

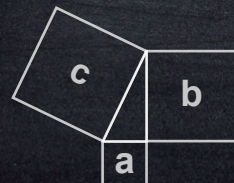
$$(x+3)^2=4$$

Powerful Mathematics Instructional Practices

$$\text{slope} = \frac{\Delta y}{\Delta x}$$

Teacher Behaviors	Student Behaviors	Artifacts
Planning for and Ensuring a Balanced Approach to Mathematics The teacher: <ul style="list-style-type: none">Provides instruction, tasks and assessments that present non-routine, abstract or real-world scenarios and promote a balance of factual, procedural and conceptual knowledge	The students: <ul style="list-style-type: none">Explore and discuss multiple strategies to solve a given problem, reflect upon which method is most efficient and explain why certain procedures workCritique each other's strategies	Assignments and assessments: <ul style="list-style-type: none">Show that students use precise mathematical language in their written products, like math notebooks, to explain how they solved authentic problems or tasksInclude summative and formative assessments that examine students' ability to use factual knowledge, understand mathematical concepts and reason and apply math procedures
Engaging Students in Assignments That Matter The teacher: <ul style="list-style-type: none">Engages students in meaningful, complex assignments that require problem solving, reasoning and mathematical modelingFrames assignments by articulating learning goals and criteria for successProvides feedback that advances students' learning without telling them step by step how to complete an assignment	The students: <ul style="list-style-type: none">Participate in productive discussions with their peers and help each other build reasoning skills and a shared understanding of mathematical concepts	Classroom assignments: <ul style="list-style-type: none">Challenge students to complete authentic assignments and provide written explanations for their work
Utilizing Questioning and Feedback for Deeper Understanding The teacher: <ul style="list-style-type: none">Asks questions that assess students' mathematical understanding and advance their comprehension of mathematical conceptsGives each student time to formulate a response to a questionGives students opportunities to share ideas with each other in groups	The students: <ul style="list-style-type: none">Build upon questions asked by the teacher or their peers to take ownership of their learning and deepen their understanding of mathematical concepts	Posted learning targets: <ul style="list-style-type: none">Include strategic, pre-determined focus and feedback questions

productive struggle



$$A^2 + B^2 = C^2$$

tools

strategies

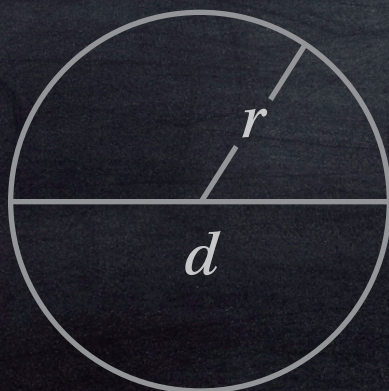


Teacher Behaviors	Student Behaviors	Artifacts
<p>Using Formative Assessment Data</p> <p>The teacher:</p> <ul style="list-style-type: none"> Plans for frequent use of short- and medium-cycle formative assessments Uses data to re-engage students in learning both minute to minute and day by day <p>The students:</p> <ul style="list-style-type: none"> Reflect on the purpose of the lesson and their mathematical understandings and misconceptions and work with the teacher to create a plan to advance their learning <p>Classroom documents:</p> <ul style="list-style-type: none"> Provide evidence that students engage in short- and medium-cycle formative assessments Demonstrate that teachers reflect on unit and lesson plans and adjust and adapt those plans to re-engage students 		
<p>Fostering a Classroom Environment That Supports Student Ownership of Learning</p> <p>The teacher:</p> <ul style="list-style-type: none"> Fosters a classroom environment in which students openly share ideas, confidently justify their problem-solving approaches using precise mathematical language, critique each other's reasoning and provide each other with meaningful feedback <p>The students:</p> <ul style="list-style-type: none"> Embrace productive struggle and persevere in completing challenging assignments that require reasoning and problem solving <p>Lesson plans:</p> <ul style="list-style-type: none"> Show that teachers intentionally structure lessons to promote the sharing of ideas 		
<p>Reflecting on Teaching Practice</p> <p>The teacher:</p> <ul style="list-style-type: none"> Collaborates with colleagues in person or virtually to reflect on evidence of student learning and adapt instruction to meet students' needs <p>Planning documents:</p> <ul style="list-style-type: none"> Show that teachers have a rationale for revising their lesson and unit plans Include agendas and minutes from reflective practice meetings with other teachers 		

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conceptual
understanding



mathematical modeling

$$A = \pi r^2$$

analyze

