

# How Planes Fly

## 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

## How Planes Fly 5E Lesson

| Grades 7-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | How Planes Fly | Ongoing Lesson |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| <b>Lesson Objective:</b><br>Students will learn about: <ul style="list-style-type: none"> <li>• Thrust</li> <li>• Engines</li> <li>• Drag</li> <li>• Lift</li> <li>• Weight</li> <li>• Flight</li> <li>• Hot Air Balloons</li> <li>• Helicopters</li> <li>• Airport Runway Length</li> <li>• Aeronautical History</li> <li>• The Wright Brothers</li> <li>• Implications of Cabin Pressurization</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                |
| <b>Possible Student Misconceptions:</b> <ul style="list-style-type: none"> <li>• Opening an airplane door while in flight is a real safety risk</li> <li>• Planes can take off quickly</li> <li>• Airplanes plummet out of the sky like you see in movies</li> <li>• Planes fly and land themselves with little input from pilots</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                |
| <b>Materials:</b> <ul style="list-style-type: none"> <li>• 1 device (smartphone, Chromebook, laptop, tablet, or computer) per 3 students</li> <li>• A means of projecting a PowerPoint presentation</li> <li>• Internet access</li> <li>• General classroom objects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                |
| <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>➢ 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 <b>Edit Hyperlink</b> or something similar.</li> <li>➢ I've created a video walkthrough if needed. It can be accessed here - <a href="https://youtu.be/oCIKIP9SaDQ">https://youtu.be/oCIKIP9SaDQ</a></li> <li>➢ 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 more, I recommend my video collection here - <a href="http://www.teachwithferay.com/sci">http://www.teachwithferay.com/sci</a> are tons of brain-break videos to choose from all grouped by category.</li> </ul> |                |                |

## How Planes Fly – 5E Lesson

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Engagement Phase</b><br>Your students will watch the video 'How Do Airplanes Fly?' and complete the questions found in the file – <a href="#">Engagement – How Do Airplanes Fly Video</a> .<br><br>The video can be found here - <a href="https://www.youtube.com/watch?v=Gg0TXNXgz-w">https://www.youtube.com/watch?v=Gg0TXNXgz-w</a><br><br><b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>- The video is about three minutes long</li> <li>- You may need to show the video more than once or pause when an answer is given to one of the questions.</li> </ul>                                                                        | Duration: 10 min<br><br>Teacher Role: Monitor and facilitate<br><br><input type="checkbox"/> Co-expl<br><input type="checkbox"/> Cr<br><input type="checkbox"/> As<br><input type="checkbox"/> Un                                                                                                                          |
| <b>Exploration Phase</b><br><b>Exploration – Lab Station Activity</b> <ul style="list-style-type: none"> <li>• In groups of 2-3, have your students complete <a href="#">Exploration – Lab Station Activity</a>. Once they're done, they will submit their passport to you.</li> </ul> <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>• The complete instructions for my Lab Station activity can be found in the <a href="#">START HERE – Instructions</a> file.</li> </ul>                                                                                                                                                                 | Duration: 15 min<br><br>Teacher Role: Monitor and facilitate<br><br><input type="checkbox"/> St<br><input type="checkbox"/> ex<br><input type="checkbox"/> St<br><input type="checkbox"/> cre<br><input type="checkbox"/> St<br><input type="checkbox"/> ob<br><input type="checkbox"/> res<br><input type="checkbox"/> co |
| <b>Explanation Phase</b><br><b>PowerPoint Lessons</b> <ul style="list-style-type: none"> <li>• The lesson is found in the folder – <a href="#">Explanation – Lesson and Lab</a></li> <li>• This lesson is designed to be completed over two days</li> <li>• There are two activities: a paper airplane lab and a Bill Nye video</li> <li>• There are multiple embedded videos and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson</li> <li>• The lesson covers the following topics:               <ul style="list-style-type: none"> <li>➢ Thrust</li> <li>○ Propellers</li> </ul> </li> </ul> | Duration: 20 min<br><br>Teacher Role: Monitor and facilitate<br><br><input type="checkbox"/> Teac<br><input type="checkbox"/> learn<br><input type="checkbox"/> unde                                                                                                                                                       |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>○ Turbo/Jet Engines</li> <li>○ Rocket Engines</li> </ul> <ul style="list-style-type: none"> <li>➢ Drag</li> <li>➢ Lift</li> <li>➢ Weight</li> <li>➢ Flight               <ul style="list-style-type: none"> <li>○ Taking Off</li> <li>○ Flying</li> <li>○ Banking</li> <li>○ Landing</li> </ul> </li> <li>➢ Hot Air Balloons</li> <li>➢ Helicopters</li> </ul>                                                                                                                                                                                           | <b>Goals</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Students develop understanding of the content</li> <li><input type="checkbox"/> Observations and experiences are discussed and critiqued</li> <li><input type="checkbox"/> Students develop vocabulary</li> <li><input type="checkbox"/> Students are able to connect the content presented to previous experiences</li> </ul> |
| <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>• 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 <b>Edit Hyperlink</b> or something similar.</li> <li>• I've created a video walkthrough if needed. It can be accessed here - <a href="https://youtu.be/oCIKIP9SaDQ">https://youtu.be/oCIKIP9SaDQ</a></li> <li>• I have also enclosed a .PDF version of both the teacher and student versions.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Elaborate Phase</b><br><b>Elaborate – Scavenger Hunt</b><br>Your students will complete – <a href="#">Elaborate – Scavenger Hunt</a> . This activity will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.                                                                                                                                                                                                                                                                                                | <b>Duration: 1 hour</b><br><br><b>Teacher Role – Facilitate learning and keep students focused</b>                                                                                                                                                                                                                                                                                                          |
| <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>- Students will work individually or in small groups</li> <li>- Students will need one device per group</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Goal</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Students use their newly obtained knowledge to propose solutions and extend their learning to new situations</li> </ul>                                                                                                                                                                                                         |
| <b>Evaluate Phase</b><br><b>Quiz</b><br>Have your students complete - <a href="#">Evaluate – How Planes Fly Quiz</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Duration: 30 min</b><br><br><b>Teacher Role – Distribute and collect evaluation</b>                                                                                                                                                                                                                                                                                                                      |
| <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>➢ It's sometimes best to have the students peer evaluate</li> <li>➢ Placing students in small groups and having them exchange papers to mark will accomplish two things               <ol style="list-style-type: none"> <li>1) Provide immediate feedback on the questions they just completed</li> <li>2) Significantly reduce your marking time</li> </ol> </li> <li>➢ Peer evaluation is not needed, only suggested when appropriate</li> </ul>                                                                                | <b>Goal</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Students are given the opportunity to demonstrate their understanding and evaluate their own progress</li> </ul>                                                                                                                                                                                                                |

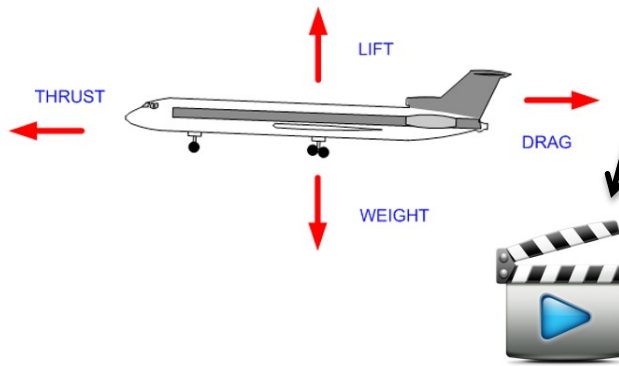
Each phase is clearly described

# A Complete Lesson

## Some Flight Lingo

Being able to fly means you must master the four forces acting on a plane at all times

1. Thrust
2. Drag
3. Lift
4. Weight



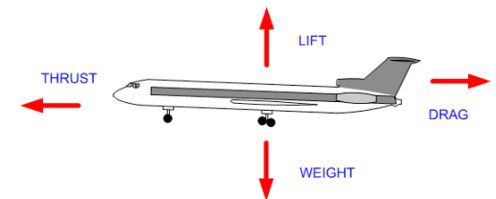
Make sure your students are on track

Student copies with blanks  
Videos embedded right into  
your slideshow

## Some Flight Lingo

Being able to fly means you must master the four forces acting on a plane at all times

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_



# Interactive and Engaging Activities

## Device-Based Scavenger Hunt How Planes Fly



Includes

- 5 Unique Locations
- Online form submission
- Answer Key

Works on all smartphones, tablets, Chromebooks, and laptops

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



## How Planes Fly 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

