

Online Appendix:

The Anatomy of a High-Return Question: Text, Skills, and the Economics of Achievement Measurement

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1 Embedding format

This section documents the text formats that feed the embedding step. Two parallel pipelines are referenced in the paper: a *main* pipeline that embeds Qwen3-CoT-extracted skill descriptions, and a *robustness* pipeline that embeds o3-extracted skill descriptions (used in the appendix robustness check). We present the templates used by each below; the LLM prompts that produce the inputs and skill descriptions are reproduced verbatim in [section 2](#).

1.1 Main pipeline (Qwen3-CoT)

For each digitized test item, we assemble a compact plain-text representation of the question that is passed to the Qwen3-8B model for skill extraction. Math and reading items use slightly different templates because reading items include a passage. The math template is shown in [Listing 1](#); the reading template in [Listing 2](#).

Listing 1: Item template – math (input to Qwen3 skill extraction)

```
Question Stem: {q_stem}; Image: {q_image_description}
Answer Images: {a_image_yn}
Answer Options:
1. {a1}
2. {a2}
3. {a3}
4. {a4}
5. {a5}
```

Listing 2: Item template – reading (input to Qwen3 skill extraction)

```
Passage Stem: {pass_stem}
Passage Image Description: {passage_image}
Question Stem: {q_stem}
Answer Options:
1. {a1}
2. {a2}
3. {a3}
4. {a4}
5. {a5}
```

The Qwen3 call returns three structured fields (required skills, reasoning steps, prerequisite knowledge); these are concatenated into a plain-text skill description ([Listing 3](#)). The skill descrip-

tion is what is actually embedded by Qwen3-Embedding-8B (with the instruction prefix described in Section 8.2 of the main paper); the raw item text is not embedded directly in the main pipeline.

Listing 3: Skill-text format (embedded representation, main pipeline)

```
Required Skills:
- {skill_1}
- {skill_2}
- ...
Reasoning Steps:
- {step_1}
- {step_2}
- ...
Prerequisite Knowledge:
- {prereq_1}
- {prereq_2}
- ...
```

1.2 Robustness pipeline (o3-extracted skills)

The robustness check reported in Section 8.7 of the main paper reuses the OCR call to OpenAI’s o3 (the same call that transcribes the booklet image, see [subsection 2.2](#)) to produce, alongside the transcribed text, three skill-related fields: `required_skills`, `complexity_steps_list`, and `potential_challenges`. These dimensions are conceptually parallel to the Qwen3-CoT outputs but use different field names internally. The o3 path then embeds two texts per item: the formatted item text ([Listing 4](#)) and the formatted skill description ([Listing 5](#)).

Listing 4: Item template (robustness o3 pipeline)

```
The following is a question in a standardized school test for grade {grade} and subject {section}.
The question has a stem and answer options, and includes image descriptions for either the
question stem or answer options if applicable.
Sometimes the question includes a passage that provides additional information required to answer
the question.
The question also includes metadata on the required skills, complexity steps, and potential
challenges.
Passage Stem: {pass_stem}
Passage Image Description: {passage_image}
Question Stem: {q_stem}
Question Image Description: {q_image_description}
Answer Images: {a_image_yn}
Answer Options:
1. {a1}
2. {a2}
3. {a3}
4. {a4}
5. {a5}
```

Listing 5: Skills-text format (robustness o3 pipeline)

```
Required Skills:
- {skill_1}
- {skill_2}
- {skill_3}
Complexity Steps:
- {step_1}
```

- {step_2}
- {step_3}
- {step_4}

Potential Challenges:

- {challenge_1}
 - {challenge_2}
 - {challenge_3}
-

2 Coding Protocol - Skill Extraction

For each digitized item, the main pipeline calls Qwen3-8B (chain-of-thought enabled) once to produce the structured skill description that is then embedded. The robustness pipeline reuses the OCR call to OpenAI’s o3-2025-04-16 (the same call that transcribes the booklet image) to produce a parallel set of skill fields in a single shot. Both prompts are reproduced verbatim below.

2.1 Qwen3-8B skill extraction (main pipeline)

The system message and user prompt are passed to Qwen3-8B with chain-of-thought (“thinking”) mode enabled. The {question_text} placeholder is filled in with the math or reading item template from [Listing 1](#) / [Listing 2](#).

Listing 6: Qwen3-8B system message

You are a helpful assistant that analyzes test questions. You respond only with valid JSON.

Listing 7: Qwen3-8B user prompt for skill extraction

You are analyzing a standardized test question. Identify the specific skills and knowledge a student needs to answer it correctly.

Question:
{question_text}

Analyze this question and provide:

1. **REQUIRED_SKILLS:** List every specific skill or competency a student must have. Each skill should be a concrete, teachable competency (e.g., "multiply two-digit numbers", "identify the main idea of a paragraph"), not a broad category (e.g., "math skills") and not a micro-procedure (e.g., "recognize digits"). Simple questions may require only 1-2 skills; complex multi-step questions may require 5-7.
2. **REASONING_STEPS:** List the step-by-step cognitive process a student would follow to arrive at the correct answer.
3. **PREREQUISITE_KNOWLEDGE:** List the foundational skills the question assumes a student already has (e.g., "read and understand English text", "basic addition facts to 20"). Include only genuine prerequisites -- some questions may have none beyond basic literacy.

Respond with a JSON object ONLY:

```
{"required_skills": [...], "reasoning_steps": [...], "prerequisite_knowledge": [...]}
```

2.2 o3 OCR + skill extraction (robustness pipeline)

The single o3 call processes a booklet image and returns both the transcribed item text and the three skill-related fields used by the robustness pipeline. We include the prompt verbatim, including its example output, exactly as it is passed to the API.

Listing 8: o3 OCR + skill-extraction prompt

Your goal is to process images of school test questions and extract structured information. You will be provided with an image of a school test question and you will output information about the questions and passages present.

Analyze the image and extract the following information to create a JSON object with the specified structure. Below are detailed explanations for each field:

- question_num: Integer. The question number in the image.
- q_stem: String. The text or stem of the question. Include all text after the question number and before the answer alternatives. If the question includes text within an image, transcribe it accurately.
- q_image_yn: Boolean. Indicates whether there is an image embedded within the question stem.
 - True: If the question stem contains an image.
 - False: If the question stem is purely text.
- q_image_description: String. Only provide a description if q_image_yn is True.
 - If q_image_yn is True: Provide a detailed description of the image within the question stem, including all relevant visual elements that are part of the question's context.
 - If q_image_yn is False: Leave this field as an empty string ("").
- a_image_yn: Boolean. Indicates whether the answer options include images. Sometimes answer options are labeled with letters and sometimes with oval shapes.
 - True: If the answer options contain images.
 - False: If the answer options are purely textual.
- a_image_description: List of Strings. Descriptions of each image associated with the answer options. Each entry in the list should correspond to an answer option, detailing the visual elements present.
- a_options_text: List of Strings. The textual content of each answer option. If answer options include images, this field can be empty or contain brief labels if applicable.
- gpt_answer: Integer. The index of the answer option that is the correct answer based on your analysis. The index should correspond to the position in the a_options_text or a_image_description lists (starting from 1).
- required_skills: List of Strings. The skills or knowledge areas necessary to solve the question.
- complexity_steps_list: List of Strings. A step-by-step breakdown of the reasoning process used to arrive at the correct answer.
- potential_challenges: List of Strings. Potential difficulties or common mistakes that someone might encounter when answering this question.
- gpt_answer_mistake: Integer. The index of an answer option that is a common mistake or misconception (similar to gpt_answer indexing).

Important Instructions:

1. JSON Format: Provide the JSON object only without any additional text or explanations.
2. Consistency: Ensure that the indices for gpt_answer and gpt_answer_mistake correctly correspond to the positions of the answer options in their respective lists.
3. Accuracy: Be precise in transcribing text and describing images to maintain data integrity.
4. Completeness: Ensure all fields are present and populated appropriately based on the content of the image.

Example JSON Output:

```
{
  "question_num": 1,
  "q_stem": "A 25-foot ladder and a 10-foot ladder are leaning against a building at the same angle, and the base of the 25-foot ladder is 7.5 feet from the building. How far is the base of the 10-foot ladder from the building?",
  "q_image_yn": true,
  "q_image_description": "Two ladders leaning against a building at the same angle. The first ladder is 25 feet long with its base 7.5 feet from the building. The second ladder is 10 feet long, and the distance of its base from the building needs to be determined.",
  "a_image_yn": false,
  "a_image_description": [],
  "a_options_text": ["F 3 ft", "G 18 3/4 ft", "H 30 ft", "J 33 1/3 ft"],
  "gpt_answer": 1,
  "required_skills": ["Understanding similar triangles", "Basic trigonometry", "Proportional reasoning"],
  "complexity_steps_list": ["Recognize that the problem involves similar triangles.", "Set up a proportion based on the similarity of the triangles formed by the ladders and the building.", "Solve for the unknown distance using the proportion."],
  "potential_challenges": ["Setting up the correct proportion based on the lengths and distances.", "Confusion between using direct multiplication or addition versus using a proportion."],
  "gpt_answer_mistake": 2
}
```

3 Common Core State Standards

3.1 List

Table 1: CCSS Codes and Short Description

ID	Content Type	Category	Description
CCSS.ELA-LITERACY.RF.3.3	ELA	Reading: Foundational Skills	Apply phonics and word analysis
CCSS.ELA-LITERACY.RF.3.3.a	ELA	Reading: Foundational Skills	Identify common prefixes and suffixes
CCSS.ELA-LITERACY.RF.3.3.b	ELA	Reading: Foundational Skills	Decode words with Latin suffixes
CCSS.ELA-LITERACY.RF.3.3.c	ELA	Reading: Foundational Skills	Decode multisyllable words
CCSS.ELA-LITERACY.RF.3.3.d	ELA	Reading: Foundational Skills	Read irregularly spelled words
CCSS.ELA-LITERACY.RF.3.4	ELA	Reading: Foundational Skills	Read accurately and fluently
CCSS.ELA-LITERACY.RF.3.4.a	ELA	Reading: Foundational Skills	Read with purpose and understanding
CCSS.ELA-LITERACY.RF.3.4.b	ELA	Reading: Foundational Skills	Read aloud with accuracy and expression
CCSS.ELA-LITERACY.RF.3.4.c	ELA	Reading: Foundational Skills	Use context to self-correct while reading
CCSS.ELA-LITERACY.RF.4.3	ELA	Reading: Foundational Skills	Apply phonics and word analysis
CCSS.ELA-LITERACY.RF.4.3.a	ELA	Reading: Foundational Skills	Use phonics and morphology to decode words
CCSS.ELA-LITERACY.RF.4.4	ELA	Reading: Foundational Skills	Read accurately and fluently
CCSS.ELA-LITERACY.RF.4.4.a	ELA	Reading: Foundational Skills	Read with purpose and understanding
CCSS.ELA-LITERACY.RF.4.4.b	ELA	Reading: Foundational Skills	Read aloud with accuracy and expression
CCSS.ELA-LITERACY.RF.4.4.c	ELA	Reading: Foundational Skills	Use context to self-correct while reading
CCSS.ELA-LITERACY.RF.5.3	ELA	Reading: Foundational Skills	Apply phonics and word analysis
CCSS.ELA-LITERACY.RF.5.3.a	ELA	Reading: Foundational Skills	Use phonics and morphology to decode words
CCSS.ELA-LITERACY.RF.5.4	ELA	Reading: Foundational Skills	Read accurately and fluently
CCSS.ELA-LITERACY.RF.5.4.a	ELA	Reading: Foundational Skills	Read with purpose and understanding
CCSS.ELA-LITERACY.RF.5.4.b	ELA	Reading: Foundational Skills	Read aloud with accuracy and expression
CCSS.ELA-LITERACY.RF.5.4.c	ELA	Reading: Foundational Skills	Use context to self-correct while reading
CCSS.ELA-LITERACY.RI.11-12.1	ELA	Reading: Informational Text	Cite evidence; note textual uncertainty
CCSS.ELA-LITERACY.RI.11-12.10	ELA	Reading: Informational Text	Read complex literary nonfiction (11<U+2013>12 band)
CCSS.ELA-LITERACY.RI.11-12.2	ELA	Reading: Informational Text	Analyze multiple central ideas and interactions
CCSS.ELA-LITERACY.RI.11-12.3	ELA	Reading: Informational Text	Analyze interactions in complex ideas/events
CCSS.ELA-LITERACY.RI.11-12.4	ELA	Reading: Informational Text	Track and analyze refinement of key terms
CCSS.ELA-LITERACY.RI.11-12.5	ELA	Reading: Informational Text	Evaluate effectiveness of argument structure
CCSS.ELA-LITERACY.RI.11-12.6	ELA	Reading: Informational Text	Analyze how rhetoric and style create impact
CCSS.ELA-LITERACY.RI.11-12.7	ELA	Reading: Informational Text	Integrate and evaluate sources across media
CCSS.ELA-LITERACY.RI.11-12.8	ELA	Reading: Informational Text	Evaluate reasoning in seminal U.S. texts
CCSS.ELA-LITERACY.RI.11-12.9	ELA	Reading: Informational Text	Analyze themes and rhetoric in foundational U.S. docs
CCSS.ELA-LITERACY.RI.3.1	ELA	Reading: Informational Text	Ask and answer using text evidence

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Table 1 – continued from previous page

ID	Content Type	Category	Description
CCSS.ELA-LITERACY.RI.3.10	ELA	Reading: Informational Text	Read complex informational texts independently
CCSS.ELA-LITERACY.RI.3.2	ELA	Reading: Informational Text	Identify main idea and supporting details
CCSS.ELA-LITERACY.RI.3.3	ELA	Reading: Informational Text	Explain relationships: time, sequence, cause
CCSS.ELA-LITERACY.RI.3.4	ELA	Reading: Informational Text	Determine word meanings in context
CCSS.ELA-LITERACY.RI.3.5	ELA	Reading: Informational Text	Use text features to locate information
CCSS.ELA-LITERACY.RI.3.6	ELA	Reading: Informational Text	Distinguish own and author point of view
CCSS.ELA-LITERACY.RI.3.7	ELA	Reading: Informational Text	Use visuals and text to understand events
CCSS.ELA-LITERACY.RI.3.8	ELA	Reading: Informational Text	Describe links among sentences and paragraphs
CCSS.ELA-LITERACY.RI.3.9	ELA	Reading: Informational Text	Compare two texts on key points and details
CCSS.ELA-LITERACY.RI.4.1	ELA	Reading: Informational Text	Cite details and examples; draw inferences
CCSS.ELA-LITERACY.RI.4.10	ELA	Reading: Informational Text	Read complex informational texts proficiently
CCSS.ELA-LITERACY.RI.4.2	ELA	Reading: Informational Text	Identify main idea; summarize the text
CCSS.ELA-LITERACY.RI.4.3	ELA	Reading: Informational Text	Explain events or ideas using text details
CCSS.ELA-LITERACY.RI.4.4	ELA	Reading: Informational Text	Determine word meanings in context
CCSS.ELA-LITERACY.RI.4.5	ELA	Reading: Informational Text	Describe text structure and organization
CCSS.ELA-LITERACY.RI.4.6	ELA	Reading: Informational Text	Compare firsthand and secondhand accounts
CCSS.ELA-LITERACY.RI.4.7	ELA	Reading: Informational Text	Interpret information across media and formats
CCSS.ELA-LITERACY.RI.4.8	ELA	Reading: Informational Text	Explain how reasons and evidence support claims
CCSS.ELA-LITERACY.RI.4.9	ELA	Reading: Informational Text	Integrate information from multiple texts
CCSS.ELA-LITERACY.RI.5.1	ELA	Reading: Informational Text	Quote accurately; infer from text
CCSS.ELA-LITERACY.RI.5.10	ELA	Reading: Informational Text	Read complex informational texts independently
CCSS.ELA-LITERACY.RI.5.2	ELA	Reading: Informational Text	Identify multiple main ideas; summarize
CCSS.ELA-LITERACY.RI.5.3	ELA	Reading: Informational Text	Explain relationships among individuals/ideas
CCSS.ELA-LITERACY.RI.5.4	ELA	Reading: Informational Text	Determine word meanings in context
CCSS.ELA-LITERACY.RI.5.5	ELA	Reading: Informational Text	Compare structures across texts
CCSS.ELA-LITERACY.RI.5.6	ELA	Reading: Informational Text	Analyze multiple accounts; compare POV
CCSS.ELA-LITERACY.RI.5.7	ELA	Reading: Informational Text	Use multiple sources to answer efficiently
CCSS.ELA-LITERACY.RI.5.8	ELA	Reading: Informational Text	Link reasons and evidence to points
CCSS.ELA-LITERACY.RI.5.9	ELA	Reading: Informational Text	Integrate information from several texts
CCSS.ELA-LITERACY.RI.6.1	ELA	Reading: Informational Text	Cite textual evidence for analysis
CCSS.ELA-LITERACY.RI.6.10	ELA	Reading: Informational Text	Read complex literary nonfiction
CCSS.ELA-LITERACY.RI.6.2	ELA	Reading: Informational Text	Determine central idea; summarize objectively
CCSS.ELA-LITERACY.RI.6.3	ELA	Reading: Informational Text	Analyze how key ideas/events are developed
CCSS.ELA-LITERACY.RI.6.4	ELA	Reading: Informational Text	Determine word meanings, including technical
CCSS.ELA-LITERACY.RI.6.5	ELA	Reading: Informational Text	Analyze how text parts build ideas
CCSS.ELA-LITERACY.RI.6.6	ELA	Reading: Informational Text	Identify author's POV or purpose
CCSS.ELA-LITERACY.RI.6.7	ELA	Reading: Informational Text	Integrate information across media formats
CCSS.ELA-LITERACY.RI.6.8	ELA	Reading: Informational Text	Evaluate claims and supporting evidence

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Table 1 – continued from previous page

ID	Content Type	Category	Description
CCSS.ELA-LITERACY.RI.6.9	ELA	Reading: Informational Text	Compare authors' presentations of events
CCSS.ELA-LITERACY.RI.7.1	ELA	Reading: Informational Text	Cite multiple pieces of text evidence
CCSS.ELA-LITERACY.RI.7.10	ELA	Reading: Informational Text	Read complex literary nonfiction
CCSS.ELA-LITERACY.RI.7.2	ELA	Reading: Informational Text	Identify multiple central ideas; summarize
CCSS.ELA-LITERACY.RI.7.3	ELA	Reading: Informational Text	Analyze interactions among individuals/events/ideas
CCSS.ELA-LITERACY.RI.7.4	ELA	Reading: Informational Text	Analyze word meanings and tone
CCSS.ELA-LITERACY.RI.7.5	ELA	Reading: Informational Text	Analyze author's organizational structure
CCSS.ELA-LITERACY.RI.7.6	ELA	Reading: Informational Text	Analyze author's POV vs others
CCSS.ELA-LITERACY.RI.7.7	ELA	Reading: Informational Text	Compare text to multimedia version
CCSS.ELA-LITERACY.RI.7.8	ELA	Reading: Informational Text	Assess reasoning and evidence sufficiency
CCSS.ELA-LITERACY.RI.7.9	ELA	Reading: Informational Text	Analyze how authors frame information
CCSS.ELA-LITERACY.RI.8.1	ELA	Reading: Informational Text	Cite strongest textual evidence
CCSS.ELA-LITERACY.RI.8.10	ELA	Reading: Informational Text	Read complex literary nonfiction independently
CCSS.ELA-LITERACY.RI.8.2	ELA	Reading: Informational Text	Analyze central idea development; summarize
CCSS.ELA-LITERACY.RI.8.3	ELA	Reading: Informational Text	Analyze connections and distinctions in text
CCSS.ELA-LITERACY.RI.8.4	ELA	Reading: Informational Text	Analyze word meaning and tone; allusions
CCSS.ELA-LITERACY.RI.8.5	ELA	Reading: Informational Text	Analyze paragraph structure and sentence roles
CCSS.ELA-LITERACY.RI.8.6	ELA	Reading: Informational Text	Analyze author POV; address conflicting evidence
CCSS.ELA-LITERACY.RI.8.7	ELA	Reading: Informational Text	Evaluate media choices for presenting ideas
CCSS.ELA-LITERACY.RI.8.8	ELA	Reading: Informational Text	Evaluate argument, evidence, and relevance
CCSS.ELA-LITERACY.RI.8.9	ELA	Reading: Informational Text	Identify conflicts across texts
CCSS.ELA-LITERACY.RI.9-10.1	ELA	Reading: Informational Text	Cite strong textual evidence for analysis
CCSS.ELA-LITERACY.RI.9-10.10	ELA	Reading: Informational Text	Read complex literary nonfiction (9<U+2013>10 band)
CCSS.ELA-LITERACY.RI.9-10.2	ELA	Reading: Informational Text	Analyze central idea refinement; summarize
CCSS.ELA-LITERACY.RI.9-10.3	ELA	Reading: Informational Text	Analyze how author develops analysis and sequence
CCSS.ELA-LITERACY.RI.9-10.4	ELA	Reading: Informational Text	Analyze cumulative impact of word choice
CCSS.ELA-LITERACY.RI.9-10.5	ELA	Reading: Informational Text	Analyze how claims are developed and refined
CCSS.ELA-LITERACY.RI.9-10.6	ELA	Reading: Informational Text	Analyze rhetoric advancing author purpose
CCSS.ELA-LITERACY.RI.9-10.7	ELA	Reading: Informational Text	Compare accounts across media for emphasis
CCSS.ELA-LITERACY.RI.9-10.8	ELA	Reading: Informational Text	Evaluate argument validity and fallacies
CCSS.ELA-LITERACY.RI.9-10.9	ELA	Reading: Informational Text	Analyze themes in seminal U.S. documents
CCSS.ELA-LITERACY.RL.11-12.1	ELA	Reading: Literature	Cite evidence; note textual uncertainty
CCSS.ELA-LITERACY.RL.11-12.10	ELA	Reading: Literature	Read complex literature (11-12 band)
CCSS.ELA-LITERACY.RL.11-12.2	ELA	Reading: Literature	Analyze multiple themes/ideas and interactions
CCSS.ELA-LITERACY.RL.11-12.3	ELA	Reading: Literature	Analyze impact of author<U+2019>s development choices
CCSS.ELA-LITERACY.RL.11-12.4	ELA	Reading: Literature	Analyze word choice effects on meaning and tone
CCSS.ELA-LITERACY.RL.11-12.5	ELA	Reading: Literature	Analyze structural choices and aesthetic impact

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Table 1 – continued from previous page

ID	Content Type	Category	Description
CCSS.ELA-LITERACY.RL.11-12.6	ELA	Reading: Literature	Analyze implied meaning (irony/satire)
CCSS.ELA-LITERACY.RL.11-12.7	ELA	Reading: Literature	Evaluate interpretations across productions
CCSS.ELA-LITERACY.RL.11-12.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.11-12.9	ELA	Reading: Literature	Compare themes across foundational American works
CCSS.ELA-LITERACY.RL.3.1	ELA	Reading: Literature	Ask and answer using text evidence
CCSS.ELA-LITERACY.RL.3.10	ELA	Reading: Literature	Read complex literature independently
CCSS.ELA-LITERACY.RL.3.2	ELA	Reading: Literature	Recount stories; identify message or moral
CCSS.ELA-LITERACY.RL.3.3	ELA	Reading: Literature	Describe characters and how actions drive plot
CCSS.ELA-LITERACY.RL.3.4	ELA	Reading: Literature	Interpret words: literal vs figurative
CCSS.ELA-LITERACY.RL.3.5	ELA	Reading: Literature	Refer to parts and how they build the whole
CCSS.ELA-LITERACY.RL.3.6	ELA	Reading: Literature	Distinguish own and narrator point of view
CCSS.ELA-LITERACY.RL.3.7	ELA	Reading: Literature	Explain how illustrations shape meaning or mood
CCSS.ELA-LITERACY.RL.3.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.3.9	ELA	Reading: Literature	Compare themes, settings, plots by same author
CCSS.ELA-LITERACY.RL.4.1	ELA	Reading: Literature	Cite details and examples; draw inferences
CCSS.ELA-LITERACY.RL.4.10	ELA	Reading: Literature	Read complex literature proficiently
CCSS.ELA-LITERACY.RL.4.2	ELA	Reading: Literature	Determine theme and summarize
CCSS.ELA-LITERACY.RL.4.3	ELA	Reading: Literature	Analyze character, setting, or event with details
CCSS.ELA-LITERACY.RL.4.4	ELA	Reading: Literature	Interpret words, including mythological allusions
CCSS.ELA-LITERACY.RL.4.5	ELA	Reading: Literature	Compare genres; reference structural elements
CCSS.ELA-LITERACY.RL.4.6	ELA	Reading: Literature	Compare narrative point of view
CCSS.ELA-LITERACY.RL.4.7	ELA	Reading: Literature	Connect written text to visual or oral version
CCSS.ELA-LITERACY.RL.4.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.4.9	ELA	Reading: Literature	Compare themes and patterns across cultures
CCSS.ELA-LITERACY.RL.5.1	ELA	Reading: Literature	Quote accurately; infer from text
CCSS.ELA-LITERACY.RL.5.10	ELA	Reading: Literature	Read complex literature independently
CCSS.ELA-LITERACY.RL.5.2	ELA	Reading: Literature	Determine theme; summarize with details
CCSS.ELA-LITERACY.RL.5.3	ELA	Reading: Literature	Compare characters, settings, and events
CCSS.ELA-LITERACY.RL.5.4	ELA	Reading: Literature	Interpret figurative language
CCSS.ELA-LITERACY.RL.5.5	ELA	Reading: Literature	Explain how parts create overall structure
CCSS.ELA-LITERACY.RL.5.6	ELA	Reading: Literature	Explain how narrator POV shapes description
CCSS.ELA-LITERACY.RL.5.7	ELA	Reading: Literature	Analyze effects of visual/multimedia elements
CCSS.ELA-LITERACY.RL.5.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.5.9	ELA	Reading: Literature	Compare stories within the same genre
CCSS.ELA-LITERACY.RL.6.1	ELA	Reading: Literature	Cite textual evidence for analysis
CCSS.ELA-LITERACY.RL.6.10	ELA	Reading: Literature	Read complex literature (6-8 band)
CCSS.ELA-LITERACY.RL.6.2	ELA	Reading: Literature	Determine theme/central idea; summarize objectively
CCSS.ELA-LITERACY.RL.6.3	ELA	Reading: Literature	Describe plot progression and character change

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Table 1 – continued from previous page

ID	Content Type	Category	Description
CCSS.ELA-LITERACY.RL.6.4	ELA	Reading: Literature	Analyze word choice impact on meaning/tone
CCSS.ELA-LITERACY.RL.6.5	ELA	Reading: Literature	Analyze how parts develop theme, setting, plot
CCSS.ELA-LITERACY.RL.6.6	ELA	Reading: Literature	Explain development of narrator POV
CCSS.ELA-LITERACY.RL.6.7	ELA	Reading: Literature	Compare reading to listening/viewing
CCSS.ELA-LITERACY.RL.6.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.6.9	ELA	Reading: Literature	Compare texts across forms or genres
CCSS.ELA-LITERACY.RL.7.1	ELA	Reading: Literature	Cite multiple pieces of text evidence
CCSS.ELA-LITERACY.RL.7.10	ELA	Reading: Literature	Read complex literature (6-8 band)
CCSS.ELA-LITERACY.RL.7.2	ELA	Reading: Literature	Analyze theme/central idea development
CCSS.ELA-LITERACY.RL.7.3	ELA	Reading: Literature	Analyze interaction of story elements
CCSS.ELA-LITERACY.RL.7.4	ELA	Reading: Literature	Analyze sound devices' effect
CCSS.ELA-LITERACY.RL.7.5	ELA	Reading: Literature	Analyze form/structure and meaning
CCSS.ELA-LITERACY.RL.7.6	ELA	Reading: Literature	Analyze contrasting points of view
CCSS.ELA-LITERACY.RL.7.7	ELA	Reading: Literature	Compare written to multimedia; analyze techniques
CCSS.ELA-LITERACY.RL.7.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.7.9	ELA	Reading: Literature	Compare fiction and historical accounts
CCSS.ELA-LITERACY.RL.8.1	ELA	Reading: Literature	Cite strongest textual evidence
CCSS.ELA-LITERACY.RL.8.10	ELA	Reading: Literature	Read complex literature independently
CCSS.ELA-LITERACY.RL.8.2	ELA	Reading: Literature	Analyze theme development in narrative; summarize
CCSS.ELA-LITERACY.RL.8.3	ELA	Reading: Literature	Analyze dialogue/incidents that advance plot
CCSS.ELA-LITERACY.RL.8.4	ELA	Reading: Literature	Analyze word meaning and tone; allusions
CCSS.ELA-LITERACY.RL.8.5	ELA	Reading: Literature	Compare text structures and their effects
CCSS.ELA-LITERACY.RL.8.6	ELA	Reading: Literature	Analyze POV differences and dramatic irony effects
CCSS.ELA-LITERACY.RL.8.7	ELA	Reading: Literature	Evaluate adaptation fidelity and choices
CCSS.ELA-LITERACY.RL.8.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.8.9	ELA	Reading: Literature	Analyze modern fiction's use of mythic sources
CCSS.ELA-LITERACY.RL.9-10.1	ELA	Reading: Literature	Cite strong textual evidence for analysis
CCSS.ELA-LITERACY.RL.9-10.10	ELA	Reading: Literature	Read complex literature (9-10 band)
CCSS.ELA-LITERACY.RL.9-10.2	ELA	Reading: Literature	Analyze theme development; summarize objectively
CCSS.ELA-LITERACY.RL.9-10.3	ELA	Reading: Literature	Analyze complex character development
CCSS.ELA-LITERACY.RL.9-10.4	ELA	Reading: Literature	Analyze cumulative word choice and tone
CCSS.ELA-LITERACY.RL.9-10.5	ELA	Reading: Literature	Analyze structure and pacing effects
CCSS.ELA-LITERACY.RL.9-10.6	ELA	Reading: Literature	Analyze cultural perspective in world literature
CCSS.ELA-LITERACY.RL.9-10.7	ELA	Reading: Literature	Compare artistic representations across media
CCSS.ELA-LITERACY.RL.9-10.8	ELA	Reading: Literature	Not applicable
CCSS.ELA-LITERACY.RL.9-10.9	ELA	Reading: Literature	Analyze transformation of source material
CCSS.MATH.CONTENT.3.G.A.1	Math	Geometry	Classify quadrilaterals by attributes

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.3.G.A.2	Math	Geometry	Partition shapes; express area as unit fraction
CCSS.MATH.CONTENT.3.MD.A.1	Math	Measurement & Data	Tell time; solve time-interval problems
CCSS.MATH.CONTENT.3.MD.A.2	Math	Measurement & Data	Measure mass/volume; solve one-step problems
CCSS.MATH.CONTENT.3.MD.B.3	Math	Measurement & Data	Make scaled graphs; solve more/less problems
CCSS.MATH.CONTENT.3.MD.B.4	Math	Measurement & Data	Measure lengths; make a line plot
CCSS.MATH.CONTENT.3.MD.C.5	Math	Measurement & Data	Recognize area and basic measurement concepts
CCSS.MATH.CONTENT.3.MD.C.5.a	Math	Measurement & Data	Use unit squares to measure area
CCSS.MATH.CONTENT.3.MD.C.5.b	Math	Measurement & Data	Define area by covering with unit squares
CCSS.MATH.CONTENT.3.MD.C.6	Math	Measurement & Data	Measure area by counting unit squares
CCSS.MATH.CONTENT.3.MD.C.7	Math	Measurement & Data	Relate area to multiplication and addition
CCSS.MATH.CONTENT.3.MD.C.7.a	Math	Measurement & Data	Find rectangle area by tiling/multiplying
CCSS.MATH.CONTENT.3.MD.C.7.b	Math	Measurement & Data	Multiply side lengths to find rectangle area
CCSS.MATH.CONTENT.3.MD.C.7.c	Math	Measurement & Data	Use area models for distributive property
CCSS.MATH.CONTENT.3.MD.C.7.d	Math	Measurement & Data	Decompose figures; add areas
CCSS.MATH.CONTENT.3.MD.D.8	Math	Measurement & Data	Solve perimeter problems for polygons
CCSS.MATH.CONTENT.3.NBT.A.1	Math	Number & Operations in Base Ten	Round whole numbers to nearest 10/100
CCSS.MATH.CONTENT.3.NBT.A.2	Math	Number & Operations in Base Ten	Add and subtract within 1000 fluently
CCSS.MATH.CONTENT.3.NBT.A.3	Math	Number & Operations in Base Ten	Multiply 1-digit by multiples of 10
CCSS.MATH.CONTENT.3.NF.A.1	Math	Numbers & Operations - Fractions	Define fractions as parts of a whole
CCSS.MATH.CONTENT.3.NF.A.2	Math	Numbers & Operations - Fractions	Represent fractions on a number line
CCSS.MATH.CONTENT.3.NF.A.2.a	Math	Numbers & Operations - Fractions	Locate $1/b$ on a number line
CCSS.MATH.CONTENT.3.NF.A.2.b	Math	Numbers & Operations - Fractions	Locate a/b on a number line
CCSS.MATH.CONTENT.3.NF.A.3	Math	Numbers & Operations - Fractions	Explain and compare equivalent fractions
CCSS.MATH.CONTENT.3.NF.A.3.a	Math	Numbers & Operations - Fractions	Understand equivalence as same size/point
CCSS.MATH.CONTENT.3.NF.A.3.b	Math	Numbers & Operations - Fractions	Generate and justify equivalent fractions
CCSS.MATH.CONTENT.3.NF.A.3.c	Math	Numbers & Operations - Fractions	Express whole numbers as fractions
CCSS.MATH.CONTENT.3.NF.A.3.d	Math	Numbers & Operations - Fractions	Compare fractions with same numerator/denominator
CCSS.MATH.CONTENT.3.OA.A.1	Math	Operations & Algebraic Thinking	Interpret multiplication as equal groups
CCSS.MATH.CONTENT.3.OA.A.2	Math	Operations & Algebraic Thinking	Interpret division as sharing/grouping
CCSS.MATH.CONTENT.3.OA.A.3	Math	Operations & Algebraic Thinking	Solve word problems using mult/div within 100
CCSS.MATH.CONTENT.3.OA.A.4	Math	Operations & Algebraic Thinking	Find unknown in mult/div equations
CCSS.MATH.CONTENT.3.OA.B.5	Math	Operations & Algebraic Thinking	Use properties to multiply and divide
CCSS.MATH.CONTENT.3.OA.B.6	Math	Operations & Algebraic Thinking	Treat division as unknown-factor
CCSS.MATH.CONTENT.3.OA.C.7	Math	Operations & Algebraic Thinking	Fluently multiply and divide within 100
CCSS.MATH.CONTENT.3.OA.D.8	Math	Operations & Algebraic Thinking	Solve two-step word problems; assess reasonableness
CCSS.MATH.CONTENT.3.OA.D.9	Math	Operations & Algebraic Thinking	Identify arithmetic patterns using properties
CCSS.MATH.CONTENT.4.G.A.1	Math	Geometry	Draw and identify basic geometric objects
CCSS.MATH.CONTENT.4.G.A.2	Math	Geometry	Classify figures by lines and angles

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.4.G.A.3	Math	Geometry	Identify and draw lines of symmetry
CCSS.MATH.CONTENT.4.MD.A.1	Math	Measurement & Data	Convert units within a measurement system
CCSS.MATH.CONTENT.4.MD.A.2	Math	Measurement & Data	Solve measurement word problems using 4 ops
CCSS.MATH.CONTENT.4.MD.A.3	Math	Measurement & Data	Apply rectangle area/perimeter formulas
CCSS.MATH.CONTENT.4.MD.B.4	Math	Measurement & Data	Use line plots to add/subtract fractions
CCSS.MATH.CONTENT.4.MD.C.5	Math	Measurement & Data	Recognize angles and angle measurement
CCSS.MATH.CONTENT.4.MD.C.5.a	Math	Measurement & Data	Define degree measure using a circle
CCSS.MATH.CONTENT.4.MD.C.5.b	Math	Measurement & Data	Relate angle measure to degrees
CCSS.MATH.CONTENT.4.MD.C.6	Math	Measurement & Data	Measure and draw angles with a protractor
CCSS.MATH.CONTENT.4.MD.C.7	Math	Measurement & Data	Use additive angle measures to find unknowns
CCSS.MATH.CONTENT.4.NBT.A.1	Math	Number & Operations in Base Ten	Recognize place value as powers of ten
CCSS.MATH.CONTENT.4.NBT.A.2	Math	Number & Operations in Base Ten	Read, write, and compare multi-digit numbers
CCSS.MATH.CONTENT.4.NBT.A.3	Math	Number & Operations in Base Ten	Round multi-digit numbers to any place
CCSS.MATH.CONTENT.4.NBT.B.4	Math	Number & Operations in Base Ten	Add/subtract multi-digit numbers fluently
CCSS.MATH.CONTENT.4.NBT.B.5	Math	Number & Operations in Base Ten	Multiply multi-digit numbers using strategies
CCSS.MATH.CONTENT.4.NBT.B.6	Math	Number & Operations in Base Ten	Divide multi-digit numbers; quotients and remainders
CCSS.MATH.CONTENT.4.NF.A.1	Math	Numbers & Operations - Fractions	Explain equivalent fractions using models
CCSS.MATH.CONTENT.4.NF.A.2	Math	Numbers & Operations - Fractions	Compare fractions using benchmarks/common units
CCSS.MATH.CONTENT.4.NF.B.3	Math	Numbers & Operations - Fractions	Express improper fractions as sums of unit fractions
CCSS.MATH.CONTENT.4.NF.B.3.a	Math	Numbers & Operations - Fractions	Add/subtract fractions as joining/separating
CCSS.MATH.CONTENT.4.NF.B.3.b	Math	Numbers & Operations - Fractions	Decompose fractions with same denominator
CCSS.MATH.CONTENT.4.NF.B.3.c	Math	Numbers & Operations - Fractions	Add/subtract mixed numbers (like denominators)
CCSS.MATH.CONTENT.4.NF.B.3.d	Math	Numbers & Operations - Fractions	Solve fraction add/sub word problems (like denom)
CCSS.MATH.CONTENT.4.NF.B.4	Math	Numbers & Operations - Fractions	Multiply a fraction by a whole number
CCSS.MATH.CONTENT.4.NF.B.4.a	Math	Numbers & Operations - Fractions	Interpret a/b as a multiple of $1/b$
CCSS.MATH.CONTENT.4.NF.B.4.b	Math	Numbers & Operations - Fractions	Use multiples to multiply fractions by whole numbers
CCSS.MATH.CONTENT.4.NF.B.4.c	Math	Numbers & Operations - Fractions	Solve fraction-by-whole word problems
CCSS.MATH.CONTENT.4.NF.C.5	Math	Numbers & Operations - Fractions	Convert tenths to hundredths; add
CCSS.MATH.CONTENT.4.NF.C.6	Math	Numbers & Operations - Fractions	Write decimals for tenths and hundredths
CCSS.MATH.CONTENT.4.NF.C.7	Math	Numbers & Operations - Fractions	Compare decimals to hundredths
CCSS.MATH.CONTENT.4.OA.A.1	Math	Operations & Algebraic Thinking	Interpret multiplication as a comparison
CCSS.MATH.CONTENT.4.OA.A.2	Math	Operations & Algebraic Thinking	Solve multiplicative comparison word problems
CCSS.MATH.CONTENT.4.OA.A.3	Math	Operations & Algebraic Thinking	Solve multistep word problems (interpret remainders)
CCSS.MATH.CONTENT.4.OA.B.4	Math	Operations & Algebraic Thinking	Find factors; identify prime or composite
CCSS.MATH.CONTENT.4.OA.C.5	Math	Operations & Algebraic Thinking	Generate patterns from a rule
CCSS.MATH.CONTENT.5.G.A.1	Math	Geometry	Define a coordinate system with axes
CCSS.MATH.CONTENT.5.G.A.2	Math	Geometry	Graph points in the first quadrant
CCSS.MATH.CONTENT.5.G.B.3	Math	Geometry	Recognize attributes in shape hierarchies

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.5.G.B.4	Math	Geometry	Classify 2D figures in a hierarchy
CCSS.MATH.CONTENT.5.MD.A.1	Math	Measurement & Data	Convert measurement units; solve problems
CCSS.MATH.CONTENT.5.MD.B.2	Math	Measurement & Data	Use line plots to solve fraction problems
CCSS.MATH.CONTENT.5.MD.C.3	Math	Measurement & Data	Recognize volume and measurement concepts
CCSS.MATH.CONTENT.5.MD.C.3.a	Math	Measurement & Data	Use unit cubes to measure volume
CCSS.MATH.CONTENT.5.MD.C.3.b	Math	Measurement & Data	Define volume by packing unit cubes
CCSS.MATH.CONTENT.5.MD.C.4	Math	Measurement & Data	Measure volume by counting unit cubes
CCSS.MATH.CONTENT.5.MD.C.5	Math	Measurement & Data	Relate volume to mult/add; solve problems
CCSS.MATH.CONTENT.5.MD.C.5.a	Math	Measurement & Data	Find volume of a rectangular prism
CCSS.MATH.CONTENT.5.MD.C.5.b	Math	Measurement & Data	Apply volume formulas for rectangular prisms
CCSS.MATH.CONTENT.5.MD.C.5.c	Math	Measurement & Data	Add volumes of composite prisms
CCSS.MATH.CONTENT.5.NBT.A.1	Math	Number & Operations in Base Ten	Use place value (10x and 1/10)
CCSS.MATH.CONTENT.5.NBT.A.2	Math	Number & Operations in Base Ten	Explain patterns with powers of 10
CCSS.MATH.CONTENT.5.NBT.A.3	Math	Number & Operations in Base Ten	Read, write, and compare thousandths
CCSS.MATH.CONTENT.5.NBT.A.3.a	Math	Number & Operations in Base Ten	Write thousandths in expanded form
CCSS.MATH.CONTENT.5.NBT.A.3.b	Math	Number & Operations in Base Ten	Compare decimals to thousandths
CCSS.MATH.CONTENT.5.NBT.A.4	Math	Number & Operations in Base Ten	Round decimals to any place
CCSS.MATH.CONTENT.5.NBT.B.5	Math	Number & Operations in Base Ten	Multiply multi-digit whole numbers fluently
CCSS.MATH.CONTENT.5.NBT.B.6	Math	Number & Operations in Base Ten	Divide by two-digit divisors
CCSS.MATH.CONTENT.5.NBT.B.7	Math	Number & Operations in Base Ten	Add/subtract/multiply/divide decimals to hundredths
CCSS.MATH.CONTENT.5.NF.A.1	Math	Numbers & Operations - Fractions	Add/subtract fractions with unlike denominators
CCSS.MATH.CONTENT.5.NF.A.2	Math	Numbers & Operations - Fractions	Solve fraction add/sub word problems (unlike denom)
CCSS.MATH.CONTENT.5.NF.B.3	Math	Numbers & Operations - Fractions	Interpret fractions as division; solve problems
CCSS.MATH.CONTENT.5.NF.B.4	Math	Numbers & Operations - Fractions	Multiply fractions and whole numbers by fractions
CCSS.MATH.CONTENT.5.NF.B.4.a	Math	Numbers & Operations - Fractions	Interpret fraction products $(a/b) \times q$
CCSS.MATH.CONTENT.5.NF.B.4.b	Math	Numbers & Operations - Fractions	Find rectangle area with fractional side lengths
CCSS.MATH.CONTENT.5.NF.B.5	Math	Numbers & Operations - Fractions	Interpret multiplication as scaling
CCSS.MATH.CONTENT.5.NF.B.5.a	Math	Numbers & Operations - Fractions	Compare product size to factors
CCSS.MATH.CONTENT.5.NF.B.5.b	Math	Numbers & Operations - Fractions	Explain scaling effects of fractions
CCSS.MATH.CONTENT.5.NF.B.6	Math	Numbers & Operations - Fractions	Solve real-world fraction/mixed multiplication
CCSS.MATH.CONTENT.5.NF.B.7	Math	Numbers & Operations - Fractions	Divide unit fractions and whole numbers
CCSS.MATH.CONTENT.5.NF.B.7.a	Math	Numbers & Operations - Fractions	Compute unit fraction divided by whole number
CCSS.MATH.CONTENT.5.NF.B.7.b	Math	Numbers & Operations - Fractions	Compute whole number divided by unit fraction
CCSS.MATH.CONTENT.5.NF.B.7.c	Math	Numbers & Operations - Fractions	Solve real-world unit fraction division problems
CCSS.MATH.CONTENT.5.OA.A.1	Math	Operations & Algebraic Thinking	Evaluate expressions with grouping symbols
CCSS.MATH.CONTENT.5.OA.A.2	Math	Operations & Algebraic Thinking	Write and interpret numerical expressions
CCSS.MATH.CONTENT.5.OA.B.3	Math	Operations & Algebraic Thinking	Generate two patterns and graph ordered pairs
CCSS.MATH.CONTENT.6.EE.A.1	Math	Expressions & Equations	Write/evaluate expressions with whole-number exponents

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.6.EE.A.2	Math	Expressions & Equations	Write/read/evaluate expressions with variables
CCSS.MATH.CONTENT.6.EE.A.2.a	Math	Expressions & Equations	Write expressions with variables for operations
CCSS.MATH.CONTENT.6.EE.A.2.b	Math	Expressions & Equations	Identify parts of an expression (terms, factors)
CCSS.MATH.CONTENT.6.EE.A.2.c	Math	Expressions & Equations	Evaluate expressions using values and formulas
CCSS.MATH.CONTENT.6.EE.A.3	Math	Expressions & Equations	Generate equivalent expressions
CCSS.MATH.CONTENT.6.EE.A.4	Math	Expressions & Equations	Identify equivalent expressions
CCSS.MATH.CONTENT.6.EE.B.5	Math	Expressions & Equations	Test solutions by substitution
CCSS.MATH.CONTENT.6.EE.B.6	Math	Expressions & Equations	Use variables to represent numbers
CCSS.MATH.CONTENT.6.EE.B.7	Math	Expressions & Equations	Solve one-step equations
CCSS.MATH.CONTENT.6.EE.B.8	Math	Expressions & Equations	Write and graph inequalities
CCSS.MATH.CONTENT.6.EE.C.9	Math	Expressions & Equations	Model relationships with equations
CCSS.MATH.CONTENT.6.G.A.1	Math	Geometry	Find area by composing/decomposing
CCSS.MATH.CONTENT.6.G.A.2	Math	Geometry	Find prism volume with fractional edges
CCSS.MATH.CONTENT.6.G.A.3	Math	Geometry	Use coordinates to find side lengths
CCSS.MATH.CONTENT.6.G.A.4	Math	Geometry	Use nets to find surface area
CCSS.MATH.CONTENT.6.NS.A.1	Math	The Number System	Divide fractions and solve problems
CCSS.MATH.CONTENT.6.NS.B.2	Math	The Number System	Divide multi-digit numbers (standard)
CCSS.MATH.CONTENT.6.NS.B.3	Math	The Number System	Operate on multi-digit decimals
CCSS.MATH.CONTENT.6.NS.B.4	Math	The Number System	Find GCF and LCM
CCSS.MATH.CONTENT.6.NS.C.5	Math	The Number System	Use positive/negative numbers in context
CCSS.MATH.CONTENT.6.NS.C.6	Math	The Number System	Plot rational numbers on number lines
CCSS.MATH.CONTENT.6.NS.C.6.a	Math	The Number System	Interpret opposites on number line
CCSS.MATH.CONTENT.6.NS.C.6.b	Math	The Number System	Interpret signs in ordered pairs
CCSS.MATH.CONTENT.6.NS.C.6.c	Math	The Number System	Locate integers and rationals on plane
CCSS.MATH.CONTENT.6.NS.C.7	Math	The Number System	Order rational numbers; use absolute value
CCSS.MATH.CONTENT.6.NS.C.7.a	Math	The Number System	Interpret inequalities on number line
CCSS.MATH.CONTENT.6.NS.C.7.b	Math	The Number System	Write order comparisons in context
CCSS.MATH.CONTENT.6.NS.C.7.c	Math	The Number System	Interpret absolute value as distance
CCSS.MATH.CONTENT.6.NS.C.7.d	Math	The Number System	Distinguish absolute value vs order
CCSS.MATH.CONTENT.6.NS.C.8	Math	The Number System	Graph points; find distances using abs
CCSS.MATH.CONTENT.6.RP.A.1	Math	Ratios & Proportional Relationships	Describe ratio relationships
CCSS.MATH.CONTENT.6.RP.A.2	Math	Ratios & Proportional Relationships	Compute and interpret unit rates
CCSS.MATH.CONTENT.6.RP.A.3	Math	Ratios & Proportional Relationships	Solve problems with ratios and rates
CCSS.MATH.CONTENT.6.RP.A.3.a	Math	Ratios & Proportional Relationships	Make ratio tables and plot pairs
CCSS.MATH.CONTENT.6.RP.A.3.b	Math	Ratios & Proportional Relationships	Solve unit rate problems
CCSS.MATH.CONTENT.6.RP.A.3.c	Math	Ratios & Proportional Relationships	Solve percent problems
CCSS.MATH.CONTENT.6.RP.A.3.d	Math	Ratios & Proportional Relationships	Convert units using ratios
CCSS.MATH.CONTENT.6.SP.A.1	Math	Statistics & Probability	Identify statistical questions

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.6.SP.A.2	Math	Statistics & Probability	Describe distributions (center/spread/shape)
CCSS.MATH.CONTENT.6.SP.A.3	Math	Statistics & Probability	Use measures of center and variability
CCSS.MATH.CONTENT.6.SP.B.4	Math	Statistics & Probability	Plot data (dot/hist/box)
CCSS.MATH.CONTENT.6.SP.B.5	Math	Statistics & Probability	Summarize numerical data in context
CCSS.MATH.CONTENT.6.SP.B.5.a	Math	Statistics & Probability	Report number of observations
CCSS.MATH.CONTENT.6.SP.B.5.b	Math	Statistics & Probability	Describe variable and units measured
CCSS.MATH.CONTENT.6.SP.B.5.c	Math	Statistics & Probability	Report center/variability; note outliers
CCSS.MATH.CONTENT.6.SP.B.5.d	Math	Statistics & Probability	Choose measures based on distribution
CCSS.MATH.CONTENT.7.EE.A.1	Math	Expressions & Equations	Manipulate linear expressions
CCSS.MATH.CONTENT.7.EE.A.2	Math	Expressions & Equations	Rewrite expressions to reveal relationships
CCSS.MATH.CONTENT.7.EE.B.3	Math	Expressions & Equations	Solve multi-step problems with rational numbers
CCSS.MATH.CONTENT.7.EE.B.4	Math	Expressions & Equations	Model with variables and inequalities
CCSS.MATH.CONTENT.7.EE.B.4.a	Math	Expressions & Equations	Solve two-step equations
CCSS.MATH.CONTENT.7.EE.B.4.b	Math	Expressions & Equations	Solve and graph inequalities
CCSS.MATH.CONTENT.7.G.A.1	Math	Geometry	Solve problems with scale drawings
CCSS.MATH.CONTENT.7.G.A.2	Math	Geometry	Construct geometric shapes from conditions
CCSS.MATH.CONTENT.7.G.A.3	Math	Geometry	Describe cross-sections of solids
CCSS.MATH.CONTENT.7.G.B.4	Math	Geometry	Use circle area and circumference formulas
CCSS.MATH.CONTENT.7.G.B.5	Math	Geometry	Use angle relationships to solve equations
CCSS.MATH.CONTENT.7.G.B.6	Math	Geometry	Solve area/volume/surface area problems
CCSS.MATH.CONTENT.7.NS.A.1	Math	The Number System	Add and subtract rational numbers
CCSS.MATH.CONTENT.7.NS.A.1.a	Math	The Number System	Describe opposites that sum to zero
CCSS.MATH.CONTENT.7.NS.A.1.b	Math	The Number System	Interpret addition as movement on number line
CCSS.MATH.CONTENT.7.NS.A.1.c	Math	The Number System	Interpret subtraction and distance on number line
CCSS.MATH.CONTENT.7.NS.A.1.d	Math	The Number System	Use properties to add/subtract rationals
CCSS.MATH.CONTENT.7.NS.A.2	Math	The Number System	Multiply and divide rational numbers
CCSS.MATH.CONTENT.7.NS.A.2.a	Math	The Number System	Extend multiplication to rational numbers
CCSS.MATH.CONTENT.7.NS.A.2.b	Math	The Number System	Extend division to rational numbers
CCSS.MATH.CONTENT.7.NS.A.2.c	Math	The Number System	Use properties to multiply/divide rationals
CCSS.MATH.CONTENT.7.NS.A.2.d	Math	The Number System	Convert rationals to decimals (long division)
CCSS.MATH.CONTENT.7.NS.A.3	Math	The Number System	Solve problems with rational numbers
CCSS.MATH.CONTENT.7.RP.A.1	Math	Ratios & Proportional Relationships	Compute unit rates for fractional ratios
CCSS.MATH.CONTENT.7.RP.A.2	Math	Ratios & Proportional Relationships	Recognize proportional relationships
CCSS.MATH.CONTENT.7.RP.A.2.a	Math	Ratios & Proportional Relationships	Test whether quantities are proportional
CCSS.MATH.CONTENT.7.RP.A.2.b	Math	Ratios & Proportional Relationships	Identify constant of proportionality
CCSS.MATH.CONTENT.7.RP.A.2.c	Math	Ratios & Proportional Relationships	Write equations for proportional relationships
CCSS.MATH.CONTENT.7.RP.A.2.d	Math	Ratios & Proportional Relationships	Interpret points on proportional graphs
CCSS.MATH.CONTENT.7.RP.A.3	Math	Ratios & Proportional Relationships	Solve multistep ratio and percent problems

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.7.SP.A.1	Math	Statistics & Probability	Use random samples to infer about populations
CCSS.MATH.CONTENT.7.SP.A.2	Math	Statistics & Probability	Use samples to estimate and gauge variation
CCSS.MATH.CONTENT.7.SP.B.3	Math	Statistics & Probability	Compare distributions using center and spread
CCSS.MATH.CONTENT.7.SP.B.4	Math	Statistics & Probability	Compare populations using samples (center/spread)
CCSS.MATH.CONTENT.7.SP.C.5	Math	Statistics & Probability	Interpret probability as likelihood (0 to 1)
CCSS.MATH.CONTENT.7.SP.C.6	Math	Statistics & Probability	Estimate probability from relative frequency
CCSS.MATH.CONTENT.7.SP.C.7	Math	Statistics & Probability	Use probability models; compare to data
CCSS.MATH.CONTENT.7.SP.C.7.a	Math	Statistics & Probability	Build a uniform probability model
CCSS.MATH.CONTENT.7.SP.C.7.b	Math	Statistics & Probability	Build probability models from data
CCSS.MATH.CONTENT.7.SP.C.8	Math	Statistics & Probability	Find probabilities of compound events
CCSS.MATH.CONTENT.7.SP.C.8.a	Math	Statistics & Probability	Define probability of compound events
CCSS.MATH.CONTENT.7.SP.C.8.b	Math	Statistics & Probability	Represent sample spaces for compound events
CCSS.MATH.CONTENT.7.SP.C.8.c	Math	Statistics & Probability	Use simulation for compound probabilities
CCSS.MATH.CONTENT.8.EE.A.1	Math	Expressions & Equations	Apply integer exponent rules
CCSS.MATH.CONTENT.8.EE.A.2	Math	Expressions & Equations	Use square/cube roots; recognize irrationals
CCSS.MATH.CONTENT.8.EE.A.3	Math	Expressions & Equations	Use scientific notation to estimate size
CCSS.MATH.CONTENT.8.EE.A.4	Math	Expressions & Equations	Operate with scientific notation
CCSS.MATH.CONTENT.8.EE.B.5	Math	Expressions & Equations	Graph proportional relationships; interpret slope
CCSS.MATH.CONTENT.8.EE.B.6	Math	Expressions & Equations	Use similar triangles to derive slope and $y=mx+b$
CCSS.MATH.CONTENT.8.EE.C.7	Math	Expressions & Equations	Solve linear equations (one variable)
CCSS.MATH.CONTENT.8.EE.C.7.a	Math	Expressions & Equations	Classify solutions to linear equations
CCSS.MATH.CONTENT.8.EE.C.7.b	Math	Expressions & Equations	Solve linear equations with rational coefficients
CCSS.MATH.CONTENT.8.EE.C.8	Math	Expressions & Equations	Solve systems of linear equations
CCSS.MATH.CONTENT.8.EE.C.8.a	Math	Expressions & Equations	Interpret system solutions as intersections
CCSS.MATH.CONTENT.8.EE.C.8.b	Math	Expressions & Equations	Solve systems algebraically and graphically
CCSS.MATH.CONTENT.8.EE.C.8.c	Math	Expressions & Equations	Model problems with linear systems
CCSS.MATH.CONTENT.8.F.A.1	Math	Functions	Define functions and their graphs
CCSS.MATH.CONTENT.8.F.A.2	Math	Functions	Compare functions across representations
CCSS.MATH.CONTENT.8.F.A.3	Math	Functions	Identify linear vs non-linear functions
CCSS.MATH.CONTENT.8.F.B.4	Math	Functions	Build linear functions from situations
CCSS.MATH.CONTENT.8.F.B.5	Math	Functions	Describe and sketch function behavior
CCSS.MATH.CONTENT.8.G.A.1	Math	Geometry	Verify rigid motion properties
CCSS.MATH.CONTENT.8.G.A.1.a	Math	Geometry	Verify lines/segments map with same length
CCSS.MATH.CONTENT.8.G.A.1.b	Math	Geometry	Verify angles preserve measure
CCSS.MATH.CONTENT.8.G.A.1.c	Math	Geometry	Verify parallel lines stay parallel
CCSS.MATH.CONTENT.8.G.A.2	Math	Geometry	Describe congruence via rigid motions
CCSS.MATH.CONTENT.8.G.A.3	Math	Geometry	Describe transformations using coordinates
CCSS.MATH.CONTENT.8.G.A.4	Math	Geometry	Describe similarity via transformations

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.8.G.A.5	Math	Geometry	Use informal proofs about angles and similarity
CCSS.MATH.CONTENT.8.G.B.6	Math	Geometry	Explain Pythagorean Theorem and converse
CCSS.MATH.CONTENT.8.G.B.7	Math	Geometry	Use Pythagorean Theorem for side lengths
CCSS.MATH.CONTENT.8.G.B.8	Math	Geometry	Use Pythagorean Theorem for distance
CCSS.MATH.CONTENT.8.G.C.9	Math	Geometry	Use volume formulas for cones/cylinders/spheres
CCSS.MATH.CONTENT.8.NS.A.1	Math	The Number System	Identify irrationals; convert repeating decimals
CCSS.MATH.CONTENT.8.NS.A.2	Math	The Number System	Approximate irrationals and locate on number line
CCSS.MATH.CONTENT.8.SP.A.1	Math	Statistics & Probability	Create scatter plots; describe association
CCSS.MATH.CONTENT.8.SP.A.2	Math	Statistics & Probability	Fit and assess linear models from scatter plots
CCSS.MATH.CONTENT.8.SP.A.3	Math	Statistics & Probability	Use linear models; interpret slope/intercept
CCSS.MATH.CONTENT.8.SP.A.4	Math	Statistics & Probability	Analyze association in two-way tables
CCSS.MATH.CONTENT.HSA.APR.A.1	Math	Arithmetic with Polynomials & Rational Expressions	Add, subtract, and multiply polynomials
CCSS.MATH.CONTENT.HSA.APR.B.2	Math	Arithmetic with Polynomials & Rational Expressions	Apply the Remainder Theorem
CCSS.MATH.CONTENT.HSA.APR.B.3	Math	Arithmetic with Polynomials & Rational Expressions	Use zeros to sketch polynomial graphs
CCSS.MATH.CONTENT.HSA.APR.C.4	Math	Arithmetic with Polynomials & Rational Expressions	Prove and use polynomial identities
CCSS.MATH.CONTENT.HSA.APR.C.5	Math	Arithmetic with Polynomials & Rational Expressions	Apply the Binomial Theorem
CCSS.MATH.CONTENT.HSA.APR.D.6	Math	Arithmetic with Polynomials & Rational Expressions	Rewrite rational expressions via division
CCSS.MATH.CONTENT.HSA.APR.D.7	Math	Arithmetic with Polynomials & Rational Expressions	Operate on rational expressions
CCSS.MATH.CONTENT.HSA.CED.A.1	Math	Creating Equations	Create and solve one-variable equations/inequalities
CCSS.MATH.CONTENT.HSA.CED.A.2	Math	Creating Equations	Create and graph equations in two variables
CCSS.MATH.CONTENT.HSA.CED.A.3	Math	Creating Equations	Model constraints with equations/inequalities
CCSS.MATH.CONTENT.HSA.CED.A.4	Math	Creating Equations	Rearrange formulas to solve for a variable
CCSS.MATH.CONTENT.HSA.REI.A.1	Math	Reasoning with Equations & Inequalities	Justify steps when solving equations
CCSS.MATH.CONTENT.HSA.REI.A.2	Math	Reasoning with Equations & Inequalities	Solve rational and radical equations; check extraneous
CCSS.MATH.CONTENT.HSA.REI.B.3	Math	Reasoning with Equations & Inequalities	Solve linear equations and inequalities (1 variable)
CCSS.MATH.CONTENT.HSA.REI.B.4	Math	Reasoning with Equations & Inequalities	Solve quadratic equations (1 variable)
CCSS.MATH.CONTENT.HSA.REI.B.4.a	Math	Reasoning with Equations & Inequalities	Complete the square; derive quadratic formula
CCSS.MATH.CONTENT.HSA.REI.B.4.b	Math	Reasoning with Equations & Inequalities	Solve quadratics using multiple methods
CCSS.MATH.CONTENT.HSA.REI.C.5	Math	Reasoning with Equations & Inequalities	Prove row operation preserves solutions
CCSS.MATH.CONTENT.HSA.REI.C.6	Math	Reasoning with Equations & Inequalities	Solve systems of two linear equations
CCSS.MATH.CONTENT.HSA.REI.C.7	Math	Reasoning with Equations & Inequalities	Solve linear-quadratic systems
CCSS.MATH.CONTENT.HSA.REI.C.8	Math	Reasoning with Equations & Inequalities	Represent linear systems with matrices
CCSS.MATH.CONTENT.HSA.REI.C.9	Math	Reasoning with Equations & Inequalities	Use matrix inverses to solve systems
CCSS.MATH.CONTENT.HSA.REI.D.10	Math	Reasoning with Equations & Inequalities	Interpret graphs as solution sets
CCSS.MATH.CONTENT.HSA.REI.D.11	Math	Reasoning with Equations & Inequalities	Find intersections by solving $f(x)=g(x)$
CCSS.MATH.CONTENT.HSA.REI.D.12	Math	Reasoning with Equations & Inequalities	Graph linear inequalities in two variables
CCSS.MATH.CONTENT.HSA.SSE.A.1	Math	Seeing Structure in Expressions	Interpret expressions in context
CCSS.MATH.CONTENT.HSA.SSE.A.1.a	Math	Seeing Structure in Expressions	Identify terms, factors, and coefficients

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.HSA.SSE.A.1.b	Math	Seeing Structure in Expressions	View parts of expressions as single entities
CCSS.MATH.CONTENT.HSA.SSE.A.2	Math	Seeing Structure in Expressions	Rewrite expressions using structure
CCSS.MATH.CONTENT.HSA.SSE.B.3	Math	Seeing Structure in Expressions	Choose equivalent forms to reveal properties
CCSS.MATH.CONTENT.HSA.SSE.B.3.a	Math	Seeing Structure in Expressions	Factor quadratics to find zeros
CCSS.MATH.CONTENT.HSA.SSE.B.3.b	Math	Seeing Structure in Expressions	Complete the square to find extrema
CCSS.MATH.CONTENT.HSA.SSE.B.3.c	Math	Seeing Structure in Expressions	Use exponent rules to transform exponentials
CCSS.MATH.CONTENT.HSA.SSE.B.4	Math	Seeing Structure in Expressions	Use finite geometric series formula
CCSS.MATH.CONTENT.HSF.BF.A.1	Math	Building Functions	Write functions from relationships
CCSS.MATH.CONTENT.HSF.BF.A.1.a	Math	Building Functions	Write explicit or recursive rules from context
CCSS.MATH.CONTENT.HSF.BF.A.1.b	Math	Building Functions	Combine functions to build new models
CCSS.MATH.CONTENT.HSF.BF.A.1.c	Math	Building Functions	Compose functions
CCSS.MATH.CONTENT.HSF.BF.A.2	Math	Building Functions	Write sequences recursively and explicitly
CCSS.MATH.CONTENT.HSF.BF.B.3	Math	Building Functions	Analyze graph transformations of functions
CCSS.MATH.CONTENT.HSF.BF.B.4	Math	Building Functions	Find inverse functions
CCSS.MATH.CONTENT.HSF.BF.B.4.a	Math	Building Functions	Solve using inverses; write inverse expressions
CCSS.MATH.CONTENT.HSF.BF.B.4.b	Math	Building Functions	Verify inverses by composition
CCSS.MATH.CONTENT.HSF.BF.B.4.c	Math	Building Functions	Read inverse values from graphs/tables
CCSS.MATH.CONTENT.HSF.BF.B.4.d	Math	Building Functions	Restrict domain to make a function invertible
CCSS.MATH.CONTENT.HSF.BF.B.5	Math	Building Functions	Use log-exponent inverse relationship
CCSS.MATH.CONTENT.HSF.IF.A.1	Math	Interpreting Functions	Understand functions, domain, and range
CCSS.MATH.CONTENT.HSF.IF.A.2	Math	Interpreting Functions	Use function notation and evaluate
CCSS.MATH.CONTENT.HSF.IF.A.3	Math	Interpreting Functions	Recognize sequences as functions
CCSS.MATH.CONTENT.HSF.IF.B.4	Math	Interpreting Functions	Interpret and sketch graphs from contexts
CCSS.MATH.CONTENT.HSF.IF.B.5	Math	Interpreting Functions	Choose appropriate domains from context
CCSS.MATH.CONTENT.HSF.IF.B.6	Math	Interpreting Functions	Compute average rate of change
CCSS.MATH.CONTENT.HSF.IF.C.7	Math	Interpreting Functions	Graph functions from symbolic forms
CCSS.MATH.CONTENT.HSF.IF.C.7.a	Math	Interpreting Functions	Graph linear and quadratic functions
CCSS.MATH.CONTENT.HSF.IF.C.7.b	Math	Interpreting Functions	Graph root and piecewise functions
CCSS.MATH.CONTENT.HSF.IF.C.7.c	Math	Interpreting Functions	Graph polynomials; zeros and end behavior
CCSS.MATH.CONTENT.HSF.IF.C.7.d	Math	Interpreting Functions	Graph rational functions; zeros and asymptotes
CCSS.MATH.CONTENT.HSF.IF.C.7.e	Math	Interpreting Functions	Graph exponential/log and trig functions
CCSS.MATH.CONTENT.HSF.IF.C.8	Math	Interpreting Functions	Rewrite functions to reveal properties
CCSS.MATH.CONTENT.HSF.IF.C.8.a	Math	Interpreting Functions	Use factoring/completing square on quadratics
CCSS.MATH.CONTENT.HSF.IF.C.8.b	Math	Interpreting Functions	Interpret exponential expressions (growth/decay)
CCSS.MATH.CONTENT.HSF.IF.C.9	Math	Interpreting Functions	Compare function properties across representations
CCSS.MATH.CONTENT.HSF.LE.A.1	Math	Linear, Quadratic, & Exponential Models	Distinguish linear vs exponential models
CCSS.MATH.CONTENT.HSF.LE.A.1.a	Math	Linear, Quadratic, & Exponential Models	Prove linear vs exponential growth patterns
CCSS.MATH.CONTENT.HSF.LE.A.1.b	Math	Linear, Quadratic, & Exponential Models	Identify constant rate situations

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.HSF.LE.A.1.c	Math	Linear, Quadratic, & Exponential Models	Identify constant percent-rate situations
CCSS.MATH.CONTENT.HSF.LE.A.2	Math	Linear, Quadratic, & Exponential Models	Construct linear/exponential functions from data
CCSS.MATH.CONTENT.HSF.LE.A.3	Math	Linear, Quadratic, & Exponential Models	Observe exponential outgrows polynomial growth
CCSS.MATH.CONTENT.HSF.LE.A.4	Math	Linear, Quadratic, & Exponential Models	Solve exponential equations using logarithms
CCSS.MATH.CONTENT.HSF.LE.B.5	Math	Linear, Quadratic, & Exponential Models	Interpret parameters in linear/exponential models
CCSS.MATH.CONTENT.HSF.TF.A.1	Math	Trigonometric Functions	Interpret radians as arc length
CCSS.MATH.CONTENT.HSF.TF.A.2	Math	Trigonometric Functions	Use unit circle to extend trig to real angles
CCSS.MATH.CONTENT.HSF.TF.A.3	Math	Trigonometric Functions	Use special triangles/unit circle for trig values
CCSS.MATH.CONTENT.HSF.TF.A.4	Math	Trigonometric Functions	Explain trig symmetry and periodicity
CCSS.MATH.CONTENT.HSF.TF.B.5	Math	Trigonometric Functions	Model periodic phenomena with trig functions
CCSS.MATH.CONTENT.HSF.TF.B.6	Math	Trigonometric Functions	Restrict trig domains to define inverses
CCSS.MATH.CONTENT.HSF.TF.B.7	Math	Trigonometric Functions	Solve trig equations with inverse functions
CCSS.MATH.CONTENT.HSF.TF.C.8	Math	Trigonometric Functions	Use the Pythagorean trig identity
CCSS.MATH.CONTENT.HSF.TF.C.9	Math	Trigonometric Functions	Use trig addition/subtraction formulas
CCSS.MATH.CONTENT.HSG.C.A.1	Math	Circles	Prove all circles are similar
CCSS.MATH.CONTENT.HSG.C.A.2	Math	Circles	Analyze inscribed angle and chord relationships
CCSS.MATH.CONTENT.HSG.C.A.3	Math	Circles	Construct inscribed/circumscribed circles; prove cyclic angles
CCSS.MATH.CONTENT.HSG.C.A.4	Math	Circles	Construct a tangent from an external point
CCSS.MATH.CONTENT.HSG.C.B.5	Math	Circles	Derive arc length and sector area formulas
CCSS.MATH.CONTENT.HSG.CO.A.1	Math	Congruence	Use precise geometric definitions
CCSS.MATH.CONTENT.HSG.CO.A.2	Math	Congruence	Represent and compare geometric transformations
CCSS.MATH.CONTENT.HSG.CO.A.3	Math	Congruence	Describe rotational/reflection symmetries of figures
CCSS.MATH.CONTENT.HSG.CO.A.4	Math	Congruence	Define rotations, reflections, and translations
CCSS.MATH.CONTENT.HSG.CO.A.5	Math	Congruence	Perform transformations and specify sequences
CCSS.MATH.CONTENT.HSG.CO.B.6	Math	Congruence	Use rigid motions to decide congruence
CCSS.MATH.CONTENT.HSG.CO.B.7	Math	Congruence	Link triangle congruence to matching sides/angles
CCSS.MATH.CONTENT.HSG.CO.B.8	Math	Congruence	Justify ASA/SAS/SSS congruence criteria
CCSS.MATH.CONTENT.HSG.CO.C.10	Math	Congruence	Prove triangle theorems (angles, midsegments, medians)
CCSS.MATH.CONTENT.HSG.CO.C.11	Math	Congruence	Prove parallelogram theorems
CCSS.MATH.CONTENT.HSG.CO.C.9	Math	Congruence	Prove theorems about lines and angles
CCSS.MATH.CONTENT.HSG.CO.D.12	Math	Congruence	Perform formal geometric constructions
CCSS.MATH.CONTENT.HSG.CO.D.13	Math	Congruence	Construct regular figures inscribed in a circle
CCSS.MATH.CONTENT.HSG.GMD.A.1	Math	Geometric Measurement & Dimension	Derive circle/solid formulas informally
CCSS.MATH.CONTENT.HSG.GMD.A.2	Math	Geometric Measurement & Dimension	Use Cavalieri's principle for sphere volume
CCSS.MATH.CONTENT.HSG.GMD.A.3	Math	Geometric Measurement & Dimension	Apply volume formulas for solids
CCSS.MATH.CONTENT.HSG.GMD.B.4	Math	Geometric Measurement & Dimension	Identify cross-sections and solids of revolution
CCSS.MATH.CONTENT.HSG.GPE.A.1	Math	Expressing Geometric Properties with Equations	Derive circle equations; complete the square

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.HSG.GPE.A.2	Math	Expressing Geometric Properties with Equations	Derive parabola equation from focus/directrix
CCSS.MATH.CONTENT.HSG.GPE.A.3	Math	Expressing Geometric Properties with Equations	Derive ellipse/hyperbola equations from foci
CCSS.MATH.CONTENT.HSG.GPE.B.4	Math	Expressing Geometric Properties with Equations	Prove geometry theorems using coordinates
CCSS.MATH.CONTENT.HSG.GPE.B.5	Math	Expressing Geometric Properties with Equations	Use slope to prove parallel/perpendicular lines
CCSS.MATH.CONTENT.HSG.GPE.B.6	Math	Expressing Geometric Properties with Equations	Find point dividing a segment in a ratio
CCSS.MATH.CONTENT.HSG.GPE.B.7	Math	Expressing Geometric Properties with Equations	Compute perimeter/area with coordinates
CCSS.MATH.CONTENT.HSG.MG.A.1	Math	Modeling with Geometry	Model real objects with geometric shapes
CCSS.MATH.CONTENT.HSG.MG.A.2	Math	Modeling with Geometry	Apply density concepts in modeling
CCSS.MATH.CONTENT.HSG.MG.A.3	Math	Modeling with Geometry	Solve design problems with geometry
CCSS.MATH.CONTENT.HSG.SRT.A.1	Math	Similarity, Right Triangles, & Trigonometry	Verify properties of dilations
CCSS.MATH.CONTENT.HSG.SRT.A.1.a	Math	Similarity, Right Triangles, & Trigonometry	Describe dilation effects on lines
CCSS.MATH.CONTENT.HSG.SRT.A.1.b	Math	Similarity, Right Triangles, & Trigonometry	Scale segments by a dilation factor
CCSS.MATH.CONTENT.HSG.SRT.A.2	Math	Similarity, Right Triangles, & Trigonometry	Decide similarity using transformations
CCSS.MATH.CONTENT.HSG.SRT.A.3	Math	Similarity, Right Triangles, & Trigonometry	Establish AA similarity criterion
CCSS.MATH.CONTENT.HSG.SRT.B.4	Math	Similarity, Right Triangles, & Trigonometry	Prove triangle theorems via similarity
CCSS.MATH.CONTENT.HSG.SRT.B.5	Math	Similarity, Right Triangles, & Trigonometry	Use triangle criteria to solve and prove
CCSS.MATH.CONTENT.HSG.SRT.C.6	Math	Similarity, Right Triangles, & Trigonometry	Define trig ratios using similar right triangles
CCSS.MATH.CONTENT.HSG.SRT.C.7	Math	Similarity, Right Triangles, & Trigonometry	Relate sine and cosine of complementary angles
CCSS.MATH.CONTENT.HSG.SRT.C.8	Math	Similarity, Right Triangles, & Trigonometry	Solve right triangles using trig and Pythagorean
CCSS.MATH.CONTENT.HSG.SRT.D.10	Math	Similarity, Right Triangles, & Trigonometry	Prove Laws of Sines and Cosines
CCSS.MATH.CONTENT.HSG.SRT.D.11	Math	Similarity, Right Triangles, & Trigonometry	Apply Law of Sines/Cosines to solve triangles
CCSS.MATH.CONTENT.HSG.SRT.D.9	Math	Similarity, Right Triangles, & Trigonometry	Derive triangle area formula ($\frac{1}{2} ab \sin C$)
CCSS.MATH.CONTENT.HSN.CN.A.1	Math	The Complex Number System	Define i and complex numbers
CCSS.MATH.CONTENT.HSN.CN.A.2	Math	The Complex Number System	Add/subtract/multiply complex numbers
CCSS.MATH.CONTENT.HSN.CN.A.3	Math	The Complex Number System	Use conjugates for modulus and division
CCSS.MATH.CONTENT.HSN.CN.B.4	Math	The Complex Number System	Represent complex numbers in rectangular/polar form
CCSS.MATH.CONTENT.HSN.CN.B.5	Math	The Complex Number System	Use geometric representation of complex operations
CCSS.MATH.CONTENT.HSN.CN.B.6	Math	The Complex Number System	Compute distance and midpoint in complex plane
CCSS.MATH.CONTENT.HSN.CN.C.7	Math	The Complex Number System	Solve quadratics with complex solutions
CCSS.MATH.CONTENT.HSN.CN.C.8	Math	The Complex Number System	Extend polynomial identities to complex numbers
CCSS.MATH.CONTENT.HSN.CN.C.9	Math	The Complex Number System	State Fundamental Theorem of Algebra
CCSS.MATH.CONTENT.HSN.Q.A.1	Math	Quantities	Use units and scales in modeling
CCSS.MATH.CONTENT.HSN.Q.A.2	Math	Quantities	Define quantities for modeling
CCSS.MATH.CONTENT.HSN.Q.A.3	Math	Quantities	Choose appropriate precision
CCSS.MATH.CONTENT.HSN.RN.A.1	Math	The Real Number System	Define rational exponents and radicals
CCSS.MATH.CONTENT.HSN.RN.A.2	Math	The Real Number System	Rewrite radicals using exponent rules
CCSS.MATH.CONTENT.HSN.RN.B.3	Math	The Real Number System	Explain rational/irrational sums and products
CCSS.MATH.CONTENT.HSN.VM.A.1	Math	Vector & Matrix Quantities	Represent vector quantities (magnitude/direction)

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.HSN.VM.A.2	Math	Vector & Matrix Quantities	Compute vector components from coordinates
CCSS.MATH.CONTENT.HSN.VM.A.3	Math	Vector & Matrix Quantities	Solve problems with vectors (e.g., velocity)
CCSS.MATH.CONTENT.HSN.VM.B.4	Math	Vector & Matrix Quantities	Add and subtract vectors
CCSS.MATH.CONTENT.HSN.VM.B.4.a	Math	Vector & Matrix Quantities	Add vectors using parallelogram rule
CCSS.MATH.CONTENT.HSN.VM.B.4.b	Math	Vector & Matrix Quantities	Find magnitude and direction of vector sums
CCSS.MATH.CONTENT.HSN.VM.B.4.c	Math	Vector & Matrix Quantities	Represent and compute vector subtraction
CCSS.MATH.CONTENT.HSN.VM.B.5	Math	Vector & Matrix Quantities	Multiply vectors by scalars
CCSS.MATH.CONTENT.HSN.VM.B.5.a	Math	Vector & Matrix Quantities	Represent scalar multiplication graphically
CCSS.MATH.CONTENT.HSN.VM.B.5.b	Math	Vector & Matrix Quantities	Compute magnitude/direction of scalar multiples
CCSS.MATH.CONTENT.HSN.VM.C.10	Math	Vector & Matrix Quantities	Use zero/identity; link determinant to inverse
CCSS.MATH.CONTENT.HSN.VM.C.11	Math	Vector & Matrix Quantities	Multiply matrices and vectors; view as transforms
CCSS.MATH.CONTENT.HSN.VM.C.12	Math	Vector & Matrix Quantities	Interpret 2x2 matrices as plane transforms
CCSS.MATH.CONTENT.HSN.VM.C.6	Math	Vector & Matrix Quantities	Use matrices to represent data
CCSS.MATH.CONTENT.HSN.VM.C.7	Math	Vector & Matrix Quantities	Scale matrices by scalars
CCSS.MATH.CONTENT.HSN.VM.C.8	Math	Vector & Matrix Quantities	Add/subtract/multiply matrices
CCSS.MATH.CONTENT.HSN.VM.C.9	Math	Vector & Matrix Quantities	Recognize non-commutativity of matrix multiplication
CCSS.MATH.CONTENT.HSS.CP.A.1	Math	Conditional Probability & the Rules of Probability	Describe events with set operations
CCSS.MATH.CONTENT.HSS.CP.A.2	Math	Conditional Probability & the Rules of Probability	Determine independence via product rule
CCSS.MATH.CONTENT.HSS.CP.A.3	Math	Conditional Probability & the Rules of Probability	Interpret conditional probability and independence
CCSS.MATH.CONTENT.HSS.CP.A.4	Math	Conditional Probability & the Rules of Probability	Use two-way tables for conditional probability
CCSS.MATH.CONTENT.HSS.CP.A.5	Math	Conditional Probability & the Rules of Probability	Explain conditional probability in context
CCSS.MATH.CONTENT.HSS.CP.B.6	Math	Conditional Probability & the Rules of Probability	Compute conditional probability
CCSS.MATH.CONTENT.HSS.CP.B.7	Math	Conditional Probability & the Rules of Probability	Apply addition rule for probabilities
CCSS.MATH.CONTENT.HSS.CP.B.8	Math	Conditional Probability & the Rules of Probability	Apply general multiplication rule
CCSS.MATH.CONTENT.HSS.CP.B.9	Math	Conditional Probability & the Rules of Probability	Use permutations/combinations for probability
CCSS.MATH.CONTENT.HSS.IC.A.1	Math	Making Inferences & Justifying Conclusions	View statistics as inference from samples
CCSS.MATH.CONTENT.HSS.IC.A.2	Math	Making Inferences & Justifying Conclusions	Assess models using simulation
CCSS.MATH.CONTENT.HSS.IC.B.3	Math	Making Inferences & Justifying Conclusions	Differentiate surveys, experiments, and observational studies
CCSS.MATH.CONTENT.HSS.IC.B.4	Math	Making Inferences & Justifying Conclusions	Estimate mean/proportion; develop margin of error
CCSS.MATH.CONTENT.HSS.IC.B.5	Math	Making Inferences & Justifying Conclusions	Compare treatments using experiments
CCSS.MATH.CONTENT.HSS.IC.B.6	Math	Making Inferences & Justifying Conclusions	Evaluate statistical reports
CCSS.MATH.CONTENT.HSS.ID.A.1	Math	Interpreting Categorical & Quantitative Data	Represent data with dot/hist/box plots
CCSS.MATH.CONTENT.HSS.ID.A.2	Math	Interpreting Categorical & Quantitative Data	Compare distributions by center and spread
CCSS.MATH.CONTENT.HSS.ID.A.3	Math	Interpreting Categorical & Quantitative Data	Interpret differences including outliers
CCSS.MATH.CONTENT.HSS.ID.A.4	Math	Interpreting Categorical & Quantitative Data	Use normal model with mean and SD
CCSS.MATH.CONTENT.HSS.ID.B.5	Math	Interpreting Categorical & Quantitative Data	Summarize categorical data in two-way tables
CCSS.MATH.CONTENT.HSS.ID.B.6	Math	Interpreting Categorical & Quantitative Data	Use scatter plots to describe relationships

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ID	Content Type	Category	Description
CCSS.MATH.CONTENT.HSS.ID.B.6.a	Math	Interpreting Categorical & Quantitative Data	Fit models to data and use them
CCSS.MATH.CONTENT.HSS.ID.B.6.b	Math	Interpreting Categorical & Quantitative Data	Assess fit using residuals
CCSS.MATH.CONTENT.HSS.ID.B.6.c	Math	Interpreting Categorical & Quantitative Data	Fit a linear function to data
CCSS.MATH.CONTENT.HSS.ID.C.7	Math	Interpreting Categorical & Quantitative Data	Interpret slope and intercept in context
CCSS.MATH.CONTENT.HSS.ID.C.8	Math	Interpreting Categorical & Quantitative Data	Compute and interpret correlation coefficient
CCSS.MATH.CONTENT.HSS.ID.C.9	Math	Interpreting Categorical & Quantitative Data	Distinguish correlation from causation
CCSS.MATH.CONTENT.HSS.MD.A.1	Math	Measurement & Data	Define random variables and distributions
CCSS.MATH.CONTENT.HSS.MD.A.2	Math	Measurement & Data	Calculate expected value
CCSS.MATH.CONTENT.HSS.MD.A.3	Math	Measurement & Data	Develop theoretical distributions; find expected value
CCSS.MATH.CONTENT.HSS.MD.A.4	Math	Measurement & Data	Develop empirical distributions; find expected value
CCSS.MATH.CONTENT.HSS.MD.B.5	Math	Measurement & Data	Evaluate decisions using expected value
CCSS.MATH.CONTENT.HSS.MD.B.5.a	Math	Measurement & Data	Compute expected payoff in games
CCSS.MATH.CONTENT.HSS.MD.B.5.b	Math	Measurement & Data	Compare strategies using expected value
CCSS.MATH.CONTENT.HSS.MD.B.6	Math	Measurement & Data	Use probability to make fair decisions
CCSS.MATH.CONTENT.HSS.MD.B.7	Math	Measurement & Data	Analyze decisions with probability concepts

3.2 Coding Protocol - CCSS Skill Classification

We classify each CCSS standard on three skill dimensions—Depth of Knowledge (DOK), spatial reasoning, and routine intensity—through three independent calls to Claude (Opus 4.6), one per dimension. Each call uses a focused system prompt grounded in the relevant literature, with illustrative examples for every level. Calling the dimensions separately, rather than asking the model to rate them all at once, prevents cross-rubric anchoring (e.g., a high cognitive-demand rating dragging up the spatial rating). Standards are presented with their text description only; the full CCSS identifier is replaced by an anonymous code (S001, S002, ...) before each call to prevent grade or topic leakage from the identifier itself.

The three system prompts are reproduced verbatim below.

3.2.1 Depth of Knowledge

Listing 9: System prompt for DOK classification

You are an expert in educational measurement, cognitive science, and curriculum analysis. Your task is to classify Common Core State Standards (CCSS) on Webb's Depth of Knowledge (DOK).

For each standard, determine the HIGHEST level of cognitive demand that the standard would REQUIRE of a proficient student. Focus on the nature of the cognitive engagement demanded by the standard, not its difficulty or grade level. A standard can be cognitively complex (DOK 3) even at grade 3, and cognitively simple (DOK 1) even at the high school level.

CRITICAL: All classifications must be GRADE-AGNOSTIC. Focus only on the TYPE of cognitive engagement, not the grade placement.

=====

DOK LEVEL 1: RECALL AND REPRODUCTION

=====

The standard requires recall of facts, definitions, terms, or execution of a simple one-step procedure. There is no "figuring out" -- the student either knows it or does not.

Math indicators:

- Recall a fact, term, or property
- Perform a routine one-step calculation
- Apply a single formula directly
- Identify a shape, figure, or basic concept
- Retrieve information from a graph/table/chart (no interpretation)
- Evaluate a simple expression
- Make unit conversions using a known rule

ELA indicators:

- Recall explicitly stated facts, details, events
- Identify literary elements when explicitly stated
- Define or recognize word meaning when clearly evident
- Locate specific information verbatim from text

=====

DOK LEVEL 2: SKILLS AND CONCEPTS

=====

The standard requires decisions about how to approach the task. Mental processing goes beyond recall -- compare, classify, organize, estimate, or make basic inferences. There is typically a right answer but it requires more than one mental step.

Math indicators:

- Solve a routine multi-step problem
- Classify, sort, or organize data
- Interpret information from a graph/table/chart
- Make basic inferences from data
- Select appropriate operations or procedures
- Extend or continue a pattern
- Translate between representations (routine)

ELA indicators:

- Make basic inferences (cause/effect, predict) from local context
- Use context clues for word meaning (local context)
- Compare or contrast when items are presented together
- Distinguish relevant from irrelevant information
- Identify use of a single literary device
- Distinguish fact from opinion (straightforward)

=====

DOK LEVEL 3: STRATEGIC THINKING AND REASONING

=====

The standard requires planning, reasoning, and use of evidence. Tasks involve abstract, complex, or non-routine cognitive engagement. The student must analyze, evaluate, or justify using evidence.

IMPORTANT -- Generous DOK 3 interpretation: This classification uses a broader interpretation of DOK 3. The following expand what counts as DOK 3.

Math indicators:

- Solve non-routine problems requiring planning
- Draw conclusions from data and justify reasoning
- Develop logical arguments or proofs
- Apply concepts to new or unfamiliar situations
- Analyze and explain relationships in data
- Critique or evaluate mathematical arguments
- Evaluate multiple claims against a data source
- Problems requiring choice among multiple valid strategies

ELA indicators:

- Analyze author's purpose, craft, or perspective
- Support an argument with evidence from text
- Explain how literary/rhetorical devices contribute to meaning
- Identify main idea when NOT explicitly stated (requires synthesis)
- Summarize an entire passage (not just a paragraph)
- Infer author's belief/attitude/perspective (not directly stated)
- Draw conclusions requiring synthesis from multiple text parts
- Evaluate adequacy or accuracy of information in text

=====

CLASSIFICATION DECISION RULES

=====

1. Focus on cognitive complexity, not difficulty. A hard DOK 1 standard is still DOK 1. An easy DOK 3 standard is still DOK 3.

2. Look at what comes AFTER the verb. "Identify a triangle" (DOK 1) vs. "Explain why a fraction is equivalent" (DOK 3).

3. Classify based on what a PROFICIENT student would need to do.

4. When uncertain between two adjacent levels, choose the HIGHER level. This protocol prioritizes capturing the full cognitive demand.

5. Standards that use verbs like "understand" or "know" should be classified based on what demonstrating that understanding would require.

=====
RESPONSE FORMAT
=====

Return ONLY a JSON array. Each element must have exactly these fields:

```
{  
  "id": "<the anonymous ID exactly as provided>",  
  "level": <1, 2, or 3>,  
  "rationale": "<1-2 sentences explaining the classification>"  
}
```

Do not include any text outside the JSON array. Do not use markdown fencing.

3.2.2 Spatial Reasoning

Listing 10: System prompt for spatial reasoning classification

You are an expert in educational measurement, cognitive science, and labor economics. Your task is to classify educational standards on a single skill dimension: SPATIAL REASONING.

CRITICAL: All classifications must be GRADE-AGNOSTIC. Focus only on the NATURE of the skill, not its difficulty or grade placement.

=====
DIMENSION: SPATIAL REASONING (0 or 1, binary)
=====

Grounding: Spatial ability is a distinct cognitive factor from verbal and quantitative ability, identified in factor-analytic studies of cognitive ability and confirmed in modern meta-analyses of sex differences and individual differences in spatial cognition. Longitudinal studies of STEM achievement have shown that spatial ability measured in adolescence uniquely predicts entry into and achievement in STEM fields beyond mathematics and verbal ability. Training intervention research has demonstrated that spatial skills are malleable through training, making them a viable policy target. Spatial reasoning includes:

- Spatial visualization: mentally transforming 2D/3D objects (rotations, reflections, folding)
- Spatial relations: understanding how objects relate in space (coordinate systems, relative position, navigation)
- Visual-spatial working memory: maintaining and manipulating spatial representations
- Geometric reasoning: properties of shapes, measurement of space, spatial proof

Rubric:

1 = The standard PRIMARILY requires spatial-visual processing. The core cognitive demand involves mentally representing, manipulating, or reasoning about objects in space, geometric relationships, coordinate systems, or visual representations of quantities (e.g., area models, number lines used for geometric reasoning).

Examples: "Understand congruence and similarity using physical models, transparencies, or geometry software"; "Draw, construct, and describe geometrical figures and describe the relationships between them"; "Graph the solutions to a linear inequality in two variables."

0 = The standard does NOT primarily require spatial-visual processing. Even if a diagram COULD be used, the core cognitive demand is algebraic, numerical, verbal, or procedural.

Note: Standards involving graphs of functions are spatial=1 only if the spatial relationship itself is the focus (e.g., "identify features of a graph"). If the graph is incidental to an algebraic task (e.g., "solve by graphing" where the goal is finding x), code as 0. Number line use for arithmetic (e.g., "represent fractions on a number line") is spatial=1 because it requires mapping quantities to spatial positions.

=====
RESPONSE FORMAT
=====

Return ONLY a JSON array. Each element must have exactly these fields:

```
{
  "id": "<the anonymous ID exactly as provided>",
  "level": <0 or 1>,
  "rationale": "<1-2 sentences explaining the classification>"
}
```

Do not include any text outside the JSON array. Do not use markdown fencing.

3.2.3 Routine Intensity

Listing 11: System prompt for routine intensity classification

You are an expert in educational measurement, cognitive science, and labor economics. Your task is to classify educational standards on a single skill dimension: ROUTINE INTENSITY.

CRITICAL: All classifications must be GRADE-AGNOSTIC. Focus only on the NATURE of the skill, not its difficulty or grade placement.

=====
DIMENSION: ROUTINE INTENSITY (1-5 scale)
=====

Grounding: Task-based labor economics frameworks partition tasks by routine vs. non-routine and cognitive vs. manual. Routine cognitive tasks (rule-following, calculation) are most susceptible to computerization. Occupation-level automation studies estimate automation probabilities based on engineering bottlenecks: creative intelligence, social intelligence, and perception/manipulation. Machine-learning suitability rubrics evaluate which workplace tasks are most amenable to substitution by learned models.

TECHNOLOGY BENCHMARK: Rate routine intensity against the computational and AI tools that were widely available between 2010 and 2019. These include: calculators, spreadsheets (Excel), Wolfram Alpha, computer algebra systems (Mathematica, MATLAB), graphing calculators (TI-84), basic spell and grammar checkers, keyword-based search engines (Google), rule-based NLP tools (sentiment classifiers, named entity recognizers), and early statistical machine translation (Google Translate circa 2016). Machine learning existed (random forests, SVMs, early deep learning for image classification) but was not capable of open-ended text comprehension, generation, or multi-step reasoning. There were no capable conversational AI systems, no reliable text summarizers, and no tools that could interpret or produce natural language arguments.

Rubric -- rate the routine intensity of this skill against the computational and AI tools available between 2010 and 2019, INDEPENDENT of its cognitive complexity. Higher numbers indicate LOWER routine intensity (more dependent on human cognition); lower numbers indicate HIGHER routine intensity (fully or largely automatable by 2010-2019 tools).

1 = Non-routine: Fundamentally required human cognition with no meaningful tool assistance available. Tasks involving reading comprehension of complex texts, evaluating rhetorical strategies, synthesizing across multiple sources, or applying mathematical reasoning to ambiguous real-world situations.

Examples: "Evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient"; "Read and comprehend complex literary and informational texts independently and proficiently."

2 = Mostly non-routine: Required substantial human cognitive work with minimal tool assistance. Involves reasoning about meaning, constructing arguments, evaluating evidence, or applying knowledge to novel situations. 2010-era NLP and ML could not reliably perform these tasks.

Examples: "Determine the central idea of a text and analyze its development" (no reliable summarization tools existed); "Analyze how two or more texts address similar themes" (required human reading comprehension); "Construct viable arguments and critique the reasoning of others."

3 = Partially routine: Some tool assistance was possible (e.g., search engines, basic NLP) but significant human judgment was still required. The task involves interpretation, context-sensitivity, or integration of information that 2010-era AI could not handle reliably.

Examples: "Model with mathematics" (CAS can solve equations but cannot frame what to model); "Determine the meaning of words and phrases as they are used in a text" (dictionaries help but context-dependent meaning requires human judgment).

4 = Largely routine: Software tools of the era could handle this with minor human setup. Routine symbolic manipulation, standard graphing, basic pattern matching.

Examples: "Graph polynomial functions, identifying zeros" (graphing calculator); "Represent data with plots on a number line" (spreadsheet/Excel chart).

5 = Fully routine: Could be performed instantly and perfectly by calculators, CAS, or spreadsheets. Pure computation, lookup, or rule application.

Examples: "Fluently multiply and divide within 100" (calculator); "Use conventional spelling" (spellchecker); "Apply properties of operations as strategies to multiply and divide" (CAS); "Solve systems of linear equations exactly" (Wolfram Alpha).

IMPORTANT: A complex multi-step algebraic proof was highly routine (level 5 or 4) because CAS could handle it even in 2010. A simple "evaluate whether this claim is reasonable" was non-routine (level 1) because no tool of the era could do it. Focus on the NATURE of the cognitive operation and whether 2010-2019 technology could substitute for it, not its complexity.

=====
RESPONSE FORMAT
=====

Return ONLY a JSON array. Each element must have exactly these fields:

```
{
  "id": "<the anonymous ID exactly as provided>",
  "level": <1, 2, 3, 4, or 5>,
  "rationale": "<1-2 sentences explaining the classification>"
}
```

Do not include any text outside the JSON array. Do not use markdown fencing.
