

# Balancing Chemical Equations – 60 min Lesson

PRE-PLANNING	<b>PRIOR KNOWLEDGE</b>	
	<ul style="list-style-type: none"> <li>Mass is conserved during a chemical reaction.</li> </ul>	
	<b>LEARNING GOALS</b>	
	<ul style="list-style-type: none"> <li>Investigate the conditions necessary for a reaction to be considered balanced using pictorial representations as a guide.</li> <li>Develop strategies that can be used to balance chemical equations.</li> </ul>	
	<b>Common Core Standards</b>	<b>Texas Essential Knowledge and Skills (TEKS)</b>
<u>NGSS Science Content HS-PS1-7</u> Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. <u>Crosscutting Concept</u> Energy and matter: the total amount of energy and matter in a closed system is conserved <u>Science and Engineering Practices</u> Using Mathematics and Computational Thinking: use mathematical representations of phenomena to describe explanations	C.8D use the law of conservation of mass to write and balance chemical equations	
<b>MATERIALS</b>		
<ul style="list-style-type: none"> <li>PhET <i>Balancing Chemical Equations</i> <a href="https://phet.colorado.edu/en/simulation/balancing-chemical-equations">https://phet.colorado.edu/en/simulation/balancing-chemical-equations</a></li> <li>Balancing Chemical Equations Investigation – 1 per student</li> <li>3-2-1 Exit Ticket – 1 per student</li> </ul>		
LESSON CYCLE	<b>ENGAGE</b> <span style="float: right;"><i>5 minutes</i></span>	
	Show the first 1:30 min of the TED Lesson on Conservation of Mass: <a href="http://ed.ted.com/lessons/the-law-of-conservation-of-mass-todd-ramsey">http://ed.ted.com/lessons/the-law-of-conservation-of-mass-todd-ramsey</a>  In pairs, ask students to state the Law of Conservation of Mass in their own words on a whiteboard or index card. Collect student ideas by having a few students share their responses.	
	<b>Part 1 – Beginning Observations</b> <span style="float: right;"><i>10 minutes</i></span>	
	<i>Teacher will...</i> <b>Pass out</b> Balancing Chemical Equations handout. <b>Select</b> 2-3 students that will share out their observations with the class. If possible, have students show their findings using the teacher computer in front of the room. *make sure students have shared the “Tools” function and how to reset the simulation.	<i>Students will...</i> <b>Explore</b> the simulation and make beginning observations (Part 1 of lab). When other students are sharing their ideas have remaining students put laptops half way closed to ensure focus on student presenting.
	<b>Part 2 -3 – Introduction and Game</b> <span style="float: right;"><i>30 minutes</i></span>	
<i>Teacher will...</i> <b>Introduce</b> lab expectations.  <b>Circulate</b> while students are completing the investigation and ask guiding questions.  The following guiding questions could be asked to individual/groups of students as the teacher circulates. <b>Guiding Questions</b> <ol style="list-style-type: none"> <li>What are the benefits of using the tools function?</li> <li>Does using one tool over the other have more advantages?</li> </ol>	<i>Students will...</i> <b>Complete</b> investigations using the introduction and game tabs.	

3. What does the pictorial diagram show that the balanced equation below it does not?
4. How are the atoms represented in the simulation? Molecules?
5. What are the limitations of the simulation?
6. Why does the simulation default – or make you – change the coefficients instead of the subscripts?

**Exit Ticket***10 minutes**Teacher will...***Distribute** Exit Ticket to students.**Collect** lab investigations and Exit Tickets. Read and use to guide further instruction.**OPTIONAL:** Have students share their responses to their 3-2-1 ticket with their table or with the whole group.*Students will...***Complete** their Exit Ticket individually.