Sharing Skepticism Instructional Routine by David Wees (http://davidwees.com)

This routine is intended to support students in both constructing arguments and critiquing each other’s arguments, and deciding what makes an argument good. The type of math problem that can sit at the center of this routine is very broad, but it should be a problem that ideally all of your students can do and students are likely to come up with a variety of solutions to the problem.

Summary of Routine

1. Launch routine
   a. Content focus (Example: Create arguments about right triangles)
   b. Think like a mathematician by constructing and critiquing the reasoning of others.
   c. The steps for today are to:
      i. solve a problem independently
      ii. work with a partner to improve our arguments
      iii. study other people's solutions
      iv. decide which solution we like best and why
      v. reflect on what we learned about constructing and critiquing arguments

2. Solve a problem
   a. Problem should be independently doable by most, if not all, students.
   b. Problem should have a variety of different solutions

3. Partner work1
   a. One person presents their solution
      ● "I think… because…” “This works in the following cases…”
      ● "This works all the time because…” “An example of how my idea works is…”
   b. The other person plays the role of skeptic
      i. “How do you know…?” “What if we changed ____…”?
      ii. "What if…?” "Did you think of ____ possibility?"
      iii. “Can you give an example?” “When might this not work?”
      iv. “Can you help me understand…?”

4. Present solutions:
   a. A pair of students presents solution to class (repeat 2-3 times using different solutions)
      i. One presenter. Student presents, then another student restates while the teacher annotates. Clarifying questions are welcome here as they help improve the argument.
      ii. One skeptic (but class and occasionally the teacher can play role of skeptic too) shares questions, comments, concerns. The original student or anyone in the class can defend or improve the argument.

5. Choose an argument
   a. Students work with their partner again and choose an argument they like best and be prepared to explain why.
      i. “I found … convincing because …”
      ii. “I understood … better because …”
   b. The class draws back together as a whole group and discusses decisions, ideally with each solution being selected by different students, who share reasons why they found the argument convincing and suggestions for improving the arguments.

6. Reflect on learning
   a. When constructing arguments, it is important to … because …
   b. When critiquing arguments, it is important to … because …

Example tasks: http://davidwees.com/m/ssexamples

1 Sentence stems from teachers at The Nueva School, San Mateo, California
WARM-UP: Work independently, then discuss your work with a partner.

Directions: Ask yourself, "How can I make my process and reasoning as clear and convincing to others?"

Find the number of circles.

EXPLORATION & WHOLE GROUP DISCUSSION

Directions: Listen to the presenting groups and take notes below to help you remember their arguments.

<table>
<thead>
<tr>
<th>Argument #1</th>
<th>Argument #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the number of circles.</td>
<td>Find the number of circles.</td>
</tr>
</tbody>
</table>

APPLICATION & REFLECTION

Reflecting on Learning: pick one of the prompts below and write your response

*When constructing arguments, it is important to … because … or When critiquing arguments, it is important to … because …*
**WARM-UP:** Work independently, then discuss your work with a partner.

**Directions:** Ask yourself, “How can I make my process and reasoning as clear and convincing to others?”

Find the total number of small white squares.

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**APPLICATION & REFLECTION**

**Reflecting on Learning:** pick one of the prompts below and write your response

*When constructing arguments, it is important to … because … or When critiquing arguments, it is important to … because …*
1. Post topics and chart paper around the room (one topic per chart paper).

2. Ask participants to go to a topic that interests them most (no more than three people to a group – so some may have to choose 2nd choice).

3. Brainstorm things you think that you know, questions, or concerns that you have about this topic onto the chart paper. Divide chart paper if more than one task is given such as things you think that you know and questions.

4. Rotate to the next chart and take your marker. Change who is the recorder.

   ✓ Add a check mark where you agree with an idea.
   + Use a plus sign when you want to add an idea.
   ☆ Star important ideas.
   Circle the most important idea.

5. Repeat step four as many times as is necessary for each group to rotate to each other group’s poster.

6. Gallery walk around to see the other chart papers – end at your starting place. Notice the changes to your chart. Put an ! point next to things that surprise you.

7. Sit down – discuss the charts –
   a. See: Ask participants what they see in the charts,
   b. Think: Ask participants what they think about the circles and underlines,
   c. Wonder: Ask participants what questions should we pursue and what are our next steps.

8. Take a moment to write a down your own learning or take away from this activity.

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2 The Idea Carousel Routine is created by Rhonda Bondie. See other group learning routines at http://www.alled.org/