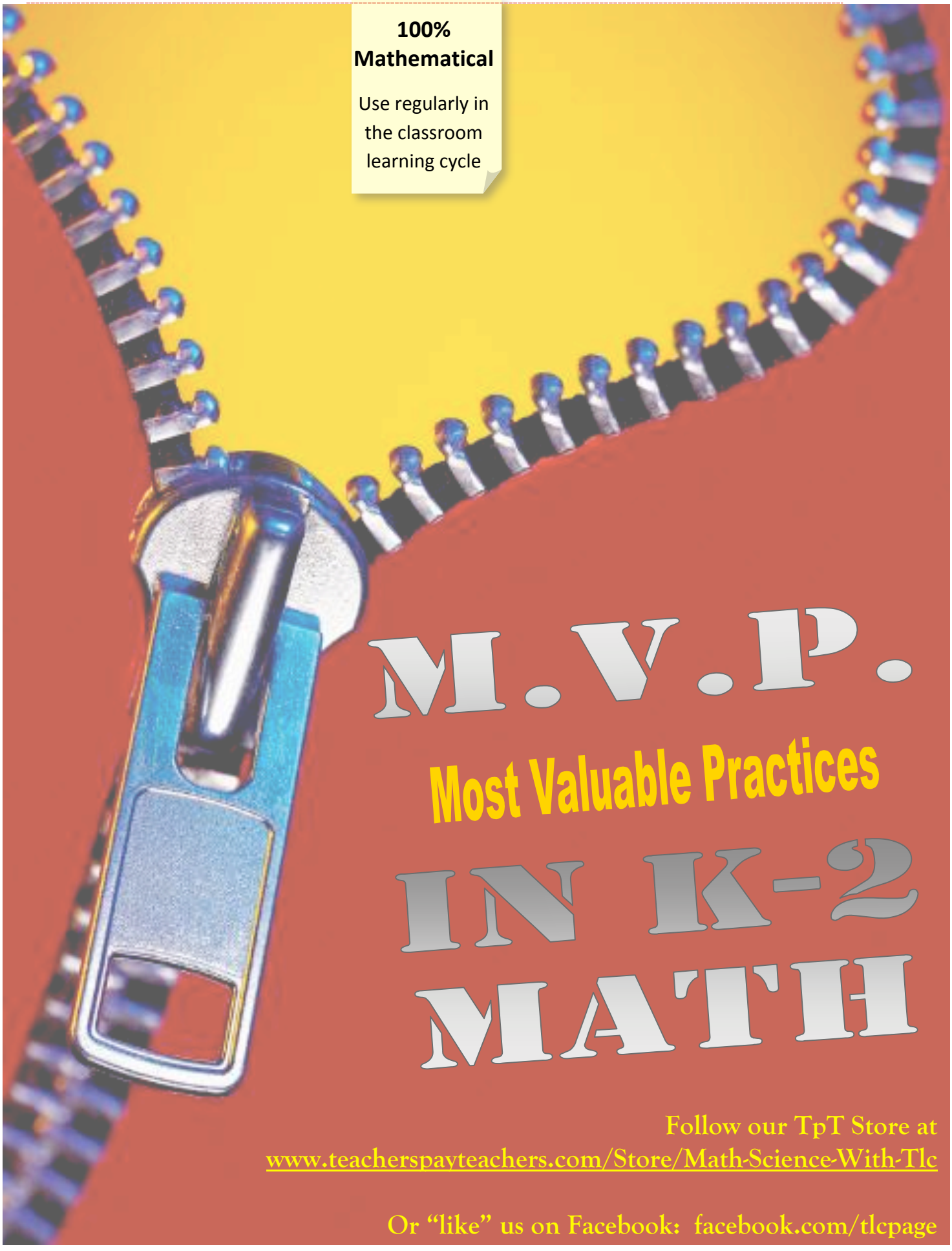

100%
Mathematical
Use regularly in the classroom learning cycle
M.V.P.
Most Valuable Practices
IN K-2
MATH
Follow our TpT Store at
www.teacherspayteachers.com/Store/Math-Science-With-Tlc
Or "like" us on Facebook: facebook.com/tlcpage


Use M.V.P. Cubes in the classroom and score a "perfect 10?"!

Using MVP Cubes in the Classroom

The Common Core State Standards in Mathematics emphasize the mathematical practices, which should be thoughtfully integrated in appropriate ways, not taught as a separate set of skills. These important "habits of mind" help define rich mathematical tasks/problems that students can engage in and develop mathematical literacy.

The following MVP's (Most Valuable Practices) are an engaging way to utilize the mathematical practices in the classroom, as students encounter rich tasks and problems. They can be used before and/or after working on a problem.

WHY USE THE CUBES:

- The MVP cubes are a great assessment tool. Two sets of cubes are included. The first set can be used "before" starting to work on a problem and the second set can be used "after" completing a problem/task.
- When students respond to a cube prompt, they are thinking mathematically and developing ways to communicate their thinking and understanding in writing.
- The prompts are designed to be quick writes and can be assessed quickly.

HOW TO USE THE CUBES:

Each cube focuses on a different mathematical practice. One set is designed to be used before solving a problem, the other set to be used after solving a problem. There are 16 cubes (one for each practice before and after) and 2 cubes that combine multiple practices onto one cube. (18 cubes total!)

Below are several ways to use the cubes in the classroom.

- ***Start by modeling!*** Use a cube that illustrates a mathematical practice and model a response to a problem as a whole group. Talk about what you are looking for in a response, and how as a class students should think like a mathematician! Once you have modeled, give students an opportunity to respond to a different prompt.

- ***In small groups:*** Give each group a cube (they could all be different) and have them roll the cube to determine the question to answer. They could talk about this as a group and share out whole class, or record a response in a math journal. WE have also included an MVP template that students could use.

- ***At a center (or individually):*** Have students completing a rich task/problem at a center. They can roll a cube (before and/or after) and write their response.

- ***Whole Class:*** The teacher can roll a class cube and pose the prompt to the class. Students can record their thinking in a journal or on a separate sheet of paper.

- ***Discussion Prompts:*** Use these to discuss mathematics with your students. It's a great formative assessment on how students are thinking and solving mathematics.

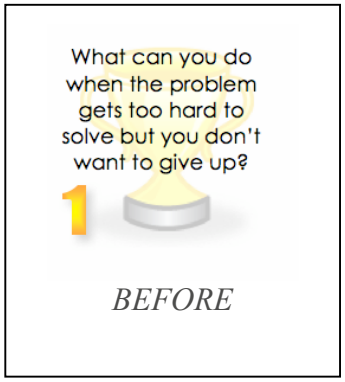
HOW CUBES ARE DESIGNED & ASSEMBLED:

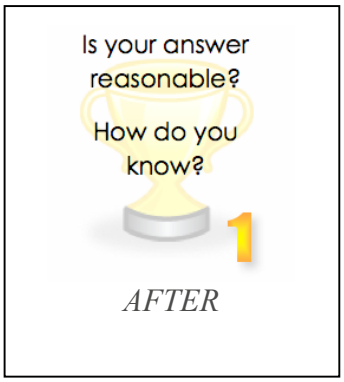
Design:

- There are 6 prompts on each face of the cube. Each prompt is labeled with the number that corresponds to the mathematical practice in the Common Core Standards.
    1. Make sense of problems and persevere in solving them.
    2. Reason abstractly and quantitatively.
    3. Construct viable arguments and critique the reasoning of others.
    4. Model with mathematics.
    5. Use appropriate tools strategically.
    6. Attend to precision.
    7. Look for and make use of structure.
    8. Look for and express regularity in repeated reasoning.

- All the cubes for "before" solving a problem are together in the packet, and all the cubes for "after" solving a problem are together. In case you cut them up and can't remember which is which, here's an easy trick!

    The cubes for "before" have the number on the right hand side (think before the text), and the cubes for "after" have the number on the left hand side (think after the text).





Tips to Make the Cubes:

- Copy each cube onto cardstock. Cut out around the cube and fold on the lines. Fold each side up and tape flaps to secure the cube.

- You can also copy onto colored copy paper and laminate. Assemble cubes after you laminate for durability.

- Use two colors of paper for the cubes. One color for "before" and one color for "after". This is an easy way to know which cube to use with students.

How To Assess Student Thinking and the Mathematical Practices

Learning to understand the mathematical practices is a journey. The more you use and reflect on them, the better understanding you will develop and the stronger math "habits of mind" your students will have. Eventually you will observe students using several practices, because they all tend to overlap on another.

As you work with your students on problem solving in your mathematics classroom, it is important to remember that you are facilitating the lesson. Included in this packet are **GOAL CHARTS** (**G**athering **O**bservations to **A**ssess **L**earning) that will help you focus on recording observations of student understanding while they work with the mathematical practices.

There are eight separate GOAL Charts, one for each of the mathematical practices. At the top of each chart are the questions that are on the "before/during" cubes and the "after" cubes. These questions are there for you to select as you observe and facilitate a problem-solving lesson. You might highlight the questions you want to focus on for the day or use them randomly as needed.

After you launch the problem, select 5 or more students to assess for the day. Step back and observe your students as they explore the problem. Your goal is to gather evidence to assess learning on the GOAL Chart. You can also use the BEFORE/DURING questions to facilitate students who are having difficulties. Remember it is okay for students to "struggle" a bit when solving problems, and the questions included on the cubes can help students clarify their thinking, and keep you in the observer mode.

Use the GOAL Chart to:

- collect evidence of pictures, numbers, words that students use to solve problem
- record comments, and questions students ask as they explore and solve the problem.
- write and record what you see and hear. This is often where you can find and select students to share their mathematical thinking.
- look for different solutions, different representations, or how students explained their reasoning in different ways.
- Identify students who can share different perspectives. This will foster their ability to critique the reasoning of others.

ORGANIZATION OF PACKET

- **Information on the Mathematical Practices in the Common Core Standards**

    - Make sense of problems and persevere in solving them.
    - Reason abstractly and quantitatively.
    - Construct viable arguments and critique the reasoning of others.
    - Model with mathematics.
    - Use appropriate tools strategically.
    - Attend to precision.
    - Look for and make use of structure.
    - Look for and express regularity in repeated reasoning.

- **MVP Cubes to use BEFORE solving problems**

- **MVP Cubes to use AFTER solving problems**

- **Assessing Using the GOAL Charts: G**athering **O**bservations to **A**ssess **L**earning

Make sense of problems and persevere in solving them.

Mathematically proficient students:

- explain to themselves the meaning of a problem and looking for entry points to its solution.
- analyze givens, constraints, relationships, and goals.
- make conjectures about the form and meaning of the solution attempt.
- consider analogous problems, and try special cases and simpler forms of the original problem.
- monitor and evaluate their progress and change course if necessary.
- transform algebraic expressions or change the viewing window on their graphing calculator to get information.
- explain correspondences between equations, verbal descriptions, tables, and graphs.
- draw diagrams of important features and relationships, graph data, and search for regularity or trends.
- use concrete objects or pictures to help conceptualize and solve a problem.
- check their answers to problems using a different method.
- ask themselves, "Does this make sense?"
- understand the approaches of others to solving complex problems.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- provide tasks that provide multiple entry points and solutions
- work on procedural fluency and conceptual fluency
- ask students to justify and defend their mathematical thinking
- give opportunities for students to check their solutions and compare their solutions
- check in with students to clarify their thinking
- give opportunities for students to compare approaches to problems with others

Reason abstractly and quantitatively.

Mathematically proficient students:

- make sense of quantities and their relationships in problem situations.
    - *decontextualize* (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents and
    - *contextualize* (pause as needed during the manipulation process in order to probe into the referents for the symbols involved).
- use quantitative reasoning that entails creating a coherent representation of quantities, not just how to compute them
- know and flexibly use different properties of operations and objects.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- help students understand relationships between problems
- provide opportunities for students to use symbols to represent multiple solutions
- pose situations where students evaluate efficient solutions
- expect students to interpret, model, and connect representations

Construct viable arguments and critique the reasoning of others.

Mathematically proficient students:

- understand and use stated assumptions, definitions, and previously established results in constructing arguments.
- make conjectures and build a logical progression of statements to explore the truth of their conjectures.
- analyze situations by breaking them into cases
- recognize and use counterexamples.
- justify their conclusions, communicate them to others, and respond to the arguments of others.
- reason inductively about data, making plausible arguments that take into account the context
- compare the effectiveness of plausible arguments
- distinguish correct logic or reasoning from that which is flawed
    - elementary students construct arguments using objects, drawings, diagrams, and actions..
    - later students learn to determine domains to which an argument applies.
- listen or read the arguments of others, decide whether they make sense, and ask useful questions

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- provide time in the classroom to engage in mathematical discourse
- have students explain and discuss their mathematical thinking
- allowing students to critique and defend arguments of mathematical reasoning
- ask students to explain their conjectures with others

Model with mathematics.

Mathematically proficient students:

- apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.
    - In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community.
    - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another.
- simplify a complicated situation, realizing that these may need revision later.
- identify important quantities in a practical situation
- map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas.
- analyze those relationships mathematically to draw conclusions.
- interpret their mathematical results in the context of the situation.
- reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- utilize real-world scenarios and represent the scenario mathematically
- facilitates discussions about whether a selected model is appropriate
- provide time for students to evaluate various models used by others

Use appropriate tools strategically.

Mathematically proficient students

- consider available tools when solving a mathematical problem.
- are familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools
- detect possible errors by using estimations and other mathematical knowledge.
- know that technology can enable them to visualize the results of varying assumptions, and explore consequences.
- identify relevant mathematical resources and use them to pose or solve problems.
- use technological tools to explore and deepen their understanding of concepts.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- give opportunities for students to use and select manipulatives (such as rulers, compasses, protractors, calculators, and other tools)
- allow students to explain how tools will help them problem solve
- provide tasks/problems that utilize multiple learning tools
- have students check for errors using estimation

Attend to precision.

Mathematically proficient students:

- try to communicate precisely to others.
- use clear definitions in discussion with others and in their own reasoning.
- state the meaning of the symbols they choose, including using the equal sign consistently and appropriately.
- specify units of measure and label axes to clarify the correspondence with quantities in a problem.
- calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the context.
    - In the elementary grades, students give carefully formulated explanations to each other.
    - In high school, students have learned to examine claims and make explicit use of definitions.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- focus on precision in communicating results and in solutions
- ask students to revise problems for accuracy
- set clear expectations for assessment
- encourage discussion in the classroom if a solution is unclear

Look for and make use of structure.

Mathematically proficient students:

- look closely to discern a pattern or structure.
    - Young students might notice that three and seven more is the same amount as seven and three more.
    - Later, students will see 7 x 8 equals the well-remembered 7 x 5 + 7 x 3, in preparation for the distributive property.
    - In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7.
- step back for an overview and can shift perspective.
- see complicated things, such as some algebraic expressions, as single objects or composed of several objects.

~The above bullet points are from the Common Core State Standards, Mathematical Practices

Teachers should:

- help students identify efficient strategies for solutions
- provide opportunities for students to generate multiple solutions to problems
- facilitate students in developing efficient ways to solve problems
- ask students to find the most effective solution path to a problem

Look for and express regularity in repeated reasoning.

Mathematically proficient students:

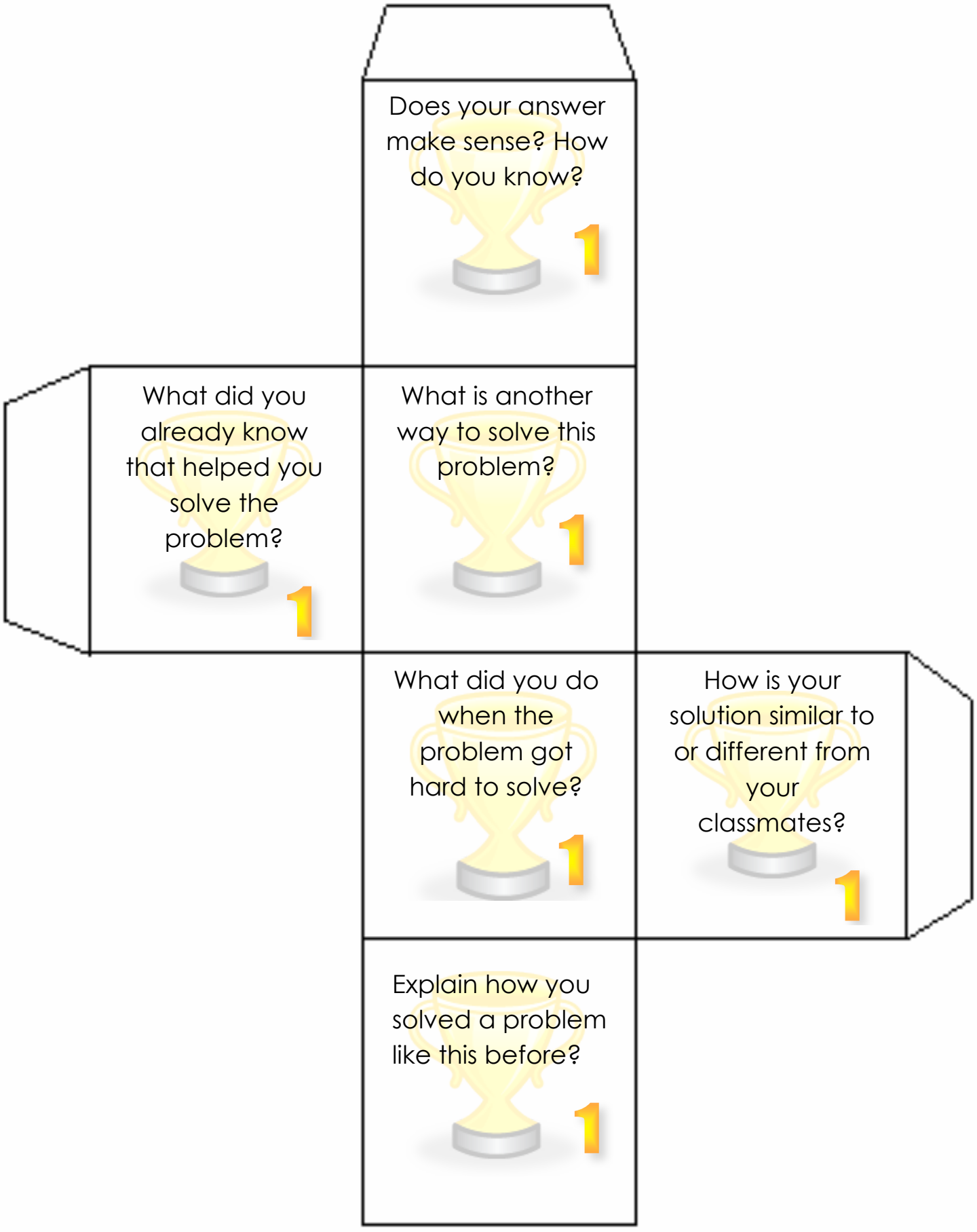
- notice if calculations are repeated
- look both for general methods and for shortcuts.
- maintain oversight of the process, while attending to the details.
- continually evaluate the reasonableness of intermediate results.

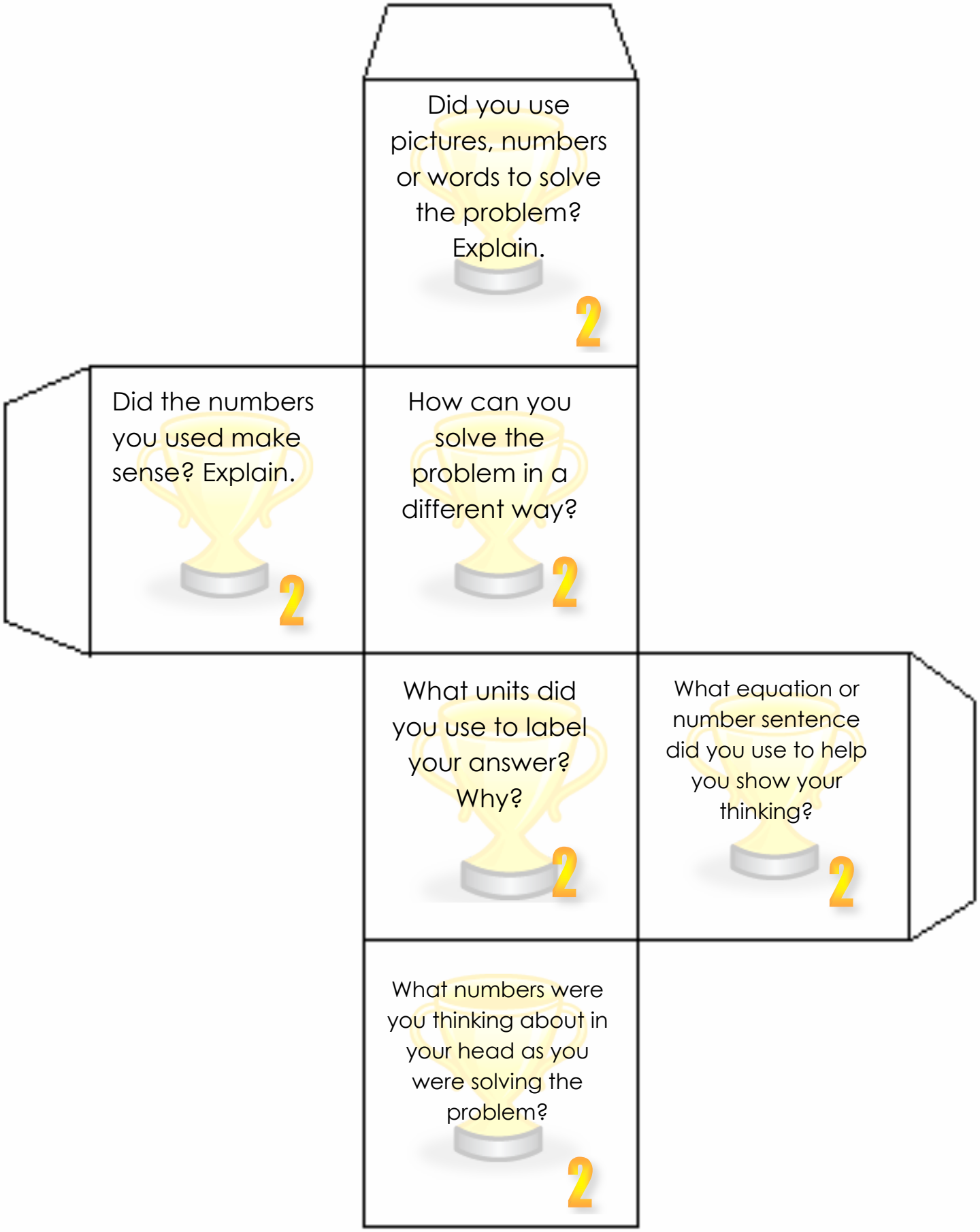
~The above bullet points are from the Common Core State Standards, Mathematical Practices

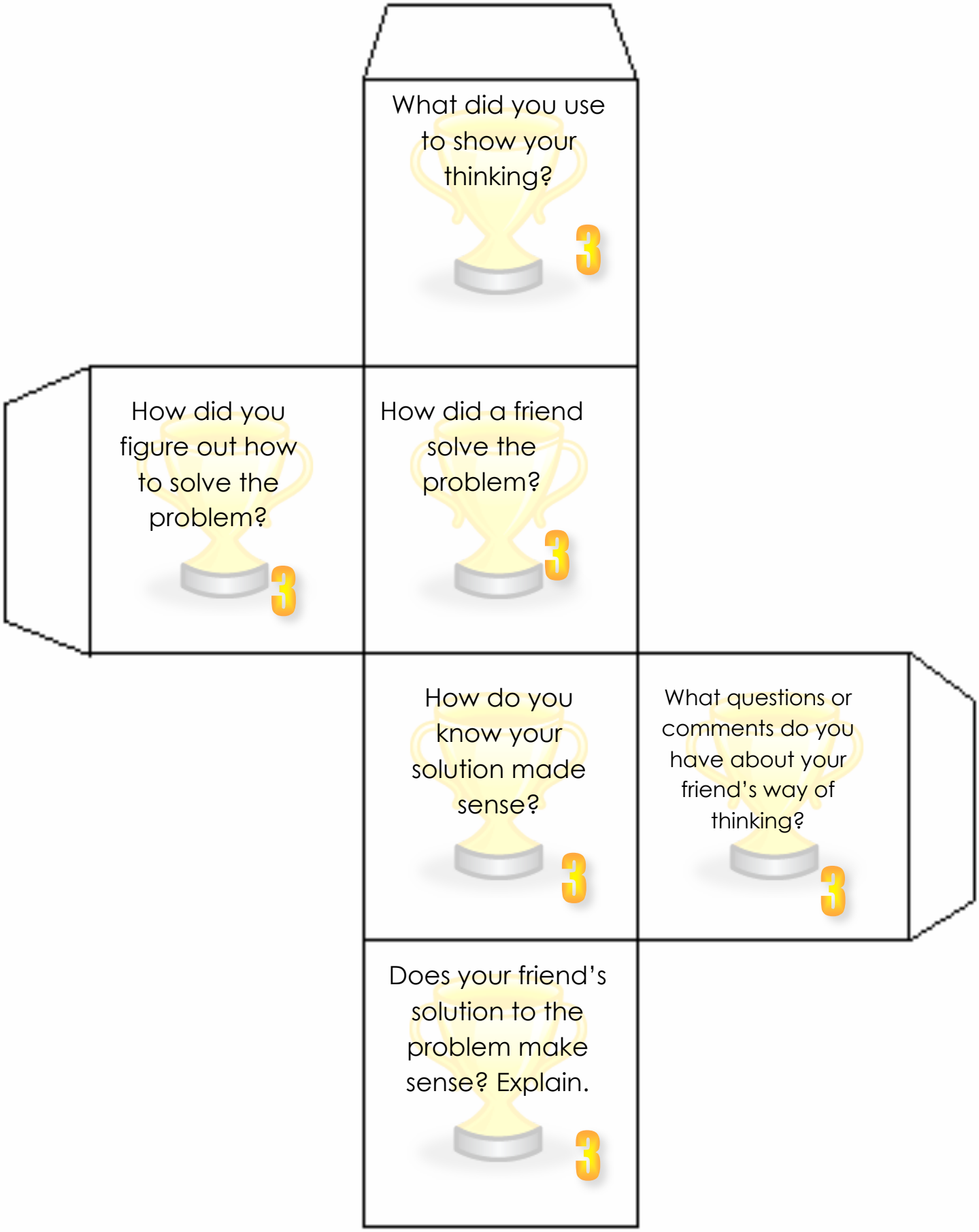
Teachers should:

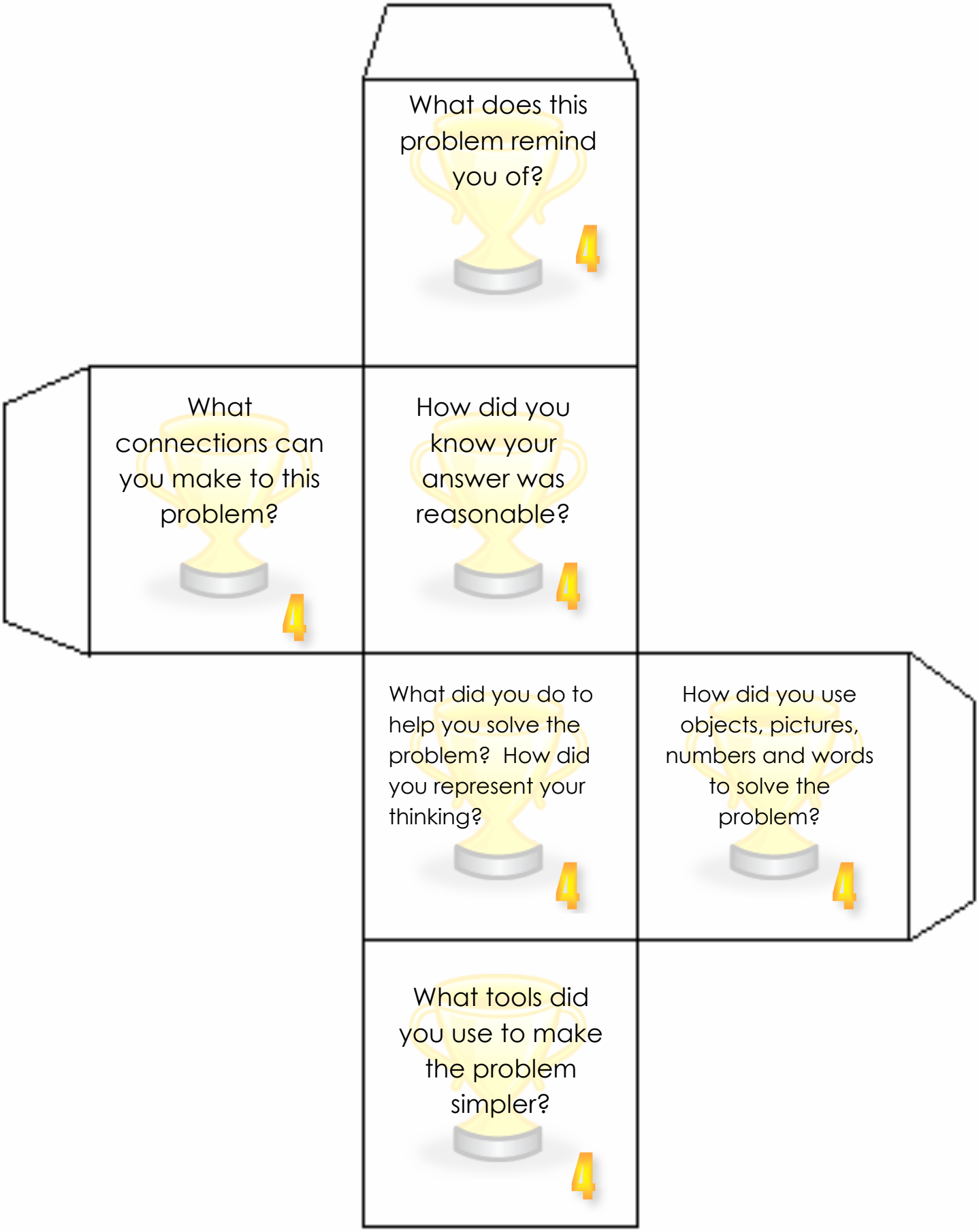
- encourage students to connect their work to prior learning/concepts
- use problems that lend themselves to developing patterns and structures
- provide opportunities the build on the structure of math

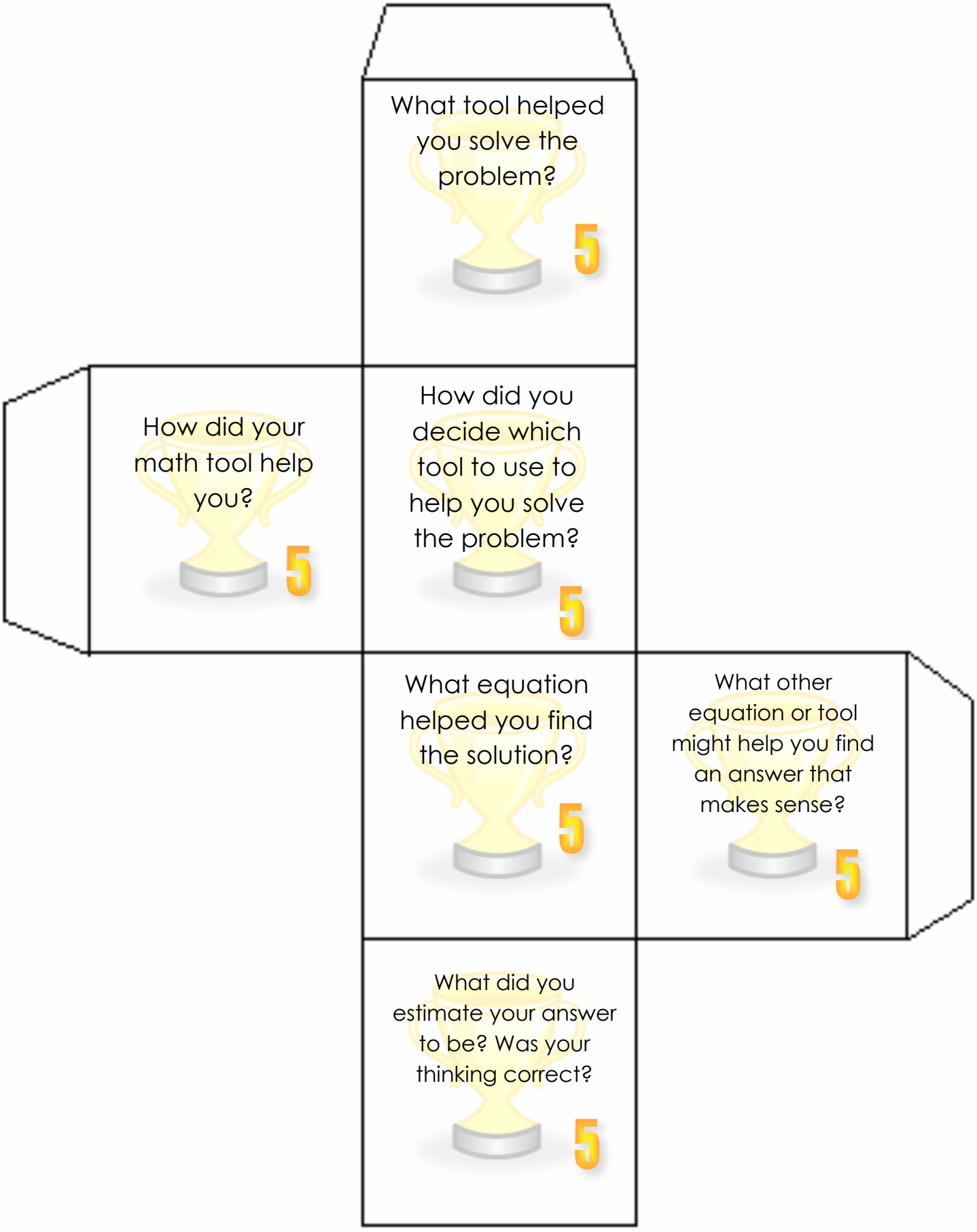

USE THIS SET OF CUBES
AFTER
PROBLEM SOVLING
M.V.P.
Most Valuable Practices

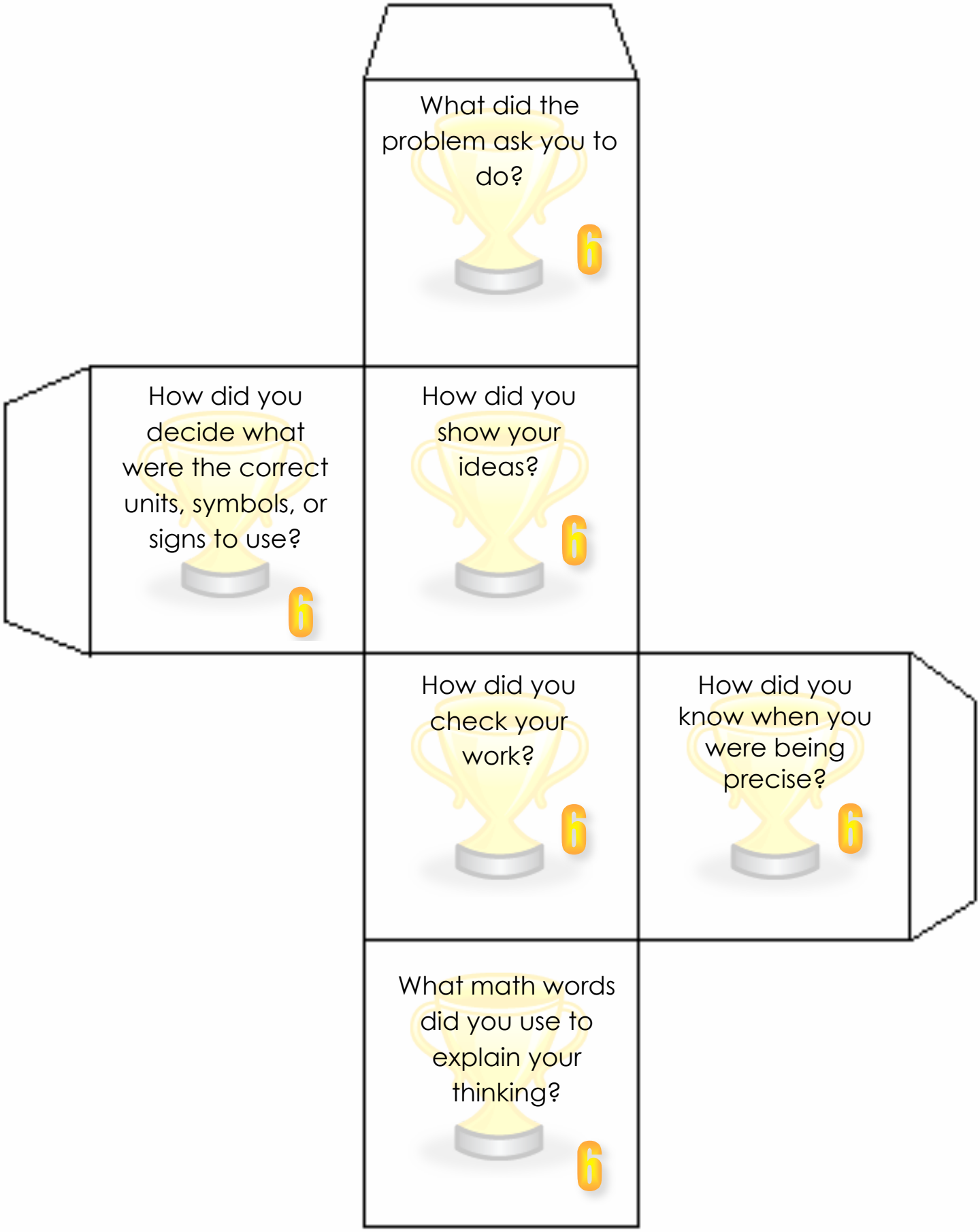

Does your answer make sense? How do you know?
1
What did you already know that helped you solve the problem?
1
What is another way to solve this problem?
1
What did you do when the problem got hard to solve?
1
How is your solution similar to or different from your classmates?
1
Explain how you solved a problem like this before?
1

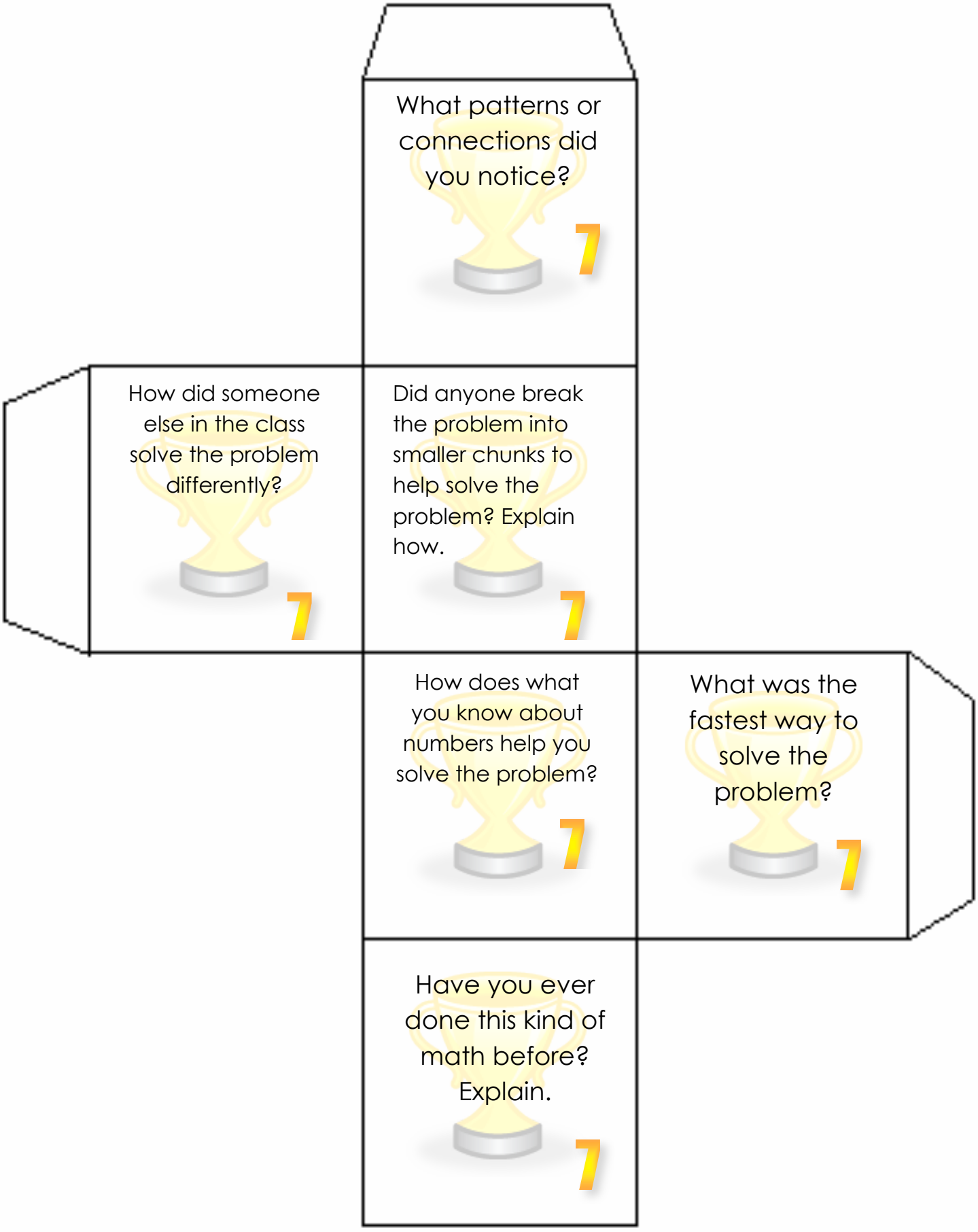

Did you use pictures, numbers or words to solve the problem? Explain.
2
Did the numbers you used make sense? Explain.
2
How can you solve the problem in a different way?
2
What units did you use to label your answer? Why?
2
What equation or number sentence did you use to help you show your thinking?
2
What numbers were you thinking about in your head as you were solving the problem?
2

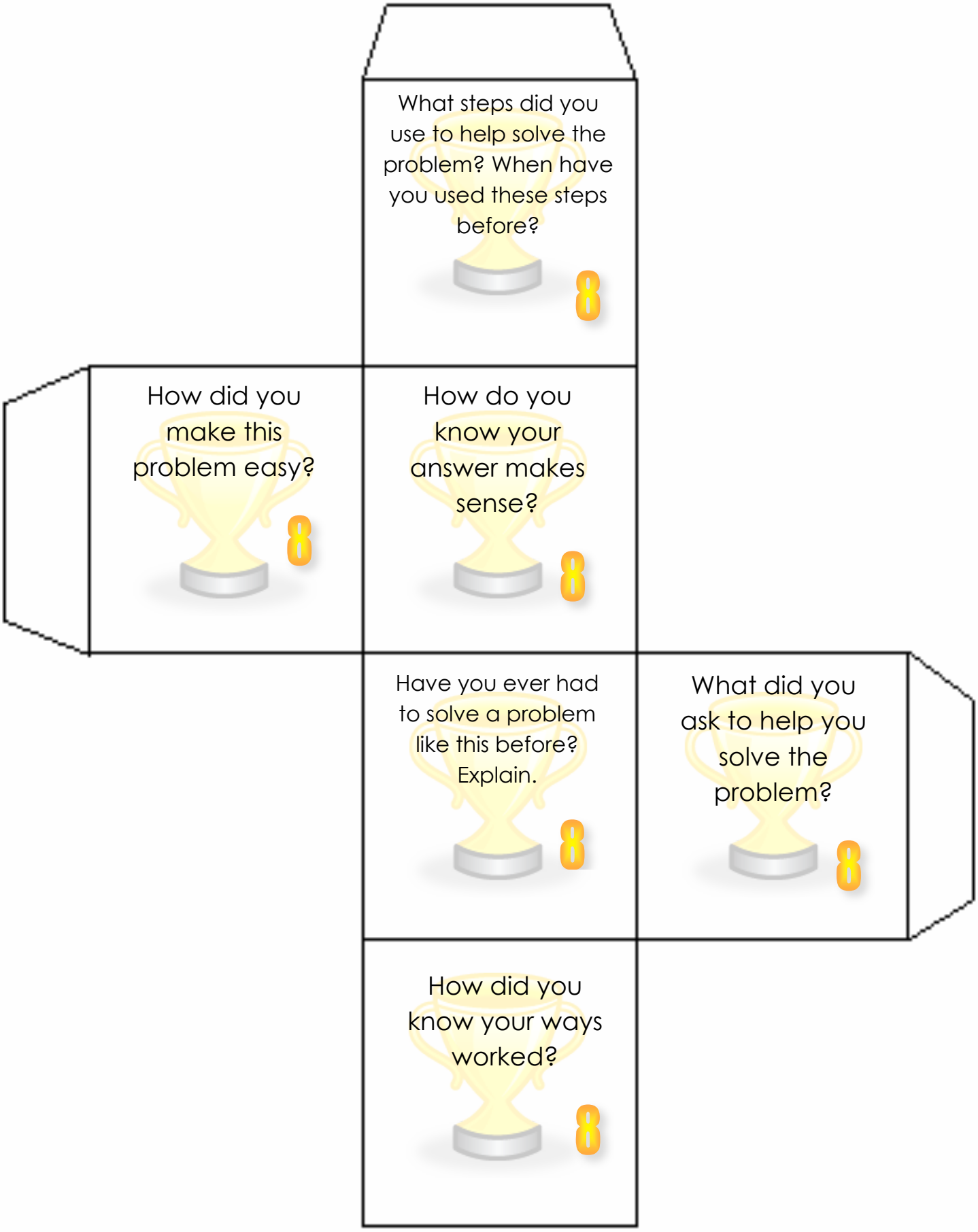

What did you use to show your thinking?
3
How did you figure out how to solve the problem?
3
How did a friend solve the problem?
3
How do you know your solution made sense?
3
What questions or comments do you have about your friend's way of thinking?
3
Does your friend's solution to the problem make sense? Explain.
3

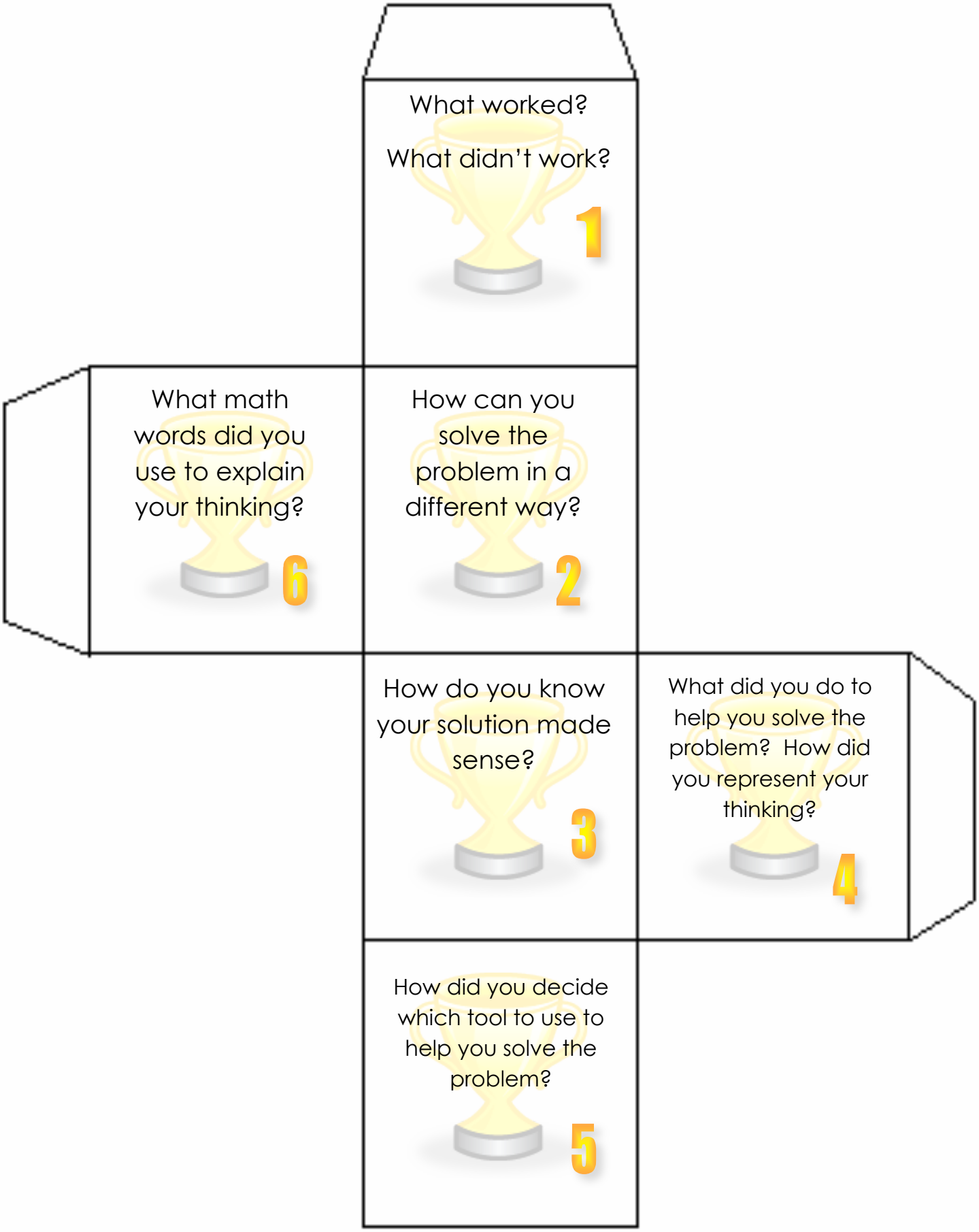

What does this problem remind you of?
What connections can you make to this problem?
How did you know your answer was reasonable?
What did you do to help you solve the problem? How did you represent your thinking?
How did you use objects, pictures, numbers and words to solve the problem?
What tools did you use to make the problem simpler?


What tool helped you solve the problem?
5
How did your math tool help you?
5
How did you decide which tool to use to help you solve the problem?
5
What equation helped you find the solution?
5
What other equation or tool might help you find an answer that makes sense?
5
What did you estimate your answer to be? Was your thinking correct?
5


What did the problem ask you to do?
6
How did you decide what were the correct units, symbols, or signs to use?
6
How did you show your ideas?
6
How did you check your work?
6
How did you know when you were being precise?
6
What math words did you use to explain your thinking?
6


What patterns or connections did you notice?
How did someone else in the class solve the problem differently?
Did anyone break the problem into smaller chunks to help solve the problem? Explain how.
How does what you know about numbers help you solve the problem?
What was the fastest way to solve the problem?
Have you ever done this kind of math before? Explain.


What steps did you use to help solve the problem? When have you used these steps before?
How did you make this problem easy?
How do you know your answer makes sense?
Have you ever had to solve a problem like this before? Explain.
What did you ask to help you solve the problem?
How did you know your ways worked?


What worked?
What didn't work?
1
What math words did you use to explain your thinking?
6
How can you solve the problem in a different way?
2
How do you know your solution made sense?
3
What did you do to help you solve the problem? How did you represent your thinking?
4
How did you decide which tool to use to help you solve the problem?
5

Topic:_____ Date:_____

Use these Observation Sheets to

(**G**athering **O**bservations to **A**ssess **L**earning)

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 1. Making Sense of Problems and persevere in solving them.	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 What might you do first to solve this problem? 🏆 How will you know if your answer is reasonable? 🏆 What is the question you need to find out when solving this problem? 🏆 What problem have you solved before that might help you? 🏆 What do you already know that will help you solve this problem? 🏆 What can you do when the problem gets too hard to solve but you don't want to give up?	🏆 What is another way to solve this problem? 🏆 How is your solution similar to or different from your classmates? 🏆 Is your answer reasonable? How to you know? 🏆 Explain how you have solved a problem like this before. 🏆 What did you already know that helped you solve this problem? 🏆 What did you do when the problem gets too hard to solve but you don't want to give up?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 2. Reason abstractly and quantitatively	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
What are two ways you might solve this problem? What equation could you use to describe the situation? What representations could help you solve the problem? What are two different ways to represent your solution? What units will you use to label your work? How will you "make sense" of the numbers and the relationships in the problem.?	How can you solve the problem a different way? How did you "make sense" of the numbers and the relationships in the problem? What units did you use to label your work? Why? How did you represent your thinking using equations? What equation did you use to describe the situation?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 3. **Construct viable arguments and critique the mathematical reasoning of others.**	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 How can you use objects, drawings, diagrams, or actions to justify and communicate your thinking? 🏆 What will your first steps be to solving the problem? 🏆 What do you know about the math that you need to use? 🏆 What opinions or conclusions can you make? (Conjectures) 🏆 What examples or non-examples (exceptions to the rule) will you use to prove or disprove your opinions or conclusions? 🏆 What questions are you asking about this problem before you solve it?	🏆 What ideas of others do not make sense to you? 🏆 What questions can you ask to clarify or improve other's arguments? 🏆 How did you think about how others solved the problem? 🏆 Explain how you solved the problem. 🏆 How can you restate how your classmate solved the problem? 🏆 How did you use objects, drawings, diagrams, or actions to justify and communicate your thinking?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 4. **Model with mathematics**	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 What concrete models, pictures, symbols, or words can you use to represent the math in the problem? 🏆 How is the problem related to everyday life situations? 🏆 What tools can you use to show relationships between the quantities? 🏆 What tools, such as diagrams, graphs, or drawings, can you use to make the task simpler? 🏆 How will you prove your answer is reasonable? 🏆 What representation will you use to help you solve the problem?	🏆 What representation did you use to help you solve the problem? Why? 🏆 What concrete models, pictures, symbols, and/or words did you use to represent the math in the problem? 🏆 How is the problem related to everyday life situations? 🏆 What tools, such as diagrams, graphs, or drawings, did you use to make the task simpler? 🏆 How did you prove your answer was reasonable? 🏆 What representation did you use to help you solve the problem? Why?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 5. **Use appropriate tools strategically**	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 Which math tools will help you solve this problem? 🏆 How can you estimation to check for possible errors in thinking and computing? 🏆 What models can you use to help you see (visualize) the results and compare predictions? 🏆 How will the tool(s) you use give you an answer that makes sense? 🏆 How will you decide what tool to use and when to use it? 🏆 How might a manipulative help you solve the problem?	🏆 What models helped you visualize the results and compare predictions? 🏆 What math tools helped you solve the problem? 🏆 How did you use estimation to check for possible errors in thinking and computing? 🏆 How did manipulatives help you solve the problem? 🏆 Explain how the tool you used gave you the answer that made sense. 🏆 How did you decide what tool to use and how to use it?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 6. Attend to precision	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 How will you communicate your ideas precisely using pictures, numbers, symbols, and words? 🏆 How will you use vocabulary correctly? 🏆 How will you know when your work is calculated efficiently? 🏆 What does the problem ask you to do? 🏆 How do you know when you are being precise? 🏆 How will you use units of measure and symbols correctly?	🏆 How did you know when you were being precise? 🏆 How do you know when your work was calculated efficiently? 🏆 What did the problem ask you to do? (Estimate or find an exact answer) 🏆 How did you use symbols correctly? 🏆 What math vocabulary did you use correctly? How did these words help you explain your thinking? 🏆 How did you use units of measure and symbols correctly? 🏆 How did you communicate your ideas precisely using pictures, numbers, symbols, and words

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 7. Look for and make use of structure	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 How can you break the problem down into smaller chunks? 🏆 What patterns do you notice? 🏆 What is another way you might view the problem? (Shift perspective) 🏆 What is the most efficient solution path? 🏆 How might the base-ten structure help you solve the problem? 🏆 What connections can you find as you think about solving this problem?	🏆 What patterns did you notice? 🏆 What connections did you find? 🏆 What is another way you could view the problem? (Shift perspective) 🏆 How did you break the problem down into smaller chunks? 🏆 How did the base-ten structure help you solve the problem? 🏆 What was the most efficient solution path?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

Topic:_____ Date:_____

GOAL CHART (**G**athering **O**bservations to **A**ssess **L**earning)

Mathematical Practice: 8. **Look for and express regularity in repeated reasoning**	
MVP Cube Prompts BEFORE/DURING	***MVP Cube Prompts AFTER***
🏆 What strategies will you use & repeat to solve the problem? 🏆 How will you check to see if your answer is reasonable? 🏆 How will you know your methods were efficient? 🏆 What shortcuts will you use or find? 🏆 What problems have you experienced before that might help you solve this problem? 🏆 What questions might you ask to explore the problem and how it might be solved?	🏆 What strategies did you use & repeat to solve the problem? 🏆 How do you know your answer is reasonable? 🏆 How do you know your methods were efficient? 🏆 What shortcuts did you use or find? 🏆 What concepts and tasks did you experience before that helped you solve this problem? 🏆 What questions did you ask to explore the problem and how it might be solved?

Student	**G**athering **O**bservations to **A**ssess **L**earning
1.	
2.	
3.	
4.	
5.	
6.	

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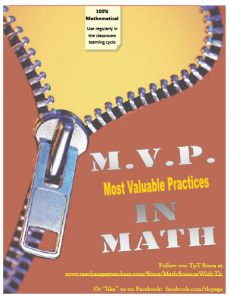

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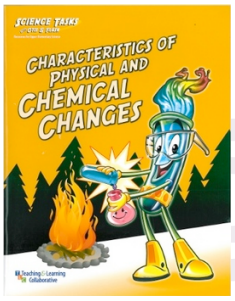

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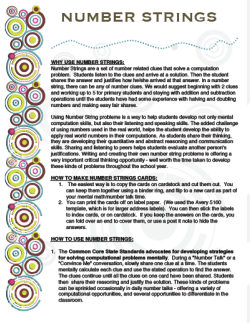

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