

## ***Common Writing Assignment: Science***

### **Charles' Law CWA**

The Charles' Law CWA can be used as the weather unit assessment. The overarching question is: If the air pressure at the beach is the same as it was at Jorge's house which of the following statements will be true? The following handouts are included:

- Prompt with two scaffolding options
- Content specific rubric
- Sample student response

Students should be provided one of the two prompts. The two options are provided so that you can select the one with the appropriate amount of support for your students. These handouts include the prompt, data, and a response section. In addition to providing a specific CERR rubric that corresponds to this topic, a sample student response is included.

## Gas Laws

### (Scaffold Option 1)

Jorge inflates a beach ball to a volume of 4L in his air-conditioned house where the temperature is 18°C. That afternoon he takes the beach ball to the beach with some friends. The temperature at the beach is 32° C, and the air pressure at the beach is the same as it was at Jorge's house. What will happen to Jorge's beach ball when he is at the beach?

Write a paragraph that clearly makes a ***claim*** about what will happen to the beach ball. Use ***evidence*** to support your claim and use science principles within your ***reasoning*** to explain the link between the claim and evidence.

## Gas Laws

### (Scaffold Option 2)

Jorge inflates a beach ball to a volume of 4L in his air-conditioned house where the temperature is 18°C. That afternoon he takes the beach ball to the beach with some friends. The temperature at the beach is 32° C, and the air pressure at the beach is the same as it was at Jorge's house. What will happen to Jorge's beach ball when he is at the beach?

Choose the claim that best answers the question:

- A. The beach ball will get smaller at the beach because the molecules are moving slower.
- B. The beach ball will stay the same size at the beach because the pressure is constant.
- C. The beach ball will get larger at the beach because the molecules are moving faster.
- D. The beach ball will get larger at the beach because the pressure will cause it to expand.
- E. The beach ball will get smaller at the beach because the molecules will collide less often.

Write a paragraph that clearly makes a **claim** about what will happen to the beach ball. Use **evidence** to support your claim and use science principles within your **reasoning** to explain the link between the claim and evidence.

### Gas Laws: CER Rubric

	Exemplary	Proficient	Needs Improvement	Critical	Invalid
<b>Claim:</b>	<b>Compelling Claim</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Claim is clear, scientifically sound, and directly related to the question</li> <li><input type="checkbox"/> Includes accurate use of <u>all</u> relevant content vocabulary               <ul style="list-style-type: none"> <li>○ The beach ball will get larger at the beach since the temperature change will cause the molecules within it to move faster.</li> </ul> </li> </ul>	<b>Credible Claim</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Claim is clear, scientifically sound, and directly related to the question</li> <li><input type="checkbox"/> Includes accurate use of <u>most</u> relevant content vocabulary               <ul style="list-style-type: none"> <li>○ The beach ball will get larger at the beach.</li> </ul> </li> </ul>	<b>Weak Claim</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Claim is implied but not clearly stated, <u>OR</u></li> <li><input type="checkbox"/> Claim reveals partial understanding, <u>AND</u></li> <li><input type="checkbox"/> Has some relevance to the question <u>AND</u></li> <li><input type="checkbox"/> <u>Partly</u> accurate use of <u>some</u> content vocabulary               <ul style="list-style-type: none"> <li>○ The beach ball change sizes.</li> </ul> </li> </ul>	<b>Inadequate Claim</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> An attempt at a claim is made</li> <li><input type="checkbox"/> Claim is minimally accurate</li> <li><input type="checkbox"/> <u>Minimal</u> use of content vocabulary</li> </ul>	<b>Invalid Claim</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not make a claim, <u>OR</u></li> <li><input type="checkbox"/> Makes a completely inaccurate claim.</li> </ul>
<b>Evidence:</b>	<b>Appropriate &amp; Sufficient Evidence</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evidence is appropriate:               <ul style="list-style-type: none"> <li>○ Accurate (in relation to the content) <u>AND</u></li> <li>○ Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li><input type="checkbox"/> Evidence is sufficient</li> </ul>	<b>Appropriate Evidence</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evidence is appropriate:               <ul style="list-style-type: none"> <li>○ Accurate (in relation to the content) <u>AND</u></li> <li>○ Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li><input type="checkbox"/> Evidence may be sufficient</li> </ul>	<b>Relevant Evidence</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evidence is accurate and relevant:               <ul style="list-style-type: none"> <li>○ Accurate (in relation to the content) <u>AND</u></li> <li>○ Relevant (related to the claim), <u>NOT</u></li> <li>○ Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li><input type="checkbox"/> Evidence may be sufficient</li> </ul>	<b>Inadequate Evidence</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evidence is accurate or relevant:               <ul style="list-style-type: none"> <li>○ Accurate (in relation to the content) <u>OR</u></li> <li>○ Relevant (related to the claim), <u>NOT</u></li> <li>○ Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li><input type="checkbox"/> Evidence is not sufficient</li> </ul>	<b>Invalid Evidence</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not provide evidence, <u>OR</u></li> <li><input type="checkbox"/> Only provides inappropriate evidence               <ul style="list-style-type: none"> <li>○ Inaccurate (in relation to the content) <u>AND/OR</u></li> <li>○ Irrelevant (not related to the claim).</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li><input type="checkbox"/> Exemplar Evidence:               <ul style="list-style-type: none"> <li>○ Identifies that the temperature increases from 18 to 32 degrees Celsius.</li> <li>○ Identifies that the pressure remains constant.</li> <li>○ Identifies the initial volume of the beach ball is 4L.</li> </ul> </li> </ul>				

	Exemplary	Proficient	Needs Improvement	Critical	Invalid
Reasoning:	<b>Appropriate &amp; Sufficient Reasoning</b> <ul style="list-style-type: none"> <li>Reasoning uses scientific principles that are appropriate:               <ul style="list-style-type: none"> <li>Accurate (in relation to the content) <b>AND</b></li> <li>Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li>Explicit reasoning is provided that links <u>all</u> evidence to the claim.</li> <li>Reasoning is sufficient.</li> </ul>	<b>Appropriate Reasoning</b> <ul style="list-style-type: none"> <li>Reasoning uses scientific principles that are appropriate:               <ul style="list-style-type: none"> <li>Accurate (in relation to the content) <b>AND</b></li> <li>Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li>Explicit reasoning is provided that links <u>most</u> evidence to the claim</li> <li>Reasoning may be sufficient               <ul style="list-style-type: none"> <li></li> </ul> </li> </ul>	<b>Relevant Reasoning</b> <ul style="list-style-type: none"> <li>Reasoning uses scientific principles that are accurate and relevant:               <ul style="list-style-type: none"> <li>Accurate (in relation to the content) <b>AND</b></li> <li>Relevant (related to the claim), <b>NOT</b></li> <li>Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li>Explicit reasoning is provided that links <u>some</u> evidence to the claim</li> <li>Reasoning may be sufficient.</li> </ul>	<b>Inadequate Reasoning</b> <ul style="list-style-type: none"> <li>Reasoning uses scientific principles that are accurate or relevant:               <ul style="list-style-type: none"> <li>Accurate (in relation to the content) <b>OR</b></li> <li>Relevant (related to the claim), <b>NOT</b></li> <li>Selective (using the most relevant and most accurate data to support the claim)</li> </ul> </li> <li>Reasoning <u>loosely</u> links evidence to the claim</li> <li>Reasoning is not sufficient.</li> </ul>	<b>Invalid Reasoning</b> <ul style="list-style-type: none"> <li>Does not provide reasoning, <b>OR</b></li> <li>Only restates the evidence, <b>OR</b></li> <li>Only applies inappropriate reasoning               <ul style="list-style-type: none"> <li>Inaccurate (in relation to the content) <b>AND/OR</b></li> <li>Irrelevant (not related to the claim).</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Exemplar Reasoning:               <ul style="list-style-type: none"> <li>The pressure remains constant because the pressure at Jorge's house and the beach are the same.</li> <li>According to Charles' Law (<math>V_1/T_1 = V_2/T_2</math>), when the pressure remains constant and the temperature increases, the volume increases.</li> <li>The 4L beach ball will increase to 4.2 L.</li> <li>The reason it expands is because when the temperature of the gas inside the beach ball increased from 18 to 32° C, the individual gas molecules began to move faster.</li> <li>As the molecules move faster, they encounter the walls of the beach ball more often and with more force.</li> <li>This increase in frequency and magnitude of force increases the volume of the beach ball because it is a flexible container that is able to expand and contract.</li> </ul> </li> </ul>				
Writing:	<ul style="list-style-type: none"> <li>Writing contains no grammatical or spelling errors.</li> <li>Writing is clear, concise, and persuasive.</li> </ul>	<ul style="list-style-type: none"> <li>Writing contains very few grammatical or spelling errors.</li> <li>Writing is clear, mostly concise, and well developed.</li> </ul>	<ul style="list-style-type: none"> <li>Writing is fairly clear, with some grammatical or spelling errors.</li> <li>Writing could be more concise.</li> </ul>	<ul style="list-style-type: none"> <li>Writing is either too wordy or too incomplete</li> </ul>	<ul style="list-style-type: none"> <li>Writing is difficult to follow, with many grammatical errors and no clear structure.</li> </ul>

### **Gas Laws: Ideal Student Response**

**Question:**

What will happen to the volume of Jorge's beach ball when he is at the beach?

**Claim:**

The beach ball will get larger at the beach (because the molecules are moving faster).

**Evidence:**

The initial volume of Jorge's beach ball was 4L, the pressure at Jorge's house and the beach are the same, and the temperature increases from 18°C at Jorge's house to 32°C at the beach.

**Reasoning:**

Because the pressure at Jorge's house and the beach are the same, the pressure remains constant. When the pressure remains constant and the temperature increases, according to Charles' Law ( $V_1/T_1 = V_2/T_2$ ), the volume increases. Specifically, the 4L beach ball will increase to 4.2 L. The reason it expands is because when the temperature of the gas inside the beach ball increased from 18 to 32° C, the individual gas molecules began to move faster. As the molecules move faster, they encounter the walls of the beach ball more often and with more force. This increase in frequency and magnitude of force increases the volume of the beach ball because it is a flexible container that is able to expand and contract.