

Acceleration

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions

Acceleration 5E Lesson

Grades 7-12	Acceleration	Ongoing Lesson
Lesson Objective: Students will learn about: - Acceleration in 1 and 2 dimensions - Uniform acceleration - Sports cars and fighter jets - P-T, A-T, and V-T graphs - Newton's second law - Galileo's and Einstein's contributions - Average and instantaneous acceleration - Deceleration/negative acceleration - Drag		
Possible Student Misconceptions: - Acceleration moves forward - Acceleration means speeding up - If velocity is zero, acceleration is also zero - If velocity is constant, acceleration is also constant - If velocity is high, acceleration is also high - Acceleration and velocity are always in the same direction		
Materials: 1 device (smartphone, Chromebook, laptop, tablet, or computer) per 3 students - A means of projecting a PowerPoint presentation - Internet access - General classroom objects - An adjustable ramp (or a means of making one) - A ball		
Teacher Notes: - All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If it doesn't, right-click on the image and click Edit Hyperlink or something similar. - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ - I don't believe in long lessons. If you feel your students are losing their focus, stop the PowerPoint and give them a 5-minute break. If you'd like to show my video collection here - http://www.teachwithferay.com/sc are tons of brain-break videos to choose from all grouped by category.		

Acceleration – 5E Lesson

Engagement Phase Your students will watch the video 'Bugatti Chiron 0-400 km/h Acceleration' and complete the questions found in the file – <i>Engagement – Bugatti Chiron Video</i> . Teacher Notes: - The video is about two and a half minutes long - You may need to show the video more than once or pause when an answer is given to one of the questions.	Dura Teac learn unde
Exploration Phase Exploration – Lab Station Activity - In groups of 2-3, have your students complete <i>Exploration – Lab Station Activity</i>. Once they're done, they will submit their passport to you. Teacher Notes: - The complete instructions for my Lab Station activity can be found in the <i>START HERE – Instructions</i> file.	Dura Teac learn unde ☐ Cc ☐ ex ☐ Cr ☐ As ☐ Ur of
Explanation Phase PowerPoint Lessons - The lesson is found in the folder – <i>Explanation – Lesson</i> - This lesson is designed to be completed over two days - There is one embedded video and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson - The lesson covers the following topics: - Acceleration in 1 dimension - Units - Examples - Graphing motion with constant acceleration - Position-time, velocity-time, and acceleration-time - Constant acceleration equations - Acceleration in 2 dimensions - Examples Teacher Notes: - All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar. - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ	Dura Teac conc mate pres ☐ St un co ☐ Ol ex dis ☐ St vo ☐ St co pr ex

- I have also enclosed a .PDF version of both the teacher and student versions.

Elaborate Phase

Elaborate – Scavenger Hunt

Your students will complete – *Elaborate – Scavenger Hunt*. This activity will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.

Teacher Notes:

- Students will work individually or in small groups
- Students will need one device per group

Duration: 1 hour

Teacher Role – Facilitate learning and keep students focused

Goal

- Students use their newly obtained knowledge to propose solutions and extend their learning to new situations

Evaluate Phase

Quiz

Have your students complete – *Evaluate – Acceleration Quiz*

Teacher Notes:

- It's sometimes best to have the students peer evaluate
- Placing students in small groups and having them exchange papers to mark will accomplish two things
 - Provide immediate feedback on the questions they just completed
 - Significantly reduce your marking time
- Peer evaluation is not needed, only suggested when appropriate

Duration: 30 min

Teacher Role – Distribute and collect evaluation

Goal

- Students are given the opportunity to demonstrate their understanding and evaluate their own progress

Each phase is clearly described

A Complete Lesson

Acceleration Units

- What units do you end up with for acceleration?

$$\vec{a}_{av} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\text{m/s}}{\text{s}} = \text{m/s}^2$$

- Acceleration is the change in velocity (m/s) over time (s) $\rightarrow$ m/s²

← Make sure your students are on track

Student copies with blanks
Videos embedded right into
your slideshow

Acceleration Units

- What units do you end up with for acceleration?

$$\vec{a}_{av} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\text{m/s}}{\text{s}} = \text{m/s}^2$$

- _____

What's the car's average acceleration?



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Interactive and Engaging Activities

Device-Based Scavenger Hunt Acceleration



Includes

- 5 Unique Locations
- Online form submission
- Answer Key

Works on all smartphones, tablets, Chromebooks, and laptops

- **100% Digital**
- Simulations
- Quizzes
- Videos
- Games
- Word Scramble
- and more



Acceleration Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

