


# Understanding by Design

Something to consider... 

“Do not confine your children to your own learning, since they were born in another time.”

- Chinese proverb

## Agenda - Day 1

- The “Big Ideas” of UbD
- Stage 1 - Goal Types
- Understandings and EQs
- Design Time (a.m. and p.m.)
- Unpacking Standards
- UbD Supportive Websites

## Design options...

- Develop or refine a UbD unit plan
- Design a year-long UbD curriculum map
- Develop a “backward design” plan for a school or district program initiative
- Develop a “backward design” plan for a professional learning topic
- Develop a “backward design” action plan for curriculum implementation

## Agenda - Day 2

- Gallery Walk - Stage 1 - Q&A
- Stage 2 - Assessment Evidence, Alignment Check
- Stage 2 - Assessing Understanding, Evaluative Criteria
- Design Time (a.m. and p.m.)
- Breakout (11 a.m.) - Introducing UbD

## Agenda - Day 3

- Stage 2 - Alignment Check
- Stage 3 - A.M.T. & Using E.Q.s
- Stage 3 - W.H.E.R.E.T.O. Elements
- Breakout (11:15 a.m.) - Macro Curriculum
- Best Designs for Learning
- Sharing and Feedback Session
- Moving Forward with UbD

### Understanding by Design

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*is not...*

- a prescriptive program
- an instructional model
- incompatible with some subject areas

### Understanding by Design

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*is...*

- a framework for planning curriculum
- a way of thinking
- Think: *Understanding, by design*

### A Research Finding

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A guaranteed and viable curriculum is the #1 school-level factor impacting student achievement.

– Marzano, *What Works in Schools*

### An Understanding-based Curriculum

*Teach & Assess for Understanding & Transfer*

*Plan Curriculum “backward”*  
**3 Stages of Design**

### 3 Stages of Backward Design

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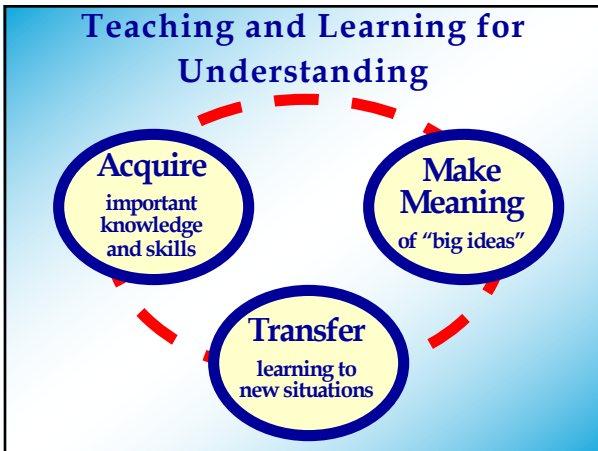
1. Identify desired results.
2. Determine acceptable evidence.
3. Plan learning experiences & instruction.

### “Backward” Design Logic

**Think like an assessor, not an activity designer!**

### This is not Backward Design

1. Identify desired results.
2. Determine acceptable evidence.
3. Plan learning experiences & instruction.



### 3 Stages of Backward Design

1. Identify desired results.
2. Determine acceptable evidence.
3. Plan learning experiences & instruction.

### A Definition


*"the course to be run"*

**Curriculum = a plan to achieve designated goals**

**Curriculum is not a list of topics and related activities**

### Long-Term Transfer Goal

*"Students will be able to independently use their learning to..."*



**An effective curriculum equips learners for autonomous performance ... by design!**

### Transfer Goal - Writing

- Effectively write in various genres for various audiences and purposes (inform, explain, entertain, persuade, guide, or challenge/change things).

### Transfer Goals - Mathematics

*Mathematically proficient students:*

- Make sense of never-before-seen problems and persevere in solving them.
- Construct viable arguments and critique the reasoning of others.

### Transfer Goal - History/SS

- Use knowledge of patterns of history to better understand the present and prepare for the future.
- Critically appraise historical claims and analyze contemporary issues.
- Participate as an active and civil citizen in a democratic society.

### Transfer Goal - World Languages

Effectively communicate with varied audiences and for varied purposes while displaying appropriate understanding of culture and context.

### Transfer Goals - Science

- Use knowledge and reasoning to evaluate scientific claims and analyze current issues involving science or technology.
- Conduct an investigation following established scientific protocols.

North Slope Borough School District, 2012

### Transfer Goal: Health and Physical Education

- Make healthful choices and decisions regarding diet, exercise, stress management, alcohol/drug use throughout one's life.
- Play a chosen game skillfully and with good sportsmanship.

**Transfer Goal:**  
**Visual and Performing Arts**


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- Create purposeful artistic expressions through various media and styles.
- Value, and participate in, the arts throughout one's life.



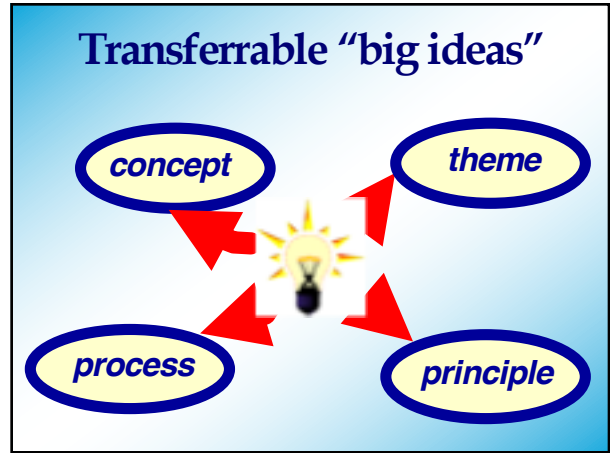
**The Four Cs**


- Critical Thinking
- Creativity
- Communication
- Collaboration

**An Understanding...** 

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- is an abstraction (e.g., a concept, theme, principle)
- is a transferrable idea
- has explanatory power




**A Study Of/In \_\_\_\_\_** 

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**The rainforest = A study of a complex ecosystem**

**World War I = A study of unintended consequences**

**A Study Of/In \_\_\_\_\_** 

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**Decimals, Fractions, Percents = A study of equivalence**


**Weight training = A study of proper technique**

A Study Of/In \_\_\_\_\_ 

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*Frog and Toad are Friends* =  
A study in **relationships**

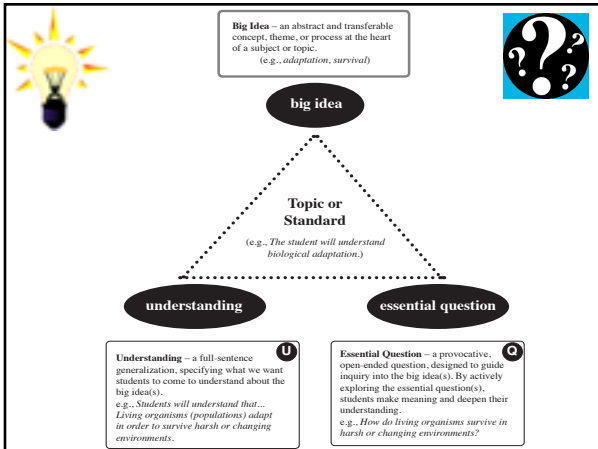
*The Catcher in the Rye* = A  
study of **author's style**


A Study Of/In \_\_\_\_\_ 

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**Insects** = A study in  
**structure and function**

**Native Americans** = A study  
of **identity and survival**




 *From concept to understanding...*

**Adaptation**

↓

*Students will understand that...*

**Understanding:**  
**Living organisms adapt to survive harsh and changing environments.**


 *From theme to understanding...*

**Friendship**

↓

*Students will understand that...*

**Understanding:**  
**True friendship is often revealed during challenging times rather than during happy times.**

 *From a process to understanding...*

**Writing**

↓

*Students will understand that...*

**Understanding:**  
**Writers don't always produce a perfect product on their first try. They draft, proofread, and revise.**

### Full Sentence Generalization

BIG IDEAS (Concepts)	UNDERSTANDING
adaptation	Living organisms adapt to survive harsh or changing environments.
survival	
environment	

### Types of Questions

**Leading**  
What are the names of the four food groups?

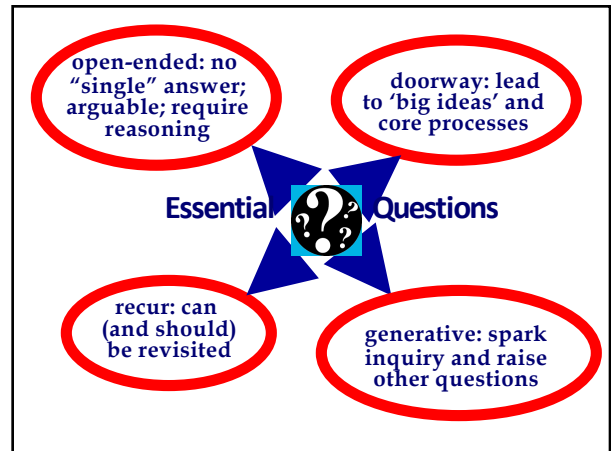
**Guiding**  
What do we mean by a "balanced" diet?

**Hook**  
Can what you eat help prevent zits?

**Essential**  
What should we eat?

### Concept Attainment

1. Compare examples (+) and non-examples (-) of a concept.
2. Identify the distinguishing characteristics of each.
3. Test your working definition against new cases.
4. Refine your concept definition.



### Connect Essential Questions with Desired Understandings


Stage 1 – Desired Results	
ESTABLISHED GOALS	Transfer Students will be able to independently use their learning to...
	Meaning
	UNDERSTANDINGS      ESSENTIAL QUESTIONS <b>U</b> <b>EQ</b>
	Application Students will know...      Students will be skilled at...
Stage 2 – Evidence	


### Adaptation

Students will understand that...

**Understanding:**  
Living organisms adapt to survive harsh and changing environments.


**Essential Question:**  
In what ways do living things adapt to survive?




*world literature* 

**'Big Idea' Understanding:**  
Great literature from various cultures explores enduring themes and reveals recurrent aspects of the human condition.

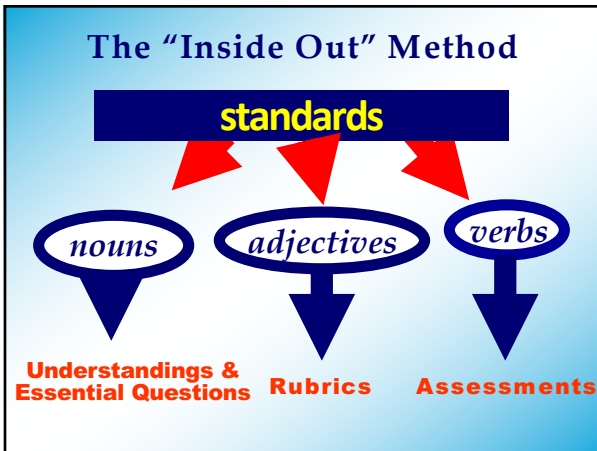

**Essential Question:**  
*How can stories from other places and times be about us?*



*friendship* 

**'Big Idea' Understanding:**  
True friendship is revealed during hard times, not happy times.

**Essential Question:**  
*Who is a 'true friend' and how will you know?*

**English - writing**

**Write arguments to support claims in an analysis of substantive topics or texts, using *valid reasoning* and *relevant and sufficient evidence*.**

**Factual Knowledge** 

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*includes...*

- vocabulary/ terminology
- definitions
- key factual information
- critical details
- important events and people
- sequence/timeline

**Skills** 

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*include...*


- basic skills - e.g., decoding, drawing
- communication skills - e.g., listening, speaking, writing
- thinking skills - e.g., comparing
- study skills - e.g., note taking
- interpersonal, group skills



### Knowledge vs. Skill

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*Students will know...*    *Students will be skilled at...*

<p>Names of holidays:                  Labor Day,                  Columbus Day                  Veterans Day</p>	<p style="color: red;"><del>Identifying the key facts of each holiday/event/person</del></p>
<p>The key facts of each holiday/event/person</p>	

### Gallery Walk Directions

- Review examples. Take notes:
  - Identify 3 particularly strong Understandings or EQs.
  - What *patterns* did you notice?
  - What *questions* emerged?

### Skill-based Understandings

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*“Students will understand ~~how to~~ speak/write persuasively.”*

*“Students will understand that effective persuaders employ techniques matched to the needs and experiences of their audience.”*

Things are always changing.

So what?

Things are always changing, often in predictable patterns.

So what?

Recognizing patterns of change allows us to predict and prepare.

Real-world issues are complex.

So...?

Complex issues are multi-faceted and do not lend themselves to simple solutions. They require an analysis of multiple factors and/or a consideration of different perspectives.

It's important to know what your body is doing.

Why?

- *to get feedback on mechanics and performance to help prevent injuries*

Monitoring what your body is doing can enhance performance and help prevent injuries.

### Avoid Leading Questions

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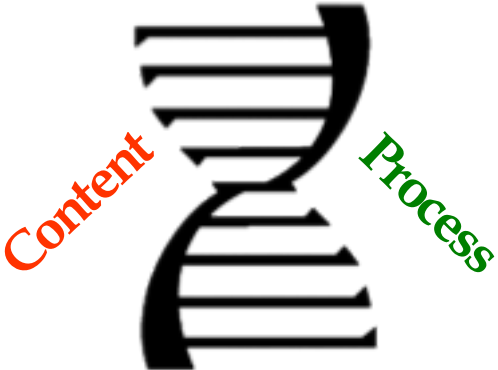
LEADING QUESTION	ESSENTIAL QUESTION
<i>What is the role of the three branches of government?</i>	<i>How might we limit abuses of power?</i>
<i>What is a "balanced" diet?</i>	<i>What should we eat?</i>

### Hook ?s vs. EQs

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Hook Question	Essential Question
<i>"Can your diet help prevent zits?"</i>	<i>"What should we eat?"</i>
<i>"Are we drinking the same water as our ancestors?"</i>	<i>"Where does water come and where does it go?"</i>

### Consider EQs in Two Strands



### 3 Stages of Backward Design

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1. Identify desired results.
2. Determine acceptable evidence.
3. Plan learning experiences & instruction.

### Think "Photo Album" versus "Snapshot"

*Sound assessment requires multiple sources of evidence, collected over time.*



### Gather evidence from a Range of Assessments


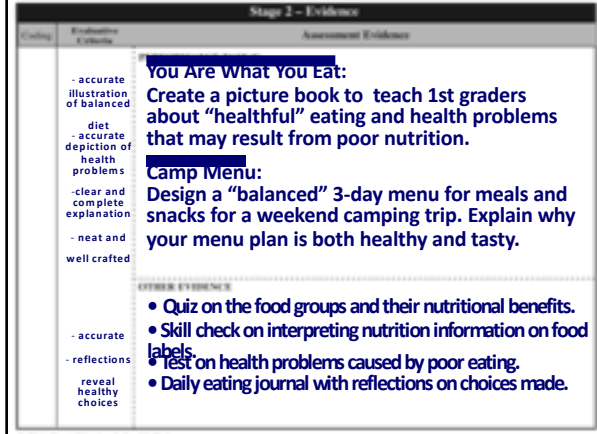
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- ✓ authentic tasks and projects
- ✓ academic exam questions, prompts, and problems
- ✓ quizzes and test items
- ✓ informal checks for understanding
- ✓ student self-assessments

## Check for Alignment

**Cover Stage 1**

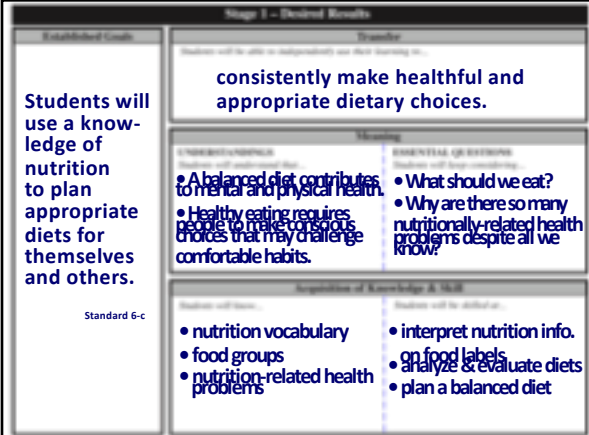
*Can people infer your goals by only seeing your assessments?*

**You Are What You Eat:**  
Create a picture book to teach 1st graders about "healthful" eating and health problems that may result from poor nutrition.

**Camp Menu:**  
Design a "balanced" 3-day menu for meals and snacks for a weekend camping trip. Explain why your menu plan is both healthy and tasty.

- Quiz on the food groups and their nutritional benefits.
- Skill check on interpreting nutrition information on food labels.
- Test on health problems caused by poor eating.
- Daily eating journal with reflections on choices made.



**Established Goals:**  
Students will use a knowledge of nutrition to plan appropriate diets for themselves and others.

**Standard 6-c**


**Desired Results:**  
consistently make healthful and appropriate dietary choices.

**Learning Objectives:**

- A balanced diet contributes to mental and physical health.
- Healthy eating requires people to make conscious choices that may challenge comfortable habits.
- What should we eat?
- Why are there so many nutritionally-related health problems despite all we know?

**Assessment of Knowledge & Skill:**

- nutrition vocabulary
- food groups
- nutrition-related health problems
- interpret nutrition info. on food labels
- analyze & evaluate diets
- plan a balanced diet

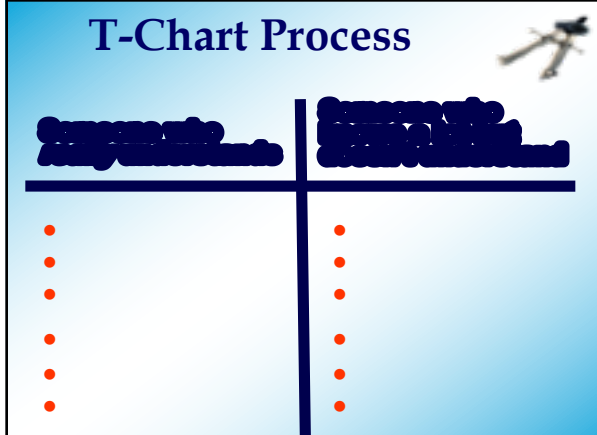
*Think like a juror!* 

**Students should be presumed innocent of understanding until convicted by evidence!**

## What is Understanding?




## T-Chart Process




**NMAP 6th-grade mathematics test item**

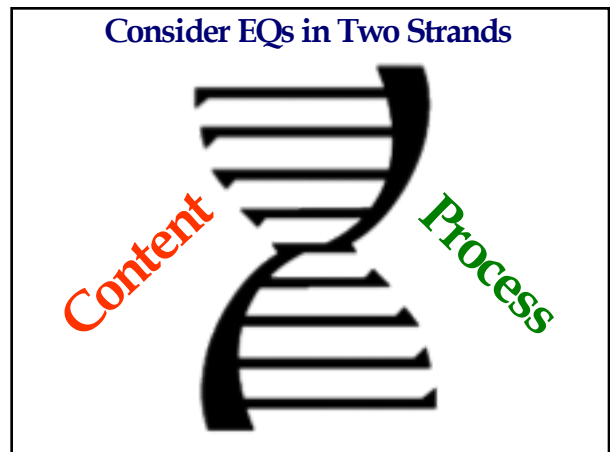
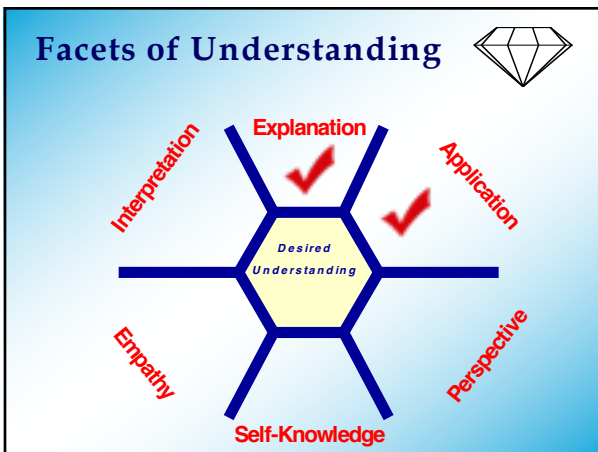
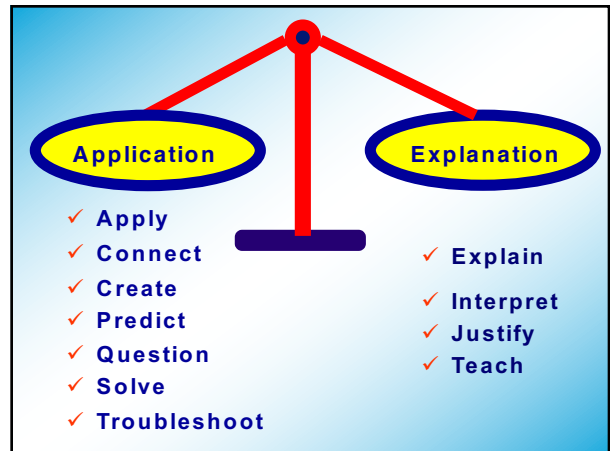
How many buses does the army need to transport 1,128 soldiers if each bus holds 36 soldiers?

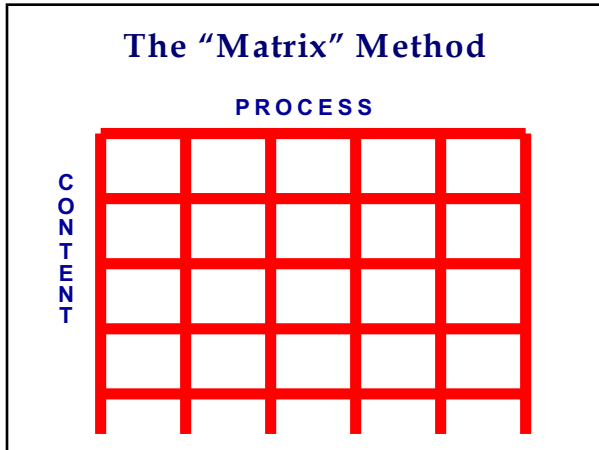


Only 24% selected the correct answer!  
**31, remainder 12**



Components of Understanding	Components of Assessment
<ul style="list-style-type: none"> <li>✓ Apply</li> <li>✓ Connect</li> <li>✓ Create</li> <li>✓ Explain</li> <li>✓ Interpret</li> <li>✓ Justify</li> <li>✓ Predict</li> <li>✓ Solve</li> <li>✓ Teach</li> <li>✓ Troubleshoot</li> </ul>	<ul style="list-style-type: none"> <li>✗ Recall</li> <li>✗ Identify</li> <li>✗ Retell</li> <li>✗ State</li> <li>✗ Regurgitate</li> <li>✗ Plug in</li> </ul>





#### Matrix Method -- Mathematics Common Core Standards

Practice Standard	1 Make sense of problems and persevere in solving them.	2 Reason abstractly and quantitatively.	3 Construct viable arguments and critique the reasoning of others.	4 Model with mathematics.	5 Use appropriate tools strategically.	6 Attend to precision.	7 Look for and make use of structure.	8 Look for and express regularity in repeated reasoning.
<b>MATH GR 3</b>								
<b>Content Standards</b>								
Represent and solve problems involving multiplication and division.								
Understand properties of multiplication and the relationship between multiplication and division.								
Multiply and divide within 100.								
Solve problems involving the four operations, and identify and explain patterns in arithmetic.								
Use place value understanding and properties of operations to perform multi-digit arithmetic.								
Develop understanding of fractions as numbers.								
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.								
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.								
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.								

### Matrix Method

#### Planning Matrix for Science Standards

PROCESSES	Asking questions & defining problems	Developing and using models	Planning and carrying out investigations	Analyzing and interpreting data	Using math & computational technology	Constructing explanations; designing solutions	Engaging in argument from evidence	Obtaining, evaluating, & communicating information
<b>CONCEPTS</b>								
Patterns								
Cause and Effect								
Scale, Proportion, and Quantity								
Systems and System Models								
Energy and Matter								
Structure and Function								
Stability and Change								

example:

## How To Perform a Task

Since you are an accomplished \_\_\_\_\_, you have been asked to develop a **step-by-step directions** to help **other kids learn** how to do it. Your directions should include **words and pictures** to help others learn how to \_\_\_\_\_ like you.

example:


## What's Your Position?

After reading \_\_\_\_\_ (literature or informational texts), write \_\_\_\_\_ (essay or substitute) that compares \_\_\_\_\_ (content) and argues \_\_\_\_\_ (content). Be sure to support your position with evidence from the texts.


example:

## What's Your Position?

After researching **school policies and student & staff opinions on Internet filters in schools**, write a (**blog, letter to the School Board, editorial for the school paper**) that argues for your position. Support your position with evidence from your research. Be sure to acknowledge competing views.

example:  
*What's Your Position?* 

**What makes something funny?**  
After reading selections from **Mark Twain and Dave Barry**, write a review that compares their humor and argues which type of humor works for a contemporary audience and why. Be sure to support your position with evidence from the texts.

**Designing Task Scenarios** 

- G ♦ What is the goal in the scenario?
- R ♦ What is your role?
- A ♦ Who is the audience?
- S ♦ What is your situation (context)?
- P ♦ What products/performances will you prepare?
- S ♦ By what success criteria will your work be judged?

*Student Developed Rubric for Classroom Behavior*

**4 Don't talk. Sits on chair and listens to teacher. Works hard. Real good!**

*Student Developed Rubric for Classroom Behavior*

**4 Don't talk. Sits on chair and listens to teacher. Works hard. Real good!**

**3 Talks a little. Sits on chair and mostly listens to teacher. Works. Pretty good.**

*Student Developed Rubric for Classroom Behavior*

**4 Don't talk. Sits on chair and listens to teacher. Works hard. Real good!**

**3 Talks a little. Sits on chair and mostly listens to teacher. Works. Pretty good.**

**2 Talks a lot. Sits on knees and maybe listens. Works a little bit. Bad.**

*Student Developed Rubric for Classroom Behavior*

**4 Don't talk. Sits on chair and listens to teacher. Works hard. Real good!**

**3 Talks a little. Sits on chair and mostly listens to teacher. Works. Pretty good.**

**2 Talks a lot. Sits on knees and maybe listens. Works a little bit. Bad.**

**1 They talk loud and never listens. Walk all around. Don't write a thang. Bad to the bone!**

## Check for Alignment

**Cover Stage 1**  
*Can people infer your goals by only seeing your assessments?*

Distinguishing Assessment Purposes

**Stage 2**  
 Assessments *OF* Learning

**Stage 3**  
 Assessment Practices *FOR* Learning

## Anticipating Concerns

*"Yes, but..."*

*But we have to prepare for the state test.*

*Our state tests don't ask Essential Questions!*

*We have too much content to cover to assess this way.*

## Misconception Alert:

*Beware: fixation on test format*

*"What we see is behavior geared toward improving test scores rather than behavior geared toward changing what students do."*

Brian Stecher, researcher at RAND Corporation

## Beware: Confusing the Measures w/ the Goals

*"Practicing for a standardized test is like practicing for your physical exam!"*

### Most Difficult Item on New York State Tenth-Grade Math Test!

34 A straw is placed into a rectangular box that is 3 inches by 4 inches by 8 inches, as shown in the accompanying diagram. If the straw fits exactly into the box diagonally from the bottom left front corner to the top right back corner, how long is the straw, to the nearest tenth of an inch?

Fewer than 30% of all tenth graders answered this correctly, even though the Pythagorean theorem is routinely taught.

**Why?**

- Lack of cues
- Failure to transfer
- Do they really understand?

**Analysis of CCS DOK Levels  
English Language Arts Grades K-2**

Key Areas	Total # Standards	DOK Level			
		1	2	3	4
Read Lit	27	4	19	4	0
Read Inform	30	3	20	7	0
Read Found	10	7	3	0	0
Writing	21	0	9	9	3
Spk List	18	3	11	4	0
Language	16	6	7	3	0
<b>Total</b>	<b>122</b>	<b>23</b>	<b>69</b>	<b>27</b>	<b>3</b>
<b>Percent</b>		<b>19%</b>	<b>56%</b>	<b>22%</b>	<b>2%</b>

**Analysis of CCS DOK Levels  
English Language Arts Grades 3-5**

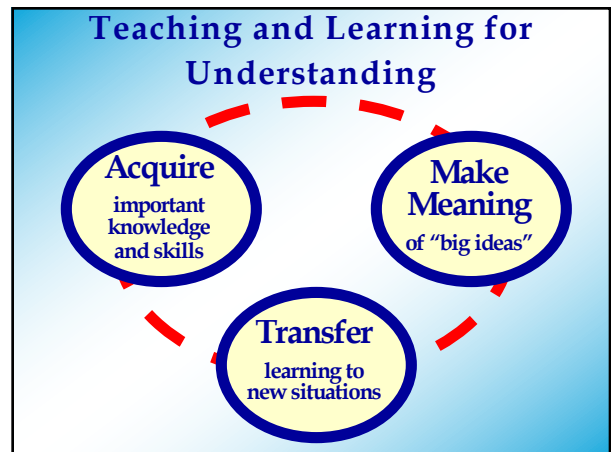
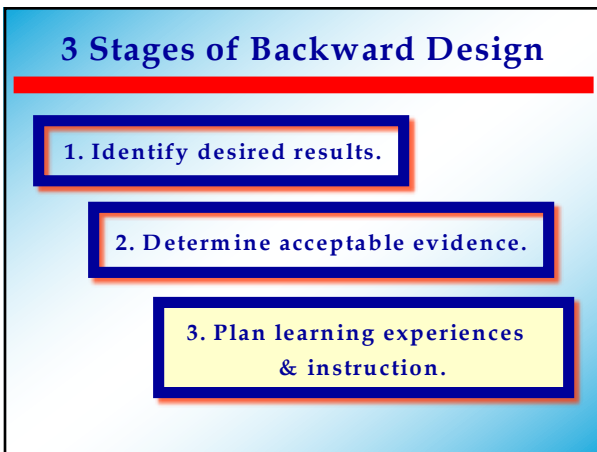
Grades 3-5 Areas	Total # Standards	DOK Level			
		1	2	3	4
Read Lit	27	0	15	12	0
Read Inform	30	0	15	14	1
Read Found	6	3	3	0	0
Writing	29	0	3	23	3
Spk List	18	1	7	10	0
Language	18	6	7	5	0
<b>Total</b>	<b>128</b>	<b>10</b>	<b>50</b>	<b>64</b>	<b>4</b>
<b>Percent</b>		<b>8%</b>	<b>39%</b>	<b>50%</b>	<b>3%</b>

**Analysis of CCS DOK Levels  
English Language Arts Grades 6-8**

Grades 6-8 Areas	Total # Standards	DOK Level			
		1	2	3	4
Read Lit	27	0	8	19	0
Read Inform	30	0	11	19	0
Writing	30	0	4	20	6
Spk List	18	0	5	13	0
Language	18	0	14	4	0
<b>Total</b>	<b>123</b>	<b>0</b>	<b>42</b>	<b>75</b>	<b>6</b>
<b>Percent</b>		<b>0%</b>	<b>34%</b>	<b>61%</b>	<b>5%</b>

**Analysis of CCS DOK Levels  
English Language Arts Grades 9-12**

Grades 9-12 Areas	Total # Standards	DOK Level			
		1	2	3	4
Read Lit	18	0	3	15	0
Read Inform	20	0	5	15	0
Writing	20	0	1	11	8
Spk List	12	0	2	10	0
Language	12	0	7	5	0
Read History	20	0	5	15	0
Read Sci Tech	20	0	8	12	0
Write HST	18	0	1	9	8
<b>Total</b>	<b>140</b>	<b>0</b>	<b>32</b>	<b>92</b>	<b>16</b>
<b>Percent</b>			<b>23%</b>	<b>66%</b>	<b>11%</b>






*Understanding must be earned!*

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Understanding requires active **meaning-making** by the learner.

**Unit on Statistics** 

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- *What is fair?*
- *How can mathematics help us judge fairly?*

**How can mathematics help us judge fairness?**

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Other meaning-making questions:

- *What do we mean when we say that the rules of a game of chance are "not fair"? What role does mathematics play in our judgment?*
- *When is straight majority voting "fair" and when is it "not fair"?*
- *When is it "fair" to consider an "average" in ranking performance (e.g. salaries, home prices, batting average) and when is it "unfair"?*

**NOTE: The content\* is learned as a means to answer questions and help solve problems!**

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*\*Measures of central tendency:*


- Mean
- Median
- Mode
- Standard Deviation (range/variance)

**Meaning Making & Transfer Activity**

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Based on our study in this unit of various measures of central tendency, and the pros and cons of using "averages" (and other such measures) in various situations, propose and defend a "fair" grading system for use in this school.

How should students' grades be calculated? Explain why is your grading system would be more fair than the current system?

*Performance Task:* **Making the Grade** 

Your math teacher will allow you to select the measure of central tendency (i.e., *mean, median or mode*) by which your quarterly grade will be calculated. Review your grades for quizzes, tests, and homework to decide which measure of central tendency will be best for your situation. Write a note to your teacher explaining *why* you selected that method.

*Other Evidence:*

### Measures of Central Tendency

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- ☒ quizzes on specific skills (e.g., calculating mean, identifying median)
- ☒ finding and explaining “real world” examples of each measure (e.g., scoring in diving competitions)

### Covering a textbook is *not* the goal.

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The textbook should be used as a *resource*, but not the syllabus!

### You Can Use A.M.T. to...

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- ✓ Develop assessments and lessons
- ✓ Code learning events (Stage 3)
- ✓ Code assessments (Stage 2)
- ✓ Observe and give feedback
- ☐ Reflect on lessons & units

### Tips for Using Essential Questions:

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- ✓ use E.Q.s to organize programs, courses, and units of study
- ✓ “less is more”
- ✓ edit to make them “kid friendly”
- ✓ post the questions
- ✓ invite student questions

### Jig Saw Process

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1 - p. 4 Top	4 - p. 5 Bottom
2 - p. 4 Bottom	5 - p. 6 FAQs
3 - p. 5 Top	6 - p. 6 Tips

**Part 1** - Individually, read designated section and highlight key points.

**Part 2** - In groups, summarize key points from each section of the article.

## The Best Design for Learning: An Inductive Exercise



### Best Learning exercise - Part 1

*What was the **best learning experience** you have ever encountered? Focus on the **design** (the tasks, goals, methods, sequence, resources used, assessments, etc.) **not** your interests or the talents of the teacher.*

**“Best” = the design resulted in highly **engaged** and **effective** learning.**

### Design Exercise - Process

*Part I*

- Individual reflection & writing (3 min.)
- Share examples w/ group (8 min.)
- Listen for common elements

*Part II*

- Generalize with your group (5 min.)  
“The best designs...”

*Suggestion: select a recorder to summarize*

### Freedom Within Structure

<p>Stage 1 – Desired Results</p> <ul style="list-style-type: none"> <li>• School Mission</li> <li>• Program Goals</li> <li>• Content Standards</li> </ul>	<p>Agree to agree. This is our job!</p>
<p>Stage 2 – Assessment Evidence</p> <ul style="list-style-type: none"> <li>• Cornerstone Assessments</li> <li>• Common Rubrics &amp; Performance Standards</li> </ul>	<p>Agree on some common evidence.</p>
<p>Stage 3 – Learning Plan</p> <ul style="list-style-type: none"> <li>• Instruction (lesson plans, instructional strategies, sequence, grouping, resources)</li> </ul>	<p>Academic freedom &amp; teacher autonomy</p>

### Ideas for Action

- Think big.
- Start small.
- Go for an “early win” in Iowa.

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### “Gourmet” Unit Design

- too demanding for “everyday meals”  
*therefore,*
- work smart: create one, share many