



THIRD SPACE
LEARNING

School Leaders Guide To Middle and High School Math Assessment

A step-by-step breakdown of when and how to use different assessment strategies, including 14 detailed examples, tools and resources.

School and District Leader Guides

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Introduction to assessment

Assessment is much more than students sitting in rows taking a high-stakes test. It's an ongoing process that starts before teachers start teaching. It provides the foundation, goal, and guide for teaching and learning.

In math, assessments provide important information about:

- ✓ What students can do;
- ✓ Whether they've mastered content and skills;
- ✓ When students require intervention or extension to advance their learning.

Purpose of the guide

This is a comprehensive overview of summative, formative, and diagnostic assessment strategies with explanations, practical examples, and ready-to-use tools, templates and actionable insights.

Here's a quick look at what you can expect:

- 1 Why assessment matters:** Understand the importance of assessment in middle and high school.
- 2 Types of assessment:** Definitions and examples of summative, formative, and diagnostic assessments.
- 3 Summative assessments:** How to use summative assessments effectively.
- 4 Formative assessments:** Key formative assessment strategies and tools that are easy to implement.
- 5 Diagnostic assessments:** Learn about how diagnostic assessment helps identify and address learning gaps.
- 6 Practical strategies and tools:** Effective strategies and tools for implementing assessments.

Share this resource with your teaching team, use it to align your school leadership team, or refer to it during staff meetings and professional learning sessions.

Why we have developed this resource

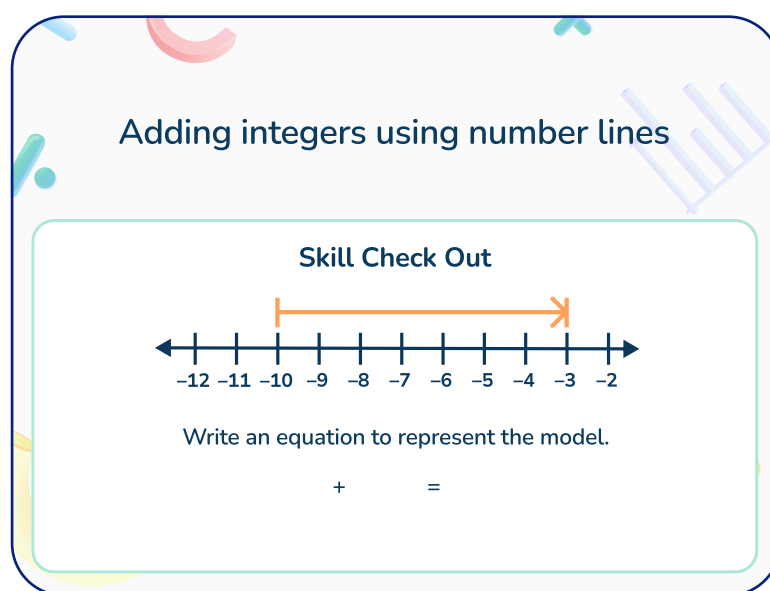
At Third Space Learning, we recognise the importance of effective assessment in elementary education. For over 10 years, we've partnered with over 4,000 schools and seen the positive impact of targeted, personalized support on student outcomes.


Every student receiving one-on-one tutoring with Skye, the AI math tutor, has various assessment opportunities throughout their program:

- ✓ Diagnostic assessments before each tutoring session
- ✓ Regular low-stakes quizzes and formative assessments during lessons
- ✓ Post-session quizzes

Skye focuses on individual misconceptions and provides actionable feedback to help students progress.

By sharing our expertise in this guide, we aim to help schools use assessments effectively to enhance student learning and progress.



 Example 7th grade skills check out question on adding integers with number lines

Assessment: the bridge between teaching and learning



Assessment is the bridge between teaching and learning – it is only through assessment that we can find out whether what has happened in the classroom has produced the learning we intended.

(William, 2011)

Assessments are crucial in determining if a student is truly learning by providing measurable evidence of their understanding and skill development. Assessments fundamentally ask the question, “Is the student learning? And how?”

Without assessment, teachers go through the motions of instruction, without a clear understanding of whether or not students have acquired the knowledge, concepts and skills to progress to the next level and be successful.

Here’s how schools and districts use assessment to bridge the gap between teaching and learning at three levels:

- ✓ Teachers
- ✓ School leaders
- ✓ District leaders

Teachers

Teachers collect and use a variety of assessment data:

- ✓ Standardized tests (NWEA MAP, state test data);
- ✓ Progress monitoring (benchmarking);
- ✓ Classroom-level data (student surveys, exit tickets, quick checks);
- ✓ Data from interaction with students (think-pair-share).

Teachers must continuously collect, analyze, and use data to inform instruction.

- ✓ **At the start of a lesson or unit:** teachers use pre-tests or diagnostic assessments to understand what students already know and identify any misconceptions they might have.
- ✓ **During lessons:** teachers use formative assessments, such as questioning strategies, exit tickets, student conferencing, quick checks, quick writes or think-pair-share, to gain an understanding of students' levels of knowledge and progression to the learning goal.
- ✓ **At the end of a unit:** a summative assessment, like an end-of-unit test, provides teachers with information about how well students mastered the content taught, and what concepts need remediation – this can vary per student.

“Our MAP data shows that **100% of all students in the program** who had low growth before starting made **measurable progress** by the end of the year. **75% of students** who had low growth and low achievement in December moved into high growth and high achievement, vs 18% of students in the same group who didn't receive the AI tutoring.”



Ryan Lucas, Principal
Governor's Ranch Elementary, Colorado





At each assessment point, teachers make decisions about content, pacing, and reteaching based on students' needs. Teachers make anywhere from 1000 - 1,500 decisions a day.

(Jackson, 1990)

For example, a teacher is teaching a lesson on equations. In the middle of the lesson, the teacher gives a short online quiz. As students take the quiz, the teacher notices that five students do not answer the questions correctly.

They then assign a set of problems for the class to complete independently and invite the five students who were not demonstrating mastery to the back of the classroom for a quick reteaching.

How the teacher uses the data ensures that students are not confused or making mistakes for too long.

In the long term, assessment data provides teachers with information about trends to answer the questions:

- ✓ Are students progressing through the curriculum?
- ✓ Are they mastering skills at the rate necessary to be ready for the next level?
- ✓ Which students aren't progressing?
- ✓ Which skills need to be retaught or reinforced?

School leaders

School leaders have access to data at the classroom and school level, such as:

- ✓ Student grades;
- ✓ Benchmarks;
- ✓ Standardized test results (state tests or NAEP results);
- ✓ NWEA MAP scores.

Assessment data helps school leaders provide a clear picture of student performance, and identify trends, and areas that need improvement.

With data, leaders can make informed decisions about:

- ✓ Curriculum adjustments;
- ✓ Resource allocation;
- ✓ Professional development;
- ✓ School goals.

Additionally, assessment data enables school leaders to monitor the effectiveness of instructional strategies, ensuring that the school is meeting its academic goals and addressing the diverse needs of its students. In particular, for teachers whose student data indicates an ongoing concern, principals may prescribe a plan for professional development.

Finally, school leaders use data to analyze the progress and achievement of subgroups. For example, are students from low-income households reaching the same level of achievement as their peers?

Analyzing data with a focus on equity ensures schools meet the needs of **all students**.

For example, when collecting, analyzing and interpreting data, use an equity lens to avoid bias.

Furthermore, when analyzing data, as it relates to academic performance, be sure to have an equity data framework to uncover student strengths and weaknesses instead of just focusing on deficits. If there is disparity in data, be sure to get to the root of the disparity.

Analyzing math performance with an equity lens involves examining how the various groups of students perform and identifying the existing disparities.

Here are some steps to take:

- ✓ Break down math performance data by demographics such as race, ethnicity, gender, English language proficiency, special education and socioeconomics;
- ✓ Spot patterns or trends in performance that may indicate inequities between the student groups;
- ✓ Ensure all student groups have access to high-quality math instruction and equal access to advanced math classes;
- ✓ Review whether there is equal access to tutoring, math clubs, and other support programs for all student groups;
- ✓ Assess whether culturally responsive teaching strategies are used and if all students feel represented in the curriculum;
- ✓ Engage with families and communities to understand their experiences and gather insights on challenges students might face;
- ✓ Set specific measurable goals aimed at closing gaps in math performance;
- ✓ Implement target-based intervention;
- ✓ Ongoing monitoring and data analysis to make adjustments.



Read: [Equity in Education: A Guide To Supporting Your Disadvantaged Students](#)

5 min read

District leaders

District leaders have access to all the student data in each of the schools such as:

- ✓ Standardized test results (state test data, NAEP);
- ✓ Benchmark assessments;
- ✓ Grades.

District leaders must identify district-level trends and use data to help all schools advance.

District leaders review school assessment data across multiple schools and can use this data to analyze school trends. This can help them identify areas of strength and weakness within the district.

For example, if one high school has an above-average ACT score or SAT score, the district leader can work with that school leadership team to understand how educators teach students content that transfers to the ACT and SAT tests.

The district leader can then establish district-wide professional learning communities with high school teachers to collaboratively learn, analyze data, and share best practices to increase student achievement.

District leaders also use data to understand how the district is progressing over time and analyze specific concerns such as:

- ✓ Performance of student subgroups;
- ✓ Strategies to close the achievement gap;
- ✓ Formulate and meet district academic goals based on the data.

Types of assessment

There are three main types of assessment:

- ✓ Summative
- ✓ Formative
- ✓ Diagnostic

Each serves a different purpose and each is used at various points in the learning process.

While definitions may differ slightly among schools and teachers, we'll use the following definitions in this guide:

Summative assessment

Summative assessment is any assessment that measures what students have learned or can do at an end-point.

In middle and high school, summative assessments are high-stakes and students' higher education can depend on the results of summative assessments.

Characteristics of summative assessment:

- ✓ Assess what students have learned;
- ✓ High-stakes;
- ✓ Standardized or administered and scored the same across test-takers;
- ✓ Graded according to a standard.

Examples of summative assessment:

- ✓ State assessments and NAEP (National Assessment of Educational Progress);
- ✓ Mid-term exams, final exams, quarterly assessments;
- ✓ AP, ACT and SAT.



Summative assessments have important information to inform long-term decision-making (**Moss, 2013**), however, there is not sufficient evidence to support the use of summative assessments to improve student achievement (Rosenshine, 2003; Yeh, 2007)

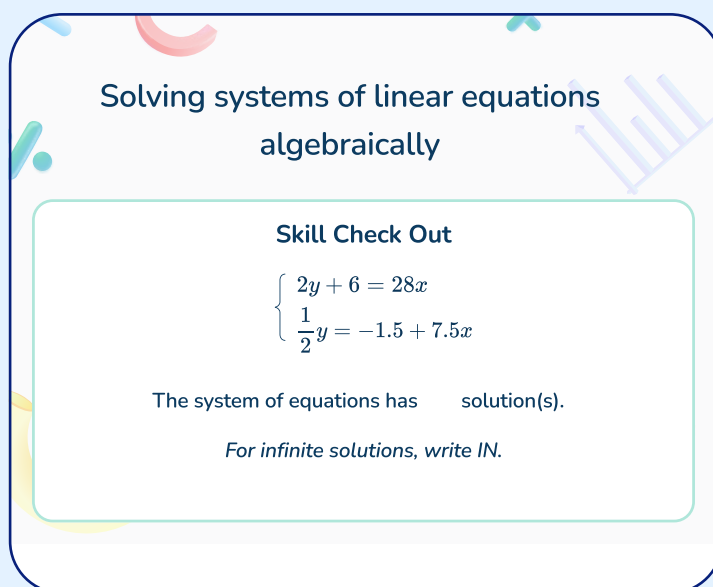
Yeh (2007) calculated the effect of summative assessment on student achievement was 0.05. This indicates that summative assessment has little impact on student achievement.



Summative assessment at Third Space Learning: Skill check out

Each Third Space Learning lesson starts with a skill check in and finishes with a skill check out, acting as a mini summative assessment of students' progress throughout the lesson. It helps evaluate students' learning and skill acquisition.

For example, if a student engages in a lesson about calculating unit rates with fractions, then their summative assessment will cover that skill.




Solving systems of linear equations algebraically

Skill Check Out

$$\begin{cases} 2y + 6 = 28x \\ \frac{1}{2}y = -1.5 + 7.5x \end{cases}$$

The system of equations has solution(s).

For infinite solutions, write IN.

 8th grade skill check out on solving systems of linear equations algebraically

Students' answers help Skye and class teachers understand how well they've understood the lesson content and which standards they still need to cover in the future.

Formative assessment

Formative assessment, also known as progress monitoring, collects and uses data through quick, informal assessments to adapt teaching to meet students' needs.

Characteristics of formative assessment:

- ✓ Assesses how students learn or demonstrate mastery in the moment;
- ✓ Low-stakes;
- ✓ Teacher-created;
- ✓ Sometimes standardized (for example, the NWEA MAP test);
- ✓ Provide real-time feedback for teachers .

Formative assessment allows teachers to answer three important questions:

- 1 What does the student know?
- 2 What does the student need to know?
- 3 How will the student get there?

Examples of formative assessment:

- ✓ Daily exit tickets;
- ✓ Check-ins (for example, writing answers on whiteboards);
- ✓ Think-pair-share;
- ✓ Quick writes;
- ✓ Quizzes (online or paper);
- ✓ Student interactions;
- ✓ Student teacher conferences.

Results from formative assessments confirm that students are learning in real-time.



Teachers use formative assessments to adjust teaching when students do not make progress, or if they have already mastered a skill.

(VanDerHeyden, 2013)

For example, during a lesson on triangles, the teacher assigns a practice problem to the class. While circulating, they notice that six students all have the same misconception.

When students are finished, the teacher takes time to address the misconception and have students correct their work.

This use of formative assessment provides teachers the opportunity to course-correct student learning so that they can keep students progressing on pace.



When teachers use the information from formative assessment to shape student learning, it can greatly impact student learning. Research identifies a formative assessment has a strong effect size of 0.9 on student achievement.

(Fuchs & Fuchs 1986)

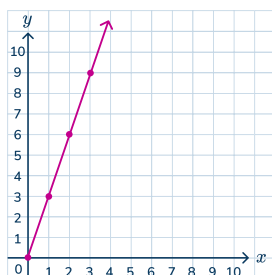
Formative assessment at Third Space Learning: Skill check in

At the start of each Third Space Learning session, students answer a skill check in question independently. The questions relate to the standards covered in the upcoming lesson with Skye.

If students answer the questions incorrectly, Skye will move to the prior learning slide to recap the topics and skills needed for the current lesson. If students answer correctly, Skye will move straight to the Let's Learn slide for the current standard.


Understanding slope of proportional relationships in graphs and tables

Skill Check In



Complete the statement with the correct numbers to describe the slope of the line.

The slope is which
means for every move on
the x axis, the line moves
on the y axis.

 Example 8th grade skills check in question on understanding slope of proportional relationships in graphs and tables

Diagnostic assessment

Diagnostic assessments and pre-tests aim to answer the question: What does the student know?

It identifies and evaluates the students' current knowledge and provides information teachers can use to plan effective lessons.

When teachers plan lessons, they often start with a diagnostic assessment. They may incorporate diagnostic assessment into the previous lessons' summative assessment, or a pre-test on the first day of a new unit to see what skills students already know.

	Summative assessment	Formative assessment	Diagnostic assessment
Purposes	<ul style="list-style-type: none"> To measure student mastery of skills taught To provide a grade as a measure of attainment To track student progress over time (from grade to grade) 	<ul style="list-style-type: none"> To monitor understanding in relation to the planned learning intentions To provide ongoing feedback about students' learning To identify and address misconceptions as they arise 	<ul style="list-style-type: none"> To understand what students know and can do at the start of a lesson To plan lessons that support students' background knowledge and advance specific skills
Design	<ul style="list-style-type: none"> High stakes Formal assessments Midterm exams End-of-unit projects 	<ul style="list-style-type: none"> Low stakes Quizzes Exit tickets Online quizzes 	<ul style="list-style-type: none"> Pre-test
Frequency	Given at the end of a specified period of study time (e.g. unit of work, term, year or key stage)	Ongoing during every lesson and at the end of a lesson or teaching episode	Given before a lesson or unit
Outcomes	<ul style="list-style-type: none"> Final grade Limited feedback 	<ul style="list-style-type: none"> In-lesson feedback Changes in instructional strategies and/or lessons 	<ul style="list-style-type: none"> Lessons that address student skills and deficits

Summative assessment

How to use summative data

Summative data is a tool to evaluate the effectiveness of instructional practices and identify curriculum areas that need to be adjusted. It also helps educators and school leaders make informed decisions about future teaching strategies, student support programs, and overall school performance goals.

A school or district assessment strategy should include:

- ✓ Clear goals around student progress;
- ✓ Assessments that provide information about how students master those goals;
- ✓ A plan to share and use results;
- ✓ Common assessments across subjects;
- ✓ Common rubric for scoring.

How to maximize the impact of summative assessment:

1 Align summative assessments with learning objectives

Internal, teacher-developed summative assessments should only include content already taught to students.

A strong summative assessment includes:

- ✓ Clear key objectives and standards;
- ✓ Questions align with the standards taught and are multiple-choice, or an open-ended format;
- ✓ A clear criteria for grading (rubric or point system);
- ✓ Shows what a student knows on the content being assessed.

Criteria	Does the assessment meet this criteria?	Notes or feedback
Key learning objectives and standards are clear		
Learning objectives and standards for this assessment align with the curriculum scope and sequence; they only assess taught content		
The format matches the standard. For example, an open-ended standard is assessed using an open-ended response format		
The grading scale or rubric is clear and written in student-friendly language		
The grading scale and rubric are objective and will produce an objective score		

2 Standardize conditions

Establish and enforce the conditions for summative assessments. If students are doing a timed math test, for example, make sure that all students have the same amount of time. Students with accommodations should receive the standardized conditions and their accommodations.

School leaders can:

- ✓ Administer assessments under consistent conditions to ensure fairness;
- ✓ Provide clear instructions and sufficient time for students to complete the assessments;
- ✓ Provide teachers with a list of students and their accommodations to ensure consistency;
- ✓ Consider student testing anxiety and provide the appropriate amount of information and support for students who demonstrate testing anxiety.

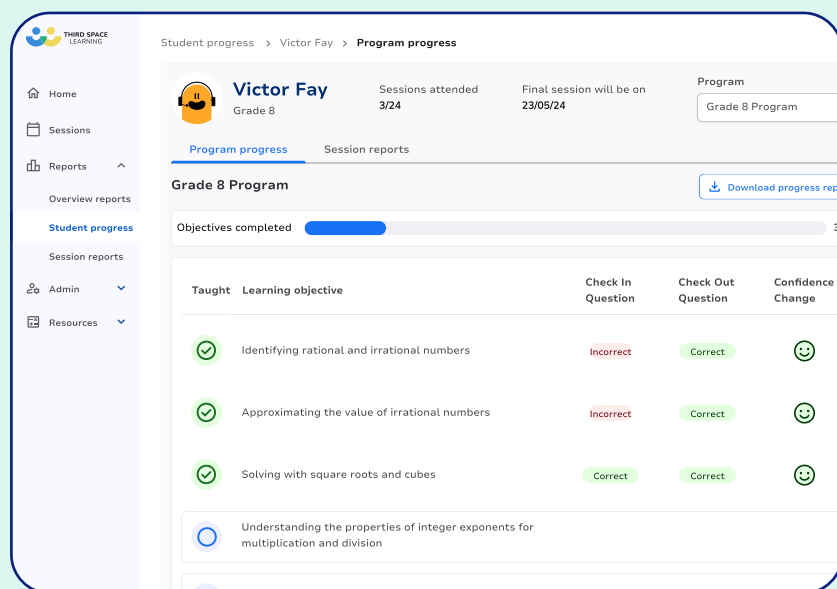
3 Analyze results for insights


Analyze results to identify strengths and areas for improvement at individual, group and class levels. Consider:

- ✓ Students whose assessment performance was higher or lower than expected;
- ✓ Students who have disabilities;
- ✓ Subgroups of students (low-income, ethnic minorities).

For example, a principal sets aside time for the 10th grade math department to review data from a recent math assessment. First, teachers talk about what they expect to see in the data.

Then, they review their data and arrange students into groups based on their results. The principal circulates and prompts teachers with questions about how their teaching impacted student results. In the end, teachers leave with standards and skills they need to focus on, and an understanding of where each student is in their level of mastery.



 Third Space Learning tutoring report for schools and teachers to review the data and track progress.

4 Inform future teaching

Summative assessments should inform future teaching strategies and curriculum planning. Use assessment data to identify topics to provide support and intervention.

For example, if information from a summative math assessment indicates students did not master the skill of representing fractions, incorporate additional practice with fractions into the next grade.

5 Reflect on results

Actively reflecting on results helps teachers understand how their decisions impact student learning.

For example, a teacher has tried a new teaching strategy in her classroom and wants to know if this strategy paid off. She reviews summative assessment results and notices that the students not mastering skills demonstrate significant growth. She concludes that the teaching strategy was successful and plans to incorporate it into future lessons.

Students can also review their summative assessments, including looking at each question, and analyze:

- ✓ Their strengths and weaknesses;
- ✓ How their behavior and study skills impacted their summative assessment result;
- ✓ How they can get additional practice or review of skills they missed.

6 Communicate results

At the end of each school year, school leaders provide information for parents about the high-level summative assessment results. Include:

- ✓ The results (school averages compared to the benchmark or average score);
- ✓ Ways the school is responding to the results;
- ✓ Opportunities for parents to ask questions.

For example, a school superintendent arranges a community meeting. In the first part of the meeting, the superintendent shares the district's goals and the district-level data and explains how the district's results are aligned with the goals.

One of the goals is for all students in AP math courses to earn a 3 or higher on the AP test. Data from the spring AP tests show that 90% of students scored a 3 or higher. The superintendent celebrates the high number, the increase from the previous years' results, and explains how the AP department is adjusting to ensure that the district moves closer to its goal.

7 Avoid over-reliance on summative assessments

While summative assessments provide valuable insights, they should be part of a bigger assessment strategy.

Summative assessments have a small impact on student learning so use the information to reflect and make changes rather than using them as the sole information about a student's progress or aptitude.

Summative assessment checklist

Use this checklist to understand and evaluate your use of summative assessments at the school level:

- ✓ Which summative assessments do students take while at your school? Create a list of all the summative assessments a student will take.
- ✓ Who takes each assessment?
- ✓ What is the purpose of the assessment?
- ✓ Who delivers the assessment?
- ✓ When and how are results shared with students?

Summative assessment	Student grade level	Purpose	Who delivers the assessment?	Which standards are assessed?	When are results shared?	How are results shared?
9th grade state test	9th graders	Determine grade level mastery	Homeroom teacher		1 week after test	Mailed to parents and school

For each assessment, analyze the results:

- ✓ What is the average score?
- ✓ What is the expected score or benchmark?
- ✓ How do subgroups score on this assessment?
- ✓ Which standards did students not meet expectations?

Grid to help analyze summative assessments

Summative assessment	Average score	Benchmark	Average by socio-economic status	Standards not meeting expectation	Average by race and ethnicity	Average of students with disabilities
7th grade math final assessment	8/10	10	Low-income: 7 Not low-income: 9	HSA.REI.C.6 HSA.REI.C.7	White: 8 Black: 7.5 Hispanic: 9.5 Asian: 9.5 Other: 6	With disabilities: 6 Without disabilities: 8.5

After you have analyzed the results, consider:

- ✓ What is the school doing well? Where are the strengths?
- ✓ What areas need improvement? Where should the school focus efforts?
- ✓ Based on this information, which instructional strategies appear to be working?
- ✓ What is a plan for “next steps”? What is the expected outcome?

Data analysis protocol

Use this protocol with your teachers to analyze and use insights to improve teaching and learning. This protocol can be used with summative, assessment or diagnostic data and with teachers or school leaders.

Preparation: Bring data that you have organized and is ready for analysis.

1. Ask questions

- a. What questions do you have about the data?
- b. Based on student work in class, what do you expect to see?

2. Review data

- a. What do you notice about the data? Are there trends? (Trends based on performance, trends based on standards, trends based on skills or questions?)
- b. Did you notice anything about the data that confirms or refutes your thinking?
- c. Was there anything in the data analysis that surprised you?

3. Reflect

- a. Thinking about your classroom, what actions had a positive impact on these results?
- b. What had an undesired impact?
- c. Where is your area of focus?
- d. What changes could impact student results? What is the desired outcome?

4. Take action

- a. Create a goal
- b. Write action steps to fulfill the goal
- c. Include the timeline for those steps

Formative assessment

How to use formative data

Formative assessments have a powerful impact on student learning by providing real-time feedback that helps both teachers and students identify areas for improvement. By continuously monitoring progress through informal checks, teachers can adjust their teaching strategies to meet students' needs, while fostering a more personalized and effective learning experience.



Classroom formative assessment makes more difference to student achievement than anything else that we could do.

(William, 2020)

Before the lesson

Check students' starting point and prior knowledge

Use formative assessment before starting a lesson or new topic.

For example, ask students to share what they already know about a topic or give a quick pre-assessment before starting a lesson. Be sure to align the pre-assessment to standards that are prerequisites to the new concepts.

During the lesson

Mid-lesson check-in

Provide a check-in during teaching to ensure students understand the learning.

For example, a teacher asks students to hold up whiteboards with a response written on it. Teachers can also infuse digital game playing to quickly check skills.

Specific and timely feedback

Provide timely, actionable feedback to students.

For example, use student conferencing to provide specific feedback on student responses. Give clear feedback on what the student did well and where there is a misconception.

Another example is to provide students with feedback after they complete a quick check by pulling a small group of students to address misconceptions. Using digital platforms to check for understanding might be beneficial because they often have built in tutorial videos to assist students.

Formative assessment answers these three questions, in this order:

- ✓ Is the student understanding the concepts to move forward in learning?
- ✓ Where in the learning is the student?
- ✓ How will the student get there?

Is the student understanding the concepts to move forward in learning?

Teachers must know where a student is going in their learning:

- ✓ What skills do they need to know?
- ✓ How will they demonstrate that skill?

Educators must also know the pitfalls that can take a student off-course. What errors or misconceptions can arise that may impact student learning?

When teachers know this, they can ask questions to identify where the student is in relation to where they are going.

Where in the learning is the student?

This is where the role of formative assessment comes into play. Teachers can choose from a variety of formative assessments to assess where the student is in their learning.

Choose activities based on the assessment exercise that best matches the type of information you want to know.

How will the student get there?

Teachers must then use the information gained from the formative assessment to help bridge the gap between where the students are now and where they are going.

Feedback is the most powerful way to do this:

1 Feedback



Verbal feedback is better than grades or other indicators.

(Black & William, 1998)

Feedback should be specific and actionable so students can apply the feedback to change what they are doing.

Teachers can give feedback in a variety of ways:

- ✓ **Verbal feedback:** immediate, spoken feedback during class.
- ✓ **Written feedback:** students read and implement it on their own.
- ✓ **Description feedback:** focuses on the learning process, highlights what students did correctly and provides clear steps to ensure understanding.
- ✓ **Corrective feedback:** identifies errors and explain how to fix them.
- ✓ **Encouraging feedback:** provides students with positive reinforcement that is motivating to students by acknowledging effort and progress.



Read more: [Whole Class Feedback: How To Boost Learning In The Classroom](#)

6 min read

2 Self-assessment and reflection

As middle and high school students progress in their skills, self-assessment and self-reflection encourage learners to take ownership of their learning which builds their metacognition, or understanding of how they learn.

Providing opportunities for students to evaluate and reflect on their performance on tasks or assessments is essential to them being able to identify their strengths and areas for improvement. Students being able to self-assess fosters self-awareness and responsibility which ultimately leads to independence in learning.

Effective formative assessment strategies

1 Questioning

Questioning is a formative assessment strategy when teachers use students' answers to adjust instruction.

Closed questions

Closed questions are used during the 'I do' or teacher-led portion of a lesson to ensure that students are following along with the content.

Open-ended questions

Open-ended questions such as "What do you notice?", "How do you know?" or "Can you show me?" are powerful because they encourage students to explain their thinking, not just produce a response.

For example, a teacher explains how to complete a geometry proof. They ask closed questions and call on students to answer. The teacher carries a clipboard with students' names and marks a check each time the student answers a question correctly or a minus if the student does not answer correctly. By the end of the lesson, the teacher has a list of students who understood and those who did not.



Read more: [Effective Questioning In The Classroom: 9 Tried and Tested Techniques For Teachers](#)

5 min read

2 Low-stakes assessments

Regular low-stakes assessments such as quizzes are short and typically have limited consequences for students, for example, a weekly ten-minute quiz about the previous week's work.

Low-stakes quizzes may be used for:

- ✓ **Retrieval practice:** Improved retention of recently learned information via the testing effect.
- ✓ **Diagnostic assessment:** Teachers use results to identify key misconceptions or continued gaps in students' knowledge. If a quiz is used once, it is not formative, but if it is used over time to identify how students are progressing in a skill, then it becomes formative. See more detail in the diagnostic assessment section.
- ✓ **Instant feedback:** Self or peer assessment can provide short, meaningful actions to be taken. Teachers can provide targeted verbal feedback to those making more persistent errors.
- ✓ **Improving metacognition:** Encourage students to reflect on their results and identify target topics for independent work. See the section on Metacognitive Prompts for more ideas.

3 Online quiz

Online quizzes engage students as they move at their own pace and receive instant feedback on correct and incorrect answers. Some online platforms even practice problems on the concepts students answered incorrectly so that they can practice skills.

They also provide teachers with information about which students are answering correctly and which are not.

4 Small-whiteboards

When used consistently across the school, whiteboards can assess students' ability to perform math skills and give teachers instant feedback about which students can perform the skill and who cannot.

Routine for small whiteboards:

- 1 Students **must not** show their boards to anyone until everyone has sufficient time to respond
- 2 The time allowed should be relative to the difficulty of the question asked, 5-10 seconds is sufficient for quickfire questions
- 3 Give students a predictable verbal indicator that they need to show their answers, for example, a countdown from three/five and "Show me"
- 4 Make a mental note of students who answer incorrectly or took longer time - these are the students to target during independent work
- 5 Repeat questioning until all students get questions correct - peer support could identify and dispel persistent misconceptions



Read more: [Small-Whiteboards: 7 Ways To Use Teachers' Favourite Classroom Resource](#)

7 min read

5 Think-pair-share

The teacher asks a question and has students think for a minute before sharing their ideas with a peer. This is a good way to get information if the teacher asks students to share what they talked about or what they shared with their peers.

For example, students are learning how to solve multi-step word problems. The teacher posts a problem and has students engage in a think-pair-share. The students think about what information they need to solve the problem and then share it with a partner.

After the think-pair-share, the teacher asks students to share what they discussed and asks if any groups were stuck.

6 Error analysis

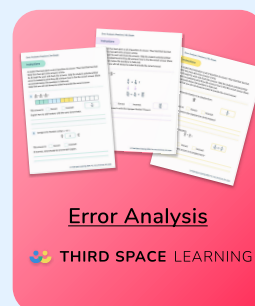
Error analysis problems allow students to identify and correct mistakes in problem solving. Analyzing errors, students develop a deeper understanding of mathematical concepts and processes while improving critical thinking and problem solving skills.

For teachers, error analysis provides valuable insight into common misconceptions enabling them to target specific areas of difficulty.



Third Space Learning's [error analysis](#) problems challenge your students to analyze errors and explain their mathematical reasoning.

Each error analysis pack tasks students with becoming the teacher to check a series of completed questions, identify any errors made and correct them.



7 Exit tickets

An exit ticket is a short low-stakes question or exercise. They are usually issued at the end of a lesson and printed for students to hand in when they leave.

Alternatively, exit tickets can be presented on-screen, which means the question(s) can be adapted if the lesson does not proceed as planned. For example, if some content has not been covered).

Teachers can collect and analyze student responses before the next lesson so they can adjust instruction accordingly. For example, if a group of students demonstrates a consistent error, the teacher can address that misconception and work with the group of students in the next lesson.



Third Space Learning has a collection of prewritten [exit tickets](#) across multiple domains and grades to help you assess your students' understanding with ease.

Each pack has printable exit tickets for individual students or a PowerPoint to assess the whole class. Clear answer sheets allow for quick assessment, peer assessment and self-assessment.



Name:

Standard: 7.RP.A.2a
Focus: Decide whether two quantities are in a proportional relationship.

Directions: Circle all tables that show a proportional relationship between x and y.

x	y
10	2
20	4
25	5

x	y
2	8
4	12
8	16

x	y
3	9
5	15
7	21

x	y
8	6
10	8
12	10

x	y
3	4
6	8
12	16

x	y
4	1
12	3
16	4

THIRD SPACE LEARNING

Example exit ticket following a lesson on properties of 2D shapes



Read more: [10 Exit Ticket Ideas To Use In The Classroom \[Includes Exit Ticket Templates\]](#)

6 min read

8 Example-problem pairs

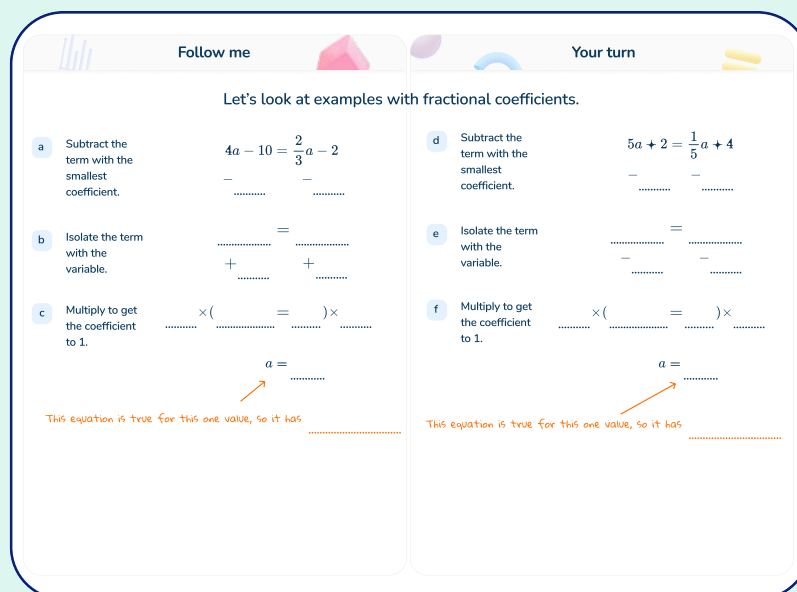
Example-problem pairs are commonly used for the rehearsal of a new method or concept.

In an example-problem pair:


- ✓ The teacher completes a worked example;
- ✓ Students complete a mirrored example (e.g. some numbers are changed);
- ✓ The process is repeated until all students can successfully replicate the task.

The teacher uses responses to draw out and address misconceptions and to decide whether to provide an alternative model for understanding.

However, if all students immediately answer correctly, they are likely ready to move on to deliberate independent practice of the new concept.



The screenshot shows a digital interface with two columns: 'Follow me' and 'Your turn'. Both columns have a header with a small icon and the text 'Follow me' or 'Your turn'. Below the headers, the text 'Let's look at examples with fractional coefficients.' is centered. The 'Follow me' column contains three steps (a, b, c) for solving the equation $4a - 10 = \frac{2}{3}a - 2$. Step a: 'Subtract the term with the smallest coefficient.' shows the equation with a line under $\frac{2}{3}a$. Step b: 'Isolate the term with the variable.' shows the equation with a line under $4a$. Step c: 'Multiply to get the coefficient to 1.' shows the equation with a line under $4a$. The 'Your turn' column contains three steps (d, e, f) for solving the equation $5a + 2 = \frac{1}{5}a + 4$. Step d: 'Subtract the term with the smallest coefficient.' shows the equation with a line under $\frac{1}{5}a$. Step e: 'Isolate the term with the variable.' shows the equation with a line under $5a$. Step f: 'Multiply to get the coefficient to 1.' shows the equation with a line under $5a$. Both columns have a final line: 'This equation is true for this one value, so it has a = _____'.

 Use of example problem pairs in Third Space Learning's one-on-one AI math tutoring sessions.



Read more: [Differentiated Instruction: 9 Differentiated Curriculum And Instruction Strategies For Teachers](#)

6 min read

9 Metacognitive prompts

Metacognition is an introspective, intentional examination of our thoughts, feelings and mental processes. It is often described as “thinking about thinking.”

This can include:

- ✓ Planning a strategy to solve a problem or learn a new skill;
- ✓ Monitoring progress, adapting the planned strategy where necessary;
- ✓ Evaluating how things have gone and changes that can be made for the future.

While metacognition is a powerful tool, some students struggle with it. Providing prompts can help them to verbalize some of their ideas and begin to identify where their next steps might be.

For example, here are a few examples of prompts you could give to assist when solving a more complex, multi-step problem:

- ✓ What are the most important parts of this question?
- ✓ What do you already know that might be relevant to answering this question?
- ✓ Have you seen a problem like this before?
- ✓ What strategies could you try if you get stuck?
- ✓ Do you understand the solution?



Read more: [What Is Metacognition And Why Does It Matter For Education?](#)

5 min read

10 Red-yellow-green

For middle school and high school students, use the color system of red-yellow-green to identify their level of understanding at the end of the lesson.

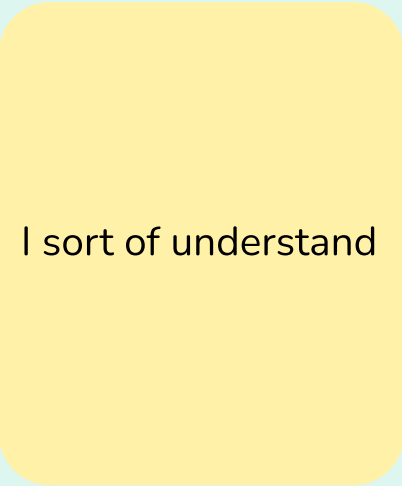
A common strategy is to have students write their name on a red sticky note if they are “completely lost”, on a yellow sticky note if they “sort of understand” but need more help, and on a green sticky note if they understand.

As they leave the classroom, have students place the sticky note on the wall. The teacher can then use the sticky notes to help inform grouping and instruction for the next class.

For example:



I understand



I sort of understand



I am completely lost

Using formative assessment data

Self-assessment and reflection

As students progress in their skills, self-reflection helps build their metacognition and an understanding of how they learn.

Students can review a short quiz to identify questions or areas they need help in.

For example, a high school teacher has students review each quiz before they turn it in. Students note how confident they are in their answers and the skills, and gives them a chance to write a personal reflection or question for the teacher.

Teachers can use student reflection to incorporate skills students lacked confidence in into upcoming lessons.

Formative assessment observations

Use this tool to observe how a teacher is implementing formative assessment

Observation	Yes/No	Notes
Teacher has posted the objective for the lesson		
Students are clear on what they are learning		
Students are active participants / learners (Think-pair-share, etc)		
Teacher has a procedure in place to call on all students		
Teacher uses a variety of planned and spontaneous/responsive formative assessment methods		
Teacher has a way to monitor formative assessment data		
Teacher provides feedback to students		
Teacher reflects on lesson's effectiveness		

Reflect on formative assessment data

Reflect on formative assessment data to make adjustments in the moment, such as when a student answers a question incorrectly and the teacher identifies and corrects a misconception.

Or, use formative assessment data to plan future lessons and interventions.

Use this data analysis protocol to organize and reflect on formative assessment data.

What was the lesson objective?	How many students mastered the objective?	Which students did not master the objective?	For those that did not, which errors do you notice? Can you group students by error type?
How will you address student errors and when?			

Use the data analysis protocol to engage in reflection and action around formative assessment.



How Third Space Learning use formative assessment data

Third Space Learning's formative assessments focus on the teaching process. Conducted at the beginning of each lesson, they provide in-depth insights into students' knowledge and offer methods and strategies to help Skye, the AI tutor, adapt teaching accordingly.

Guided by ongoing tutor assessment, Third Space Learning's sessions contain multiple pathways to allow students to move quickly through areas they are confident in and receive additional support in areas they struggle with.

Diagnostic assessment

How to use diagnostic assessment

Diagnostic assessments align with the standards and outcomes of a lesson or unit. They're used at the start of a lesson or activity to determine students' understanding.

They are low-stakes and focus on a few areas of student understanding with the aim to help teachers identify specific areas of:

- ✓ Student mastery;
- ✓ Learning gaps;
- ✓ Misconceptions.

For example, a teacher might give a diagnostic test to determine what students know about the Pythagorean theorem.

After the diagnostic, the teacher can see that students know when to use the theorem, but not how to apply it.

Consequently, they plan additional application practice for students.

Effective diagnostic assessments

1 Multiple-choice questions

Diagnostic questions act as a pre-exit ticket with a question that students should be able to answer by the end of the lesson.

Closed, multiple-choice questions are good diagnostic questions as they do not require students to work problems they may not know yet.

You can also include an “I do not know yet” option since it is a pre-test.

For example, when learning about prime factors, you may ask students: “What are the prime factors of 20?” and provide answers that include prime factors and non-prime factors of 20 to identify misunderstandings.

Multiple-choice diagnostic questions should be designed to identify specific misconceptions. Every wrong answer given by a student should highlight the part of that concept they do not yet understand.



Every student completes a skill check in question relating to the lesson before starting their Third Space Learning tutoring session. Skye uses the results to personalize student learning based on the student's answers.

Solving systems of linear equations algebraically

Skill Check In

$$\begin{cases} y = 12x - 2 \\ 1 = -6x + \frac{1}{2}y \end{cases}$$

The system of equations has solution(s).

For infinite solutions, write IN.



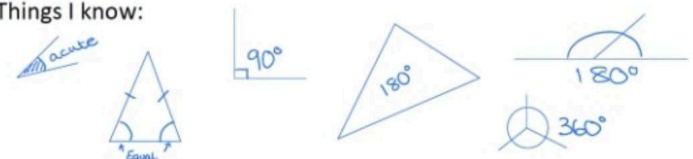
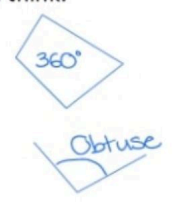
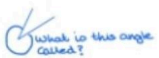
Example 8th grade skill check in question on solving systems of linear equations algebraically


2 Quick writes

Quick writes, also known as brain-dumps, require students to write down everything they know about a given topic.

This helps the teacher check and assess prior knowledge to determine the most appropriate starting point for a new topic.

Students can do this informally on blank paper, a whiteboard or even a Google Form.

Things I know: 		
I think: 	Topic: Angle Properties I would like to know: What do the angles add up to in bigger shapes? 	Key Words: Acute Angle Triangle Right-angle straight line Isosceles Obtuse

 Example quick write for students to brain dump all of their angle knowledge

3 Concept map

Concept maps are a related strategy where students brain-dump and draw the links they already know between different parts of a new topic. This helps to emphasize connections between math topics.

4 Always-sometimes-never

Always-sometimes-never tasks generally take more time than simple diagnostic questions. They are more open-natured and require more discussion time, either as a small group or class.

Teachers provide students with a series of statements connected to a particular topic. The goal is to group these statements under three headings:

Teachers provide students with a series of statements connected to a particular topic. The goal is to group these statements under three headings:

- ✓ Always true;
- ✓ Sometimes true;
- ✓ Never true.

For example:

Always true	Sometimes true	Never true
A triangle has three sides	A triangle's sides are all the same length	A triangle's angles add up to more than 180 degrees
Sin, cosine, and tangent are based on a right triangle	Sin, cosine, or tangent can be equivalent	The length of the angle's sides changes the ratio

Using diagnostic assessment to support student achievement

Diagnostic assessment can have a positive impact on student achievement when teachers and school leaders:

- ✓ Clearly define the knowledge and skills that each diagnostic assessment is measuring, ideally diagnostic assessments should be aligned with summative assessments to create a clear trajectory of student progress;
- ✓ Incorporate informal diagnostic assessments into routine instruction;
- ✓ Dedicate time reviewing and analyzing results;
- ✓ Plan activities and interventions based on results.

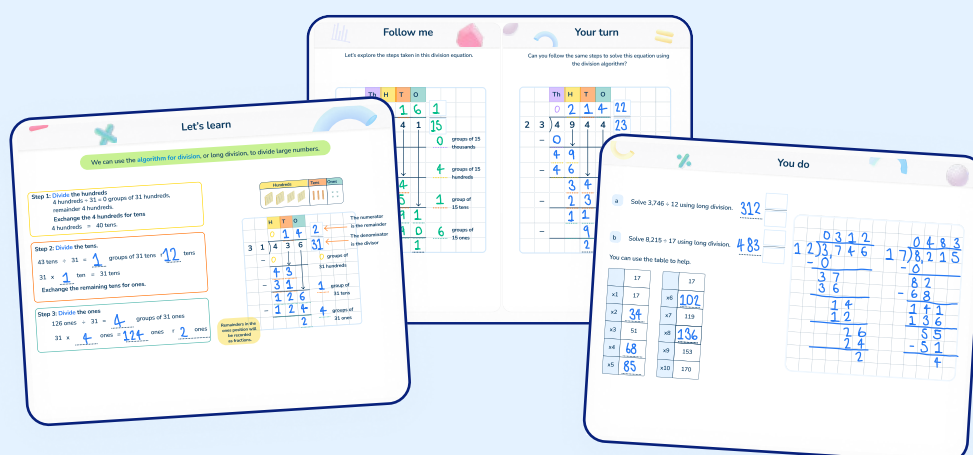


How we use diagnostic assessment in online one-on-one tutoring


Here at Third Space Learning, our AI math tutor, Skye, uses pre-assessment, assessment for learning and post-assessment to monitor student progress and personalize learning in real-time to ensure maximum student achievement.

You choose which standards each student needs additional practice with each week, and Skye uses diagnostic assessments throughout the session to adapt the pace and pitch for each student.

For an even simpler experience, you can send us students' assessment data and we'll personalize the pathways for you.



The image displays three overlapping screenshots of the Skye AI math tutor interface. The top-left screen, titled 'Let's learn', shows a step-by-step guide for dividing 31 by 12 using long division, with a place value chart and a multiplication table. The top-right screen, titled 'Follow me' and 'Your turn', shows a similar interface for practicing division. The bottom-right screen, titled 'You do', shows a student's work on a division problem, with a multiplication table and a list of numbers to be divided.

 Diagnostic assessment helps Skye adapt teaching in real time to meet the student's needs

Using diagnostic assessments effectively

To maximise the benefits of diagnostic assessments, it is essential to integrate them into a broader assessment strategy. Here are some key considerations and practical tips for using diagnostic assessments effectively in middle and high schools:

✓ Align with learning objectives

Clearly define what knowledge and skills the assessment is intended to measure. Diagnostic assessments must align with the intended knowledge and skills assessed, the learning objectives and state standards.

✓ Use informal approaches

Incorporate diagnostic assessments into everyday classroom activities to reduce students' anxiety around testing. Use informal methods, such as questioning and observations, to gather diagnostic data.

✓ Analyze results for insights

Use the data from diagnostic assessments to identify specific learning gaps and misconceptions. These results should inform targeted instructional interventions.

✓ Plan targeted interventions

Design targeted interventions and additional support for individual students to address identified learning gaps using diagnostic data. Maximize use of the data to create individualized learning plans and set achievable goals.

✓ Monitor progress

Administer regular diagnostic assessments to monitor student progress and adjust interventions as needed.

Subsequent diagnostic data can track improvements over time and ensure that students are making progress.

Final word on assessment

Summative, formative, and diagnostic assessments enable teachers to monitor student achievement, inform instructional practices, and identify specific learning needs. To help you get started, we've included an assessment tool picker overleaf to help identify what kind of assessment you need when.

Third Space Learning tutoring complements these assessment strategies by providing **personalized, one-on-one support** tailored to each student's unique needs.

Our expert AI tutor uses the insights gained from various assessments questions to **personalize each student's learning journey** and address their specific gaps. This targeted approach helps students **build their confidence in math**.

By incorporating different assessments into our tutoring programmes, we've helped schools to support multiple students simultaneously, at scale, and at a price that works for school budgets. Find out more about the [one-on-one math support](#) for middle and high schools like yours.

Assessment tool picker

Purpose	Type	Strategies to try
Measure if students have mastered content taught in a unit	Summative	<ul style="list-style-type: none"> • End-of-unit test • Final project
Track student progress over years	Summative	<ul style="list-style-type: none"> • Grades • Standardized tests (NWEA MAP, State tests)
Track student progress over months	Formative	<ul style="list-style-type: none"> • NWEA MAP • Teacher created tests
Check students' starting points before planning a teaching episode	Diagnostic	<ul style="list-style-type: none"> • Diagnostic questions • Quick writes • Concept maps • Confidence indicators
Ensure that any pre-requisite knowledge is secure before introducing a new concept	Diagnostic	<ul style="list-style-type: none"> • Diagnostic questions • Low-stakes assessments
Provide a "live" check during a teaching episode to see whether students are following the explanation given	Diagnostic	<ul style="list-style-type: none"> • Example-problem pairs • Mini-whiteboards • Questioning • Think-Pair-Share • Online quiz • Red-Yellow-Green
Provide feedback on the pace of the lesson	Formative	<ul style="list-style-type: none"> • Questioning • Mini-whiteboards • Red-Yellow-Green • Think-Pair-Share
Check to what extent the learning accomplished by students matches with the learning that was planned	Formative	<ul style="list-style-type: none"> • Questioning • Quiz • Exit ticket • Error Analysis • Metacognitive prompts
Provide students with actionable next steps for their learning	Formative	<ul style="list-style-type: none"> • Giving feedback
Involve students actively in their learning and promote independence	Formative	<ul style="list-style-type: none"> • Giving feedback • Metacognitive prompts

References

Black, P., & William, D. (1998). Assessment and Classroom Learning. *Assessment in Education*, 5, 7-74. <https://doi.org/10.1080/0969595980050102>

Fuchs, L. S., & Fuchs, D. (1986). Effects of systematic formative assessment: A meta-analysis. *Exceptional Children*, 53(3), 199-208.

Jackson, P. W. (1990). *Life in Classrooms*. NY: Teachers College Press.
www.winginstitute.org/effective-instruction-assessment

Moss, C. M. (2013). Research on classroom summative assessment. In J. H. McMillan (Ed.) *Handbook of Research on Classroom Assessment*, 235-255. Los Angeles, CA: Sage.

Rosenshine, B. (2003). High-stakes testing: Another analysis. *Education Policy Analysis Archives*, 11(24), 1-8.

States, J., Dietrich, R., & Keyworth, R. (2017). Overview of Formative Assessment. Oakland, CA: The Wing Institute. www.winginstitute.org/student-formative-assessment

States, J., Dietrich, R., & Keyworth, R. (2018). Overview of Summative Assessment. Oakland, CA: The Wing Institute. www.winginstitute.org/assessment-summative

VanDerHeyden, A. (2013). Are we making the differences that matter in education? In R. Dietrich, R. Keyworth, & J. States (Eds.). *Advances in Evidence-Based Education: Vol 3. Performance Feedback: Using data to improve educator performance*, 119-138. Oakland, CA: The Wing Institute. www.winginstitute.org/uploads/docs/Vol3Ch4.pdf

Yeh, S. S. (2007). The cost-effectiveness of five policies for improving student achievement. *American Journal of Evaluation*, 28(4), 416-436.



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Looking to improve your school's maths results without stretching your budget?

Tutoring from our spoken AI maths tutor Skye gives schools an even more affordable option for every pupil.

- ✓ 90% cheaper than other tutoring providers
- ✓ Curriculum-aligned lessons designed by qualified teachers
- ✓ Discounts available for long-term bookings and MATs

93% of teachers feel Third Space Learning lessons helped their pupils achieve higher assessment scores.

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