Inquiry 4.2: Movement of Air

Name _____
Date _____
Period ____

Background, Part A: Answer the following questions as completely as possible.

1. How does the temperature of a substance effect the speed of its molecules?

_____

_____

_____

2. Compare the spacing of molecules in a solid versus the spacing of molecules in a liquid.

_____

_____

_____

Background, Part B: Circle true or false.

3. True or False: Molecules in a gas are even farther apart than in a liquid.

4. True or False: Most substances expand when heated and contract (take up less space) when cooled.

5. True or False: More dense air will sink and less dense air will rise.

Listen as the teacher describes the procedure. Then answer questions # 6 - 12.

Materials: Convection Tube, punk stick, lighter, funnel, plastic tubing, flashlight, cup of ice, candle, empty beaker

Testable Question:

6. Circle the most *complete and testable* question:
   - A) Why does air move faster when it is heated up?
   - B) What is the difference between warm air and cold air?
   - C) In what direction & speed does warm air move and what direction & speed does cold air move?

(2) 7. Explain why <u>one of the other choices</u> above is not testable or complete enough.

_____

_____

Prediction/Hypothesis:

8. Write your prediction here. *(What do you think the results will be to the testable question?)*

_____

_____

Safety: Do not leave the lit candle under the tube for very long, be aware of where the punk stick is at all times, flashlight is fragile, melted wax (and flame!) are hot.

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Manipulated Variable

(1) 9. What is the ONE thing we are changing between the two set-ups?

_____

Response Variable

(1) 10. What data are we going to observe, measure, and/or record during the inquiry?

_____

(3) 11. List at least three things that need to stay the same between the two set-ups to be a fair test.

_____ = _____

_____ = _____

_____ = _____

→**Procedure**:

(4) 12. *On a separate piece of paper,* write out a procedure for JUST the cold air experiment. Title it: "Procedure 4.2"

Data Collection and Presentation

13. Use the space below to record your data. Use words **and** diagrams this time! Remember to label and explain the speed and direction of the smoke/air. Use directional arrows to show air flow.

(1 2 3 4) **COLD** AIR DIAGRAM *with labels!*	(1 2 3 4) **WARM** AIR DIAGRAM *with labels!*
Descriptive sentence:	Descriptive sentence:

<u>Conclusions:</u>

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(4) 14. **Answer & Evidence-Based Conclusion:** Using the data you collected, describe any conclusions you can make about the testable question. (hint: use descriptive words like "hovered," "lingered," "rose quickly," or "shot up"…)

_____

_____

_____

_____

(6) 15. **Scientific Explanation**: Using expected data, explain ***WHY*** air moves the way it does. (Include information about the speed, spacing, and density of hot and cold air molecules.)

HOT air molecules move this way because they are: _____

_____

COLD air molecules move this way because they are: _____

_____

(3) 16. **Problems:** Describe any problems, how they might have affected the results and suggest a possible improvement.

Problem: _____

_____

How It Affected the Results: _____

_____

Improvement: _____

_____