FLIGHT UNIT

PDF & DIGITAL FORMATS

2 Peas and a Dog

Middle School Teaching Resources

RESOURCE INCLUDES

- ✓ Ontario Curriculum Aligned
- ✓ Detailed Lesson Plans
- ✓ Readings, Videos, Graphic Organizers, Group Work, Projects, Rubrics
- ✓ Hands-On Science Labs
- ✓ MP3 Audio Files
- ✓ Answer Keys
- ✓ Quizzes & Unit Test
- ✓ Print & Digital Formats

INCLUDED LESSONS

- Introduction: Safety Rules & Unit Vocabulary
- The Properties of Air
- The Properties of Air - Teacher Demonstration
- Compression and Insulation of Air
- The Four Forces of Flight
- Unbalanced Forces
- How The Four Forces Can Be Altered
- Characteristics and Adaptations That Enable Living Things To Fly
- Paper Airplane Lab
- Air Travel Inquiry
- Flight Unit Test
- Unit Review/Sub Plans - Bill Nye and Magic School Bus Videos
- Drones Non-Fiction Article
- Flight Digital Escape Room

UNIT ORGANIZATION

ONTARIO CURRICULUM ALIGNMENT

Lesson	2007 Curriculum	2022 Curriculum
Introduction Safety Rules & Vocabulary	2.1, 2.4	A1.4, A1.5
#1A The Properties of Air	3.1	D2.1
#1B The Properties of Air	3.1	D2.1
#2 Compression and Insulation of Air	3.2	Not Included, But Still Relevant
#3 Four Forces of Flight	3.3, 3.4	D2.2
#4 Unbalanced Forces	3.5	D2.3
#5 How The Four Forces Can Be Altered	3.6	D2.4
#6 Characteristics And Adaptations That Enable Living Things To Fly	2.3	D2.5
#7 Paper Airplane Lab	2.4	A1.1, A1.2, A1.3, A1.4, A1.5
#8	1.1	D1.1

CURRICULUM ALIGNMENT

LESSON OVERVIEW

Lesson	Activity Type	Name	Suggested Time & Curriculum Expectations
Intro	Class Discussion	Safety Rules & Unit Vocabulary	2 Classes
	QR Code Scavenger Hunt		2.1, 2.4
#1A	Whole Class Reading, Graphic Organizer and Activity	The Properties of Air	1 Class
			3.1
#1B	Teacher Demonstration	The Properties of Air	0.5 Class
			3.1
#2	Whole Class Reading and Activity	Compression and Insulation of Air	1 Class
			3.2
#3	Whole Class Reading and Activity	Four Forces of Flight	1 Class
			3.3, 3.4
#4	Whole Class Reading and Activity	Unbalanced Forces	1 Class
			3.5
#5	Whole Class Reading and Activity	How The Four Forces Can Be Altered	1 Class
			3.6

UNIT PLAN

LESSON #1A

Properties of Air

Lesson Overview:
Students will learn about the properties of air that make flight possible.

Materials Needed:
- ❑ Computer with projector/speakers
- ❑ Video: Exploring Air & Air Pressure
- ❑ Photocopy a class set of or use the provided Google Slides version:
  - Properties of Air article
  - Properties of Air Checklist Activity

Teacher Instructions:
1. Watch the Exploring Air & Air Pressure video.
2. Hand out article and read it out loud as a class.
3. Hand out Checklist Activity and have students complete it individually or in pairs.
4. Take-up answers using the provided answer sheet.

LESSON PLANS

WHAT'S INSIDE?

CHARACTERISTICS THAT ENABLE LIVING THINGS TO FLY

It is amazing to watch a bird's ability to leap from the ground and fly into the sky. However, flight is not confined to birds; many invertebrates and bats can fly. Birds, bats, and insects have evolved and/or adapted to fly. This article will discuss several adaptations that have allowed vertebrates (have a backbone) and invertebrates (have no backbone) to fly.

Photo of a Canada goose bird.

Birds

Birds have streamlined bodies which reduce air resistance and saves energy. In... insulators... aerodynar... save ener... and improve lift, which continues to save energy.

When a bird's wing is examined from the side, we see that it is large in the front and gradually tapers off toward the back. This shape is comparable to an airplane wing, also referred to as an airfoil. Rotating the wing forward provides the lift from the air to propel the bird forward, not just upward. This forward movement is referred to as thrust.

Birds' bones are hollow and light, which helps them fly efficiently.

A bird's chest has an enlarged breastbone called a sternum, which is ...scles that ...ssure ...e lungs ...breathe.

Bats

Bats are the only mammals capable of flight. Among the characteristics that enable them to fly are their long arms with thin and light finger bones capable of supporting and manipulating the wing membranes.

While their arms are large and sturdy, the legs are tiny, which reduces the overall mass of the creature and enables it to fly smoothly.

Additionally, the bat has fused bones in areas such as the skull, which helps lessen the total weight of the bat.

ARTICLES

SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.

ENGAGING ACTIVITIES

AIR TRAVEL ASSIGNMENT

Your family has decided that they want to go on vacation. They are going to let you make the final decision if you are going to go somewhere in a plane or by another transportation method. You must research the advantages and disadvantages of air travel and make a final decision for your family.

Assignment Requirements

1. Research is completed through the use of guiding questions and graphic organizers. These must be handed in for assessment.
2. Final decision on the vacation decision in written and presentation form.
3. Source list – remember to keep track of the websites, videos or books used.

Criteria	1	2	3	4
Research	Limited	Researched	Researched with most details provided.	Thoroughly researched with all details provided.
			A concise decision is provided in the written response.	A well thought out decision is presented in the written response.
(1-2 minutes)		...on the final decision.	Presentation explains their opinion of air travel.	Presentation is well-prepared and supported with visual materials.
Sources	No sources provided.	Some sources provided.	Most sources provided.	All sources provided.

WHAT'S INSIDE?

ANSWER KEY

Task: Read through each example and circle whether you think it is an example of compression or insulation of air.

1. Keeping the heat inside your h

   COMPRESSION

2. A sleeping bag using many lay

   COMPRESSION

3. Rubber tires on a car being us

4. Air tanks used for scuba divir

   COMPRESSION

5. A winter jacket used to keep

   COMPRESSION

6. An airplane cabin that uses p
   flying:

   COMPRESSION

SAMPLE ANSWERS

Students will need to use the information they gathered from the Air Travel Inquiry to answer this long answer question.

Advantages of Aviation Technology

Medical Transportation
Organs can be transported quickly for life-saving transplants thanks to the speed and ease of air travel. Medical air evacuation is necessary when a medical issue cannot be resolved in the immediate area. By using planes or helicopters, injured or sick patients are

tourism industry. Many tourist destinations experience growth of their local economies due to air travel.

Travel
Flying across great distances, such as those between continents, is most efficient by plane.

Humanitarian Relief
It is now possible to send emergency and humanitarian aid relief to any region on Earth because of the global air transportation network.

Employment
Prior to the Covid-19 pandemic, the aviation industry employed a lot of people. The aviation sector employs more than just pilots and mechanics.

Disadvantages of Aviation Technology

Crop Dusting
Planes cannot guide chemicals onto the target crop precisely, so the chemicals spread where they are not needed. As a result, some substances can remain in the air and contribute to air pollution. Crop dusting can expose pilots, field workers, ground crews, and people living near ls to the chemicals.

aviation is one of the fastest-
rces of greenhouse gas emissions.

Noise Pollution
Noise from aircraft engines is a severe issue during takeoff and landing. The problem is made worse by high-speed turbulence in the air. People who are exposed to high levels of noise are at risk for health issues.

AIR TRAVEL RESEARCH PLANNER

What do I already know about air travel?	What do I want to know about air travel?

PAPER AIRPLANE LAB

Instructions: You are going to create two paper airplanes to investigate the properties of flight.

Materials Needed:

easure

ovided by the teacher.
Basic Dart paper airplane design. Practice
you feel that you are ready to create your
ell your teacher.
The Basic Dart.
er airplane. You can use the provided The
r your own.
nes. Once you feel that you are ready to
er airplane, tell your teacher.
your second design paper airplane.
ow when it is your time to test out your

ab graphic

e the rest of

per Airplane

write up and
once you have
ements for this lab.

ANSWER KEYS

LABS & CASE STUDIES

TEACHER FEEDBACK

"What an amazing resource! There are so many great resources inside and my student have absolutely loved it so far. It was easy to follow and I can't wait to try out your other products." - Once Upon a Teacher

"You always create excellent resources! They hit all expectations, are simple to use, and involve little to no planning which helps out a lot!" - Sandra B.

INTRODUCTION

DRONE SAFETY RULES

Basic Drone Usage

You must meet all this criteria
1. The drone is flown in an un
2. The drone is flown more th people.
3. The drone is never flown di
4. The drone must be flown r a military base.
5. The drone must be flown r landing pad.

If you are in violation of any of advanced usage.

You must also follow these rule
- Your drone must
- Your drone must the drone.
- You must pass th
- You must be able proof of registra

When flying drones remember:
1. Always be able to see your
2. The drone must not be flo
3. Do not fly your drone over
4. Do not fly near airports, mi
5. Do not fly near powerlines.
6. Ensure your drone is ready
7. Ensure that the drone does

If your drone weighs less than is considered a Micro drone and weigh more than 250 grams. Fo financial penalty.

SAFETY RULES QUIZ /15

Complete the following true/false questions on safety.

1. When you clean-up, wash your hands with just water.	T	F
2. Before you begin, you must listen to ALL the teacher's instructions.	T	F
3. Remember to tie-up any loose items (e.g., hair, clothing, jewelry, etc.).	T	F
ience room.	T	F
ration is located	T	F
6. Do not bother reading your procedure. Just make it up as you go!	T	F
7. Handle all tools with care, especially sharp objects.	T	F
8. Wear open-toe shoes and use gloves/goggles as needed.	T	F
9. Read labels on chemicals used carefully (e.g., WHMIS symbols).	T	F
10. Do not tell the teacher if there is a spill or if an item is broken/faulty.	T	F

SCIENCE SAFETY

Vocabulary Word	Definition
#1	

SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.

UNIT VOCABULARY

LESSON 1A & 1B

PROPERTIES OF AIR

Have you ever wondered how planes can fly? Air is invisible, but aircraft would not be able to fly without it to the unique properties of air, ob like hot air balloons, birds, and plan can take flight.

Properties Of Air

We can't see the air surrounding but we know it's there. Air is a div mixture of gases, water vapour, a other substances with distinct properties. Air is composed of ar 78% nitrogen and 21% oxygen. It contains small amounts of other like neon, carbon dioxide, and hydr and a large number of micro part such as dust, pollen and pollutants

Air Takes Up Space

Air surrounds the Earth and take space. The large blank planet. This everywher parks, etc. you blow u see the sp inside your The more air you add into the ball the bigger it gets.

Air Has Mass

Since air is made up of matter, it composed of molecules and atom gas, dust, pollen, water vapour, an other particles.

PROPERTIES OF AIR CHECKLIST ACTIVITY

Task: Shade in only what is FALSE about air in the chart.

Air is invisible.	Air is always cold.
Air is friendly.	Air has a mass.
Air can be compressed.	Air smells really bad, all the time.
Air is colourful.	Air is always hot.
Air is [illegible] carbon dioxide.	Air is heavy.
	Air has pressure.
Air is made up of mostly nitrogen and oxygen.	Air is everywhere.
Air is nowhere.	Air takes up space.

PROPERTIES OF AIR

LESSON #1B

Properties of Air – Teacher Demonstration

Lesson Overview:

Students will learn about the properties of air through video demonstrations.

Materials Needed:

- ❑ Computer with projector/speakers
- ❑ Video #1: Properties of Air (5 Science Experiments)
- ❑ Video #2: 6 Easy Air Pressure Science Experiments for Kids

TEACHER DEMONSTRATION

discussion about the information shared in the video.

3. As a class, watch video #2: 6 Easy Air Pressure Science Experiments for Kids – Easy Science Experiments for Kids.
4. Pause the video after each experiment to have a brief class discussion about the information shared in the video.
5. You may want to watch each video more than once to have students gain a deeper understanding of the properties of air.

Reminder:

Tell students that these experiments are not to be tried at home, especially the ones involving candles, as fires can start quickly.

LESSON 2 & 3

COMPRESSION AND INSULATION OF AIR

Air has practical uses, such as compression and insulation. Air is being used every day in homes, transportation, clothing, and other applications for compression and insulation purposes.

Compression of Air

Compressibility is the measurem
of how much an object decrease
volume when it is under pressure
example, if you take a balloon and
squeeze it with your hands, you
observe that it shrinks in size. Th
because the air that filled the ba
is compr
your han

Compres
areas, in
and heal
compres
vehicles
because
condition
limited c
rougher

Compressed oxygen is routinely u
in hospitals to help patients breat
In addition, airplanes use a
pressurized cabin to allow passer
to breathe sufficiently at high
altitudes where the air is thin.
Likewise, scuba divers must carr
supply of compressed air with t
at all times to breathe underwate

COMPRESSION & INSULATION OF AIR

COMPRESSION OR INSULATION? ACTIVITY

Task: Read through each example and circle whether you think it is an example of compression or insulation of air.

1. Keeping the heat inside your home:

   COMPRESSION OR INSULATION

2. A sleeping bag using many layers to keep you warm at night:

   NSULATION

   NSULATION

   COMPRESSION OR INSULATION

5. A winter jacket used to keep you warm on cold days:

   COMPRESSION OR INSULATION

6. An airplane cabin that uses pressurized air to help people breathe when flying:

   COMPRESSION OR INSULATION

THE FOUR FORCES OF FLIGHT

The science of flight uses different forces acting together to make flying

Photo of an Airplane on a Runway.

the amount of resistance an
e encounters as it moves
n the air. Drag goes against the
n of the movement of the

rences
rag force
t
e's mass,

is the force put on an object by
The weight of an aircraft is
nined by its mass, fuel, cargo, and
gers. Distributing the plane's
is essential to maintaining proper
and safety. During a flight, an
e's weight fluctuates due to fuel
erefore, the pilot must
ntly adjust the controls to
the plane.

THE FOUR FORCES DEFINITIONS

Task: Cut out the definitions on this page. Place the correct definition on the plane direction to explain each force of flight.

LIFT	THRUST
The difference in pressure on the wing's	The force that drives the plane forward
through the air.	determined by its mass, fuel, cargo and passengers.

THE FOUR FORCES OF FLIGHT

LESSON 4 & 5

HOW UNBALANCED FORCES CONTROL FLIGHT

The movement of an airplane is influenced by the direction and strength of different forces. If the lift, thru drag, and weight are balanced, the p will remain stationary or in constant motion. Yet, if there is an unbalance the forces, movement and speed w change.

Effects of Unbalanced Forces on Ob

If an unbalanced force is applied to stationary objects, they will begin to move. For example, an airplane park an airport will remain stationary if i undisturbed. The airplane will move an unbalanced force interacts with i such as when it is being pulled by a when the jet plane forward

A flying plane speed (consta drag, and weig in the same d speed as long balanced.

However, if unbalanced forces act o moving objects, they can change direction, speed, or even come to a complete stop. For example, when t pilot increases the thrust, it will cre unbalanced force. The airplane will m in the direction of the larger force. result, the aircraft accelerates forv since the thrust will be higher than drag.

How Can Unbalanced Forces Control Flight?

The interaction of numerous uneven

UNBALANCED FORCES MULTIPLE CHOICE

Complete the following multiple choice questions after reading the article.

1. If the four forces are balanced:
   a) The object is unbalanced.
   b) The object remains stationary or in constant motion.
   c) The object's speed or movement will change.

2. If the four forces are unbalanced:
   a) The object is unbalanced.
   b) The object remains stationary or in constant motion.
   c) The object's speed or movement will change.

4. Tail elevators are used to do what in an airplane?
   a) Create drag in the airplane.
   b) Create lift.
   c) Steer an airplane up or down.

5. If a bird is flying straight and steady it means:
   a) All the forces are balanced.
   b) All the forces are unbalanced.
   c) The lift is equal to the drag.

UNBALANCED FORCES

WAYS IN WHICH THE FOUR FORCES OF FLIGHT CAN BE ALTERED NOTES

vrite the dot jot notes on
vrite down each note on

considered when trying to

gear help
ach

ate and if

reduce

ttack is raised, speed is

engines and propellers.

aised, speed is increased.

ly more efficiently.

g.com

WAYS IN WHICH THE FOUR FORCES OF FLIGHT CAN BE ALTERED NOTES

Adjust Tilt or Angle of Attack	
Reduce Weight	
Manage Thrust	
Control Drag	

HOW THE FOUR FORCES CAN BE ALTERED

LESSON 6 & 7

BIRDS, BATS, INSECTS AND SEEDS

Task: Read each characteristic below. Decide which of the following items – Birds, Bats, Insects, and Seeds – have each characteristic.

Has Wings	
Has Feathers	
Is Lig	
Has H / B	
Has A l	
Has Flight Muscles	

LIVING THINGS THAT FLY QUIZ

Name: _____ Class: _____

True or False Instructions: Read each question and then write T or F in the box beside the question.

Question	Write T (True) or F (False) in the box.
Most living things need some sort of wing to fly.	
Insects can use their wings independently, allowing them to move more effortlessly.	
Seeds cannot fly.	
Maple keys use their wing-like form to guide them as they fall.	

/10

CHARACTERISTICS THAT ENABLE FLIGHT IN LIVING THINGS

PAPER AIRPLANE LAB

er airplanes to investigate the

PAPER AIRPLANE LAB

Observations & Reflections	
1. Test out each paper airplane design three times. 2. Record the distan	
Paper Airplane	
Test Flight 1	
Test Flight 2	
Test Flight 3	Test Flight 3
How do you think the design differences affected the flight of your paper airplanes?	
What design differences did you make between the two paper airplanes? Why did you make those changes?	

PAPER AIRPLANE LAB

ractice
ou are ready to create your
.

can use the provided The

eel that you are ready to
your teacher.
sign paper airplane.
your time to test out your

Paper Airplane Lab graphic

planes, complete the rest of
.
tlined on the Paper Airplane

airplanes, your write up and
your teacher once you have
s lab.

g.com

LESSON 8 & 9

ADVANTAGES AND DISADVANTAGES OF AVIATION TECHNOLOGY

Aviation has made travelling betw
continents and countries easier f
people and goods. More than 45,0
planes and 2.9 million passengers
travel the United States' airspace
every day. Think about how many
people and planes use the Earth'
airspace daily.[1]

Travel between countries, which
previously took months by boat, r
takes only a few hours via comm
airplanes.

Additionally, aviation also contribu
economic growth by allowing
businesses to expand globally. Thi
increase in aviation has also had a
negative
also caus
increased

Advanta

Medical T
Organs c
life-savin
speed and ease of air travel. Med
air evacuation is necessary when
medical issue cannot be resolved
the immediate area. By using plan
helicopters, injured or sick patient
quickly transported to a different
hospital.

[1] https://www.faa.gov/air_traffic/by_the_numbe

AIR TRAVEL RESEARCH PLANNER

What do I already know about air travel?	What do I want to know about air travel?

AIR TRAVEL INQUIRY

UNIT TEST /15

Name: _____ Class: _____

n and then write T or F in the

Write T (True) or F (False)
ox.

UNIT TEST

Name: _____ Class:

Short Answer Question (5 M

Explain some positive and ne

FLIGHT UNIT TEST

LESSON 10

SUB PLANS/UNIT REVIEW

B

Lesson Overview:
Students will work on reviewing

Materials Needed:
- ❑ Bill Nye Flight Video:
  - Source 1: https://www.schooltub
  - Source 2: https://youtu
- ❑ Photocopy a class set of the
  - Bill Nye – Flight

The best sources of these vide
streaming services, but YouTub
every video before showing you
advertisements may be inappro

Teacher Instructions:
1. The video is about 20 – 25
2. Save this video for a day th
   substitute teacher or use t
   educational videos gives tea
   conference 1–on–1 with st
3. Ensure students have the
   going to watch.
4. After watching each video,
   discussion.

ESL & IEP Accommodations:
- Turn on closed captioning or
  needs of your students.

BILL NYE: FLIGHT

Complete the following True/False questions:

1. Air pressure makes things fly. T F
2. Lift comes from the ground. T F
3. The idea of lift was created by a scientist named Bernoulli. T F
4. Air pressure gives balloons
5. An airplane can weigh as mu
6. Everything is made of molec particles, which are used to
7. The difference in air pressure that causes flight is known as the Bernoulli effect. T F
8. It is very important to test out airplanes. T F
9. Wings do not need an angle of attack. T F
10. Helicopters use wings that turn to create lift. T F

UNIT REVIEW OR SUB PLANS

SUB PLANS/UNIT REVIEW

Video

gQY
m/video/x5iiixl
se the provided Google Slides:

our school board's paid video
en linked. Always PREVIEW
nks can change and

unit when you have a
eview activity. Showing
catch up on their grading or
re struggling.
ut for each video they are

wers to each in a class

sed captions, depending on the

MAGIC SCHOOL BUS: TAKING FLIGHT

Task: Watch the video and circle the correct answer for each question.

1. When an airplane tips upwards and the plane slows down it is called a:
   - D. Bubbles
2. on an
3. The propeller does what?
   - A. Keeps the plane moving forward.
   - B. Keeps the plane moving backwards.
   - C. Allows the plane to travel on the ground.
   - D. Allows the plane to dive.
4. Birds use what to fly:
   - A. Legs
   - B. Beaks
   - C. Wings
   - D. Eyes
5. Another way to make a propeller work is to:
   - A. Shake
   - B. Peddle
   - C. Bounce
   - D. Walk
6. What do the back feathers of a bird or airplane do?
   - A. Dance
   - B. Propel
   - C. Fly
   - D. Steer

LESSON 11 & 12

DRONES

What Is A Drone?
A drone is an aircraft that flies
without a pilot on board. Instead
is controlled from the ground b
remote control. It is called an
"Unmanned Aerial Vehicle" or UA

Drone Uses
Drones are used for many
purposes, including military use
policing, marketing, film-making
agriculture and personal use.

Other drone u
police with cro
3D maps from
crops, and insp
such as buildin
There have als
drones for ho
and medicine.
to help with s

They can be equipped with a fir
person view camera, which
broadcasts to the controller on
ground. This provides a view to
ground controller as if they wer
actually on the drone as it flies
also allows the device to fly hig
and farther than it would other

THINKING QUESTION

Assessment	Below Expectations	Meets Expectations	Above Expectations
	✓ -	✓	✓ +

In your opinion, is delivering packages by drone a good idea? Explain your thinking.

DRONES NON-FICTION ARTICLE

LESSON #12

Room

solve this digital escape room.
es to complete, but every class

one)

a
r
se a
udents

ovided

t contains an escape room
e escape room section, open up
ner. Start the timer once you
e and the rules. Please play by
cape."

-time translation. Just hold the
creen.

com

THE STORYLINE

LOST AT THE AIRPORT

Your class is on a field trip to the local airport. You are thirsty and leave the group to find a water fountain. You open up a door and accidentally walk down a jetway that leads directly into an airplane. Once you realize where you are, you immediately try to exit the plane. The flight attend
next 1
off.

ESCAPE ROOM RULES

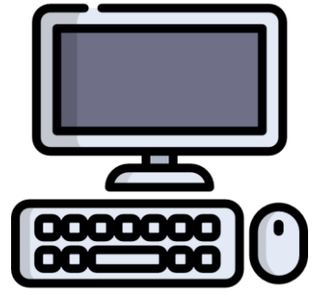
1. Once you and your team are ready to start, hit the timer button. You are not allowed to pause or change the time. Your teacher will tell you how much time to put on the timer.
2. Make sure you look at and read EVERYTHING in each section, including titles, images, etc.
3. Write answers in ALL CAPS with NO SPACES.
4. You are allowed ONE FREE HINT.
5. After your free hint, you are allowed two more hints, but they will cost you 3 minutes on the clock per hint!
6. Please do not Google the answers.
7. Please do not share your answers with other students.

FLIGHT DIGITAL ESCAPE ROOM

LESSON FORMATS

PDF

✓ Individual & Whole Unit



DIGITAL

✓ Google Slides

RESOURCE CAN BE USED IN-PERSON OR ONLINE