



## ***Noticings/Wonderings (Forget the Question)***

Make a list of all of the mathematical information and relationships you notice and everything you are wondering.

I notice...	I wonder...

If you get stuck, you might try to notice

- The quantities (known or unknown counts or measurements).
- Relationships between quantities.
- Information that is not given in the problem but that might be related or that the problem reminds you of.
- Key words from the problem.

Your wonderings may include:

- I wonder what will happen if ...
- I wonder what this word means ...
- I wonder if this pattern will continue ...
- What does this mean?
- What do they want?
- Does it have to be that way?
- Do I need to figure that out?
- How does this situation work?
- Is there another way to think of it?
- How will I know if this is true?
- What is a good way to express that?
- When is this true?



## Extracting the Information and Question (PoW IQ)

“PoW IQ” stands for extracting the **I**nformation in the problem, and understanding the **Q**uestion.

<b>Information from the Problem</b> (as mathematically as you can)	<b>Calculations or Mathematical Relationships</b>	<b>The Question and Predictions/Considerations</b>

If you get stuck, for the **Information** column, you might:

- Identify and list important information given in the problem:
  - What quantities are given?
  - What terms are important?
  - What constraints are given?

For the **Question** column, you might:

- Predict as much as you can about the final answer:
  - What will the units of the solution be (what will be counted or measured)?
  - What justification is needed/what am I trying to prove?
  - Can I figure out upper and lower bounds?
  - Could the answer be negative? Could it be a non-integer?



## ***Paraphrasing (In Your Own Words)***

**Step 1:** Read the problem as a group. Discuss what the words mean, make sense of the situation and of the question that must be answered.

**Step 2:** Put away the problem and any notes and individually paraphrase the problem, using one of the three prompts below.

**Prompt 1:** Identify the key words/phrases in the problem. How would you define them?

**Prompt 2:** How would you rewrite the problem?

**Prompt 3:** Same math idea/Different math story: How could you put the problem in a different scenario, while preserving the math behind the problem?



## ***Acting It Out (Try It!)***

Before you begin, choose who wants to be the *narrator/checker* and who wants to be the *noticer/recorder*.

**Step 1:** The *narrator* reads the problem and the group brainstorms ways to act it out. The *noticer* is responsible for making sure that any new quantities, constraints, or mathematical relationships used in the brainstorming are pointed out and recorded.

**Step 2:** The *narrator* makes sure that the group checks the acting-it-out ideas to see that they fit all of the constraints in the problem. The group picks one of the acting-it-out approaches.

**Step 3:** As the group acts out the problem, the *noticer* records any relationships or quantities that come up that aren't already on the list of noticings and wonderings. The *narrator/checker* watches carefully to compare the acting out to what the problem says.

**Step 4:** The group decides whether they have enough understanding to try solving the problem. If not, they can try another way to act out the problem, or improve the design of the approach they used.

**Step 5 (optional):** The different groups perform their versions of the problem for each other.

**Noticings: (quantities, constraints, mathematical relationships)**

**Constraints we checked:**

**We are ready to move on because:**

**OR**

**We need to try again and think about:**