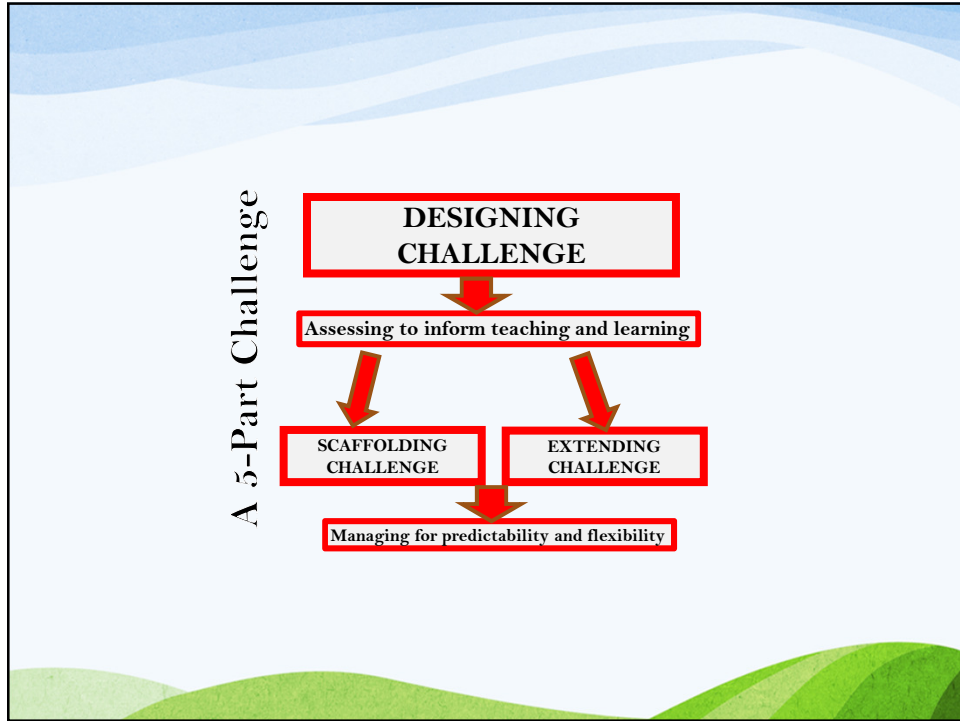
6 students listed and accurately explained all of the key elements  
12 students listed at least 3 elements and explained most of them with general accuracy  
11 students left the answer blank or listed just 1-2 elements and provided ambiguous or incorrect explanations

#### Explaining analysis

Only two students provided an effective, step-by-step response that would be helpful in understanding how to analyze something.

#### Major theme in your life

A large group of students noted topics (I like sports)  
7 students provided a theme-like statement and shared how/why it represented them  
A large group of students left the answer blank or provided a brief response not readily connected with the question



## Building a Persuasive Paragraph 3<sup>rd</sup> Grade

**KNOW:** Purpose of a persuasive paragraph  
Parts that come together to create a persuasive paragraph  
Topic sentence, elaboration, concluding statement, persuasive paragraph, analyze

**UNDERSTAND:** How we construct what we write affects how readers understand it.

**DO:** Students will...

1. Analyze a paragraph to identify key components of a persuasive paragraph
2. Organize an individual paragraph with topic sentence, relevant elaboration, and a concluding sentence

Common Core:  
3.W.1: Write an opinion piece supporting a point of view with reasons.



## Pre-Assessment

- Administered during previous week
- Writing prompt
  - What do you think?
    - Read the following prompt and let us know what you think about this issue. Write a paragraph that would help someone know what your point of view is about the decision.
    - The school board met and decided that recess would no longer be needed in school. They felt that it would help students spend more time learning without being interrupted each day for recess. What do YOU think?
- The teacher used a question about something that interests students in order to elicit their best responses
- Results from the pre-assessment:
  - **Group A** – Writing indicated that they were comfortable with the organization of their argument
  - **Group B** – Writing indicated that they struggled with organizing their argument

## Steps in the Lesson

- Reintroduce the pre-assessment topic and have the students Think-Pair-Share about their own opinion of the topic. Ask pairs to read the two sample paragraphs (both with the same opinion, but one is organized well, and another is not) and talk about which one they felt was more persuasive.
- Introduce to the whole group the vocabulary of organizing a paragraph (topic sentence, supporting details, elaboration, concluding sentence). As a class, go through each definition while all students highlight the example in the example paragraph with markers
- (Green – topic sentence, Blue- supporting details, Orange- elaborations, Red- concluding sentence).

## Sample Paragraph

- There are many reasons why we shouldn't have recess during the school day. First of all, if we didn't have recess, we would have more time to work on projects in school without being interrupted. Sometimes I am in the middle of something really, really important and then all of a sudden, we have to stop and I have to leave it behind. By not having recess, fewer students would get hurt. It seems that every time we are out on the playground, someone trips or falls and needs to go to the nurse. Finally, by not having recess, we might do better on tests. Everyone would have longer to study and we could all get A's. So you see, if we didn't have recess, it would be good for our school.

## Groups based on Assessment Information



- Quarter Pounder Group – Grab your boxes and meet at the left side table



- Big Mac Group – Grab your boxes and meet at the right side table





### Quarter Pounder Group

- Pick up the Quarter Pounder boxes. With a partner, work on the jumbled paragraph inside your box. When you feel that it is organized, retrieve the answer key and check your work. Glue your corrected paragraph to your paper and turn in.
- Meet with teacher to talk about a model for persuasive paragraphs. Your teacher will give you a graphic organizer that will be used to organize your paragraph.
- Complete the following assignment:

Using the graphic organizer, choose one of the following topics and tell us what you think about...

**–Whether chewing gum should be allowed in class,  
whether students should be allowed to bring toys to  
school, whether dogs make better pets than cats.**

*Your work will be reviewed to see to how well you show an  
understanding of*

*how to organize a persuasive paragraph.*

### **Graphic Organizer for Quarter Pounder Group**



Topic: \_\_\_\_\_  
By \_\_\_\_\_

Topic Sentence:

Supporting Detail:

1. Elaboration:

2. Elaboration:

Supporting Detail:

1. Elaboration:

2. Elaboration:

Supporting Detail:

1. Elaboration:

2. Elaboration:

Concluding Statement:

### Big Mac Group



- Pick up the Big Mac boxes. With a partner, work on the jumbled paragraph inside your box. When you feel that it is organized, raise your hands to have your teacher check your answer. Glue your corrected paragraph to your paper and turn in.
- Meet with teacher to talk about a model for persuasive paragraphs. Your teacher will give you a graphic organizer that will be used to organize your paragraph.
- Complete the following assignment:

Using the graphic organizer, choose one of the following topics and tell us what you think about...

**–Whether chewing gum should be allowed in class, whether students should be allowed to bring toys to school, whether dogs make better pets than cats.**

–If you need a hint, go to retrieve an “extra topping” from our jars!

*Your work will be reviewed to see how well you show an understanding of how to organize a persuasive paragraph.*

## Graphic Organizer for Big Mac Group



Topic: \_\_\_\_\_  
By \_\_\_\_\_

Topic Sentence: **What do I believe about this?**  
**What is my overall opinion about this?**

Supporting Detail: **What is one reason that I believe what I said in my topic sentence?**

1. Elaboration: **What is an example of how I know the supporting detail is true?**
2. Elaboration: **What is another example of how I know the supporting detail is true?**

Supporting Detail: **What is another reason that I believe what I said in my topic sentence?**

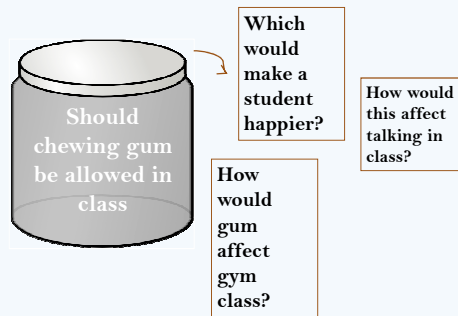
1. Elaboration: **What is an example of how I know the supporting detail is true?**
2. Elaboration: **What is another example of how I know the supporting detail is true?**

Supporting Detail: **What is another reason that I believe what I said in my topic sentence?**

1. Elaboration: **What is an example of how I know the supporting detail is true?**
2. Elaboration: **What is another example of how I know the supporting detail is true?**

Concluding Statement: **How can I let the reader know that I'm finished with giving supporting details? (Hint: Start with, "So..." or "Therefore..." or "In summary...")**

## “Extra Toppings” Example



## Future Steps in Lesson



- Students present their writing; teacher assesses products for student understanding of the organization of persuasive paragraphs.
- Re-teach & practice as necessary.
- Formative assessment of and instruction on making a link between supportive details and opinion.
- Eventual summative assessment: Writing a persuasive paragraph
  - Students will choose a side of an argument and build a logical case for their opinion.
  - The paragraph will need to be:
    - Clear, and logical,
    - Have a strong, clear topic sentence stating the writer's opinion,
    - Have supporting details with elaborations,
    - Include a concluding sentence that restates the author's point of view.

## How Do you See...

The example we just looked at?

In terms of:

clear KUDs

engagement

understanding

alignment between KUDs and the assessment

assessment that promotes understanding/thinking

dipstick assessment vs. intent to measure everything

use of formative assessment info. to address students' varied learning needs

alignment between KUDs and instruction



What questions does the example raise for you?

## The Voices in my Head...

Potential  
benefits of  
tiering...

Potential  
drawbacks of  
tiering...

I need more  
help or  
information...

