

## Molecules in Motion Questions

### 1. Grades 3–5 Science Selected Response Item

Which of the following represents water in its gaseous state?

- A. Ice cubes  
B. Water in a glass  
C. Steam from a tea kettle  
D. Lake

### 2. Grades 3–5 Science/Language Arts Constructed Response Item

Imagine that you are a water molecule. You are in the solid state. Write a short story about what happens to you as you float in a glass of lemonade on a hot summer day.

### 3. Grades 3–5 Science Constructed Response Item

The Molecules in Motion activity is a simulation of what really happens to water molecules as they change physical states. Write a paragraph that explains how a simulation can help you to learn about important scientific ideas.

## Molecules in Motion Responses

1. **Correct Response:** C. Steam from a tea kettle

**Benchmarks:** Grades 3–5 — SC.A.1.2.2, SC.A.2.2.1, SC.B.1.2.4, SC.B.1.2.6, SC.H.2.2.1

**Difficulty Level:** Grades 3–5 — Easy

### 2. Sample Top-Scoring Response

I am a water molecule. When I woke up this morning, I was in the freezer in an ice cube tray. It was very dark and cold. The other water molecules and I were snuggled very closely together. Then the light went on and someone took us out of the freezer and put us in a bathtub. It was a very deep bathtub filled with yellow water. But wait — it wasn't water, it was lemonade. It felt nice and warm. The day was very sunny. The lemonade bathtub was sitting

on the picnic table. I enjoyed the sunshine and floating in my lemonade bath. I noticed that I was starting to feel a little warmer and a strange thing was happening. Some of my ice cube buddies were disappearing into the lemonade bath. I started to worry about them when all of a sudden, I was swimming all around in the lemonade. I saw my ice cube buddies, but they looked different now. As I got even warmer, something else happened to me. I started to swim very fast in the lemonade bath. Suddenly I was not in the lemonade bath anymore. I was flying very fast through the air. It seemed like I was invisible. I was really having fun soaring through the air when I started to feel chilly. It felt like I was in the freezer again, but another water molecule explained to me that I was in a cloud. It had been a busy day, and I was very tired.

#### **4-Point Response**

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.
2. Student demonstrates an understanding that heat energy regulates the physical states of water.
3. Student demonstrates an understanding that the speed of molecule motion changes with each change in physical state.
4. Student demonstrates that molecule distance changes with respect to the physical state of water.

#### **3-Point Response**

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.
2. Student demonstrates an understanding that heat energy regulates the physical states of water.
3. Student demonstrates an understanding that the speed of molecule motion changes with each change in physical state.

OR

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.
2. Student demonstrates an understanding that heat energy regulates the physical states of water.
3. Student demonstrates that molecule distance changes with respect to the physical state of water.

#### **2-Point Response**

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.

2. Student demonstrates an understanding that heat energy regulates the physical states of water.

OR

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.
2. Student demonstrates an understanding that the speed of molecule motion changes with each change in physical state.

OR

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.
2. Student demonstrates that molecule distance changes with respect to the physical state of water.

### **1-Point Response**

1. Student correctly sequences the changes in the physical states of water — solid↔liquid↔gas.

**Benchmarks:** Grades 3–5 — SC.A.1.2.2, SC.A.2.2.1, SC.B.1.2.4, SC.B.1.2.6, SC.H.2.2.1

**Difficulty Level:** Grades 3–5 — Medium

Prompt could also be used for an FCAT-like writing prompt using the FCAT Writing Rubric.

Correlated benchmarks (all additions to the correlations):

**Grades 3–5 — LA.B.1.2.3, LA.B.1.2.4, LA.B.1.2.5, LA.B.1.2.6, LA.B.1.2.7, LA.B.1.2.8, LA.B.1.2.9, LA.B.1.2.10, LA.B.1.2.11, LA.B.1.2.12, LA.B.2.2.**

### **3. Sample Top-Scoring Response**

Playing the Molecules in Motion game helped me to learn about how real water molecules act. Because real water molecules are too small to see with my eyes, this game helped me to see what happens when water changes from a solid to a liquid to a gas. It showed me how heat and cold affect how fast real water molecules move. It also helped me to see how heat and cold make real water molecules get closer together or further apart.

## **2-Point Response**

1. Student correctly explains how the simulation activity mirrored actual events.
2. Student supplied numerous examples of how the simulation imitated actual events. Examples could include the effects of heat and cold on molecule activity and molecule separation at each physical state, as well as the fact that water exists in three states.

## **1-Point Response**

Student correctly explains how the simulation activity mirrored actual events.

**Benchmarks:**     **Grades 3–5 — SC.A.1.2.2, SC.A.2.2.1, SC.H.1.2.5, SC.H.2.2.1**

**Difficulty Level:** **Grades 3–5 — Medium**

Prompt could also be used for an FCAT-like writing prompt using the FCAT Writing Rubric.

Correlated benchmarks (all additions to the correlations):

**Grades 3–5 — LA.B.1.2.3, LA.B.1.2.4, LA.B.1.2.5, LA.B.1.2.6, LA.B.1.2.7, LA.B.1.2.8, LA.B.1.2.9, LA.B.1.2.10, LA.B.1.2.11, LA.B.1.2.12, LA.B.2.2**