



# Parachutes

- ◆ *An experience in inquiry learning*
- ◆ *What type of parachute would you like attached to your back?*

# Workshop Strands

## ◆ Understanding by Design

## ◆ Supporting Inquiry

- How can I facilitate and assess inquiry investigations in a K-8 classroom and achieve a standards-based curriculum?
- How can I plan an inquiry to ensure that students demonstrate critical learning of content and process skills?

## ◆ Literature Inquiry

## ◆ Next Steps & Collaboration

# Agenda

- ◆ Inquiry Investigation (integrate break) – approx 2.5 hours
  - Phase 1
  - Phase 2
  - Lunch @ 12:00 – 1:00
  - Phase 3
- ◆ Debrief and share strategies to support inquiry in the classroom @ 1:45
- ◆ Share Inquiry Template

# Purpose

Provide a quick, intensive  
experience of **inquiry** to  
create a


**feel** for inquiry and

**vision** of the process.

# Parachute Inquiry

- ◆ Based on the Exploratorium's work
  - Model structure of inquiry (see map)
- ◆ Focused on middle school but could be modified for elementary

# This experience includes

- ◆ Science content associated with parachutes.
  - ◆ Use of process skills to learn content.
  - ◆ Process of doing inquiry.
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# Become the learner.

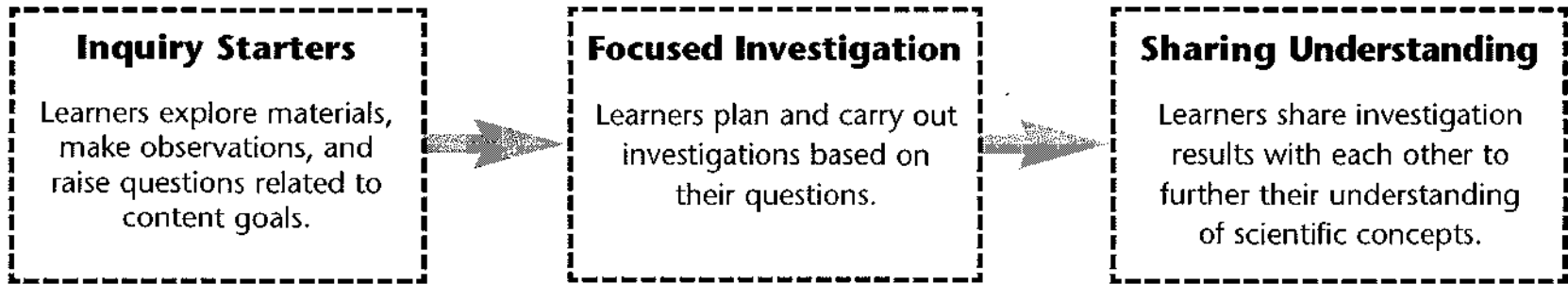


# Mess around and explore






# Inquiry Structure for Learning Science Content

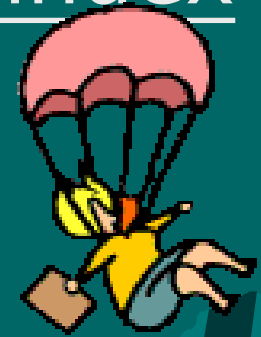


# Inquiry Starters – Phase 1

- ◆ The inquiry experience is introduced.
  - ◆ Explore engaging materials and phenomena.
  - ◆ Raise and record questions.
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# Inquiry Starter

- ◆ Build parachute according to the directions
- ◆ Explore how your parachute works
- ◆ Record observations (front) and questions (back) you have on index cards



# Types of Questions

- ◆ Investigable (testable)
- ◆ Non-investigable questions

## What is the difference?

Sort your index cards & discuss


# Investigable or Non-investigable?

- ◆ Will a round parachute work better than a square parachute?
- ◆ How do you steer a parachute?

# Variable Scan

<b>Independent Variables</b>	<b>Dependent Variables</b>

# Variable Scan

- ◆ 1/2 room – “What effects heart rate”
  - ◆ 1/2 room – “What effects the speed of the car?”
  
  - ◆ Your task:
  - ◆ Brainstorm possible independent variables
  - ◆ dependent variables
  - ◆ Variables that are kept constant
- 

# Variable Scan

- ◆ 1/2 room – plant experiment
- ◆ 1/2 room – paper towel testing

Your task:

- ◆ Brainstorm possible variables that you could change (Independent variable)
- ◆ Variables that you could measure/observe (dependent variables)
- ◆ Variables that are kept constant for a fair test




# Question Format

- ◆ How does the \_\_\_\_\_ IV \_\_\_\_\_ affect the \_\_\_\_\_ DV \_\_\_\_\_?
- ◆ Does not always work – sometimes more “lose” questions are more valuable

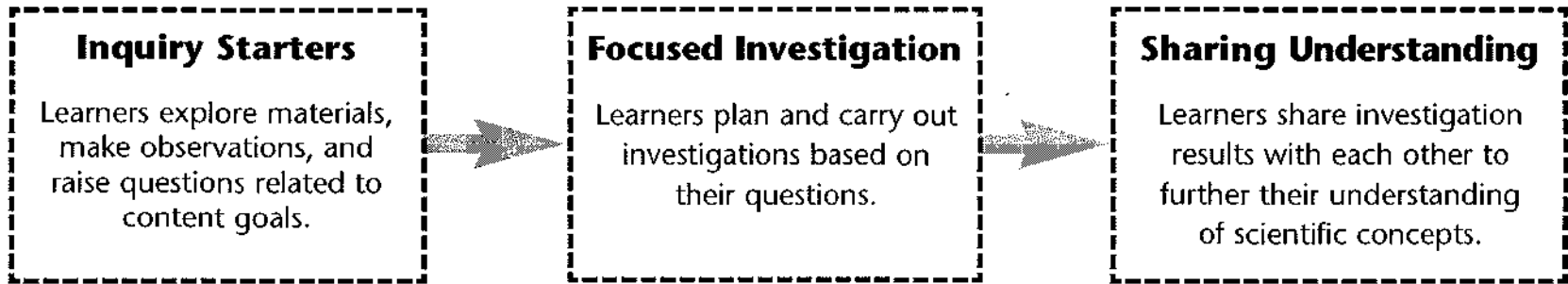
# Fair Test / Controlled Experiment

- ◆ What is a fair test?
- ◆ How do you get your students to understand what a fair test is?

# Gallery Walk

- ◆ Post about 6 questions on wall
  - ◆ Read questions
  - ◆ Form groups of approximately 3
  - ◆ Use planning template
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# Inquiry Structure for Learning Science Content

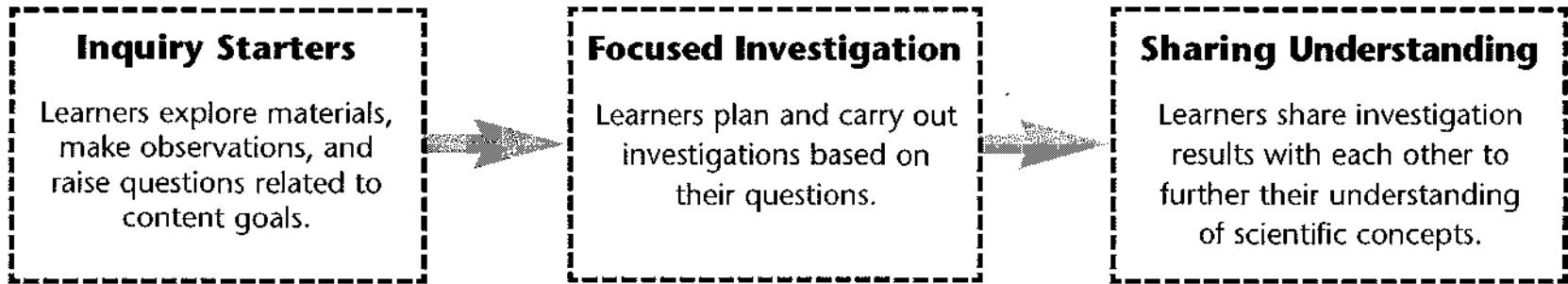


# ◆ Investigate – Phase 2



- Figure something out
- Receive help from facilitators
- Share information with other groups
- Raise new questions
- Revise your plan

# Inquiry Structure for Learning Science Content



# Sharing Understanding – Phase 3

- ◆ Process for meaning
- ◆ Share results of investigations
- ◆ Facilitator synthesizes these results
  
- ◆ 2-3 minutes
- ◆ Template as a guide
- ◆ Chart paper & markers available




# Parachute Synthesis

*We learned...*



# Different forces were influencing motion.

- ◆ Air exists as a substance and can act against objects (can exert a force).
  - ◆ The force of air against objects is called air resistance or drag.
  - ◆ The forces acting on a parachute are gravity pulling down and drag pulling it up.
  - ◆ The greater the surface area of an object the greater the drag.
  - ◆ MORE...
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Different materials and/or designs have benefits / drawbacks such as:

- ◆ Groups found that flexible materials make better parachutes because they unfold into a parachute shape easily.
- ◆ Groups found that larger parachutes work better than smaller parachutes because they catch more air, as long as they are not too heavy.
- ◆ MORE...

# If emphasized...

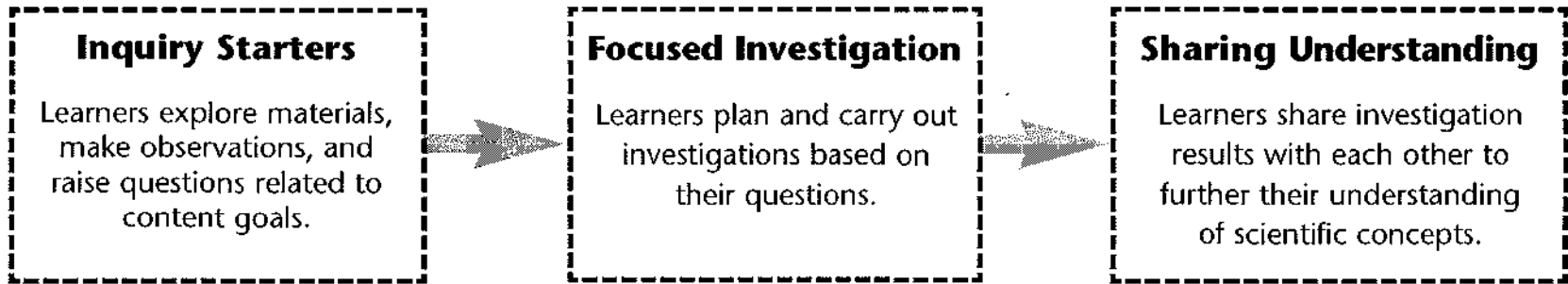
- ◆ Calculate the average speed of a moving object.



# Inquiry Skills

- ◆ Investigable (testable) questions can be answered in the here and now. Non-investigable questions need to be answered using print resources.
- ◆ To help ensure reliable data, the experimental design should have only one independent variable, the rest of the variables should be held constant. (controlled experiment / fair test)
- ◆ Rich inquiry investigations lead to more questions.
- ◆ MORE..

# Inquiry Structure for Learning Science Content



# Chart Talk

- ◆ Identify strategies that help support these critical elements of inquiry
- ◆ Debrief

# Inquiry Template

- ◆ Common structure to communicate grade level inquiries to teachers
- ◆ Structure to design new inquiries
- ◆ 3 phases
- ◆ Apply to unit of choice on Saturday.
  
- ◆ Exploratorium's work is focused on professional development

# Essential Questions for the Pathway

## Supporting Inquiry

- How can I facilitate and assess inquiry investigations in a K-8 classroom and achieve a standards-based curriculum?
- How can I plan an inquiry to ensure that students demonstrate critical learning of content and process skills?



# Turn and Talk

- ◆ Are there any topics that don't lend themselves to a hands-on inquiry?