

Below we highlight how students use specific thinking strategies in Mathematical Problem Solving.¹

→ thinking about their own thinking

Thinking Strategy	Cognitive Behaviors
Monitoring for Meaning	<ul style="list-style-type: none"> Mathematicians are <u>metacognitive</u> as they continually ask themselves, "Does this make sense?" and "Is my answer reasonable?" Mathematicians use accurate math vocabulary and show their work in clear concise forms so others can follow their thinking without asking questions.
Activating, Using and Building Background Knowledge (schema)	<ul style="list-style-type: none"> Use their prior knowledge to generalize about similar problems and to choose problem solving strategies. Mathematicians add to schema by trying more challenging problems and hearing for others about different problem solving methods.
Asking Questions	<ul style="list-style-type: none"> Mathematicians test theories/answers/hypotheses by asking questions about various approaches to a problem. Mathematicians extend their own thinking by asking themselves questions for which they don't have answers.
Drawing Inferences	<ul style="list-style-type: none"> Mathematicians use patterns and relationships to generalize and infer what come next in the problem-solving process. Mathematicians solve problems in different ways and support their methods through proof, number sentences, pictures, charts, and graphs.
Determining Importance	<ul style="list-style-type: none"> Mathematicians gather text information from graphs, charts, and tables. Mathematicians use key words to decide what information is relevant and irrelevant to a problem.
Creating Sensory Images	<ul style="list-style-type: none"> Mathematicians use mental pictures/models of shapes, numbers, and processes to build an understanding of concepts and problems and to experiment with ideas. Mathematicians visually represent their thinking through drawings, pictures, graphs, models, and charts.
Synthesizing Information	<ul style="list-style-type: none"> Mathematicians generalize from patterns they observe. Mathematicians synthesize math concepts when they use them in real-life applications.

↪ These strategies are tools that "successful" math students use when they are solving math problems.

In what ways are you/can you teach students to use these strategies?

¹ Adapted by Pearson/Dole revised Tovani & James Donohue.
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