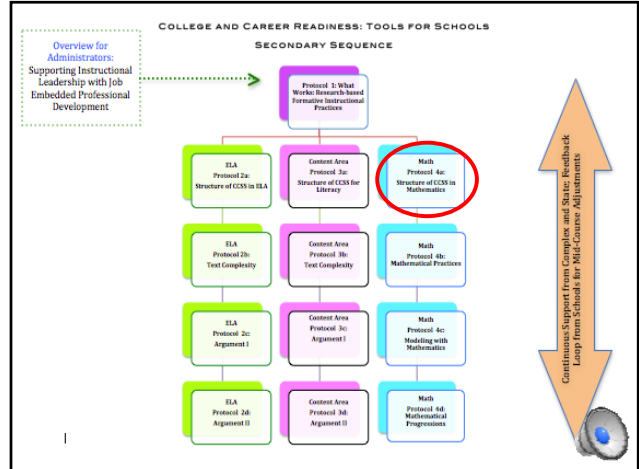


## CCR High School Mathematics Protocol 4a

# Structure of Common Core State Standards for High School Mathematics



## Formative Instructional Practices

### Where am I going?

How do we make learning targets clear to students so that they have the same understanding of quality as teachers do?

### Where am I now?

How does feedback allow students to self assess and set goals?

### How do I close the gap?

What opportunities allow students to close the learning gap?



## Desired Outcomes

- Understand the structure and design of the CCSS in High School Mathematics
- Discuss the implications for instruction



## All Means All

- The Common Core State Standards articulate rigorous expectations to prepare **all** students to be college and career ready, including English language learners and Special Education Students.
- These students likely will require additional instructional support.
- English Language Proficiency Standards (ELP) for ELL students are aligned to the CCSS.



**Common  
Core:  
Mathematics  
Standards**

**Standards for  
Mathematical  
Practice  
And  
Content**



## **Standards for Mathematical Practices (K-12)** **Key for Identifying the Components**

- \_\_\_\_\_ Standard Title
- (            ) Narrative Description

Turn to Standards for Mathematical Practices (Page 6)



## **Standards for Mathematical Practice**

Follow along with the *Standards for Mathematical Practice* document – Practice 1 (page 6)

- Underline the Standard Title
- Bracket the Narrative Description



**Mathematics I Standards for Mathematical Practice**

The standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “mathematical mindsets” such as “making sense of a problem and persevering in solving it” and “attending to precision.” The standards are drawn from the research on student learning in mathematics education and are intended to be used in conjunction with the content standards for mathematics. The standards are organized into three domains: **Problem Solving**, **Reasoning and Proof**, and **Communication**.

**1. Make sense of problems and persevere in solving them.**

Students with a growth mindset believe that their abilities in mathematics are not fixed but can be developed through effort and practice. They understand that learning from mistakes is an important part of the process. They are able to identify what they know and what they need to learn in order to solve a problem. They are able to break a problem down into smaller parts and work on them one at a time. They are able to use a variety of strategies to solve a problem and are able to check their work to make sure it is correct.

**2. Reason abstractly and quantitatively.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to reason abstractly and quantitatively are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**3. Construct viable arguments and critique the reasoning of others.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to construct viable arguments and critique the reasoning of others are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**4. Model with mathematics.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to model with mathematics are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**5. Use appropriate tools strategically.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to use appropriate tools strategically are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**6. Attend to precision.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to attend to precision are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**7. Look for and make use of structure.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to look for and make use of structure are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**8. Look for and express regularity in repeated reasoning.**

Mathematical problems often involve a mixture of abstract and quantitative reasoning. Students who are able to look for and express regularity in repeated reasoning are able to identify the underlying structure of a problem and to use that structure to solve the problem. They are able to use numbers and operations to represent a situation and to use those numbers and operations to solve the problem. They are able to use mathematical symbols and notation to represent a situation and to use those symbols and notation to solve the problem.

**Underline: Standard title**

**Bracket: Narrative Description**

## Standards for Mathematical Practice

Review the Standards for Mathematical Practice document. Complete the process for Practices two through eight (page 6 – 8)

- Underline the Standard Title
- Bracket the Narrative Description

## Components: High School Standards for Mathematical Content

**Conceptual Categories:** provide a coherent view of high school mathematics

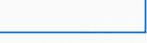
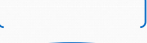



**Introduction:** provide important contextual information and calls out and describes critical areas of focus

**Domains:** larger groups of related standards

**Cluster Headings:** overview and quick summary of the mathematical ideas within a domain

**Content Standards:** define what students should understand and be able to do

## Standards for Mathematical Content (High School) Key for Identifying the Components

-  Conceptual Category
-  Introduction
-  Domain
-  Cluster Heading
-  Content Standard

# Mathematics Standards for High School

On page 57:

- Box the Conceptual Categories
- Highlight the second sentence in the first paragraph (description of the plus symbol (+))
- Highlight the first sentence of the last paragraph (description of the star symbol (\*))



The screenshot shows the title page of the Mathematics Standards for High School document. Annotations include:

- A blue box labeled "(+) Plus Indicates content needed for advanced courses" pointing to the second sentence of the first paragraph.
- A blue box labeled "Box: Conceptual Categories" pointing to a box containing the categories: Algebra, Functions, Modeling, Geometry, and Statistics and Probability.
- A blue box labeled "(\*) Star Indicates content that should be taught through the lens of modeling" pointing to the first sentence of the last paragraph.



# Conceptual Categories

- There are six conceptual categories
  - Number and Quantity
  - Algebra
  - Functions
  - Modeling\*
  - Geometry
  - Statistics and Probability
- Modeling\* is best interpreted not as a collection of isolated topics but in relation to other standards.
  - The star symbol (\*) appears throughout the high school standards to indicate making mathematical models



The screenshot shows the 'Functions' section of the Mathematics Standards for High School. Annotations include:

- A blue box labeled "Box: Conceptual Category" pointing to the 'Functions' header.
- A blue box labeled "Bracket: Introduction" pointing to the first paragraph of the Functions section.



## Standards for Mathematical Content (High School) Key for Identifying the Components

Select a different Conceptual Category

Number and Quantity: Pg. 58

Algebra: Pg. 62

Modeling: Pg. 72

Geometry: Pg. 74

Statistics and Probability: Pg. 79

- Box the Conceptual Category
- Bracket the Introduction



## Modeling Standards in Algebra

- Identify all the standards with a star symbol within the Conceptual Category of Algebra



## Modeling Standards in Algebra

Did you find all of the modeling standards in the conceptual category of Algebra?

At your table, discuss:

- Where did you find these modeling standards?  
(. . . in the conceptual category level, the domain level, the cluster level, or at the standard level)
- What are the implications for planning for instruction?



**Function Overview**

**Identifying Functions**

- Understand the context of a function and use **function notation**.
- Interpret **mathematical models** and **relationships**.
- **Identify** **functions** using different **representations**.

**Identifying Domains**

- **Identify** **functions** using different **representations**.
- **Identify** **functions** using different **representations**.

**Linear, Exponential, and Exponential Models**

- **Identify** **all modeling standards** and **associated cluster headings**.
- **Identify** **all modeling standards** and **associated cluster headings**.

**Identifying Functions**

- **Identify** **all modeling standards** and **associated cluster headings**.
- **Identify** **all modeling standards** and **associated cluster headings**.

**Mathematical Practices**

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.





Circle: Domain

Underline: Conceptual Categories

Check mark: Standard

Note the code: F-IF Function (Conceptual Category) IF (Domain)

\* Indicates standards that should be approached through a modeling perspective

+ Indicates standards necessary for advanced courses

## How to read a Common Core High School Mathematics Standard

Letter & Number indicating the Standard within the Cluster

Conceptual Category → A-SSE.1b

ALGEBRA  
Seeing Structure in Expressions

Domain

A-SSE

**Interpret the structure of expressions**

- Interpret expressions that represent a quantity in terms of its context.\*
  - Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret  $P(1+r)^n$  as the product of  $P$  and a factor not depending on  $P$ .*

## How to read a Common Core High School PATHWAYS Mathematics Standard

Indicates: Content needed for advanced courses

Numbers indicating the Standards within the Cluster Heading

(+)N.CN.4

**Number & Quantity**  
The Complex Number System

**Represent complex numbers and their operations on the complex plane.**

4. (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.

5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,  $(-1 + \sqrt{3}i)^2 = 8$  because  $(-1 + \sqrt{3}i)$  has modulus 2 and argument  $120^\circ$ .*

6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

## + Additional Mathematics

- Additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics are indicated by a plus symbol (+).
- All standards without a (+) symbol should be in the common curriculum for all college and career ready students.
- Standards with a (+) symbol may also appear in courses intended for all students.

## Standards for Advanced Courses in the Conceptual Category of Algebra

- Identify all the standards with a plus symbol within the Conceptual Category of Algebra

## Standards for Advanced Courses in Algebra

Did you find all of the standards for advanced mathematics in the conceptual category of Algebra?

At your table, discuss:

- Where did you find these advanced standards?
- What are the implications for planning for instruction?

## RESOURCES

### Common Core State Standards

<http://www.corestandards.org/the-standards>

### Hawaii Standards Toolkit

[http://wetserver.net/hcpsv3\\_staging/cc/common-core.jsp](http://wetserver.net/hcpsv3_staging/cc/common-core.jsp)

### Unpacked Math Standards (Arizona):

<http://www.azed.gov/standards-practices/mathematics-standards/>

### HIDOE Edmodo online community for High School:

[www.edmodo.com](http://www.edmodo.com)

(join "HIDOE High School Math". Use code: mcbkv6)

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## PDE<sup>3</sup> Survey Reminder: <https://pde3.k12.hi.us>

Survey

**Use all currently missing - Rate to the Top (RTTT)**

Questions: 1 Rate your satisfaction level on this protocol.

Rate your satisfaction level on this protocol.

Not at all satisfied

Slightly satisfied

Moderately satisfied

Very satisfied

Extremely satisfied

Questions: 2 Rate the level of understanding learned or gained from this protocol.

Rate the level of understanding learned or gained from this protocol.

Not at all

A little

Somewhat

Quite a bit

A lot

Questions: 3 Rate the level of impact this protocol will have on your practice.

Rate the level of impact this protocol will have on your practice. (not at all, A little, Somewhat, Quite a bit, A lot)

Not at all

A little

Somewhat

Quite a bit

A lot

Questions: 4 What other resources would be helpful?

What other resources would be helpful?

Feedback

Questions: 5 Any other questions or comments about the material in this protocol.

Any other questions or comments about the material in this protocol.

Thank you for your feedback!