



Lesson 1 – History of Drone Aviation

Lesson Focus

This lesson introduces students to Unmanned Aerial Vehicles (UAV's) and Unmanned Aerial Systems (UAS'). Students will research the history of drone aviation and present their findings to their peers.

Lesson Synopsis

Students learn about the history of drone aviation by researching and constructing a presentation to present to their peers.

Objectives

During this lesson, students will:

- Describe the difference between a UAS and a UAV
 - Develop a basic understanding for drones.
-

Anticipated Learner Outcomes

As a result of this activity, students will have:

- Researched the history of drone aviation.
 - Organized their research and construct a presentation to share with their peers.
-

Lesson Activities

Students will use various resources to research the history of drone aviation. Students will organize their findings and construct a presentation to present to their peers.

Resources / Materials

- Teacher Resource Documents (attached)
 - Student Worksheets (attached)
 - Student Resource Sheets (attached)
-

Alignment to Curriculum Frameworks

See attached curriculum alignment sheet.

Lesson 1 – History of Drone Aviation

For Teachers: Teacher Resources

Lesson Goal:

The goal of this lesson is that students develop an understanding for drone aviation and how it has evolved.

Lesson Objectives

During this lesson, students will:

- Describe the difference between a UAS and a UAV
- Develop a basic understanding for drones.

Materials:

- Computer with Internet access
- Engineering Notebook
- Student worksheets
- Student Resource Sheet

Time Needed: Four – Five, 45 minute sessions

- The lesson can be done in as little as 3 class periods for older students. However, you don't want students to feel rushed. So, to ensure student success (especially for younger students), split it into four to five periods giving students more time to research and analyze their findings.

Procedure:

1. Break students into groups of 3-4. Have students brainstorm what they know about drones (prior knowledge). Brainstorming can be completed in a variety of styles: having students do a "Graffiti" brainstorm, Pictionary Brainstorm, or Round Robin style.
2. Hand out the History of Drones student worksheet.
3. Discuss the project with students, drawing prior knowledge from groups into the discussion.
4. Provide students with a timeline of the project.
5. Review the Student resources with the class and appropriate use of technology.
6. Allow students to begin working on the project.
7. At the end of the project, provide each student a peer rubric page. Students will present their findings to three of their peers, who will grade their project according to the peer assessment rubric.

Teacher Prep:


- If using postermymwall.com, teachers must first create a teacher account and create a class for students to work in.
- Provide students will basic supplies: construction paper, glue, coloring utensils, etc. to make their posters.

Examples of Student Work:

HISTORY OF DRONES

AREOSPACE AND SPACE ENGINEERS

They are important to UAV & UAS because they do flight vehicles and systems and space flight.

UAV'S & UAS

- *to the military they are UAV'S or RPAS knows has drones.
- *used for manned flight that are considered to risky
- *government uses them for surveillance in the U.S.
- *to make money off drone is sell footage, wedding photos, and to become a FPV racer.

HOW DRONES IMPACT SOCIETY

positive-low cost, low risk, saving lives
negatives-limited abilities, too easy to operate, loss of lives

CHANGES IN UAV & UAS

- *size
- *the way it looks
- *controllers



1895
Nikola Tesla that makes small unmanned boat

1940
Reginald Denny sells 15,000 radio controller target drone

1943
german military made a 2,300 pound bomb with 4 small wings and radio controller

1944
Norma jeane Doughety (Marilyn Monroe) created a drone (OO-2 radioplane)

1995
in the decade following 9/11 the predator will become the public face of drones

2012
congress requires the FAA to integrate small drones

2013
a plan: delivery drones called prime air

THE HISTORY OF DRONES

WHAT IS IT?

A drone is an unmanned aircraft which can navigate without human control. These are separated into UAVs, and UASs. UAVs are unmanned aerial vehicles, which don't look like vehicles. UAVs are unmanned aerial vehicles, which do

WHO MAKES THEM?

Many people aid in creating drones. A systems Engineer creates them, and an aerospace engineer

HOW ARE THEY USED?

The government uses drones to aid in war & operations. Companies use them to aid in shipment, and to advertise their products. They are also useful for farming, and researching different things. They also help cops, and with disaster relief. Drawbacks are invasions of privacy, and also potential

HOW DO THEY AFFECT SOCIETY?

Drones affect the world positively by helping with farming, surveillance, reducing crime, news gathering, disaster relief, sports coverage, delivering products, and more. They affect negatively by causing damage to property, hurting people, and they're sometimes misused.

TIMELINE

- First drones used in 1782 in France.
- Used in 1806 to spread leaflets.
- Used in the Civil War for bombing.
- 1898-Military uses a drone camera.
- 1935-Used as military targets.
- 1945-Japanese kill six in Oregon using drone.
- 2001-Drones used in the War on Terror

By: [redacted]

Lesson 1 – History of Drone Aviation

For Teachers: Teacher Resources
Alignment to Curriculum Frameworks

Next Generation Science Standards Grades 6-8 (Ages 11-14)

Engineering Design

Students who demonstrate understanding can:

- MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

National Science Education Standards Grades 5-8 (ages 10 - 14)

CONTENT STANDARD E: Science and Technology

As a result of activities, all students should develop

- Abilities of technological design
- Understandings about science and technology

Standards for Technological Literacy - All Ages

Technology and Society

- Standard 6: Students will develop an understanding of the role of society in the development and use of technology.
- Standard 7: Students will develop an understanding of the influence of technology on history.

Design

- Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Lesson 1: History of Drone Aviation

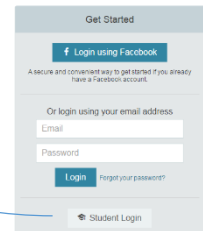
Student Worksheet

You will investigate the history of Unmanned Aerial Vehicles (UAV's) and Unmanned Aerial Systems (UAS) and find out their impact on society. You will learn how it may be used differently today than it was 10 years ago, 25 years ago, 100 years ago. You will use various resources to find the information, including print, multi-media, and the web. Be AWARE that every site on the web is not always reliable, so **verify your resources**. Your presentation will include the minimum requirements below. Answer the questions in your notebook and then prepare a presentation to share what you found with your classmates.

DO NOT SIMPLY ANSWER THESE QUESTIONS IN ORDER ON YOUR POSTER! ANALYZE YOUR RESEARCH AND CREATE A PRESENTATION

You will:

- Gather information about UAV's and UAS', taking notes in your engineering notebook. (These notes count towards a notebook grade. Clearly label your notes.)
- Create a presentation from your information to share with your classmates. This presentation can be in to following formats:
 - Traditional Poster – two 8 ½ x 11" sheets of paper (any color) with a piece of construction paper on back of papers to make it sturdy (This also adds a border around you're the entire poster).
 - Online poster – that will be printed here at school and presented in class
 - www.postermywall.com
 - Click on Login
 - then click on "Student Login"
 - Use the class code: _____

All presentations must include the **minimum** of the information shown below:

- the bullets are to help you answer the # question

***Include your name & team name (bottom right corner of poster)

1. All resources used (bottom left of poster)
 - www.google.com is NOT a resource, it is a search engine
 - Wiki – of any type cannot be used
 - Please ask me if you are unsure of any website! See approved websites below.
2. Explanation of UAV's & UAS'
 - What is a drone & how are drones used?
 - Why does the government use drones?
 - How are drones used for personal/recreational use? Commercial use?
 - What are the benefits of using a drone? What are the drawbacks? (pro's / con's)
3. List the discipline(s) of engineering most important to the development of drones
 - What type of engineer(s) makes the drone? Fly's a drone? Explain why these types are engineers are important to UAS'/UAVs.

4. Provide a timeline drawn to scale showing the history of drone aviation and evolution of drone aviation.
 - Who was the original inventor and when were drones product invented?
 - How was it used when originally invented?
 - How is it used today?
5. Identify major changes that have occurred in the design of UAV's and UAS'.
 - What are some of the innovations (changes) that this product has undergone since its original invention?
6. Address the global impact on society and the environment.
 - How has this product impacted society in a positive way?
 - How has this product impacted society in a negative way?

Internet Resources: these are not exclusive, but a good starting point

**Remember, if you are unsure of a website. Please ask for assistance.

**ALL resources must be included on your presentation.

- **The Pro's & Con's of Drones**
 - <http://www.philforhumanity.com/Drones.html>
 - <http://drones.procon.org/>
- **18 awesome ways drones are being used**
 - <http://blog.atmel.com/2014/08/08/18-awesome-ways-drones-are-used-today/>
- **How Drones are being used**
 - <http://www.pbs.org/newshour/rundown/how-are-drones-used-in-us/>
- **History of Drones Timeline**
 - <http://www.timetoast.com/timelines/history-of-drones>
- **The history of drones in 9 minutes (Video)**
 - <http://www.popsoci.com/watch-brief-history-drone>
- **10 Ways Drones will impact Society**
 - <http://www.worldinbeta.com/blog/drones-impact-on-society>
- **Drones: What they are and how do they work?**
 - <http://www.bbc.com/news/world-south-asia-10713898>
- **The Commercial use of drones**
 - <http://dartdrones.com/commercial-use-of-drones/>
- **5 Benefits of Drones that might surprise you**
 - <https://www.sri.com/blog/5-benefits-drones>
- **Military Air Robots**
 - <https://sites.google.com/a/cortland.edu/tori-military-air-robots/disadvantages>



Lesson 1: History of Drones Rubric

Elements	4 Points	3 Points	2 Points	1 Points	Total / Comment
Science Content	<ul style="list-style-type: none"> • Concept fully and properly explained • Insight present • Understanding present and apparent. • Content is accurate, comprehensive and well supported • Excellent use of resources 	<ul style="list-style-type: none"> • Adequate explanation • Some level of understanding shown. • More than one resource present 	<ul style="list-style-type: none"> • Poor explanation, minimal • Misinterprets the science, needs serious refinement • One resource for sure 	<ul style="list-style-type: none"> • No analysis of science topic • No explanation • No science specific connection • No use of resources 	
Organization	<ul style="list-style-type: none"> • Defined Sections • Clear headings • Flows nicely to assist the reader without help • Finished product 	<ul style="list-style-type: none"> • All section present, but unclear • Clear headings • Must re-read for clarity • Some evidence of refinement 	<ul style="list-style-type: none"> • No headings, but sectioned • Hard to follow, requires assistance • Missing parts • Obvious refinement required 	<ul style="list-style-type: none"> • Clutter, no definitive sections, all over the place • Not all sections present 	
Creativity	<ul style="list-style-type: none"> • Interesting, engaging, visually stimulating • Aesthetically appealing use of color, diagrams and text • Interest, motivation, effort and time obviously present 	<ul style="list-style-type: none"> • Some use of color, diagrams, etc. • Will engage but will not stimulate 	<ul style="list-style-type: none"> • Very little use of color or pictures but enough to engage and hold attention 	<ul style="list-style-type: none"> • Bland, no variability • No use of color or diagrams • Boring to look at, does not catch your attention • Interest, motivation, effort and time obviously absent 	

Name _____

Total _____ / 12 x 100 = _____ %

Score for project



Lesson 1: History of Drones Rubric

Elements	4 Points	3 Points	2 Points	1 Points	Total
Science Content	<ul style="list-style-type: none"> • Concept fully and properly explained • Insight present • Understanding present and apparent • Content is accurate, comprehensive and well supported • Excellent use of resources 	<ul style="list-style-type: none"> • Adequate explanation • Some level of understanding shown • More than one resource present 	<ul style="list-style-type: none"> • Poor explanation, minimal • Misinterprets the science, needs serious refinement • One resource for sure 	<ul style="list-style-type: none"> • No analysis of science topic • No explanation • No science specific connection • No use of resources 	
Organization	<ul style="list-style-type: none"> • Defined Sections • Clear headings • Flows nicely to assist the reader without help • Finished product 	<ul style="list-style-type: none"> • All section present, but unclear • Clear headings • Must re-read for clarity • Some evidence of refinement 	<ul style="list-style-type: none"> • No headings, but sectioned • Hard to follow, requires assistance • Missing parts • Obvious refinement required 	<ul style="list-style-type: none"> • Clutter, no definitive sections, all over the place • Not all sections present 	
Creativity	<ul style="list-style-type: none"> • Interesting, engaging, visually stimulating • Aesthetically appealing use of color, diagrams and text • Interest, motivation, effort and time obviously present 	<ul style="list-style-type: none"> • Some use of color, diagrams, etc. • Will engage but will not stimulate 	<ul style="list-style-type: none"> • Very little use of color or pictures but enough to engage and hold attention 	<ul style="list-style-type: none"> • Bland, no variability • No use of color or diagrams • Boring to look at, does not catch your attention • Interest, motivation, effort and time obviously absent 	

Name _____ Total ____ / 12 x 100 = _____ %
Score for project

Peer _____

Lesson 1: History of Drones Rubric

Elements	4 Points	3 Points	2 Points	1 Points	Total
Science Content	<ul style="list-style-type: none"> • Concept fully and properly explained • Insight present • Understanding present and apparent • Content is accurate, comprehensive and well supported • Excellent use of resources 	<ul style="list-style-type: none"> • Adequate explanation • Some level of understanding shown • More than one resource present 	<ul style="list-style-type: none"> • Poor explanation, minimal • Misinterprets the science, needs serious refinement • One resource for sure 	<ul style="list-style-type: none"> • No analysis of science topic • No explanation • No science specific connection • No use of resources 	
Organization	<ul style="list-style-type: none"> • Defined Sections • Clear headings • Flows nicely to assist the reader without help • Finished product 	<ul style="list-style-type: none"> • All section present, but unclear • Clear headings • Must re-read for clarity • Some evidence of refinement 	<ul style="list-style-type: none"> • No headings, but sectioned • Hard to follow, requires assistance • Missing parts • Obvious refinement required 	<ul style="list-style-type: none"> • Clutter, no definitive sections, all over the place • Not all sections present 	
Creativity	<ul style="list-style-type: none"> • Interesting, engaging, visually stimulating • Aesthetically appealing use of color, diagrams and text • Interest, motivation, effort and time obviously present 	<ul style="list-style-type: none"> • Some use of color, diagrams, etc. • Will engage but will not stimulate 	<ul style="list-style-type: none"> • Very little use of color or pictures but enough to engage and hold attention 	<ul style="list-style-type: none"> • Bland, no variability • No use of color or diagrams • Boring to look at, does not catch your attention • Interest, motivation, effort and time obviously absent 	

Name _____ Total ____ / 12 x 100 = _____ %
Score for project

Peer _____

Lesson 1: History of Drones Rubric

Elements	4 Points	3 Points	2 Points	1 Points	Total
Science Content	<ul style="list-style-type: none"> • Concept fully and properly explained • Insight present • Understanding present and apparent • Content is accurate, comprehensive and well supported • Excellent use of resources 	<ul style="list-style-type: none"> • Adequate explanation • Some level of understanding shown • More than one resource present 	<ul style="list-style-type: none"> • Poor explanation, minimal • Misinterprets the science, needs serious refinement • One resource for sure 	<ul style="list-style-type: none"> • No analysis of science topic • No explanation • No science specific connection • No use of resources 	
Organization	<ul style="list-style-type: none"> • Defined Sections • Clear headings • Flows nicely to assist the reader without help • Finished product 	<ul style="list-style-type: none"> • All section present, but unclear • Clear headings • Must re-read for clarity • Some evidence of refinement 	<ul style="list-style-type: none"> • No headings, but sectioned • Hard to follow, requires assistance • Missing parts • Obvious refinement required 	<ul style="list-style-type: none"> • Clutter, no definitive sections, all over the place • Not all sections present 	
Creativity	<ul style="list-style-type: none"> • Interesting, engaging, visually stimulating • Aesthetically appealing use of color, diagrams and text • Interest, motivation, effort and time obviously present 	<ul style="list-style-type: none"> • Some use of color, diagrams, etc. • Will engage but will not stimulate 	<ul style="list-style-type: none"> • Very little use of color or pictures but enough to engage and hold attention 	<ul style="list-style-type: none"> • Bland, no variability • No use of color or diagrams • Boring to look at, does not catch your attention • Interest, motivation, effort and time obviously absent 	

Name _____ Total ____ / 12 x 100 = _____ %
Score for project

Peer _____

Lesson 1: History of Drones Rubric

Elements	4 Points	3 Points	2 Points	1 Points	Total
Science Content	<ul style="list-style-type: none"> • Concept fully and properly explained • Insight present • Understanding present and apparent • Content is accurate, comprehensive and well supported • Excellent use of resources 	<ul style="list-style-type: none"> • Adequate explanation • Some level of understanding shown • More than one resource present 	<ul style="list-style-type: none"> • Poor explanation, minimal • Misinterprets the science, needs serious refinement • One resource for sure 	<ul style="list-style-type: none"> • No analysis of science topic • No explanation • No science specific connection • No use of resources 	
Organization	<ul style="list-style-type: none"> • Defined Sections • Clear headings • Flows nicely to assist the reader without help • Finished product 	<ul style="list-style-type: none"> • All section present, but unclear • Clear headings • Must re-read for clarity • Some evidence of refinement 	<ul style="list-style-type: none"> • No headings, but sectioned • Hard to follow, requires assistance • Missing parts • Obvious refinement required 	<ul style="list-style-type: none"> • Clutter, no definitive sections, all over the place • Not all sections present 	
Creativity	<ul style="list-style-type: none"> • Interesting, engaging, visually stimulating • Aesthetically appealing use of color, diagrams and text • Interest, motivation, effort and time obviously present 	<ul style="list-style-type: none"> • Some use of color, diagrams, etc. • Will engage but will not stimulate 	<ul style="list-style-type: none"> • Very little use of color or pictures but enough to engage and hold attention 	<ul style="list-style-type: none"> • Bland, no variability • No use of color or diagrams • Boring to look at, does not catch your attention • Interest, motivation, effort and time obviously absent 	

Name _____ Total ____ / 12 x 100 = _____ %
Score for project

TEACHER ASSESSMENT

TEACHER ASSESSMENT