

# Learning/Thinking Routines<sup>1</sup>

## Individual/Partner/Small Group Routines:

### **Fact, Question, Answer (FQA)**

#### Instructional Context/Goal:

Individual and small group.

Students elaborate on factual information from a text.

#### Description:

Each student states a fact from the text. Then they discuss one of the facts. They change the fact into a question, then answer the question. Process repeats for each of three facts.

#### Strengths of the Routine:

- Promotes making meaningful connections
- Encourages collaboration
- Provides a means for students to receive feedback on evidence or quotes from a text.
- Allows students to explore and play with a text
- Invites creativity
- Requires listening to and thinking about the responses of others

#### Starting Position:

- Individually: Students identify facts of a text that they want to remember. Teacher can specify one fact and allow two more from students.
- Groups: Groups of three. Assigned where to meet, students at same level (eye to eye or knee to knee)

#### Criteria:

- Must Have: Connection to personal experience, must add meaning, answer/response includes the word "because"
- Amazing: Answer/response to the question uses domain-specific vocabulary

#### Action Pattern:

- Roles: Speaker and listeners
- Turns: One student goes first, then second, and third.
- Rules: Add or repeat: Students can repeat an answer from a previous student or add a new response
- Time: Time each round so that all groups proceed at the same pace

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<sup>1</sup> From <https://www.alled.org/>, <http://www.pz.harvard.edu/thinking-routines>, and <http://curriculum.newvisions.org/science>

1. Fact: One at a time, read the fact to be remembered.
2. Question: As a group, restate the fact into a why or how question.
3. Answer: One at a time, answer the how/why question using personal phrasing/experience (no text quoting).
4. Reflect through open discussion
5. Repeat through other facts.

Reflection:

- Create a list of the most meaningful connections.
  - Answer a summary question about the meaning of the text/connection to student lives.
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## List, Write, Draw

Instructional Context/Goal:

Individual.

Record student thinking and details on a topic

Strengths of this routine:

- Takes little time
- Is fun for students
- Shows key points that are on the minds of students

Starting Position:

Individual: Ask students to think about a question or prompt.

Action Pattern

1. Provide students with the rules:
  - a. You must use the whole time to add to your response. So if you finish your drawing, add words, or if you finish writing, add a sketch. When you think that you are finished, review your work and add two more details. Continue working until the time is called.
  - b. Time: 2-4 minutes
2. Ask students to List, Write, Draw to answer the prompt.
3. Remind students of the rules.
4. Reflection: Ask students to reread what they have written and circle the most important part.

Notes:

1. Prompt can be adapted for circumstances (ex. Type, Picture with Caption, Collage if you are using a computer).
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## Criteria Checklist

Instructional Context/Goal:

Partners.

Students use criteria to monitor their work and establish a vision for the objective they are trying to achieve.

### Description:

Students use provided criteria to consider peer work and provide feedback via compliments and suggestions.

### Strengths of the Routine:

- Promotes reflection via comparison of work to criteria
- Focuses students on learning from assignments.
- Prompts self-regulated learning
- Supports building student feelings of competence
- Challenges all students

### Starting Position:

- Students need a completed or in-progress assignment and criteria
- Individually or with a partner: Students examine the criteria to determine which criteria they will look for in their work.

### Criteria:

- Must have annotations of work for evidence of criteria. Explanation of why evidence addresses criteria.
- Amazing: Annotates work for exemplary criteria. Explains how evidence could be strengthened. Proposes additional useful criteria.

### Action Pattern:

- Rules: Annotations must refer to actual evidence in student work.
  - Time: 1-5 minutes depending on length of work/number of criteria
1. Model offering compliments and suggestions typing specific criteria to evidence when looking at student work.
  2. Ask students to review their work, underlying evidence of a specific criterion.
  3. Ask students to explain why their evidence meets or is working toward the criteria
  4. Invite students to share their evidence and annotations of quality criteria with their peers.

### Reflect:

- Ask students to set a next step or goal based on their work.
- Use next steps, strengths, needs to adjust instruction.
- Check self-assessments for accuracy and offer feedback to students.

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## Elbow Exchange

### Instructional Context/Goal:

Partners.

Offers students an opportunity to clarify and consolidate their thinking.

## Strengths of the Routine:

- Promotes making meaningful connections
- Encourages collaboration
- Provides a means for students to receive feedback on their thinking
- Provides meaningful practice for using vocabulary and language skills
- Requires listening to and thinking about the responses of others

## Starting Position:

- Individually: Ask students to jot down an initial answer to a prompt.
- Groups: Assign students an elbow partner. Consider changing seats.

## Criteria:

- Must Haves: Answer/Response needs to include the word “because”
- Amazing: Uses domain vocabulary,

## Action Pattern:

Teacher identifies the roles (ex. questioner/speaker, summarizer/detailer, etc.).

- Turns: Assign partners so that each partner plays both roles.
- Add or repeat: Students can repeat an answer from a previous student OR add a new response.
- Time: time each partner to ensure equity

1. State purpose or reason for listening during the exchange.
2. Ask learners to turn to an elbow partner.
3. Give learners a minute or two to exchange an idea or question.
4. Switch roles

## Reflection:

1. Allow partners to have an “open exchange” or regular conversation around similarity/differences in what they heard.

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## Questions, Answers, Practice, Switch (QAPS)

### Instructional Context/Goal:

Individual → Partner

Teach expertise to another person.

### Description:

A tutoring structure where students work together as teacher and learner, switching roles during the structure.

## Strengths of the Routine:

- Promotes critical thinking

- Encourages collaboration
- Requires students to use and develop language skills
- Develops appreciation of the talents and strengths of others
- Clarify confusion and build confidence.

### Starting Position:

- Individually: Use an individual Criteria Checklist or other review. Check and circle. Students should check something they are confident in, and circle one thing they are unsure about.
- Partners: Students should all be on the same level for discussion (eye to eye or all standing, etc.) so it is easy to hear each other.

### Action Pattern:

Identify the following:

- Roles: One teacher/tutor and one learners
    - Note: When a participant's task is to listen, they can not talk.
  - Turns: The teacher assigns one student in each group to go first. They will state a fact from the text, and then who will go second and third.
  - Rules: Add or repeat: Students can repeat an answer from a previous student or add a new response. Students cannot copy problems or answers verbatim.
  - Time: Timed so that all groups move through each round at the same pace
1. Round 1 Questions: Learner asks questions and teacher notes important questions to answer first (2-3 minutes).
  2. Round 2 Answers: Teacher answers questions and models the skills/tasks to be learned. Learner listens and follows directions (3-5 minutes).
  3. Round 3 Practice: Learner practices and teacher offers feedback (5 to 10 minutes).
  4. Round 4 Switch Roles: Learner teaches the expert the skill or task. Teacher follows the Learner's directions and offers feedback (5 to 10 minutes).
  5. Repeat rounds with another problem or task until learner feels ready to try the task independently.

### Reflections:

6. Open Exchange to follow as to what they learned from the exercise

### Criteria:

- All learners leave the group able to work independently on the task.
- Exemplary: Each group member shares how the discussion furthered their learning.

### Variations:

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## Think-Talk-Open Exchange (TTOE)

### Instructional Context/Goal:

Small Group.

Generate Ideas Collaboratively.

## Description:

In this routine, students share with others and gain feedback on their ideas by finding similarities and differences, piecing together disparate bits of information, or reconciling different interpretations. The Talk portion of the routine is timed, so students know there is a protected, finite participation component. Additionally, there is built in think time between student shares, allowing students to process what has been shared, synthesize ideas, and plan for their next share. Overall, the routine allows students to clarify or generate ideas collaboratively.

## Starting Position:

Individual: Students independently develop a set of initial ideas in response to a prompt, then put a star next to the points they determine are most important to share.

## Action Pattern:

1. Assign students into groups of three with a range of student skill and background knowledge levels in each group.
2. Designate where in the room each group of three will meet, with students sitting or standing knee to knee and eye to eye – so that it is easier to hear each student in the group.
3. Each group includes one speaker and two listeners. Assign one student in each group to speak first, then the student who will speak second and third.
4. Act as timekeeper (or assign this to one student per group), while each student talks for 1 minute, with 15 sec of processing and planning time in between shares.
5. All three students in the group engage in an unstructured open exchange around the prompt for 2-3 minutes after all members of the triad have shared.

## Criteria:

- Students respond to the prompt, explaining their thinking. One student speaks while all others listen.
- Students respond to the question using domain specific vocabulary.

## Variation:

In a variation called **Buzzwords**, students in the group have lists of “buzzwords,” key words from the unit, that they try to identify in their group mates’ discourse during the open exchange. The buzzwords can be generated by the teacher, by each group, or by individual students.

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## Read-Generate-Sort-Solve

### Instructional Context/Goal:

Small Group

Generate Ideas Collaboratively

## Description:

This routine promotes student engagement in problem-solving. Often, when students get a problem to solve, whether this is a mathematical problem or a puzzling idea, they start jumping to answers. Many students need support to build a habit of generating many ideas before selecting the best one. This routine supports students in articulating their thinking and making it transparent, before considering solutions.

Read-Generate-Sort-Solve works well if students follow the collaboration steps using chart paper, a whiteboard, or a virtual whiteboard -- any space where they can work together on responding to the prompt, or solving the problem of the task. The R-G-S-S organizer can be created on chart paper, or printed as a poster.

### Starting Position:

- Individual: Students read a text and generate ideas in response to a given prompt.

### Action Pattern:

1. Assign students into groups of three with a range of student skill and background knowledge levels in each group.
2. Designate where in the room each group of three will meet.
3. For each round, each group has a speaker and two listeners. The teacher facilitating the routine acts as the time keeper. Assign one student in each group to speak first, then the students who will speak second and third.
4. Students take turns sharing ideas they generated; this should be timed and proceed in rounds, to promote equity in sharing.
5. Students collaborate in their groups to sort ideas and identify which ones are most relevant to the prompt.
6. Students individually or as a group complete a final response.

### Criteria:

- Listen when another person is talking.
  - Everyone contributes to the final response.
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## Whole Class Routines

### Rumors

#### Instructional Context/Goal:

Individual → Whole Class.

Exchange ideas to find similarities and differences

#### Strengths of this routine:

- gets learners on their feet
- everyone has to engage in conversation
- requires students to listen and repeat the ideas of others
- allows many learners to talk at the same time, no waiting for a turn
- patterns or groupings may be used to further instruction

## Starting Position

Individual: Ask learners to jot down their name and an idea on a post-it-note or small piece of paper. For example:

- note three questions, put a star next to the most urgent to needs answering
- sum-up what they are feeling in a word
- identify their next step for implementing a new idea
- list one strategy they will use to study this topic
- Solve a math problem on the front and write the steps used on the back

**Note:** Use only ONE idea at a time.

## Action Pattern – Listen, Say, Exchange

1. Invite learners to join you in an open space with their completed post-it-note.
2. Tell learners there are a lot of rumors going around about “(whatever the topic was for the post-it-note)”. Ask learners, what they know about rumors (they spread quickly and people repeat what they heard from other people).
3. Tell learners that we are going to spread our rumors by going up to someone, reading our post it note, listening to their post-it-note, and then exchanging rumors. Then each person goes up to another person and does the same thing again, Listen, Say, Exchange, or Say, Listen Exchange. Learners can use the name written on the post-it-note when they tell a rumor – “I heard from Debbie that....”.
4. Allow learners to exchange ideas with as many people as possible in 3 minutes.

## Reflect

5. Rumors Organization
6. Stop the rumors. Ask one participant to read the rumor that they ended up with out loud. Post the rumor on a white board or chart paper and then ask others to post their rumor next to it if it could be in a group with this one. Ask learners to read their rumor out loud as they post them in a group.
7. Encourage learners to give the group of rumors a name.
8. Ask for a very different rumor – and start a second group. Invite others to post similar rumors to make a second group and brainstorm a name for the new group of rumors.
9. Continue adding groups until all rumors are collected.
10. Discuss what our rumors may tell us about our learning, questions, ourselves.

## Return

11. Ask students to return to their initial thinking to consider how learning in class has changed or confirmed their thinking.

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## Domino Discover

### Instructional Context/Goal:

Small group → Whole Class

Learning the status of student’s thinking.

## Description:

In this routine, students share out ideas rapidly, in a way that quickly surfaces ideas and informs instructional next steps. Since student ideas are shared quickly and effectively, this routine ensures that a range of thinking across the class is surfaced. This routine is often used after small group discussions, with one student reporting out their small group's collective thinking. This should result in data the teacher needs to tailor instruction that will clarify, further, or review student learning.

## Starting Position:

- Individual: Students jot down their responses to a prompt.
- Group: Students engage in a small group discussion, often a group learning routine like **Think-Talk-Open Exchange** or **Idea Carousel**.

## Action Pattern:

1. Each small group prepares one or more reporters to share out ideas generated in the group.
2. Decide which small group will share out first.
3. Select and announce the small group that will go second, establishing the direction for the Domino Discover.
4. Reporters from each small group take turns sharing the collective thinking of their group until every reporter has gone, one after the other without interruption, like dominoes falling.
5. Record ideas from all groups, or have a student act as recorder.
6. Ask students to share patterns in thinking, surprises, or questions that arise.
7. Invite anyone to add something that came up in their small group, but was not captured yet.

## Criteria

- One student speaks while all others listen.
- Everyone is listening for patterns in thinking across the room.

## Variation:

**Random Reporter** is often used to select which student in the small group will be the speaker in the Domino Discover. The random reporter can be selected by the teacher (or a student) based on simple criteria such as birthdays or clothing color. The important thing is select the Random Reporter right before the Domino Discover starts, so that all students prepare with their groups.

If you have many groups and time is a constraint, only have some of the groups share in the Domino Discover.

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## Consensus-Building Share

### Instructional Context/Goal:

Small group → Whole Group

Building on ideas to move towards agreement.

## Description:

This routine, most frequently used during an Explain phase, is a way to make sensemaking visible and move towards a class-wide consensus around a new idea. This routine is similar to **Domino Discover** in terms of the action pattern, but the knowledge-building focus is different. Rather than surfacing a range of ideas and seeking patterns, in a **Consensus-Building Share** the class is attempting to converge on an agreed-upon explanation, model, or argument. It requires skillful teacher facilitation, as it is important to not tell students what they need to know, instead supporting students as a class in using the information they have from investigations, their models and texts in order to figure out and state those important ideas.

## Starting Position:

- Groups have completed their investigative work which may include an explanation, model, or investigation, and have had time to converge around their shared idea. This routine can also follow **Think-Talk-Open Exchange** or **Idea Carousel**.

## Action Pattern:

1. Each small group or partnership prepares one or more reporters to share out ideas generated in the group.
2. Decide which small group will share out first.
3. Select and announce the small group that will go second, establishing the direction for the share.
4. Reporters from each small group take turns sharing their thinking, adding on to or disagreeing with the previous group. This requires more think time than a Domino Discover, and that can be built into the action pattern by saying, "Since we are expecting everyone to add on or question other groups' thinking as we go, you may find you need a moment to huddle with your group in between share-outs. Just ask for a moment to huddle, then resume the share!"
  - Helpful sentence starters for groups to use are We agree with \_\_\_\_\_'s group, and we have more evidence for that; or We came to a different explanation than \_\_\_\_\_'s group because \_\_\_\_\_.
5. Reporters from each small group take turns sharing the collective thinking of their group until every reporter has gone.
6. Record and annotate ideas from the class, clustering ideas that support the sense-making work of the class.
7. Ask students to share patterns in thinking, surprises, or questions that arise.
8. Invite anyone to add something that came up in their small group, but was not captured yet.

## Criteria:

- One student reports their group's thinking while all others in the class listen.
  - The student sharing from each group should stand up, to help with visibility and projection.
  - Everyone is listening for connections in thinking across the room. This might include repetitions of similar ideas, ideas that we are not yet sure about, and ideas we want to build upon.
  - The reporter for each small group confirms thinking from other groups and/or adds additional ideas.
  - Everyone is responsible for making sense of the ideas presented, in service of figuring something out together.
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## Idea Carousel

### Instructional Context/Goal:

Small group → Whole Class

Building ideas in the classroom

### Description:

This routine supports groups of students in thinking through a set of related problems, tasks, or visuals, in order to develop a larger insight or discovery. Since students work in groups through multiple pieces of classmates' work, they develop a layered understanding of a topic. This routine, therefore, is great for developing complex understandings of a phenomenon in science.

### Starting Position:

- Each group develops a response to a prompt in the form of a visual, piece of writing, or diagram. These responses are created on chart paper or marker boards and posted around the group.

### Action Pattern:

1. Start each group at a poster in the room. Provide one marker per group, and ask groups to annotate the poster they are visiting, using the annotation guide below.
2. Rotate to the next chart and take your marker.
3. Repeat steps (1) and (2) as many times as is necessary for each group to rotate to each other group's poster.
4. Make sure each group ends back at their own poster. Prompt them to notice changes and annotations on their chart.

- ✓ 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.

### Criteria:

- Read each group's chart for understanding, and attempt to provide annotations that are helpful for building understanding.
- Consider how learnings gathered around the room help with your own topic.

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## Class Consensus Discussion

### Instructional Context/Goal:

Whole Class. Elevating Ideas to move towards class agreement

## Description:

This routine, most frequently used during an Explain phase, is a way to ensure that the accurate scientific ideas students are figuring out are made public and visible for all students to access. It requires skillful teacher facilitation, as it is important to not tell students what they need to know, instead supporting students as a class in using the information they have from investigations, their models and texts in order to figure out and state those important ideas.

## Starting Position:

- Group: Groups have completed their investigative work which may include an explanation, model, or lab.

## Action Pattern:

1. Select a few different groups to share their work.
2. The first group shares out their work. Sharing can be done by:
  - a. projecting using a document camera
  - b. copying the models to be shared and passing them out to the class
  - c. taking a picture of each model and projecting them as slides
3. Another person in class repeats or reiterates what the first group shared.
4. Class members ask clarifying questions about the work.
5. Repeat for each group that is sharing work.
6. Everyone confers in table groups.
7. Engage in whole-class discussion about the ideas that were shared, in order to come to agreement.

## Criteria:

- One group shares while all others watch and listen.
- Everyone is responsible for making sense of the ideas presented, in service of figuring something out together.

## Variations:

Once this routine is well-established in a class, students can often take on the facilitation and orchestration of discussions.

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# Formative Assessment Strategies

## Sort and Post

### Instructional Context/Goal:

Whole Class.

Organize student responses into categories to see their understanding.

## Description:

Students place their responses to a prompt, based on criteria.

## Strengths of the Routine:

- Saves time
- Prompts students to think about their responses
- Encourages students to help each other
- Does not require discussion

## Starting Position:

- Individual. Students complete a response to a question or a self-reflection on their learning.

## Action Pattern:

Teacher Identifies:

- Roles: Observers
- Turns: Simultaneous
- Rules: Look for patterns and differences considering each person's work.
- Time: Two Minutes.

1. Place categories or topics in columns.
2. Ask students to sort their responses into the appropriate category.

## Reflection:

1. Ask students to make observations about what the sort indicates.
2. Adjust instruction as necessary

## Criteria:

- Answers the question, explains placement into category.
- Amazing: Uses domain-specific vocabulary. Makes a connection to a class activity, reading, or comment from another student

## Variations:

- Could do it digitally

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## Show and Share

## Instructional Context/Goal:

Small Groups

To find patterns and surprises among student responses

## Description:

The routine is a way for students to share and consider their work and the work of their peers in an efficient manner.

## Strengths of the Routine:

- Takes little time
- Everyone participates at the same time
- No real language or speaking required
- Students gain clarity from viewing the work of others

## Starting Position:

- Individuals consider a response to a question. Could use List, Write, Draw

## Action Pattern:

Teacher identifies in directions:

- Roles: Observers
  - Turns: Simultaneously, all students share.
  - Rules: Look carefully for patterns and differences, paying attention to each person's work; Keep silent. No talking, only looking.
  - Time: 1-3 minutes
1. State a reason for looking at each other's work. Ex. to notice patterns and differences. Or direct students to add two new ideas "The purpose of sharing responses is *Plus Two*- to gather two new ideas that you can use when you revise", or spark questions.
  2. Direct students that on the count of three, they will show their work to their peers in silence. No talking

## Reflection:

1. Return to individual work to revise or compose a question.
2. Share learning via an elbow partner or with their table.
3. Adjust instruction as needed

## Criteria:

- Uses the word because, explains with detail, includes visual representation of ideas.
- Makes connections to course material, uses domain-specific vocabulary.

## Variations:

- Can use fist to five for MCQ items.

# iHub/OpenSciEd Discussion Protocols<sup>2</sup>

## Generating and Prioritizing Questions Protocol

The goal of a Generating and Prioritizing Questions Discussion is to identify the questions students need to answer or investigate next. It corresponds with the scientific practice of asking scientific questions (scientists) and defining the problem (engineering). In Inquiry Hub it occurs most often at the beginning of a unit or bend, or during an Anchoring Phenomenon Routine.

### Routine: Anchoring Phenomena Routine

1. Give each student two sticky notes. Tell students, "On each sticky, write ONE question you have. Just ONE per sticky note."
2. If you have many ELL students in your class, ask students to work in partners to write FOUR questions. It is good to have a total number of questions of at least 20 but up to 50.
3. Allow 3 minutes to write these questions. Be sure it is just one question per sticky note.
4. When students are through, form a semi-circle around a large blank space: a board, a wall, etc.
5. Say, "Now we are going to group our questions by their topic. Listen carefully to others' questions. If you have a related question then bring it up, read it, and stick it next to it. When we are finished we will have a bunch of questions grouped by related ideas."
6. Have one student start by reading their question. When that student is finished, ask, "Who has a related question?"
7. If no students respond, do not cold call; ask them to listen for related ideas. Simply ask the previous student to repeat their question and ask, "Who has a related question?" Be patient. Insist that there are a lot of great questions and that we do this because we care about each others' ideas as a classroom community.

### Tips

- Don't cold call. Students learn that their peers have great ideas when they are encouraged to listen. If the teacher cold-calls students, they may not listen as carefully to try to understand their peers' questions and compare them to their own questions. The high-level cognitive work (and learning!) is listening deeply and thoughtfully wondering, "Is my idea the same as that one?" This also sets the tone for a unit where students are doing the intellectual work.
- Some ways to modify the Generating and Prioritizing Questions Discussion (Smith, 2019) include:
- Ask students to think and talk about phenomena related to the anchoring phenomenon before students write questions
- Direct students to talk [OR not to talk] to one another while drafting questions
- Ask students to think about a question that someone else might want to know an answer to
- Ask students to write questions in their notebooks [OR on activity sheets] and select one [OR more than one] for sticky note[s]
- Provide an example question as students wrote their questions
- Explain to students that some questions may be answered in a later unit or another science class

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<sup>2</sup> iHub Discussion Protocols taken from: [Discussion Protocols - Full Set inquiryHub Chemistry](#)

## Initial Ideas Discussion

### Routine: Peer Listening

1. Initial ideas are an opportunity for students to bring all of their background knowledge to their science experience. It is extremely important to honor all students' ideas during an initial ideas discussion. It is part of building toward a scientific explanation of a phenomenon.
2. Pre-teaching (just for the first time you do peer listening)
3. Brainstorm, as a class, the characteristics of a good listener. "Patient, responds to what you need, supportive, etc." You also need to add (if it doesn't come up) that a good listener isn't just waiting for their turn to talk. Generate a list of celebrities good at (e.g., Oprah) and bad at listening (e.g., ESPN commentators).
4. Tell students, "Now you are going to listen to each other with science ideas. When you are listening, you keep your ideas to yourself. Your job is to listen carefully to your partner."
5. If possible, model this, using a student as an explainer and the teacher as the listener. Ask something easy, like, "Could you explain how you got to school today?" The teacher/coach should ask for details using talk moves like "Say more about \_\_\_\_."
6. Have the students generate a few sentences stems for when they get stuck as a listener.
7. Ask, "What could you say if you really don't understand what someone said? How can you show that you listened without saying if you like or don't like their idea?" Write these prompts on the board for students to use if they get stuck. Include students' native languages if you can, or ask students to write the prompts on the board for you.

### For peer listening:

- Ask students to pair up. Show a few prompts that can help the listeners, such as "Are you saying \_\_\_\_?" or "Can you tell me more about \_\_\_\_?"
- Designate who goes first.
- Ask an open-ended question. Repeat it once so everyone can hear.
- Give 'think time'. Count to 10 in your head. You could expand this to a pre-write if you prefer.
- Ask the listeners to listen. The rest of the students are explainers.
- Move through the room and listen carefully. Do not interrupt. Teacher interruption almost always reduces the cognitive work on students.
- Celebrate. Have the coaches give their explainers a "very coachy high five." or tell the explainers, "You're my MVP!" (or something similarly goofy but supportive).
- Switch coaches and repeat.
- Ask students to nominate a "listener of the day" or to reflect again on their coaching practice. Emphasize to students that really listening to each other is very, very hard – especially if you have a big idea of your own, but that you are proud of them.
- Go public. Ask students to share an idea they heard or an idea they have with the class.

## Building Understandings Discussion: Share Trade

### Routine: Share-Trade

1. Ask a question that students need to figure out using pieces of evidence from the lesson.
2. Give all students a chance to write what they think on a piece of scrap paper
3. Have students get up and find someone to share their idea with
4. Trade their papers

5. Take their “new” idea to a new partner and share it
6. Repeat sharing and trading until students have a chance to share several ideas.
7. Have students sit so they can see each other and the teacher
8. Make a class list of all possible explanations.
9. Ask students if any of the explanations are related.
10. Optional: Draw individual or class models.

## Building Understandings Discussion: Three Stay, One Stray

### Routine: Three Stay, One Stray

When to use it: if students are doing group work and you want them to share ideas to build toward a common understanding.

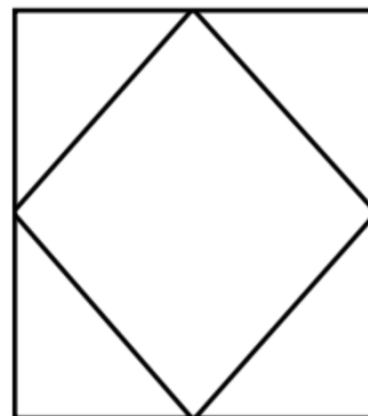
1. In groups of 2 or 4, have students nominate one person to “stray” to see other groups’ work: models, summaries, or simulations.
2. Ask the person who strays to look for “What great ideas you’re going to borrow” for their own group.
3. Give the “stray” 3-4 minutes to go to a different group.
4. Send them back to their group to share new ideas.

## Consensus Discussion

The purpose of a consensus-building discussion is to use evidence to generate a common class idea and/or to pursue a next step.

### Routine: Discussion diamond.

1. Pass out a piece of paper for each table group that has a diamond in the middle and space for each person in the group to write at the corners. Alternatively, students can make one in their notebooks (credit: Windschitl, Thompson, & Braaten, *Ambitious Science Teaching*. Harvard Education Press, 2018)
2. Discussion Diamond Instructions
3. Students’ independent ideas go in the corners and the consensus of the group goes in the middle.
4. Tell students that today we are going to think about what we have seen so far and try to agree as a class.
5. Remind students, “In science class, we rely on evidence and careful thinking, NOT the popular one, the loudest person, or the one whose parent teaches science. In science, we ONLY look at evidence.
6. Ask students an open-ended question. Give think time.
7. Tell students to write their thinking in their corner and put their name. This part can be graded if needed as an explanation or argument related to the phenomenon.
8. Generate consensus. Tell students that in their groups they should share their ideas and in the center, write the ideas they think are the best. Remind them that they should use the evidence we have seen in class to determine the best answer.
9. Compare across discussion diagrams. Have students fold back their corners and bring their discussion diagrams to a shared table and gather around (if space allows). Ask what common ideas we think we have at this point.
10. These common ideas are our consensus.



# Consolidation Prompts:

For lesson closures/end of class/discussion segment

## Factual Discussions

For discussions that focus on delivering factual information or historical events.

1. **Summary Spotlight:** Summarize the discussion topic using three bullet points: **green** for facts everyone agrees on, **yellow** for debatable points, and **red** for unresolved questions.
2. **Factoid Flash:** List five quick facts discussed and challenge a partner to rank them by importance.
3. **Two-Minute Timeline:** Create a quick timeline of the discussion's main points in a logically connected order.
4. **Data Dash:** Quickly draft a table or chart summarizing relevant data from the discussion.
5. **Keyword Kaleidoscope:** Create a list of important terms or phrases and explain their significance.
6. **Chain Reaction:** Identify and arrange the sequence of events or concepts from today's material.
7. **Snapshot Scene:** Imagine you're capturing today's concept in a photograph—describe what the photo would depict.
8. **Quick Quiz Master:** Create a 3-question quiz based on the discussed material.
9. **Fact-Check Foursome:** In groups of four, challenge each other with potential misconceptions about the discussion topic.
10. **Idea Inventory:** List the big ideas discussed and mark each one you feel confident about, unsure of, or need more info on.
11. **Sticky Note Summary:** Write a sticky note summary and place it on a classroom wall to form a visual collage.
12. **One-Sentence Synthesis:** Summarize the entire discussion in one concise sentence.
13. **Misconception Mischief:** List as many possible misconceptions about today's material as you can think of in 2 minutes and explain why each one is a misconception.

## Conceptual Discussions

For discussions that explore theories, concepts, or models and their applications.

1. **Thought Triangle:** Create a diagram that connects three key ideas discussed, labeling their relationships.
2. **Mind Map Minute:** Sketch a quick mind map linking main ideas and sub-points from the discussion.
3. **Metaphor Maker:** Craft a metaphor or analogy to explain a core concept from this lesson.
4. **Concept Challenge:** Explain why a concept from this lesson matters beyond this lesson.
5. **Connection Corner:** Link today's topic to a previous topic from the class.
6. **Concept Cliffhanger:** Share one unresolved question or potential future application of the discussed topic.

7. **Mini Mock-Up:** Diagram a miniature model representing a topic that we discussed.
8. **Conceptual Capsule:** Compare and contrast today's topic with a previous lesson, pointing out similarities and differences.
9. **Narrative Navigator:** Write a brief narrative paragraph that incorporates the ideas covered in today's discussion.
10. **Triangular Thinking:** Create three possible scenarios related to the discussion topic and explain the outcomes.
11. **Relatable Recap:** Relate the topic to a current event or trending news story.

## Procedural Discussions

For discussions that involve step-by-step processes or methods.

1. **Partner Parrot:** In pairs, retell the discussion points as if explaining to a novice.
2. **Two Truths and a Myth:** Share two accurate facts and one misconception about the material that we discussed, and see if a partner can identify the myth.
3. **Reverse Engineer:** Design a problem based on the discussed material.
4. **Peer Prediction:** Predict potential questions or misconceptions that might arise for someone new to the topic.
5. **Speed Round Share:** Each person has 10 seconds to share their biggest takeaway in rapid succession.
6. **Speed Summarizer:** Time yourself summarizing the entire discussion in under one minute.
7. **One-Word Wrap-Up:** Summarize the discussion in a single word and share why you chose it.
8. **Sketch Scene:** Draw a quick sketch that visualizes the main theme of the discussion.
9. **Q&A Scramble:** Write down one question from the discussion, then swap it with a partner for an immediate answer.
10. **Time Capsule:** Identify one concept that will be valuable for you to remember in the future and explain why.
11. **Learning Links:** Draw arrows between today's topic and previous ones, showing how they are connected.
12. **Whisper Wheel:** Whisper a summary to a partner, who then passes it around and adds to it to form a collective summary.
13. **Expert Exchange:** In pairs or trios, share and refine one big takeaway from the discussion.
14. **Double-Dash Diagram:** Draw a diagram to represent the relationship between two discussed concepts.

## Debatable Discussions

For discussions that engage opinions, arguments, or ethical considerations.

1. **Role Reversal:** Explain the topic from a different perspective (e.g., a different stakeholder or viewpoint).
2. **Feedback Loop:** Write a sentence summarizing the discussion, pass it around, and each student adds a comment or clarification.

3. **Idea Elevator:** Summarize the discussion using the "elevator pitch" concept, condensing everything to a 30-second explanation.
4. **Persuasion Pitch:** Convince a partner of one key point from the discussion.
5. **Reflection Ripple:** Reflect on how the discussion aligns or contrasts with initial thoughts from your group chat.
6. **Acronym Ace:** Create an acronym summarizing the main points of the discussion.
7. **Challenge Chat:** Share a challenge or counter-argument about the discussed content and try to resolve it.
8. **Peer Predictions:** Write one question you expect to appear in future quizzes or assessments.
9. **Table Talk:** Share a summarizing point with your group, and discuss if everyone agrees.
10. **Problem Planter:** Generate a real-world problem that could be solved using the discussed material.
11. **Personal Profile:** Relate the discussion topic to your own life experiences or future plans.

## Exploratory Discussions

For discussions that delve into emerging ideas, brainstorm potential research topics, or investigate possibilities.

1. **Idea Incubator:** Brainstorm as many potential applications of the topic as possible in 2 minutes.
2. **Future Forecast:** Predict what research or technological advances might emerge from today's topic in the next 5-10 years.
3. **Research Roadmap:** Create a quick research plan outlining questions and methods related to the topic.
4. **Hypothesis Highway:** Propose multiple hypotheses that could explain observed phenomena discussed today.
5. **Curiosity Carousel:** Rotate in pairs at your table, brainstorming questions about the topic and sharing with the next group.
6. **Wonder Wall:** Fill a wall with sticky notes listing questions, ideas, or problems yet to be solved.
7. **Mapping Mindset:** Sketch a path that traces how an idea or innovation has changed over time.
8. **Wild What-Ifs:** Pose unusual or extreme what-if questions about the topic to stretch imagination and challenge understanding.

## Problem-Solving Discussions

For discussions that involve analyzing complex issues or generating strategies to address problems.

1. **Solution Sketch:** Draw a sketch illustrating potential solutions to a problem raised in the discussion.
2. **Priority Pyramid:** Rank multiple potential solutions or priorities in a pyramid structure.
3. **Problem Grid:** Identify root causes and possible solutions to the problem(s) discussed, creating a matrix with varying scenarios.
4. **Obstacle Overview:** List the key obstacles to solving a problem and strategize how to tackle them.
5. **Failure Flowchart:** Develop a flowchart mapping possible missteps or challenges in solving the problem.

6. **SWOT Squad:** Analyze the strengths, weaknesses, opportunities, and threats of potential solutions.
7. **Troubleshooting Trio:** Break into trios and solve mini-problems based on the larger problem.
8. **Resource Roundup:** Identify key resources required to implement a solution and analyze availability.

## Mathematical Problem-Solving Discussions

For Discussions that involve solving math problems or reasoning through mathematical concepts.

1. **Equation Explanation:** Summarize how the group arrived at the solution step-by-step, highlighting the logic behind each equation.
2. **Proof Partner:** Work in pairs to explain the rationale behind the solution as if presenting it to a mathematician for peer review.
3. **Formula Flashback:** List the formulas or theorems used during the discussion and identify where each was applied.
4. **Error Examiner:** Review the problem-solving process for errors or misconceptions, explaining how to correct them.
5. **Visual Verification:** Illustrate the solution using a graph, diagram, or flowchart to confirm that it logically follows.
6. **Alternate Avenue:** Propose an alternative solution or method to solve the problem and compare its efficiency with the original.
7. **Calculation Collage:** Create a visual collage that demonstrates the solution process and includes all relevant calculations.
8. **Number Network:** Construct a concept map showing the relationships between numbers, formulas, and the logical steps used.
9. **Math Mentor:** Pretend you're mentoring a younger student, explaining each step of the solution clearly and simply.
10. **Justification Junction:** Provide a written justification for why each step of the solution is mathematically sound.
11. **Problem Comparison:** Compare today's problem to a previously solved problem, identifying common strategies or patterns.
12. **Assumption Audit:** List any assumptions made during the problem-solving process and determine their validity.
13. **Symbol Swap:** Substitute numbers or symbols in the original problem and predict how these changes would affect the solution.
14. **Algorithm Assembly:** Develop a step-by-step algorithm to solve similar problems, explaining each part of the process.
15. **Collaborative Computation:** Divide the solution process among group members and then reassemble it collaboratively, ensuring consistency.



# Template

**<NAME>**

Instructional Context/Goal:

Description:

Strengths of the Routine:

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Starting Position:

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Action Pattern:

- 

3.

Criteria:

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Variations: