EQUITY IN MOTION

MATH ASSIGNMENT ANALYSIS GUIDE

The Education Trust

edtrust.org/equity-in-motion

#EquityInMotion

HOW TO USE THIS ASSIGNMENT ANALYSIS GUIDE

We encourage you to use this guide as a resource when analyzing sets of assignments across multiple days or weeks within your classroom, school, or district. It can also be used to call out important features to consider during the assignment formation process.

We add a note of caution about its effectiveness when examining a single math assignment. And we caution against the notion that each assignment in a given classroom should include every feature or meet every indicator within this guide. Rather, we encourage you to look across multiple assignments to determine when and how often students are:

- working on tasks that are align with grade-appropriate math content and practice standards;
- experiencing assignments that require high levels of cognitive challenge;
- developing mathematical understanding of the skills and process as well as the concepts;
- using the language of mathematics to respond to arguments, justify conclusions, and communicate to others using precise language;
- engaging in tasks that hold relevance and support student choice;
- receiving light or heavy supports from teachers as they work toward independence.

ASSIGNMENT IDENTIFICATION

The scope of your assignment analysis and the parameters around which you want to report the data will be the driving factors in determining which contextual features of the assignment you want to capture. While these are not content elements of the framework, the information collected in this section will shape what comparisons you are able to make across multiple assignments. Basic information, such as the course, grade, etc., should be captured. For purposes of a blind analysis, you may also consider giving each assignment a unique identification number in place of the teacher's name.

GUIDING QUESTIONS

- Will the assignments collected cover multiple courses, teachers, or grade levels?
- Is it important for individual teachers to remain anonymous?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
What is the assignment identification number? **What course does this assignment come from?** **What is the grade level of this assignment?** **What is the source of this assignment?** **Does this assignment come from an honors course?** a) No b) Yes	• These are a few sample characteristics you may want to collect for each assignment. Consider the purpose of your analysis and how you hope to report the data before determining which features of the assignment you want to capture. You may also want to give each assignment a unique identification number for analysis purposes.
Is the assignment an exam or quiz? a) No b) Yes	• Typically, an assignment will be labeled as an exam or quiz in the title. This component can sometimes prove to be a useful data point when comparing the rigor of classroom assignments and classroom assessments. It is safe to assume the assignment is NOT an exam or quiz unless otherwise indicated.
Which best describes the length of the assignment? a) **Short/brief task** that is completed in **15 minutes or less** (e.g., do now, warm-up, exit ticket, journal reflection) b) A task that is completed within **one to two class periods** (e.g., performance task, extended discussion) c) A task that is a long-term, ongoing assignment completed over the duration of **multiple weeks** (e.g., project, research analysis)	• Use your best judgment to determine how long it will take students to complete the task. • While assignments may cover similar topics, or use the same materials over multiple days, this does not necessarily mean they are part of a long-term project.

ALIGNMENT

A college- and career-aligned assignment for mathematics must focus on all or part of a grade- or course-appropriate math cluster or content standard. Additionally, an aligned assignment clearly articulates the task so that students can fully understand what is expected of them as defined by the standard(s).

GUIDING QUESTIONS

- How do I ensure that my assignments address the math content standards AND the Standards for Mathematic Practice in a way that achieves the depth required by college- and career-ready math standards?
- How do I ensure that my assignments and expectations for student work are clear? What language and guidance do I provide to ensure clarity?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
Does the assignment focus on the depth of grade-level cluster(s), grade-level content standard(s), or part(s) thereof?* a) No – the assignment focuses on mathematics outside the grade-level standards or superficially reflects the grade-level cluster(s), grade-level content standard(s), or part(s) thereof b) Yes- the assignment focuses only on mathematics within the grade-level standards and fully reflects the depth of the grade-level cluster(s), grade-level content standard(s), or part(s) thereof	• *Language adapted from Student Achievement Partners Instructional Practice Guide • To be aligned, the assignment should reflect the depth of grade-level cluster(s), grade-level content standard(s) or part(s) thereof.
What is the primary content standard addressed in this assignment?	• While the assignment may touch on more than one standard, the primary content standard can be defined as the one standard that is most prevalent throughout the assignment.
Does this assignment build on or connect to additional content standards? *Check all that apply:* a) Within the same grade b) From a previous grade or course c) From a future grade or course	• Additional content standards can be defined as other standards that are addressed in the assignment aside from the primary content standard.
Does this assignment provide opportunities to incorporate the Standards for Mathematical Practice? *Check all that apply:* a) Make sense of problems and persevere in solving them b) Reason abstractly and quantitatively c) Construct viable arguments and critique the reasoning of others d) Model with mathematics e) Use appropriate tools strategically f) Attend to precision g) Look for and make use of structure h) Look for and express regularity in repeated reasoning	• In addition to alignment with math content standards, assignments should also provide opportunity for students to demonstrate the Standards of Mathematical Practice.

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
Does the assignment clearly articulate the task? a) No b) Yes	• Directions are clear and easily interpreted OR the assignment's format signals a routine procedure that is well-known by the students in the class.

COGNITIVE CHALLENGE

The cognitive work required to achieve conceptual understanding, procedural skills and fluency, and application of mathematical concepts ranges from simple to complex. Cognitive challenge within an assignment increases when questions and tasks become more complex and require students to communicate mathematical understanding and develop conceptual understanding. This framework utilizes Norman L. Webb's Depth of Knowledge Levels to capture this thinking.

GUIDING QUESTIONS

- When and how often do students experience an assignment that requires high levels of cognitive challenge?
- What am I asking of students during warm-ups and exit tickets? How could I repurpose these activities to promote higher levels of cognitive demand?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
What is the level of cognitive demand required by the assignment? a) **Recall and Reproduction** – Recall a fact, term, principle, concept; perform a routine procedure or a simple algorithm; or apply a formula b) **Basic Application of Skills/Concepts** – Use information, apply conceptual knowledge, select appropriate procedures for a task, complete two or more steps with decision points along the way, complete routine problems, organize/display data, or interpret/use sample data c) **Strategic Thinking** – Requires reasoning or developing a plan or sequence of steps to approach the problem; requires some decision-making and justification; it's abstract, complex, or non-routine; and there is often more than one possible answer d) **Extended Thinking** – An investigation or application to real world; requires time to research, problem-solve, and process multiple conditions of the problem or task; and requires non-routine manipulations across disciplines/content areas/multiple sources	• Based on Norman L. Webb's Depth of Knowledge Levels.
Does the assignment require high levels of cognitive demand? a) No b) Yes	• To meet this criterion, the assignment must align with strategic or extended thinking in Norman L. Webb's Depth of Knowledge Levels.

ASPECTS OF RIGOR

A central tenant of college- and career-ready math standards is the equal pursuit of rigor in three areas — conceptual understanding, procedural skills and fluency, and application — so that students can obtain an authentic command of mathematical concepts. Taken together, these aspects of rigor allow students to develop a deep understanding of mathematical content, carry out procedures flexibly and accurately, and apply their knowledge in mathematical situations. Importantly, these three should be pursued with equal intensity, over time. All three aspects of rigor do not do not always have to be presented together, just as they do not always have to be presented separately. Consider if students are required to build conceptual understanding or solve math problems by using or interpreting information that is represented two or more ways, including but not limited to data tables, graphs, symbols, and words.

GUIDING QUESTIONS

- How often do my assignments enable students to develop mathematical understanding of the skills and process as well as the concepts?
- Do I provide opportunities for students to build authentic understanding of math by presenting the same content in multiple ways?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
Which aspect(s) of rigor* does the assignment address? *Check all that apply:* a) **Conceptual Understanding** – the assignment provides an opportunity for conceptual understanding of key concepts; allows for accessing the concept from a number of perspectives in order to see math as more than a set of mnemonics or discrete procedures b) **Procedural Skills and Fluency** – the assignment provides an opportunity for practice of core functions, solving equations with speed and accuracy in calculation c) **Application** – The assignment provides an opportunity to use math flexibly for applications in problem-solving contexts	• *Based on the Key Shifts in Mathematics • Consider the proportion of the assignment that addresses any one aspect of rigor. Does at least 1/3 of the assignment address the aspect of rigor? • Also, consider the following: • **Conceptual Understanding** – does the assignment both offer alternative representations of abstract content like concrete and pictorial representations/ explanations and present the topic from a number of perspectives? • **Procedural Skills and Fluency** – does the assignment focus primarily on practicing computation or does this assignment allow for students to carry out procedures flexibly, accurately, efficiently, and appropriately? • **Application** – does the assignment require that students choose appropriate concepts for application even when not prompted to do so (e.g. word problems reduced to words around a problem vs. true application)?
Does this assignment provide multiple representations of mathematical concepts and/or equations? a) No b) Yes	• Consider if the assignment presents the math using two or more representations.

COMMUNICATING MATHEMATICAL UNDERSTANDING

A core principle of mathematical understanding is the ability to communicate one's thinking using the language of mathematics. This incorporates Standards for Mathematical Practice (SMP) 3 and 6, which note that mathematically proficient students construct and respond to arguments, justify their conclusions, and communicate to others using precise language. Opportunities for writing and discussion provide insight into student thinking and are useful indicators to measure when analyzing math tasks.

GUIDING QUESTIONS

- How often do I ask my students to justify a response, respond to an argument, or communicate their thinking to others?
- How can I incorporate SMP 3 and 6 into my assignments so that students are provided with opportunities to communicate their thinking using the language of math?
- When and how often do my students have the opportunity to participate in rich, structured, math conversations with their peers? As part of a whole class? In small groups?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
Does the assignment require students to communicate their understanding using the language of mathematics? a) No b) Yes	• Consider how students are asked to use the language of mathematics to express mathematical ideas precisely (attend to precision). For example, in writing equations, does the task explicitly require students to define the variables? • Consider the NCTM Process Standard for communication and Standards of Mathematical Practice 3 and 6. Does the assignment provide students an opportunity to: ✓ organize and consolidate their mathematical thinking through communication; ✓ communicate their mathematical thinking coherently and clearly to peers, teachers, and others; ✓ analyze and evaluate the mathematical thinking and strategies of others.
What is the writing output of the assignment? a) **No writing** or communication b) Writing **short phrases, up to 2 sentences** c) Writing **1 or more paragraphs**	•

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
How is discussion incorporated into this assignment? a) **No evidence** of discussion in this assignment b) The assignment includes **cues/moments for informal and/or brief discussion** c) The assignment includes **cues/significant time for formal and/or extended discussion**	• Use the assignment directions to guide your analysis. Focus on the discussion structure (brief/informal OR formal and/or extended). • Examples of informal and/or brief discussion: students required to "turn and talk," or “pair-share” work with a partner or collaborative group • Examples of formal and/or extended discussion: mathematical debates or extended discussions
What is the central purpose of the discussion within the assignment? a) **No evidence of discussion** in the assignment b) The central purpose is to **clarify the tasks or manage the logistics** within the assignment (e.g., students discuss the plan for the assignment, students talk with a partner if they need help/clarification) c) The central purpose **aligns with a Speaking and Listening Standard** and is anchored by course content (e.g., students contribute accurate and relevant information, students present knowledge and ideas using evidence and a clear line of reasoning, students consider and evaluate the ideas of others)	• Use the assignment directions to guide your analysis. Focus on the discussion purpose and content (e.g., is discussion to manage logistics OR is it aligned with CCR standards for speaking and listening).

MOTIVATION AND ENGAGEMENT

For students to thrive and achieve at high levels, educators must embrace both the content of the curriculum and the design of instruction. Both of these elements impact student attention, interest, motivation, and cognitive effort and must be considered in the design of assignments. Specifically, two key areas hold priority: choice and relevancy. Students must be given some level of autonomy and independence in their tasks, with rigor maintained across all options. And the tasks must be relevant by focusing on poignant topics, use real-world materials and experiences, and give students the opportunity to make connections with their goals, interests, and values.

GUIDING QUESTIONS

- Are there opportunities for my students to bring their own ideas, experiences, and opinions into the assignments I give them? Is so, when and how often?
- How do I bridge the known to the unknown for my students? Or how can assignments in my classroom offer students the opportunity to experience rigorous content — which may be unfamiliar or feel "foreign" — in a way that feels relevant for them?
- When and how do I give students choices in their assignments that support their autonomy?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS

Do students have choice in the assignment in one of the following areas: content, product, process, or tools? Is rigor maintained across all options?
 	
a) No
b) Yes
	• Choice in **content:**
	  ○ Broad topics are provided by teacher; students can narrow/or specify the topic.
	  ○ Content choices include problem-solving approaches, representations, etc.
	• Choice in **product**:
	  ○ Students are given a choice on how they will present their learning.
	• Choice in **process:**
	  ○ Students may work alone or with their peers.
	  ○ Students are given freedom to design their course of action and sequence their steps as they work on an assignment.
	  ○ Students manage their timelines and deliverables — with teacher support provided as needed.
	• Choice in **tools:**
	  ○ Students have the opportunity and are encouraged to use multiple mathematical tools (SMP 5).

Is the task relevant; does it focus on a poignant topic, use real world materials, and/or give students the freedom to make connections to their experiences, goals, interests, and values? a) No b) Yes	• Consider the relevancy of the assignment. Notice if it: • Focuses on a poignant topic (e.g., themes, essential questions, enduring understandings). • Uses real-world materials or pertains to real-world events. • Allows students to make connections to their own experiences, goals, interests, or values.

SCAFFOLDING

Teacher scaffolding speaks to the temporary supports teachers provide for students as they work toward independence.

Scaffolding can:

- range from light to heavy as teachers provide more or less support
- be present at particular moments within an assignment
- be ongoing, existing at each stage of the task for all students or only for those who need it
- appear in different forms in assignments (e.g., graphic organizers, discussion)

GUIDING QUESTIONS

- When and how do I use scaffolding in my assignments?
- When is scaffolding important for my students?
- When and how do I limit or remove scaffolding in my assignments?

QUESTIONS FOR ANALYSIS	CONSIDERATIONS
What is the amount of teacher supports and/or scaffolds in this assignment? a) **No scaffolding** in this assignment b) **Minimal/moderate scaffolding** in this assignment (e.g., scaffolding appears in one section of the assignment, scaffolding appears in less than half of the assignment) c) **Heavy scaffolding** in this assignment (e.g., scaffolding is ongoing in the assignment, scaffolding is present in more than half of the assignment)	• Look closely at the scaffolding in the assignment (e.g., problem starters, graphic organizers, checklists, detailed steps/procedures laid out, teacher-student conferences). • Consider *how much* support students are given.
What is the type of scaffolding in this assignment? *Check all that apply* a) **No scaffolding** in this assignment b) This **assignment itself is a scaffold** (e.g., students complete a graphic organizer, students take notes) c) This assignment is **broken down into small bits/chunks** (e.g., students work on very small tasks such as individual, discrete steps to solve a math problem) d) The **heavy cognitive work has already been given to students in this assignment** (e.g. the process, strategy or math tools have been laid out for students)	• Look closely at the scaffolding in the assignment (e.g., problem starters, graphic organizers, checklists, detailed steps/procedures laid out, teacher-student conferences). • Consider *the type(s)* of support students are given.

The Education Trust

Growing All Students Through High-Quality Assignments

Assignment Analysis Capture Sheet – MATH

ASSIGNMENT IDENTIFICATION	
What is the assignment identification number?	
What course does this assignment come from?	
What is the grade level of this assignment?	
What is the source of this assignment?	
Does this assignment come from an honors course?	
Is the assignment an exam or quiz?	
Which best describes the length of the assignment?	
ALIGNMENT	
Does the assignment focus on the depth of grade-level cluster(s), grade-level content standard(s), or part(s) thereof?	
What is the primary content standard addressed in this assignment?	
Does this assignment build on or connect to additional content standards?	
Does this assignment provide opportunities to incorporate the Standards for Mathematical Practice?	
Does the assignment clearly articulate the task?	
COGNITIVE CHALLENGE	
What is the level of cognitive demand required by the assignment?	
Does the assignment require high levels of cognitive demand?	

Assignment Analysis Capture Sheet- MATH

ASPECTS OF RIGOR	
Which aspect(s) of rigor does the assignment address?	
Does this assignment provide multiple representations of mathematical concepts and/or equations?	
COMMUNICATING MATHEMATICAL UNDERSTANDING	
Does the assignment require students to communicate their understanding using the language of mathematics?	
What is the writing output of the assignment?	
How is discussion incorporated into this assignment?	
What is the central purpose of the discussion within the assignment?	
MOTIVATION AND ENGAGEMENT	
Do students have choice in the assignment in one of the following areas: content, product, process, or tools? Is rigor maintained across all options?	
Is the task relevant? Does it focus on a poignant topic, use real-world materials, and/or give students the freedom to make connections to their experiences, goals, interests, and values?	
SCAFFOLDING	
What is the amount of teacher supports and/or scaffolds in this assignment?	
What is the type of scaffolding in this assignment?	

ABOUT THE EDUCATION TRUST

The Education Trust is a nonprofit organization that promotes closing opportunity gaps by expanding excellence and equity in education for students of color and those from low-income families from pre-kindergarten through college. Through research and advocacy, the organization builds and engages diverse communities that care about education equity, increases political and public will to act on equity issues, and increases college access and completion for historically underserved students.

EQUITY IN MOTION

ABOUT THIS SERIES

In this series, we will take a close look at how issues of equity are playing out in the daily activities of schools and educators. We aim to advance the work of practitioners and connect district, state, and federal actions aimed at improving education for low-income students with meaningful teaching and learning in schools. Most importantly, however, work in this series will continue to ask how we can adjust our practices, systems, and policies so that low-income students and students of color are actually benefitting from these efforts.

The Education Trust

edtrust.org/equity-in-motion

#EquityInMotion