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Google Slides Lessons Preview

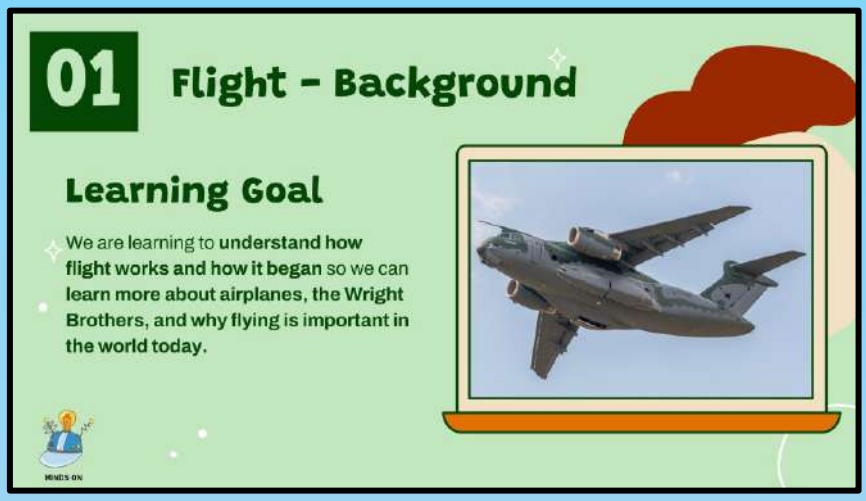
Alberta Science Curriculum

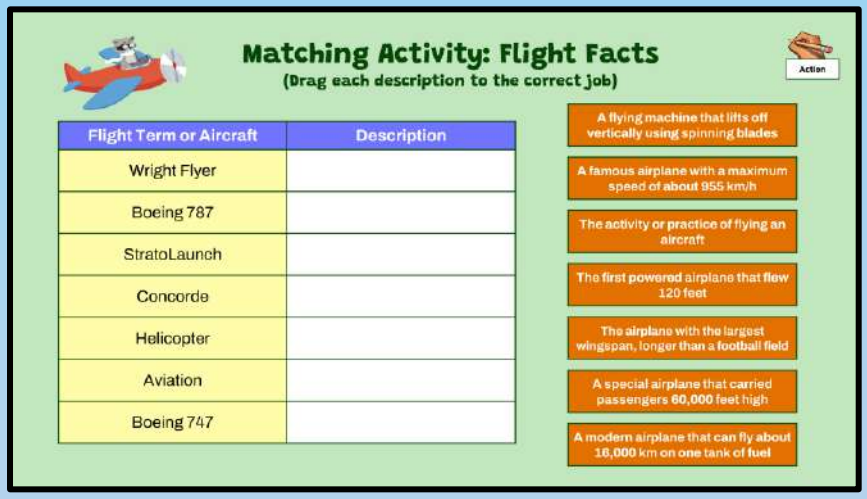
Energy: Flight and Energy Resources – Grade 5

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!



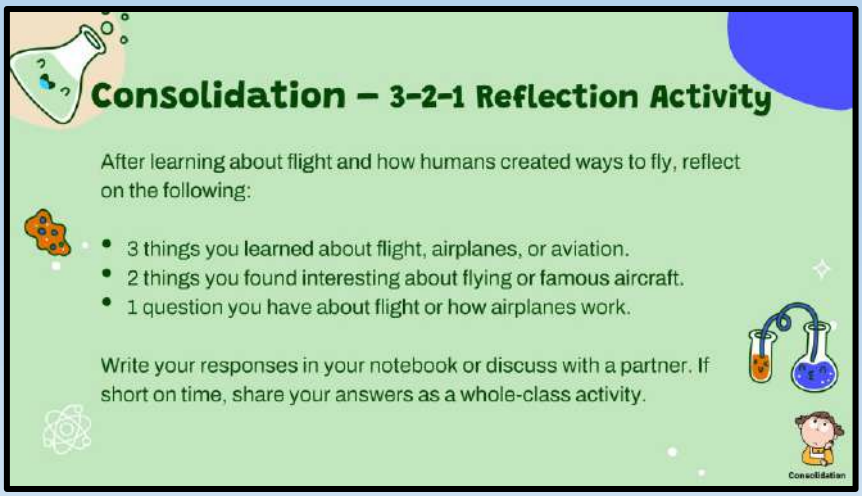


Part 2 – Action!

- Surveys/Polls
- Matching
- Drag and Drop
- Videos
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quick Draw
- 3-2-1 Reflection
- One-Sentence Summary



Alberta Science Curriculum

Energy: Flight and Energy Resources – Grade 5

Cause And Effect: Flight

Action

Instructions: Drag the letter of each Effect to match its corresponding Cause.

	Cause		Effect
	The airplane's engines push air backward with great force.	A	**A)** This helps the plane push through air resistance.
	The shape of airplane wings makes air move faster over the top.	B	**B)** This improves lift by changing how air moves over the wing.
	Air pushing against the front of the plane while flying.	C	**C)** This creates lift, helping the plane rise.
	Gravity constantly pulls the airplane toward the Earth.	D	**D)** This reduces drag, helping the plane move faster.
	Planes must have strong engines to overcome drag.	E	**E)** This makes planes fall quickly after takeoff.
	Planes are designed with smooth, rounded shapes.	F	**F)** This creates thrust, moving the plane forward.
	Wings are tilted upward slightly at the back edge.	G	**G)** This creates weight, pulling the plane downward.
		H	**H)** This causes drag, slowing the plane down.

...ple Choice

...r C) in the Answer column

	A	B	C	Answer
...What happens if the angle of attack gets too high?	Plane stalls	Plane speeds up	Plane turns	
2) What is a safe angle for takeoff?	Around 25 degrees	Around 15 degrees	Over 50 degrees	
3) What is the relative wind?	Wind from the back	The air moving toward the wing	Wind that moves side to side	
4) What does "angle of attack" mean?	Angle between wing and air	Speed of the plane	Size of the airplane	
5) What helps lift the plane into the air?	Turning the engine	Flapping the wings	Tilting the wings at the right angle	
6) What does "stall" mean in flying?	Plane goes faster	Plane can't lift due to lost airflow and begins to descend	Plane lands safely	

Cause And Effect: How Geography ...

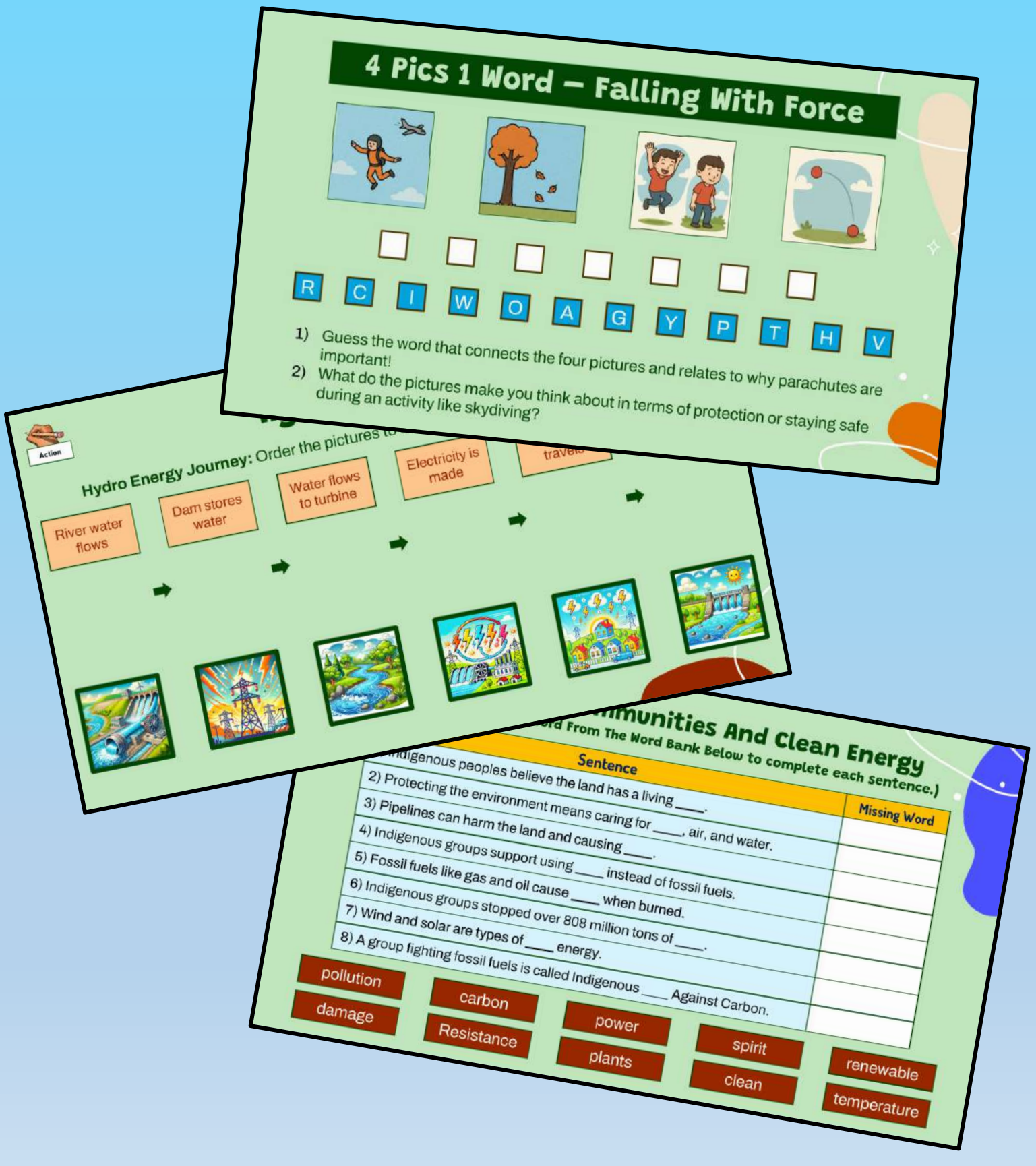
Action

Instructions: Drag the letter of each Effect to match its corresponding Cause.

	Cause		Effect
	The teardrop-shaped body of a dolphin cuts through water easily.	A	A) This reduces friction, making movement easier.
	The smooth surface of a bird's feathers helps reduce drag.	B	B) This creates lift by changing how air moves over the wing.
	A maple seed falls while spinning like a helicopter.	C	C) This helps the animal glide smoothly through water.
	A bird's wings have one wide side and one narrow side.	D	D) This spins, helping it stay in the air longer.
	A dolphin's strong tail moves side to side in water.	E	H) This stores extra energy for the animal during winter.
	Hollow bones make birds lighter.	F	F) This helps the animal fly more easily.
	Seeds are shaped to catch the air as they fall.	G	G) This shape helps seeds float and spread farther.
		H	E) This pushes the animal forward through water.

Alberta Science Curriculum

Energy: Flight and Energy Resources – Grade 5



Workbook Preview

Grade 5 – Science Unit

Organizing Idea: Energy: Understandings of the physical world are deepened by investigating matter and energy.

Guiding Question: How are energy resources understood?

	Learning Outcome – Students investigate and compare how forces affect living things and objects in water and air.	**Pages**
E.1	Thrust and drag are opposing forces. Lift and weight are opposing forces. Thrust is a force that can act in the direction of movement. Drag is a force that can act in opposition to the direction of movement.	7-24, 27-39, 42-45, 125-140
E.2	▪ horizontal and vertical movement ▪ altitude ▪ straight and level flight	40-43, 50, 135-140
E.3	Traditional technologies developed by diverse cultures that reflect understanding of forces that affect flight include the o bow and arrow o slingshot o fishing spear	46-73, 135-140
E.4	Buoyant force is an upward force exerted by a fluid that opposes the weight of anything placed in the fluid. When the buoyant force is greater than the weight of an object, the object will float. When the buoyant force is less than the weight of an object, the object will sink. Fluids include liquids and gases.	79-89, 135-140

Grade 5 – Science Unit

Organizing Idea: Energy: Understandings of the physical world are deepened by investigating matter and energy.

Guiding Question: How are energy resources understood?

	Learning Outcome – Students investigate and analyze various energy resources.	**Pages**
E.5	Energy resources are renewable or non-renewable. Renewable energy resources are not depleted over time as they can be naturally replenished if handled responsibly.	91-93, 135-140
E.6	Renewable energy resources include ▪ solar ▪ wind ▪ biomass ▪ geothermal ▪ tidal ▪ water and hydro	94-107, 135-140
E.7	Non-renewable energy resources are depleted over time because they will not be naturally replenished for thousands or millions of years Non-renewable energy resources include nuclear and fossil fuels.	108-114, 135-140
E.8	Alberta relies on both renewable and non-renewable energy resources to fulfill energy needs, including ○ fossil fuels ○ water and hydro ○ wind ○ biomass	115-127, 132-140
Computer Science:		
CS.1	Students apply design processes when creating artifacts that can be used by a human or machine to address a need.	74-78, 128-131

NAME: _____

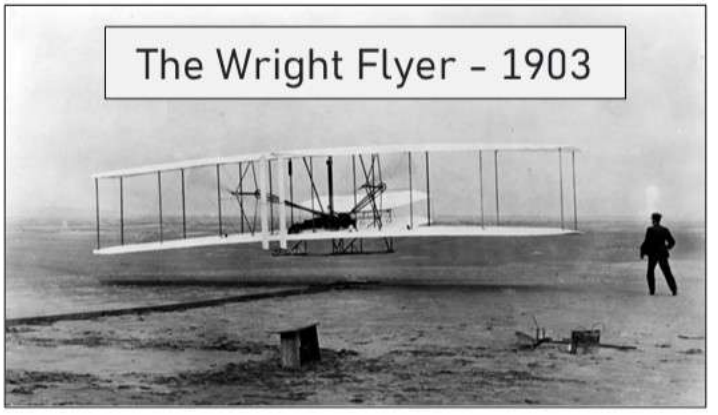
Name: _____ 7

Curriculum Connection
E.1

Flight - Background

What is Flight?

The term **flight** refers to the action or process of flying through the air. For example, an eagle is in flight when they are soaring ab[illegible]he trees. An eagle is an example [illegible]ght occurs naturally in our e[illegible]



Fl[illegible]t also [illegible]g human-made structures called aircrafts. Examples of aircrafts are a[illegible]e[illegible]ts, and [illegible]ters. **Aviation** is the flying of an aircraft.

History of Aviation

It took thousands of years fo[illegible]s to [illegible]hirds around them. It wasn't until December 17, 1903 that the famous Wri[illegible]ers [illegible]d the first successful airplane that flew only 120 feet. The aircraft was [illegible]ed the [illegible]

Interesting Facts about Flight

- Today's Boeing 787 airplanes can fly 16,000km on a [illegible]k of fu[illegible] is the length of a flight from New York City to Sydney, Australia.
- The largest airplane is called the *Stratolaunch* with a wingspan l[illegible]all field!
- The Concorde is a special aircraft that takes passengers up to 60,000 feet, which is over 16km into the air. Passengers can see the curvature of the Earth!
- More than 80% of the population is afraid of flying
- Airplanes are crucial to today's world. Businesses send their products across the world using airplanes, militaries use planes to defend their territories, and people travel across the world to travel or visit friends and family.
- A Boeing 747 has a maximum speed of 955km/h
- Only 5% of the world's population have ever been on an airplane

Name: _____ 8

Curriculum Connection
E.1

Questions Answer the questions below using evidence from the text.

1) How have airplanes changed today's world?

2) Which [illegible]out flight did you find most surprising or interesting? Explain.

Questioning Writ[illegible]stions yo[illegible]bout the reading

1)	
2)	
3)	

True Or False Is the statement true or false?

1) The first flight humans took was in 1803	True	False
2) Humans have been flying for a very long time	True	False
3) A Boeing 747 can fly from New York to Australia with one tank of gas	True	False
4) Most humans are afraid of flying	True	False
5) Most people in the world have been on an airplane	True	False

Curriculum Connection
E.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____ Mark

Match each of the terms to the correct description.

Flight	❑ First plane to fly
Wright Flyer	❑ Jet that flies very high
Stratolaunch	❑ The process of moving through the air
Concorde	❑ Plane with biggest wingspan

Name: _____ Mark

Match each of the terms to the correct description.

Flight	❑ First plane to fly
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Concorde	❑ Plane with biggest wingspan

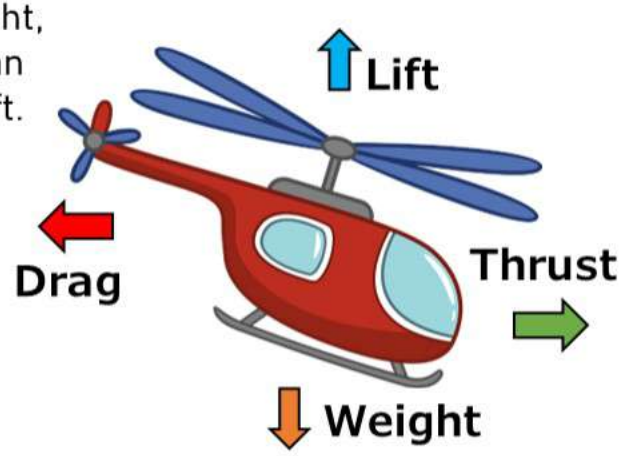
Name: _____ 14

Curriculum Connection
E.1

Four Forces Of Flight

The Four Forces of Flight

In order for an aircraft to maintain a steady flight, it needs balance. Balance is achieved through an equilibrium of all forces acting upon the aircraft. Weight, lift, thrust, and drag are the acting forces on an aircraft.



For aircraft to travel a straight and level flight, thrust must be equal to drag. Thrust will produce speed, creating an amount of drag. If any forces change, the aircraft will move upwards, downwards, or accelerate.

Thrust (Propulsion) – The engine of an aircraft creates the thrust that propels the plane forward. The engine pushes air backwards with the same force that the plane moves forward. This is in accordance to Newton's 3rd Law of motion where a force in one direction produces an equal force in the opposite direction.

Drag – Drag is unwanted in flight as it forces the engine to work harder. When you stick your hand out of a window while you are driving, you will feel air pushing against your hand. You are causing a small amount of drag that acts against your car's motion. To reduce drag and increase efficiency, planes are streamlined and made aerodynamic.

Lift – Lift is a force generated by solid objects moving through a fluid. An airplane needs many parts to generate lift but the wings do most of the work as the plane flies through the air. As the airplane travels at fast speeds on a runway, the wings deflect the air downwards which in turn sends the wings upwards. This is Newton's 3rd Law of Motion. The Bernoulli effect also explains how changes in air pressure generates more lift for airplanes. Together, these theories explain how lift is achieved for many aircrafts.

Weight – Weight is the force of gravity that acts in a downward direction, towards the center of the Earth. The weight of an aircraft affects how much lift and thrust an aircraft will need in order to fly. This is why airplanes have rules on how much weight passengers can have in their suitcases on board the plane.

Name: _____ 15

Curriculum Connection
E.1

Questions

Answer the questions below using evidence from the text

1) How does an aircraft fly? Explain using the forces of flight.

2) What ha[illegible]s when the forces acting on an aircraft become unbalanced?

Fill In The Blanks

[illegible]word[illegible]ords to fill in the blanks

UPWARD	DOWNWARD	ACCELERATE	DECELERATE

1) If the lift becomes greater than the weight, th[illegible]aft wi[illegible]

2) If the weight becomes greater than the lift, the ai[illegible]ove

3) If the thrust becomes greater than the drag, the aircraft [illegible]

4) If the drag becomes greater than the thrust, the aircraft will

Diagram

Draw a diagram of an airplane and the four forces acting on it

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____ Mark

Is the statement true (T) or false (F)?

1) Lift pushes an airplane forward.	T / F
2) Drag helps reduce the plane's speed.	T / F
3) Thrust works against drag.	T / F
4) Weight works against thrust.	T / F

Name: _____ Mark

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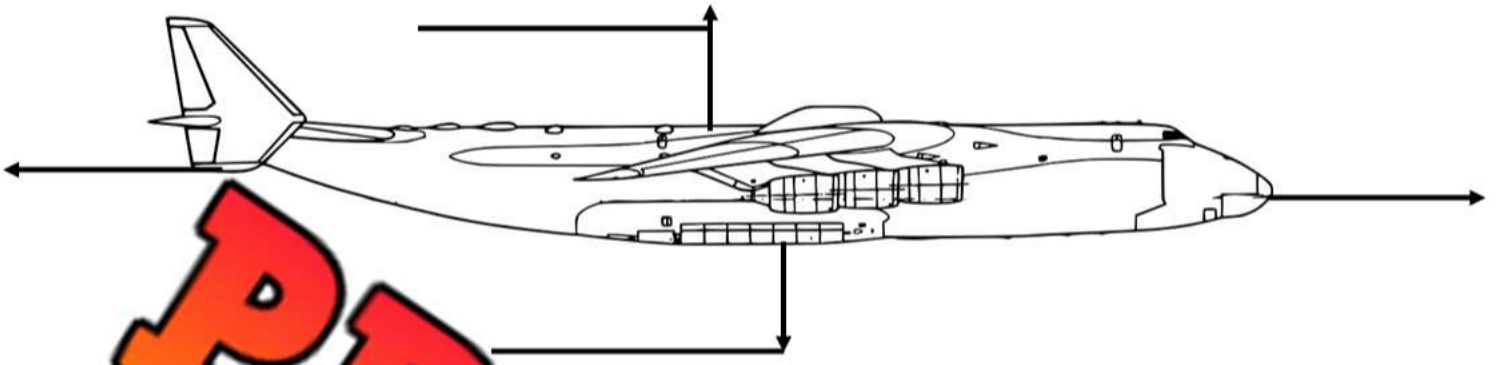
3) Thrust works against drag.	T / F
4) Weight works against thrust.	T / F

Name: _____ 17

Curriculum Connection
E.1

Four Forces Of Flight - Activity

Diagram Label the 4 forces of flight: Weight, Thrust, Lift, Drag



Instructions Follow the instructions below

1. Using a piece of paper, make a paper airplane.
2. Draw arrows on your plane indicating the forces acting on your plane during flight.
3. Throw your plane and see how far it flies.

Questions Answer the questions below

1) How was the thrust created in your paper airplane? Can you add more thrust into your plane? Explain.

2) Why did your plane eventually fall? Use the terms: weight, thrust, lift, and drag.

3) Did your airplane have any drag? How could you change the shape to lessen the drag?

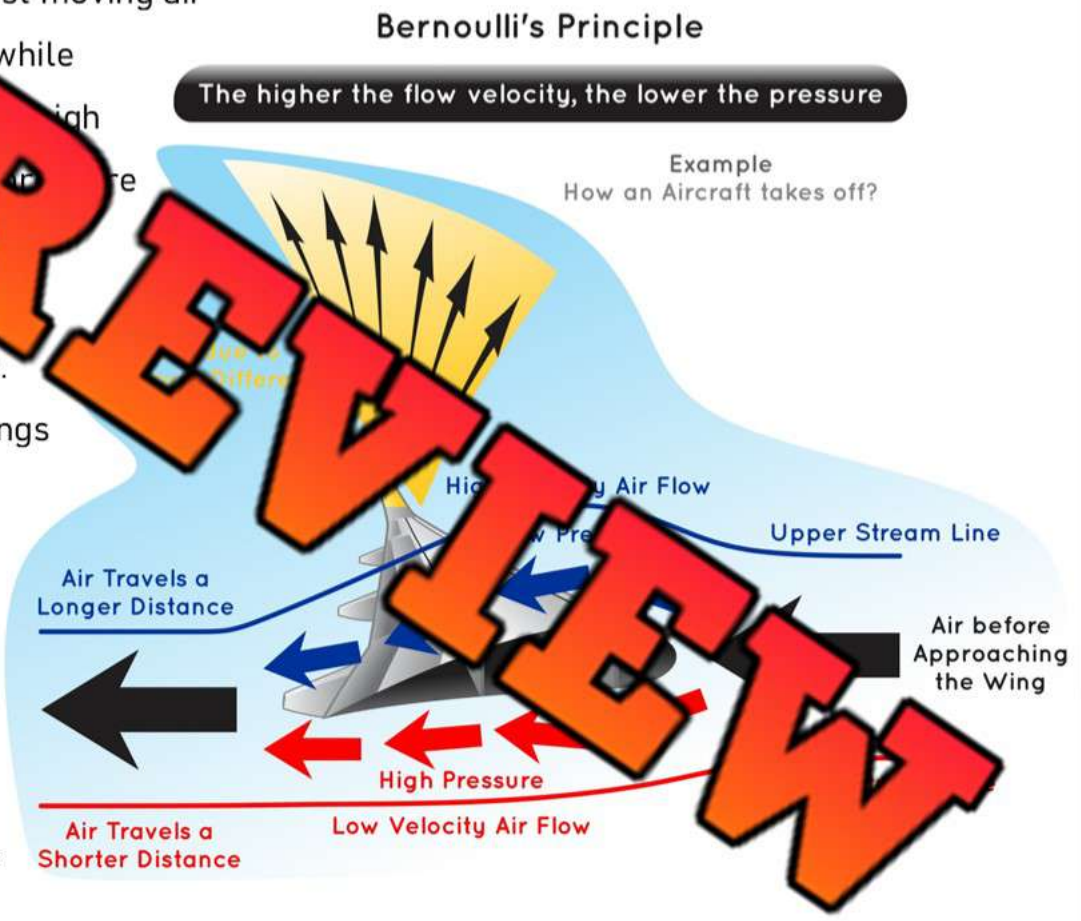
Name: _____ 18

Curriculum Connection
E.1

Bernoulli's Principle

What is Bernoulli's Principle?

Bernoulli's principle helps explain how an aircraft uses its wings to achieve lift. Remember, air is a fluid, which means the wings are cutting through the fluid as they fly through the air. The wings are shaped so that air flows faster over the top of the wing and slower underneath. Fast moving air creates low pressure while slow moving air creates high pressure. The high air pressure under the wing pushes the aircraft up through the lower air pressure.



An airplane's wings are usually curved at the upper part which causes the wind to rush over the top and speed up. This decreases the air pressure on the top of the wing.

The bottom of the wing is generally flat which causes the air to move in a straighter line, which keeps a consistent lower speed and higher pressure. Since high pressure always moves towards low pressure, the air below the wing pushes upward towards the air above the wing.

The wing, which is in the middle of a plane, is then lifted by the force of the air and this causes the entire plane to lift and travel upwards. The faster the plane moves, the more lift there can be.

Name: _____ 19

Curriculum Connection
E.1

Questions

Answer the questions below using evidence from the text

1) How are airplanes designed to achieve lift?

2) How do air pressure affect lift?

Visualizing

Draw what the picture looked like while you were reading. Explain the picture

True Or False

Is the statement true or false?

1. Bernoulli's principle explains how airplanes use their wings to achieve lift	T	F
2. Air flows faster below the wings on an airplane	T	F
3. Faster moving air creates low air pressure	T	F
4. The high air pressure under the wings pushes the plane upwards	T	F
5. The wings on an airplane are usually in the front of a plane	T	F

Name: _____ 22

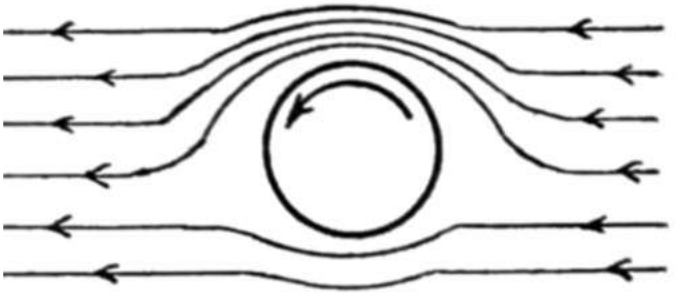
Curriculum Connection
E.1

Lift – Bernoulli Vs Newton

Two Different Theories of Lift

Sir Isaac Newton and Daniel Bernoulli each have theories of how an aircraft can lift off the ground and how they stay off the ground.

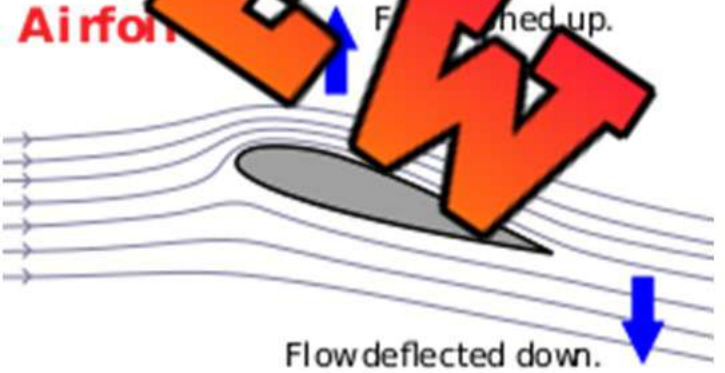
Both theories are commonly used to explain lift and both are debated as the reasons lift occurs. Which makes more sense to you?



Achieving Lift – Bernoulli's Principle

Lift is the force that pushes an airplane in the air and also holds it there. Bernoulli's principle explains how lift occurs. The air pressure under the wing is higher than the air pressure over the wing.

Higher pressure underneath pushes the wing up and produces lift. Looking at the example above, the air must meet at the other side of the ball at the same time. This means the air must move faster over top of the ball than below. This causes the lower air pressure above and the higher air pressure below.



Achieving Lift – Newton's Theory

According to Newton, airplanes fly because their wings deflect air downward so that the plane is forced upwards. Newton's third law of motion states that for every action, there is an equal and opposite reaction.

Newton's law suggests that to generate lift, the wing must divert air down so that the plane can go up. This is done by creating a wing that is shaped to push air under it. The issue is that we need a lot of air to be diverted down in order to generate lift. This is why planes must have an extremely fast takeoff speed as they need to push a lot of air down to lift off the ground.

Name: _____ 23

Curriculum Connection
E.1

Questions

Answer the questions below using evidence from the text

1) Which theory of lift makes more sense to you? Bernoulli's or Newton's? Explain.

2) How is [illegible]essure affected by the shape of an aircraft's wing?

Questioning

[illegible]uestion[illegible]ave about the reading

1)	
2)	
3)	

True Or False

Is the statement true or false?

1. The faster the air moves, the lower the air pressure	T	F
2. If the air pressure is lower on top of the wing, the plane will lift	T	F
3. Bernoulli's principle states that for every action there is an equal reaction	T	F
4. The takeoff speed must be high in order to push a lot of air down	T	F
5. Both theories explain how aircrafts generate lift	T	F

Curriculum Connection
E.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____ Mark

Circle the correct answer.

1) Who explained lift using air pressure?	Bernoulli / Newton
2) Where on the wing must air move faster for lift?	Above / Below
3) Who said lift comes from wing deflection?	Bernoulli / Newton
4) Newton's theory needs what speed?	Fast / Slow

Name: _____ Mark

Circle the correct answer.

1) Who explained lift using air pressure?	Bernoulli / Newton
2) Where on the wing must air move faster for lift?	Above / Below
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3) Who said lift comes from wing deflection?	Bernoulli / Newton
4) Newton's theory needs what speed?	Fast / Slow

Name: _____ 27

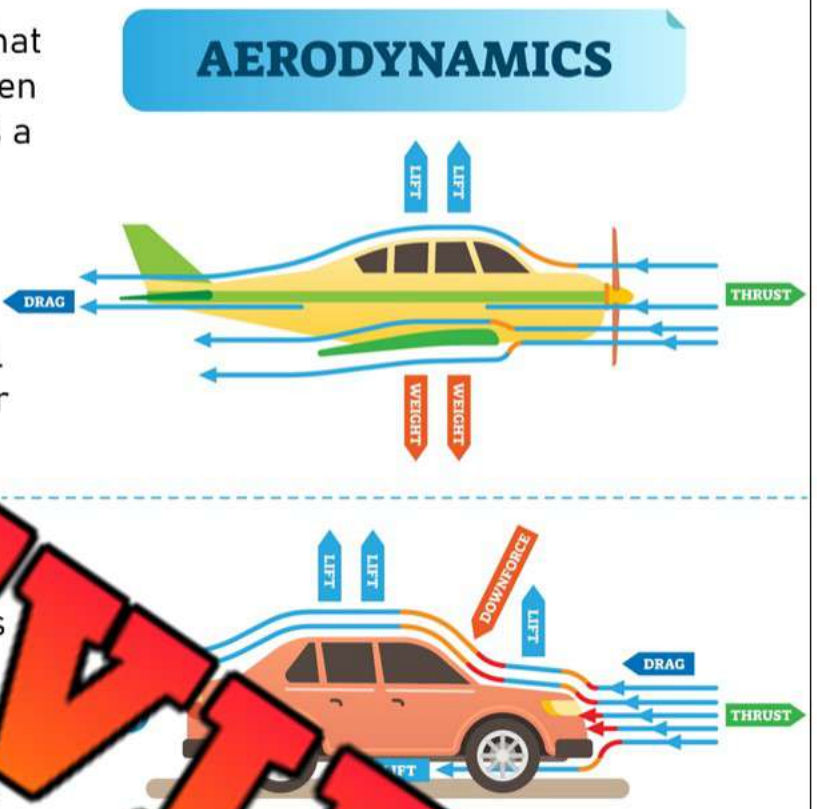
Curriculum Connection
E.1

Drag – Aerodynamics

What is Drag?

Drag in simple terms, is something that slows us down. You can feel drag when you walk in a swimming pool. **Drag** is a force that acts upon an object in the opposite direction that it is moving.

Wh stick your hand out of the wi a moving car, it is difficul and forwards. This ause dr ng on your hand. Y want t ur hand forward, but a kes difficult. You co your sideways to lessen t am drag acting on your han akes your hand more aerodynam



Aerodynamics

The term aerodynamics is commonly used when discussing drag. **Aerodynamics** means we make objects that have a shape whi e m air moving past. Turning your hand sideways when you have it wind duces the drag from the air moving past as the fluid (air) can eas ve surface area of your hand. Therefore, we can reduce drag by m ic planes that cut through the air easier.

All planes have some drag, which makes it important for engi to calculate the amount of drag an airplane has so they can adjust how much thrust is needed to overcome drag and keep the airplane up in the air.

Engineers have the challenging job of finding creative ways to reduce drag so that airplanes can go faster and fly more efficiently. The less drag an airplane experiences, the less fuel it needs to fly at the same speed.

Importance of Drag

Drag slows down objects in flight, which is important for regulating speed and landing. Skydivers use drag to slow down their falls so they can land safely. A parachute is another example of a mechanism that produces drag for falling objects to land safely.

Name: _____ 28

Curriculum Connection
E.1

Questions Answer the questions below using evidence from the text

1) What is drag? How do engineers work hard to reduce drag?

2) Why is d[illegible]mportant? How does drag help skydivers?

Visualizing Draw wh[illegible]e pict[illegible]hile you were reading. Explain the picture

True Or False Is the statement true or false?

1. Drag can be reduced using aerodynamics	True	False
2. An aerodynamic aircraft struggles to fly through the air	True	False
3. All drag can be eliminated if the aircraft is designed properly	True	False
4. Some drag is needed for safe landings and to regulate speed	True	False
5. Drag impacts how much fuel an aircraft uses	True	False

Name: _____ 29

Curriculum Connection
E.1

Paper Airplane – Drag Experiment

Research Question	How will changing the drag affect your paper airplane?

Paper airplanes are simple to make, but it can be challenging to make ones that fly well. Some paper planes fly better than others. One factor is the design of the plane. In this activity, you'll get to build a paper plane and change its basic design to see how it affects its flight.

Materials	What you'll need for this experiment

- Sheet of paper
- Ruler
- Tape
- Scissors
- Paper Clips

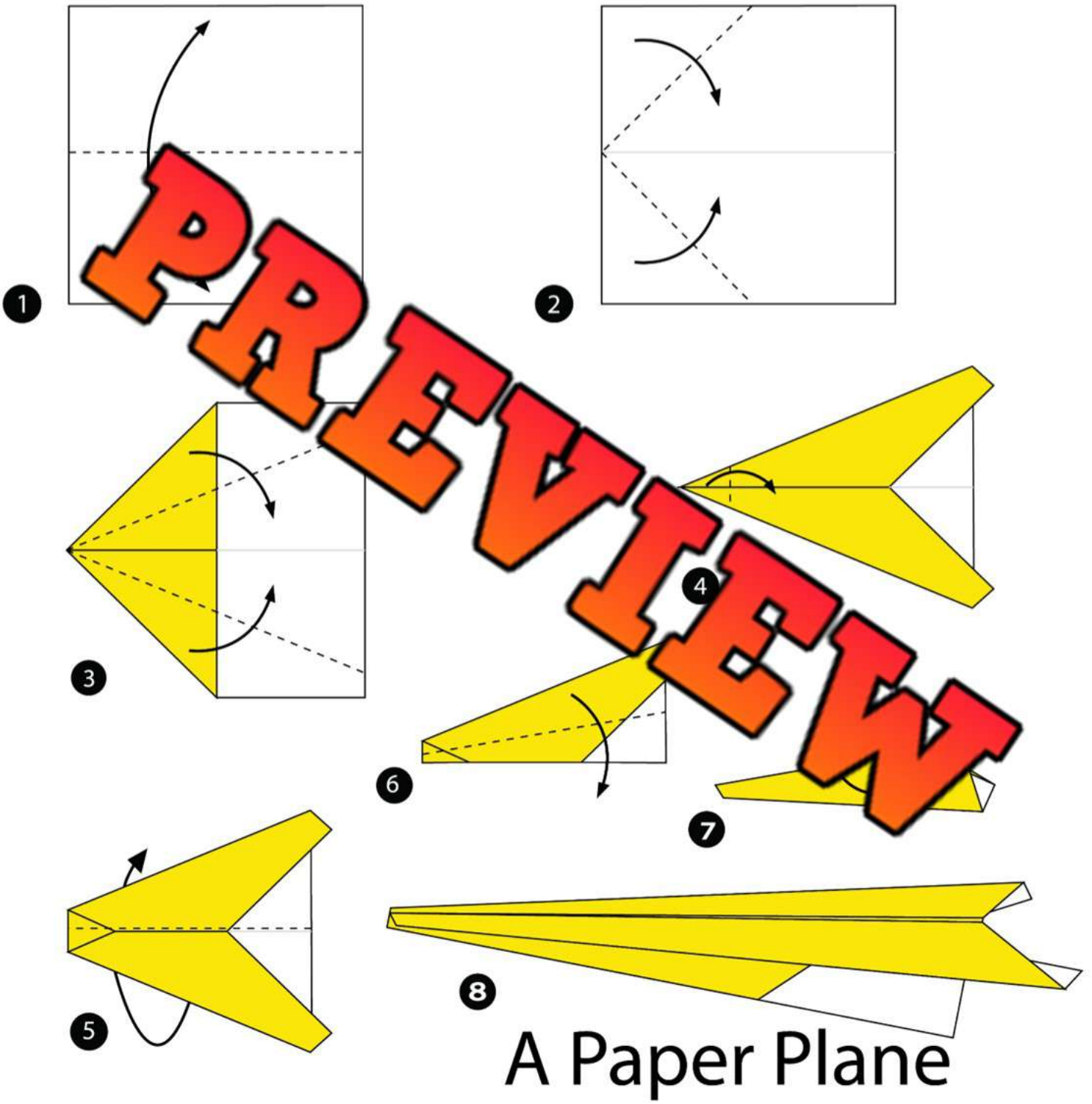
Procedure	What to do

1. Make a standard dart paper airplane. Make your folds as sharp as possible.
2. Throw your plane 5 times from a spot you've marked with tape or something. Use the same amount of force (thrust) to throw the plane
3. Once you have a good idea of how far it can fly, change the shape to increase how much drag it experiences. Do this by cutting slits that are about 3-5cm long on the wings. You can also make more folds that will produce a drag effect for the plane.
4. Retest your plane with the new changes. Record your observations below.
5. Add paper clips to the planes to see if that makes them fly better. Put them on different parts of the plane. Record your results below

Name: _____ 30

Curriculum Connection
E.1

Instructions | Step-by-step instructions for a paper plane

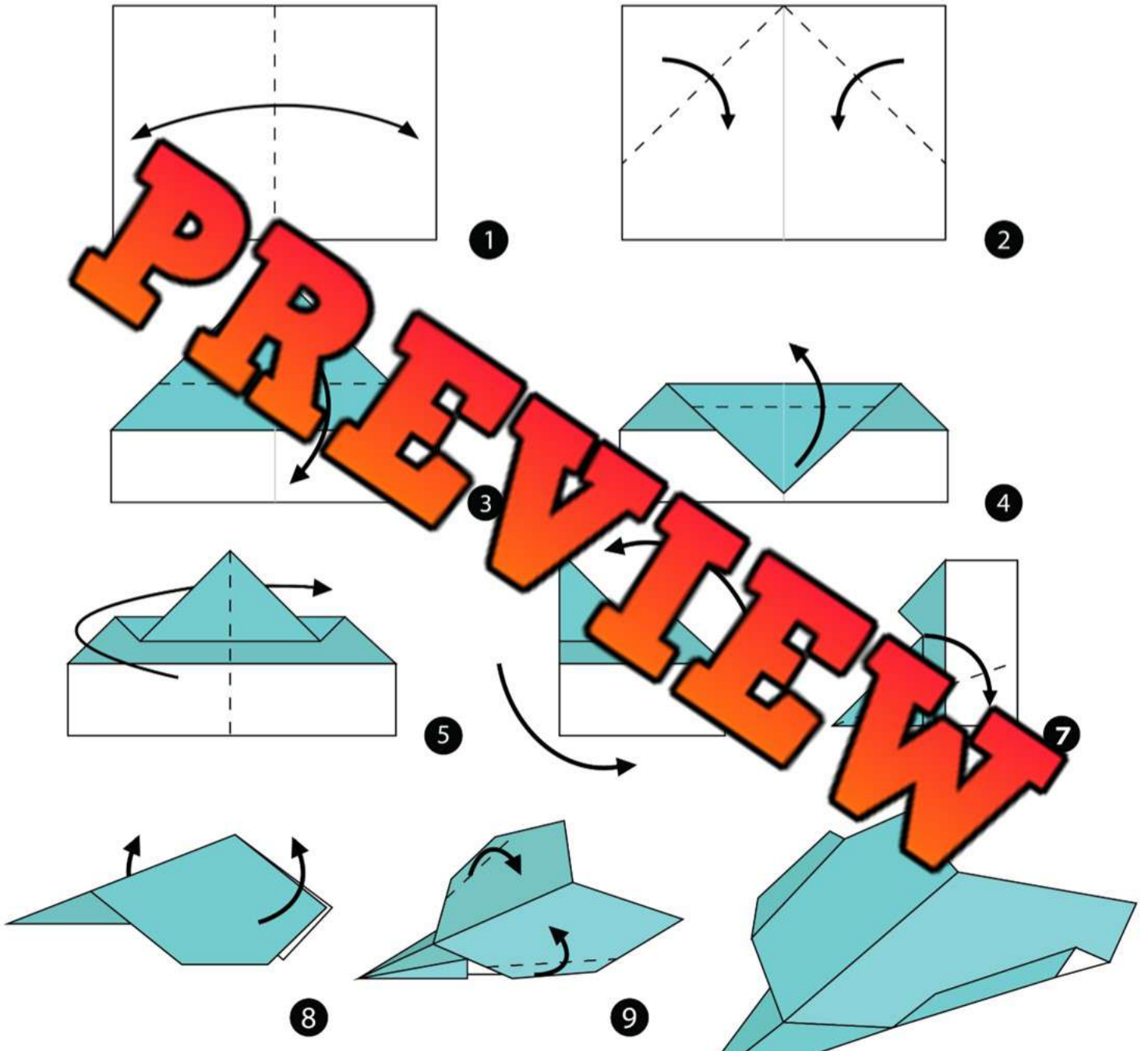


A Paper Plane

Name: _____ 31

Curriculum Connection
E.1

Instructions | Step-by-step instructions for a paper plane



A Paper Plane

Name: _____ 32

Curriculum Connection
E.1

Hypothesis How will creating drag and using extra weight affect the flight?

After Creating Drag	
After Adding Paper Clips	

Obse What happened?

Design State **vati**	Did it fly better or worse than the original design?
After Creating Drag	
After Adding Paper Clips	

Results What did we learn?

1) Did the drag slow down your plane? Why do you think this happened?

2) Did the paper clips help the plane fly? Why do you think this happened?

Name: _____ 33

Curriculum Connection
E.1

Weight – Gravity

Effect of Gravity on an Aircraft

Gravity is the force of attraction that pulls together all matter. The Earth has a gravitational pull that pulls all matter towards the centre of the earth. This keeps us on the ground and it makes things that are in the air, fall to the ground.

Gravity is the biggest obstacle that makes flying a challenge as humans are not designed to fly. **Weight** is the force of gravity pulling aircrafts to the ground. Lift is what is used to overcome gravity and send an aircraft into the air.

Centre of Gravity

The centre of gravity of an aircraft is the point it would be possible to balance the aircraft if we suspended it in the air. This is where there is an equal weight on all sides of the center of gravity. CG can be called the balance point, and it is very important to know because it affects the stability and performance of the aircraft.

The CG of an aircraft should be near the centre of lift, otherwise the plane will pitch forward or backwards and would never stabilize. Usually the centre of gravity is near the wings, as the wings are what lift the airplane.

Effects of Excess Weight on an Aircraft

Too much weight on a plane affects the performance of a plane in many aspects. To make up for the extra weight, a plane needs: a higher takeoff speed, longer runway, lower maximum altitude, shorter range of how far it can go, slower cruising speed, reduced maneuverability, higher approach and landing speed and more.

This is why airlines require passengers to have their bags weighed so they understand how much weight will be onboard the plane. They will also position the suitcases near the wings to keep the extra weight near where lift is achieved. If they put the cargo at the front or back of the plane, it would move the CG away from the wings.

Name: _____ 34

Curriculum Connection
E.1

Questions

Answer the questions below using evidence from the text

1) What does centre of gravity mean? How does it affect an aircraft?

2) How can aircraft overcome excess weight?

Questioning

Write questions you have about the reading

1)	
2)	
3)	

True Or False

Is the statement true or false?

1. Gravity pulls all matter to the centre of the earth	T	F
2. Gravity is the biggest restriction to flying and lift off the ground	T	F
3. Lift is what an aircraft uses to overcome its weight	T	F
4. The centre of gravity on a plane is usually at the back of the plane	T	F
5. To make up for excess weight, a plane will have a lower takeoff speed	T	F

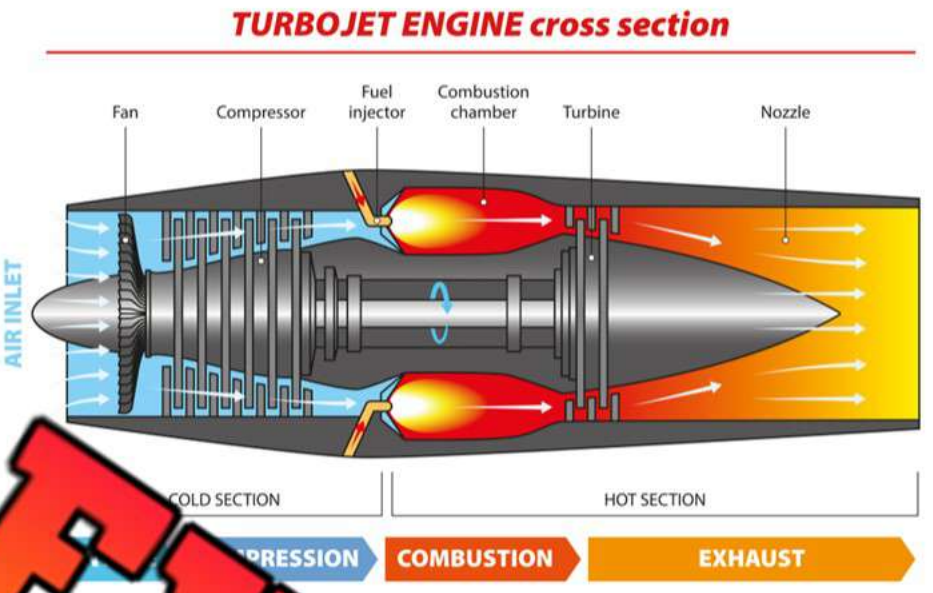
Name: _____ 36

Curriculum Connection
E.1

Propulsion – Thrust

What is Propulsion?

Propulsion is the force which moves an aircraft through the air. Propulsion is also called thrust. Thrust is needed to overcome the drag of an airplane. It also overcomes the weight of a rocket. The thrust is generated by engines.



A **jet engine** is a machine that converts fuel into a powerful pushing force that we call thrust. Engines create thrust by sucking air through the front and then having an air compressor raise the pressure of the air. Increasing pressure causes the compressed air is then sprayed with fuel by the fuel injector. The spark creates a spark that lights the mixture on fire. The burning gases expand and blast out through the nozzle at the back of the engine. As the exhaust shoots backwards out of the nozzle, it pushes and aircraft thrust forwards.

Pilots can accelerate the aircraft by adjusting the throttle. They use a mechanical device to add more fuel to the engine's system, which creates more exhaust backwards. This causes an equal opposite reaction of propelling the aircraft forwards.

Propeller

A propeller can generate thrust for aircrafts to fly. A **propeller** has spinning blades that generate differences in air pressure between the front and back surfaces of the blades.

A propeller works the same way as a screw. When you turn a screw into a wall, it goes further in as it grabs the wall and travels further with each turn. A propeller works the same way as it spins with the help of an engine. The blades pull the air (fluid) behind which results in the aircraft being pushed forwards. The more air that is pulled behind the propeller, the more thrust is generated.

Smaller aircrafts will use a propeller on the front to generate thrust. As aircrafts get larger, they require more thrust. These larger aircrafts use multiple jet engines to create this additional thrust needed for long trips with heavy loads

Name: _____ 37

Curriculum Connection
E.1

Questions Answer the questions below using evidence from the text

1) What does propulsion/thrust mean? What force does it overcome?

2) How do[es] [a] jet engine work?

Diagram Draw a diagr[am] [of a] jet [engine] [and] label the important parts

True Or False Is the statement true or false?

1. A propeller has spinning blades that create lift	T	F
2. Thrust opposes drag to move an aircraft	T	F
3. An engine uses fuel to move and accelerate faster	T	F
4. An engine uses the 3rd law of motion – every action causes an opposite reaction	T	F
5. A propeller spins on its own, causing the lift of an aircraft	T	F

Name: _____ 38

Curriculum Connection
E.1

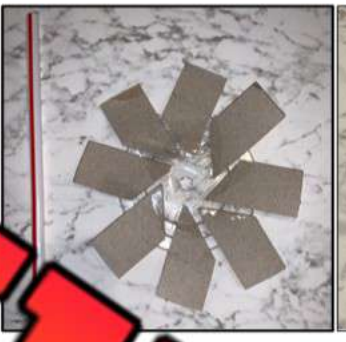
Activity – Building a Propeller

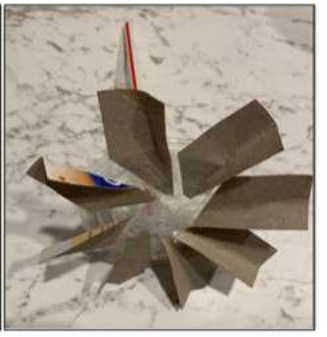
Background — How does a propeller work?

A propeller is just like a spinning wing. Most aircraft propellers have 4 wings that attach to a centre nose. When the propeller spins, the rotary motion creates a difference in air pressure between the front and back surfaces of the blades. Behind the propeller has a higher air pressure than in front of the propeller which has lower pressure. Air always moves from high pressure to low pressure. This difference provides thrust or propulsion that pushes the aircraft forwards.

Mat… — What do we need for this activity?

- Thin cardboard
- Scissors
- Plastic Lid (5-1… diameter)
- Glue or tape (hot g… pr…)
- Wooden skewer or stra… x)





Procedure — What to do

1. Cut the cardboard into 8 rectangles about 3cm h… cm
2. Cut the bottoms of the rectangles at a slant (… have … nd
3. Make a hole in the middle of the plastic lid (get … ach … t)
4. Stick the skewer through the hole (or use the straw)
5. Glue the rectangles to the lid with the pointed ends on …
6. Twist the skewer to simulate the propeller rotating. Do you … el ai… your results below
7. Now bend the wings on the propeller
8. Rotate the propeller again and feel for air blowing. Record your result… ow

Observations — What happened?

Design	**Observations –** Did you feel wind or air movement from the propeller spinning? Which design created more wind?
Flat wings on propeller	
Curved/bent wings on propeller	

Name: _____ 39

Curriculum Connection
E.1

Results | What happened during the experiment?

1) Which propeller produced more air movement? Why do you think more air moved with that version of propeller?

2) How do [illegible]opeller generate thrust for an aircraft?

3) A fan and a prop[illegible]are ve[illegible] fan moves air while a propeller moves an aircraft through still a[illegible] that means.

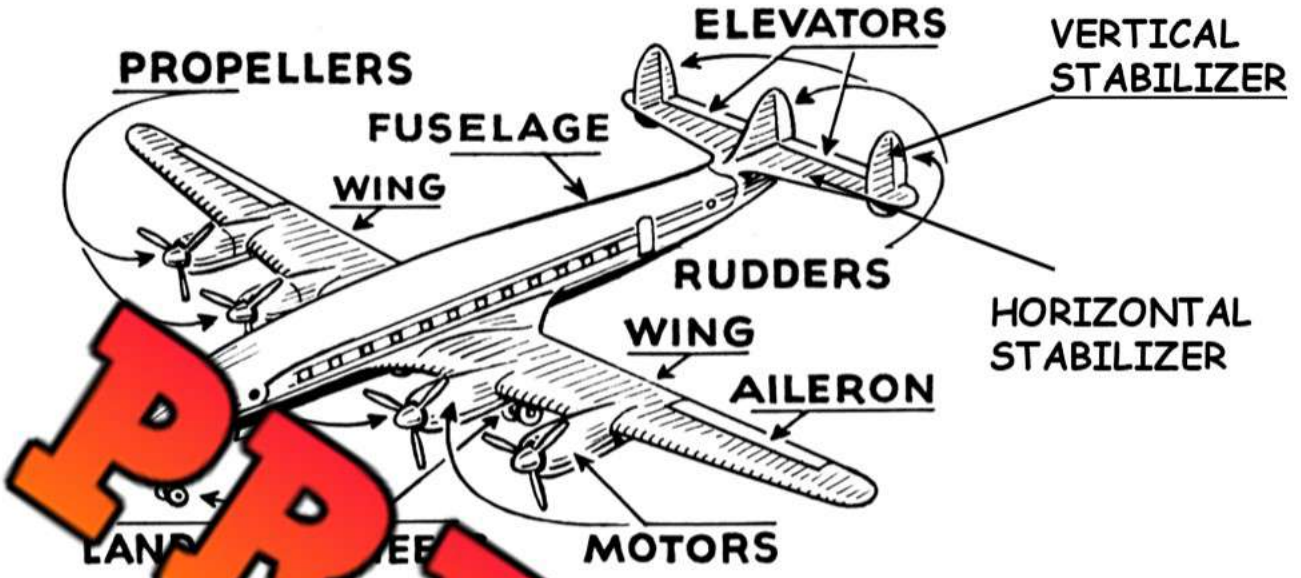
4) Why is the shape of a wing important on a pr[illegible]?

5) Draw an aircraft with a propeller. Label the following: wings, nose, low[illegible]pressure, high air pressure, and the direction of the aircraft versus the direction of the air. Use arrows to show the movement.

Name: _____ 40

Curriculum Connection
E.2

Control Surfaces Of A Plane



Aircraft Part	Function – What It Does
Elevators	Controls the pitch of the craft. Pitch means going up or down. When up, the aircraft goes down.
Rudders	Controls the yaw. The motion is the side to side movement of the of the
Wing	Controls the lift of the plane. winds to generate lift off the ground. The wing keep in the air.
Aileron	Controls the lateral balance by the air ft or right. When the right aileron goes up, th g aircraft can roll using the ailerons.
Motor	Controls the thrust to lift the plane into the sends the plane forward
Landing Wheels	Allows the plane to land safely
Fuselage	The centermost piece of the aircraft that holds the cargo and passengers. Most aircrafts can hold up to 500 passengers and 200,000 pounds of cargo!
Propellers	Controls some of the thrust the plane needs to go forwards. Also controls pitch by tilting the propellers up or down.
Horizontal Stabilizer	Helps control pitch. Keeps the aircraft's equilibrium when flying up and down
Vertical Stabilizer	Helps control yaw by preventing lateral movements of the craft. Needed for complete control of the plane.

Name: _____ 41

Curriculum Connection
E.2

Label the Airplane Below Using the Word Bank Words

Horizontal Stabilizer Vertical Stabilizer Wing Fuselage Aileron
Rudder Elevator Engine/Motor

Question	Follow the

1) How does a pilot make sure the plane doesn't ro... lose ...ce laterally? Which controls can they use?

2) How does a pilot make sure the plane doesn't lose control vertically? W... ...ntrols do they use to maintain a proper pitch?

3) What is the function of the propeller and/or the engines? (function = what it does)

Name: _____ 46

Curriculum Connection
E.3

How Do Animals Fly?

Flying Animals

The only animals that can truly fly are birds, insects, and bats. Many other animals can glide for a short period of time, but cannot generate lift from the ground. Almost all birds can fly because they have most of the following physical features:

- Lightweight – makes it easier for them to achieve lift
- Light b… a bird's bones are almost hollow which makes the bird lighter
- Stro… …s that allow the flapping of wings
- W… hat crea… …ce needed for lift
- A streamli… …red… the force of drag

How Birds Fly

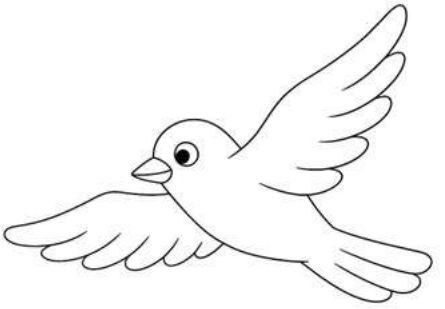
A bird will flap its wings t… …e lift f… …ground. The curved shape of a bird's wings … air … …kly over the top surface of the wing, which lowe… …essur… …e top. This generates lift as the bird will move into the area of lower air pressure.

The angle of the wing will also be tilted, w… …defle… …wards causing an opposite reaction of the wing and body moving upwar…

Larger wings produce more lift than smaller wings. … …ans … …irds with smaller wings will need to flap more to generate the same am… …ing-birds are tiny birds that will flap their wings up to 80 times per second, es… …lly if they are just hovering. This is because they cannot glide while hovering.

Gliding

When a bird is gliding, it is not working at all. Its wings are open to its sides cutting through the air at a slight angle, which deflects the air downwards causing the body to move or stay upwards. As drag acts on their body, they will lose some lift and will need to increase their wings angle of attack so they can fly upwards.



Name: _____ 47

Curriculum Connection
E.3

Questions Answer the questions below using evidence from the text

1) How do birds fly?

2) What physical characteristics that allow birds to fly?

Inference Why do you think

Diagram Draw a diagram of a bird flying. Label the air pressures and parts of the bird

Name: _____ 48

Curriculum Connection
E.3

Fact Or Fiction – How Do Animals Fly?

Objective What are we learning about?

Students will understand how animals fly by evaluating statements about bird anatomy, wing function, gliding, and how birds generate lift using muscles, wing shapes, and air pressure.

Materials What you will need for the activity.

- Fact or Fic[illegible]ts
- A 'Fact' sign a[illegible]ction' [illegible]nguish the two sides of the roo[illegible]
- Designated areas in the c[illegible]n t[illegible] 'Fact' and 'Fiction' signs, allowing s[illegible]stude[illegible] to move to either side

Instructions How you will complete the activity

1. Your teacher will read statements from cards. Pay close attenti[illegible]ent is shared.
2. Consider carefully whether you think the statement is true or false.
3. If you decide the statement is true, walk to the 'Fact' side of the room.
4. If your guess is that it's not true, move to the 'Fiction' side of the room.
5. Stay on your chosen side and listen attentively for the correct answer to be revealed.
6. When the right answer is announced, return to your seat, ready for the next round.
7. Have fun getting up and moving!

Name: _____ 49

Curriculum Connection
E.3

Fact or Fiction | Read the statements to the class

#	Statement	
1	Only birds, insects, and bats can truly fly.	Fact
2	Birds can glide for hours without flapping their wings.	Fiction
3	A bird's bones are almost hollow, making them lighter.	Fact
4	Birds fly because they have heavy, strong bones.	Fiction
5	A str ed body helps reduce drag while flying.	Fact
6	Wi the lift birds need to fly.	Fact
7	do not cles to flap their wings.	Fiction
8	A bird fl s to lift from the ground.	Fact
9	The curved s of a ir pressure on top.	Fact
10	Flat wings help cr lift t ed wings.	Fiction
11	Birds fly by pushing dow rd	Fiction
12	The angle of a bird's wing helps air do d	Fact
13	Moving air pressure helps birds lift off t ound	Fact
14	When gliding, birds flap quickly to stay in	Fiction
15	Larger wings create more lift than smaller wing	Fact
16	Small birds flap less because they are light.	on
17	Hummingbirds flap their wings up to 80 times per second.	Fact
18	Birds lose some lift when gliding due to drag.	Fact
19	Birds glide with their wings folded tightly.	Fiction
20	Gliding birds fly without using their muscles much.	Fact
21	Drag acts against the bird's movement as they glide.	Fact
22	Wings that are flat and wide help birds glide faster.	Fiction
23	A bird must change its angle of attack to gain lift while gliding.	Fact
24	Birds always stay at the same height when gliding.	Fiction
25	Birds need lift to stay in the air and move upward.	Fact

Name: _____ 50

Curriculum Connection
E.3

Quiz Check-In	This quiz will assess students' understanding of the concepts covered in the Fact or Fiction activity.

Name: _____

Mark

Is the statement true (T) or false (F)?

1) A bird's bones are almost hollow.	T	F
2) Flat wings help create more lift than curved wings.	T	F
3) When gliding, birds flap quickly to stay in the air.	T	F
4) Small birds flap less because they are light.	T	F
5) Larger wings create more lift than smaller wings.	T	F

Name: _____

Mark

Is the statement true (T) or false (F)?

1) A bird's bones are almost hollow.	T	F
2) Flat wings help create more lift than curved wings.	T	F
3) When gliding, birds flap quickly to stay in the air.	T	F
4) Small birds flap less because they are light.	T	F
5) Larger wings create more lift than smaller wings.	T	F

Name: _____

Mark

Is the statement true (T) or false (F)?

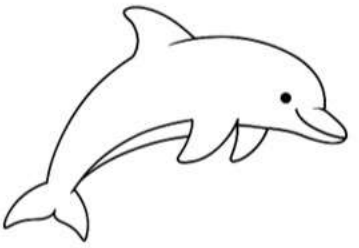
1) A bird's bones are almost hollow.	T	F
2) Flat wings help create more lift than curved wings.	T	F
3) When gliding, birds flap quickly to stay in the air.	T	F
4) Small birds flap less because they are light.	T	F
5) Larger wings create more lift than smaller wings.	T	F

Name: _____ 51

Curriculum Connection
E.3

Animal Adaptations – Propelling In Air/Water

Animal Adaptations



Animals need to adapt to be able to survive in their environment. Adapting means they need to change. Therefore, **animal adaptations** are the changes in animals that allow them to survive in t[illegible] environment. Dolphins and birds have adapted to [illegible]m the ability to propel themselves through water and air.

Dolp[illegible]

Dolphins and bar[illegible] have streamlined bodies that are shaped to reduce air resistance when [illegible] in mo[illegible] **esistance** is also known as drag, which is the force of air pushing o[illegible] through it. Both dolphins and barn swallows have teardrop shaped bodie[illegible] duce[illegible] ter and air.

Friction drag happens when two t[illegible] A flat faced organism will feel more fricti[illegible] ag whe[illegible] moving through the air or the water. The flat sh[illegible] has a large surface area that the air strikes and has[illegible] travel relatively further distances to pass by it. Adapted animals like swallows and dolphins have less friction drag acting against them, which allows them to move easier in the fluid th[illegible]

Helicopter Motion

Maple trees drop their seeds in helicopter shaped “samaras”. The maple tree plant has adapted to dropping these helicopter seeds to ensure that their seeds will be spread near and far from the plant they fell from. The seed falls in a helicopter motion as it has wings attached to the seed.

As a result, when the seed falls, it spins as the wings cut through the air. The wings have a wider side and a narrower side that make them spin due to Bernoulli’s principle.

Name: _____ 52

Curriculum Connection
E.3

Questions

Answer the questions below using evidence from the text

1) What does animal adaptation mean?

2) Why do[illegible]phins and birds have a streamlined shape?

Making Connections

[illegible] reading remind you of in your life?

True Or False

Is the statement true or false?

1) Air resistance is the force of air that objects have to move through	True	False
2) Flat surfaced objects are aerodynamic, moving easily through the air	True	False
3) A dolphin has a teardrop shape to cut through the liquid fluid	True	False
4) Maple trees drop samaras that are shaped like helicopters	True	False
5) Air and liquids are both fluids	True	False

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Fill in the blanks using the word bank.

Friction Drag	Helicopter Motion	Mark
Air Resistance	Teardrop	

1) The force that pushes on moving animals is called _____.
2) The body shape that cuts drag is _____.
3) The rubbing that slows animals is _____.
4) The way maple seeds spin is _____.

Name: _____

Fill in the blanks using the word bank.

Friction Drag	Helicopter Motion	Mark
Air Resistance	Teardrop	

1) The force that pushes on moving animals is called _____.
2) The body shape that cuts drag is _____.
3) The rubbing that slows animals is _____.
4) The way maple seeds spin is _____.

Name: _____

Fill in the blanks using the word bank.

Friction Drag	Helicopter Motion	Mark
Air Resistance	Teardrop	

1) The force that pushes on moving animals is called _____.
2) The body shape that cuts drag is _____.
3) The rubbing that slows animals is _____.
4) The way maple seeds spin is _____.

Name: _____

Fill in the blanks using the word bank.

Friction Drag	Helicopter Motion	Mark
Air Resistance	Teardrop	

1) The force that pushes on moving animals is called _____.
2) The body shape that cuts drag is _____.
3) The rubbing that slows animals is _____.
4) The way maple seeds spin is _____.

Name: _____ 60

Curriculum Connection
E.3

What Is A Parachute?

What is a Parachute?

A **parachute** is a device that is used to slow down an object that is falling towards the ground. When someone goes skydiving, they use a parachute to counter the force of gravity pulling the person to the ground. Gravity is t[illegible]orce that pulls all matter to the centre of the earth.

Why Use [illegible]te

We c[illegible] a parac[illegible]low down the force of gravity. We do this by increasing another force, wh[illegible]sist[illegible]ce. When we fall to the ground, our body shape and aerodynamics w[illegible]ome d[illegible]lows the force of gravity. If you are skydiving, you can open up your bod[illegible] a[illegible]pe[illegible] increase your air resistance. This will slow you down by increasing dra[illegible]nte[illegible]ce of gravity.

Gravity is strong if you fall [illegible]elly f[illegible]ear[illegible]. Skydivers travel around 200 km/h in th[illegible]ition. Th[illegible]ar[illegible] reach up to 290 km/h when diving headfirst. To [illegible]avity's force, a parachute increases wind resistance. With [illegible]o parachute, skydivers slow to 28 km/h for a safe landing.

How a Parachute Works

A parachute works the same way that our bodies work when we starfish [illegible]alling. Parachutes provide more surface area for a falling object or person to use to increase the air resistance while falling. Remember, there is gas all around us. It is a fluid that we travel through. When we increase our surface area that needs to travel through the air, we create more air resistance and this slows us down or makes it harder to travel through.

Imagine running your hand through water. When you slice through the water with your hand, it is easier to move your hand quickly, but when you open your hand up and move it through the water, there is more resistance, and it is slower. Water and air are both fluids and the same principles apply.

Name: _____ 61

Curriculum Connection
E.3

Questions

Answer the questions below using evidence from the text

1) What is a parachute? Why do we use them?

2) How do parachute work? How much can they slow us down?

True Or False

...or false?

1. Opening your parachute decre...s th... hen skydiving	T	F
2. When a skydiver falls during a freefal... ey can t... up t...0 km/h	T	F
3. We can position our bodies like a starfish to i... e air ...ta	T	F
4. Increasing air resistance while falling will slow our ...	T	F
5. Water is a fluid but gas is not		F

Visualizing

Draw what you were picturing while you were reading. Ex... the picture

Name: _____ 63

Curriculum Connection
E.3

Testing A Parachute

Research Question — Can we make a parachute that slows down an objects fall?

We use a parachute to slow an object's fall to the ground. It helps overcome gravity by increasing surface area, which increases air resistance and slows the fall. Let's design one now!

Materia — What you need for this experiment

- A pla… material
- So…
- String
- A small obje… gu… fun to use)
- Stopwatch

Procedure — What …

1. Find a high spot that you can drop yo… fro…
2. Have one person use the stopwatch … how l… als for the object to hit the ground. Have another person drop the object. R… ho… it takes on this page.
3. Cut a large square out of the plastic bag to u… he pa…
4. Trim the edges so the square now looks like a… go… s…
5. Cut small holes near the edge on each side (8 total)
6. Attach 8 pieces of string that are the same length to t… (arou… 25 cm each)
7. Tie the pieces of string to the object you are using as the w… ght
8. Drop the object with the parachute from the same spot. Have so… ong it takes for the object to fall. Record your results below.
9. Drop it 4 times total and record the rest of your results

Observations — What happened?

Drop Attempt	How many seconds did it take to fall to the ground?
No parachute	
1	
2	
3	
4	

Name: _____ 64

Curriculum Connection
E.3

Testing A Parachute – Results

Diagram | Follow the instructions below

Draw a diagram of your object falling. Label the diagram using the following terms: gravity, parachute, object, and air resistance. Use arrows to show which direction gravity is pulling and which direction the air resistance is resisting.

Results | What happen[illegible]urin[illegible]t?

1) Did your parachute work? What was it [illegible]pposed [illegible]?

2) Why was your parachute successful? How could you impr[illegible]our [illegible]asn't very successful?

3) Extend: Do you think parachutes are aerodynamic? Explain why or why not using the terms: air resistance and drag.

Name: _____ 65

Curriculum Connection
E.3

Designing A Parachute

Most parachutes are designed to not only slow down the object or person using it, but to give them control of their descent to the ground. When skydivers use a parachute, they can control their descent by pulling on cords attached to the parachute. These cords change the shape of the parachute, which increases or decreases the drag and air resistance. Therefore, they can fall faster or slower. They can also use the cords attached to the parachute to change their direction.

Design Draw a picture of the perfect parachute

Explain Why is your parachute perfect? Expl... design

1) What is great about your parachute? How does it work?

2) What materials is your parachute made of? Why did you choose those materials?

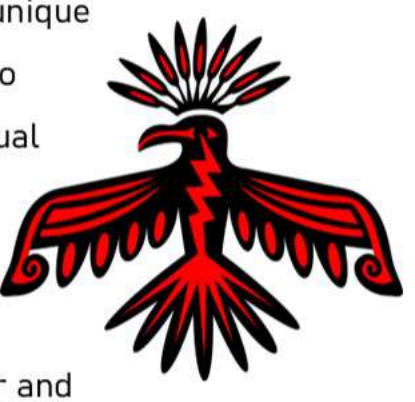
Name: _____ 66

Curriculum Connection
E.3

First Nations And Métis – Birds

First Nations and Métis Art and Storytelling - Birds

First Nations and Métis cultures deeply appreciate and respect nature, including birds. Birds are often chosen as symbols in these cultures due to their unique qualities that align with cultural beliefs and values. Birds' ability to fly high and close to the sky often associates them with the spiritual realm or the connection between the earth and the heavens.

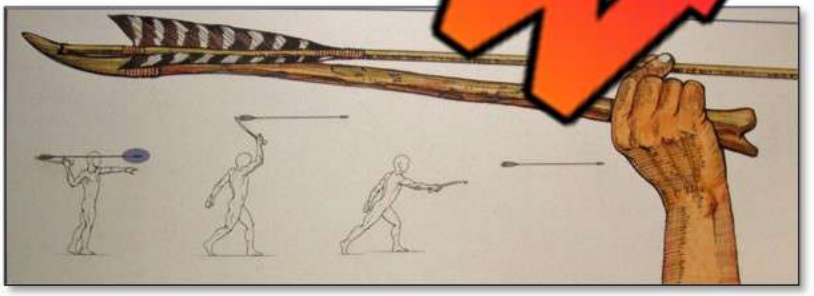


For example, the Thunderbird, often seen in art, is a powerful sacred being in many of these cultures, representing not just the physical but also the elemental power of thunder and storm. Ravens, common in Northwest art, are known as tricksters and creators, reflecting the intelligence and mystery behaviour observed in these birds in nature.

The Role of Birds in Storytelling

Birds also play a central role in Indigenous storytelling. These stories passed down generations carry lessons and moral teachings. For example, we cultivate's a story about how a small bird, the chickadee, shows bravery, suggesting that size does not determine courage. This story teaches that each creature has its own strength and value.

Technologies Using Flight



First Nations and Métis people have a long history of crafting tools that cleverly use the principles of flight. The atlatl and the bow and arrow are remarkable examples. Both of these hunting tools were designed with a deep understanding of aerodynamics.

The atlatl, a spear-throwing device, increases the speed and distance of a dart by extending the arm's length, acting like an extra joint. Similarly, the bow and arrow, with its aerodynamic shape and fletching, follows a stable, accurate trajectory towards its target.

Name: _____ 67

Curriculum Connection
E.3

Questions

Answer the questions below using evidence from the text

1) Why are birds often chosen as symbols in First Nations and Métis cultures?

_____

_____

_____

2) What ar[illegible]me traditional tools that were developed based on principles of flight?

_____

_____

_____

True Or False

[illegible]or false?

1) The Thunderbird is a sacred be[illegible]g in [illegible] cultures.	True	False
2) The raven is seen as the creator in N[illegible]est Co[illegible]t.	True	False
3) The atlatl and bow and arrow use principles [illegible]dyna[illegible]	True	False
4) Birds are not an important animal in Indigenous sto[illegible]g.	[illegible]e	False
5) The atlatl makes the arm length shorter.	[illegible]	False

Visualizing

Draw what you were picturing while you were reading. Ex[illegible]e picture

_____

_____

_____

_____

_____

_____

Name: _____ 71

Curriculum Connection
E.3

Activity – Designing And Building A Glider

Research Question	Can you make a glider that flies far and stays in the air longer?

Gliders cannot stay in the air as long as airplanes because they can't generate their own thrust. Once in the air, they need to find thermals, which are rising air currents, to help generate lift. If not, they will descend. Some well-piloted gliders can stay in the air up to 8 hours! A g ilot often has two goals: to stay in the air longer and to travel farther. Can you mak stays in the air and travels far?

Materia	W d for this experiment

- Straws
- Tape
- Newspaper or other large p
- Cardboard
- Paperclips
- Stopwatch
- Tape measurer
- Any other materials that might improve your glider

Procedure	What to do

1. Research paper gliders to find one you would like to make
2. Design your paper glider by drawing it on the backside of this page.
3. Write down the materials you need to build the glider.
4. Begin building your glider once you have filled in the materials you need and designed the glider.
5. Test the glider for two things: distance and time spent in the air. Have one partner throw the glider and the other time how long it is in the air for using a stopwatch.
6. Record your results.

Name: _____ 72

Curriculum Connection
E.3

Design

Draw your glider

Materials

_____

_____

Observations

What happened?

Attempts	Distance	Time in the Air
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Name: _____ 73

Curriculum Connection
E.3

Results | What happened during the experiment?

1) How successful was your glider? How far did it go and how long was it in the air?

2) What ch[illegible]s did you make to improve the glider from the last glider you made? Why do you thi[illegible]ed your glider go farther or stay in the air longer?

3) Compare your glide[illegible] class? What do you like about their glider?

4) How could you improve the design of your glid[illegible]hat[illegible]ifferently?

Draw your new design

Name: ______________________

Curriculum Connection
CS.1

Coding – Auto Pilot On Planes

Auto-Pilot

Planes today are built to fly themselves. The reason is because most plane crashes are a result of human error. Auto-pilot is used for cruising at altitude, while pilots taxi the airplane to the runway, land the plane, and perform take offs.

How Does Autopilot Work?

A computer system monitors all sensors and components of the airp[illegible]hrough feedback loops. The computer is constantl[illegible] and receiving if/else statements through [illegible]

For ex[illegible]e

Is [illegible]ight wing balanced?	
if the right wing [illegible] not [illegible]	else
then balance the wi[illegible]	[illegible]inue flying

The autopilot works to monitor speed, s[illegible] altitu[illegible] more. All of this is done without the pilot lifting a finger.

Pilots Role

The pilot's job is to monitor the autopilot system [illegible] es arise. Pilots need to stay alert at all times. They can correct or dis[illegible] autopilot [illegible] glitchy, or in order to perform a manual landing.

As of 2022, pilots perform 99% of landings, although au[illegible]ilot [illegible] landings as well. In cases where visibility is an issue, autopilot can [illegible] rely.

When a plane is being flown by a pilot, passengers will notice the ri[illegible] be bumpier. This is because a computer can fly more efficiently than humans[illegible] mputers can perform tasks quickly and gradually so that the passenger doesn't feel the plane's movement. For example, after a gust of wind, a plane's angle might be off. A pilot will likely take 30 seconds to level the plane. Autopilot can level the plane is 15 seconds, about half of the time.

Future For Pilots

So, will pilots be needed in the future? Yes, pilots will always be needed to monitor the autopilot program. However, the job is changing. No longer are pilots only required to fly a plane.

Today, pilots need to also understand coding and more science and technology as they have to understand how autopilot works so they can troubleshoot problems that could arise.

Name: _____ 75

Curriculum Connection
CS.1

True Or False

Circle whether the statement is true or false

1) Autopilot lands most planes	True	False
2) Pilots do most of the flying throughout a flight	True	False
3) Autopilot works because of coding and feedback loops	True	False
4) A pilot can fly a plane better than autopilot	True	False
5) We won't need pilots in the future for flying planes	True	False

Questio

wer the questions below using evidence from the text

1) Why is autopilo is it better than a pilot flying manually?

2) How is the flying industry changing? pilot hanging?

Coding

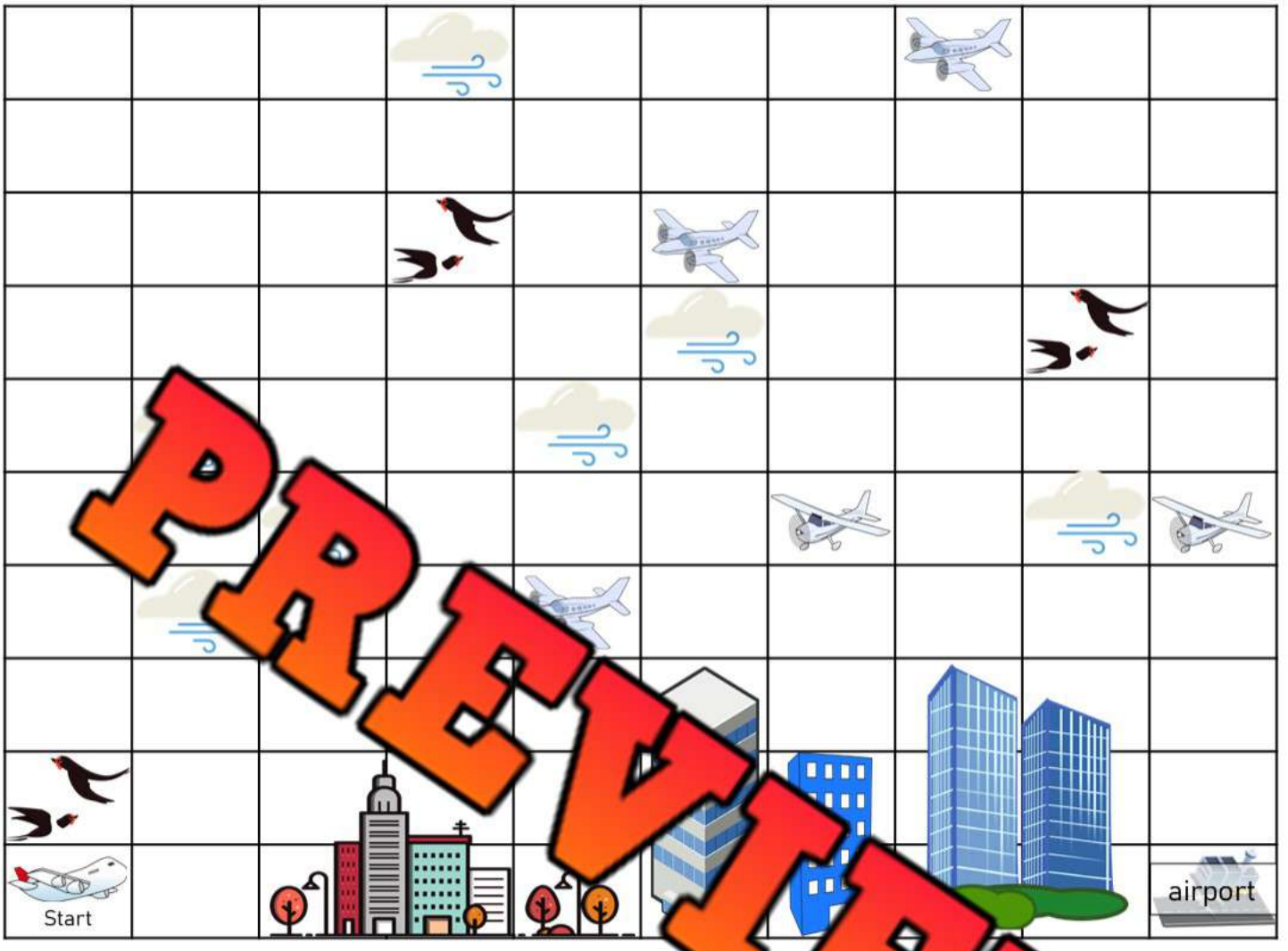
Write if/else statements based on the information b

Are there strong wind currents straight ahead?	
If	Else
Then	

Is the plane decreasing speed ?	
If	Else
Then	

Name: _____ 76

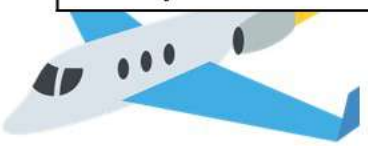
Curriculum Connection
CS.1



Direction Code the airplane around the obstacles (sti… stop…rds, and other planes) and land it at the airport. Write as …les … sible.

Example Code

- fly right 3
- fly up 4
- fly down 2
- fly left 5



Code

Name: _____ 77

Curriculum Connection
CS.1

Autopilot – Feedback Loop

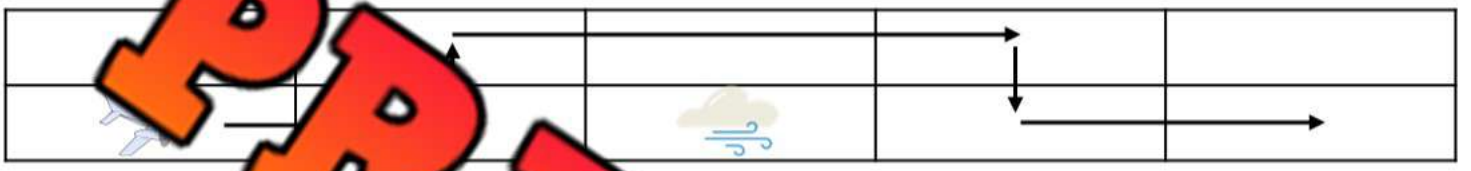
Autopilot works using IF/ELSE statements and feedback loops.

IF/ELSE

If the plane is about to reach an obstacle, the plane needs to fly around it. The **else** statement will keep the plane moving since it wasn't about to hit something.

Loops

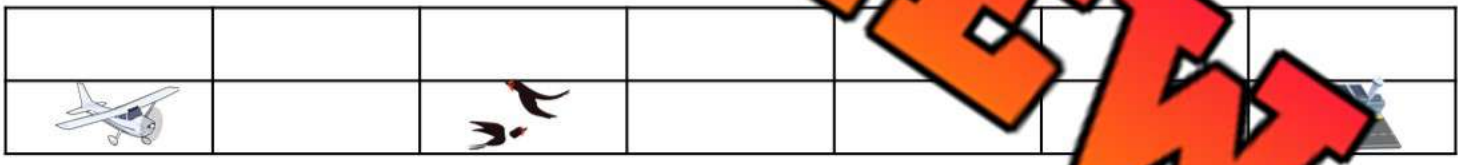
A loop means the code inside the loop block will repeat the number of times shown. An **infinite loop** means the code will repeat until a condition has been met, like a plane reaching its destination.



destination = when the plane reaches its destination
infinite loop destination = never reaches destination

The plane moves 1 space	
If it is about to hit something	Else
Then move the plane around the obstacle	Keep moving 1 space

IF/ELSE Coding Write your own IF/ELSE program that moves the plane past the obstacles



1)

Draw arrows showing the plane's flight and describe how the code works below.

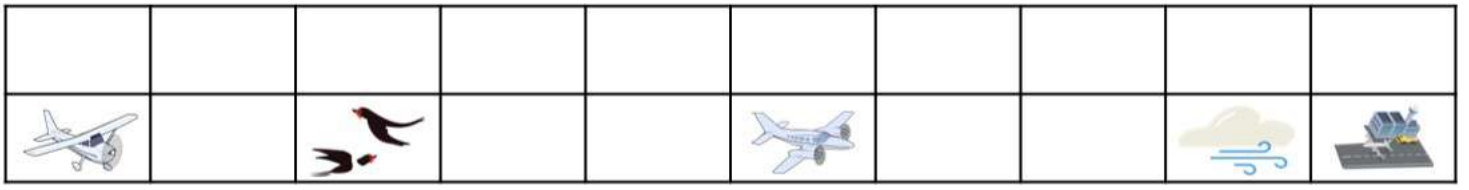
_____

_____

Name: _____ 78

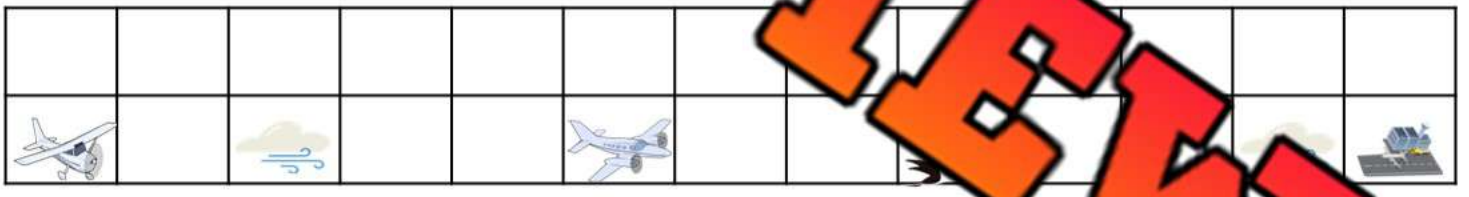
Curriculum Connection
CS.1

IF/ELSE Coding Write your own IF/ELSE program that moves the plane past the obstacles



2)

Draw arrows showing the plane's flight and describe how the code works below.



3)

Draw arrows showing the plane's flight and describe how the code works below.

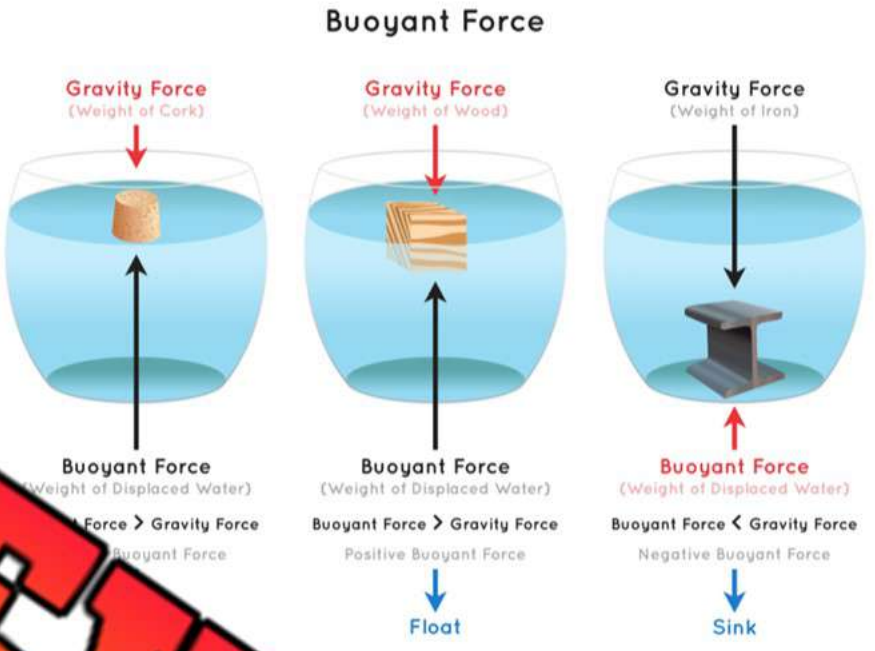
Name: _____ 79

Curriculum Connection
E.4

What Is Buoyant Force?

Understanding Buoyant Force

Buoyant force is a fascinating force that becomes evident when an object is submerged in a fluid, s as water or air. Have you ced how much lighte jump into a p That's t force! It's the d exerted by the fluid e ob opposing the pull of gravi



Floating: The Victory of Buoyancy Over

An object floats when the buoyant force overpowe pul vity. In simpler terms, if the fluid pushes upward on an object with mo e th pull it down, the object will float. Gravity pulls harder on dense or heav ct

Examples of this are a rubber duck in a bathtub or a t atin y're less dense than the water they're in, so the buoyant force from the ward is stronger than the force of gravity pulling down.

Sinking: When Gravity Wins the Battle

Conversely, if an object sinks, it means that the pull of gravity is stronger than the buoyant force. This implies that the object is too dense for the fluid to hold up. The force of gravity acting on the object is stronger than the fluid's push, causing the object to sink.

Think about a pebble or a coin - when you toss them into a pond, they sink to the bottom. They're denser than the amount of water they displace, so gravity's pull on these objects is stronger than the buoyant force of the water.

Name: _____ 80

Curriculum Connection
E.4

Questions

Answer the questions below using evidence from the text

1) What does buoyant force mean? Explain when you have felt it.

2) Why do some objects float and some objects sink?

True Or False

Is the statement true or false?

1) Buoyant force is only evident in water.	True	False
2) You feel lighter in a pool due to buoyant force.	True	False
3) Buoyant force pulls objects downwards.	True	False
4) If buoyant force is stronger than gravity, objects sink.	True	False
5) Gravity pulls harder on dense or heavy objects.	True	False

Draw

Draw a diagram of gravity and buoyant forces acting on an object. Label the diagram

Curriculum Connection
E.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Guess who I am and write the answer!

Pebble	Rubber Duck
Buoyant Force	Gravity

Mark

1) I push upward on objects in water.	
2) I pull objects down toward Earth.	
3) I float if buoyant force is stronger than gravity.	
4) I sink if gravity is stronger than buoyant force.	

Name: _____

Guess who I am and write the answer!

Pebble	Rubber Duck
Buoyant Force	Gravity

Mark

1) I push upward on objects in water.	
2) I pull objects down toward Earth.	
3) I float if buoyant force is stronger than gravity.	
4) I sink if gravity is stronger than buoyant force.	

Name: _____

Guess who I am and write the answer!

Pebble	Rubber Duck
Buoyant Force	Gravity

Mark

1) I push upward on objects in water.	
2) I pull objects down toward Earth.	
3) I float if buoyant force is stronger than gravity.	
4) I sink if gravity is stronger than buoyant force.	

Name: _____ 82

Curriculum Connection
E.4

Buoyant Forces And Densities

The Importance of Density

To understand why some things float and some sink, we must talk about 'density.' Density is a measure of how tightly packed the 'stuff' or 'matter' in an object is. If you have a fluffy marshmallow and a small rock of the same size, the rock is denser because it has more matter packed in the same space. We measure density in grams per cubic centimeter (g/cm³).

Density and Buoyancy Harmony

If an object is less dense than the fluid it's in, it floats. Take a rubber duck, for instance. It has a density less than 1 g/cm³, while the density of water is about 1 g/cm³. Because the rubber duck is less dense than water, it floats.

But if an object is denser than the fluid it's in, it sinks. A steel marble, with a density of around 8 g/cm³, is denser than water. This means that if you drop it into a pool, it sinks!

And fluids are not just liquids; air is a fluid too. A helium balloon is a great example. The density of air is about 0.0013 g/cm³, while the density of helium is only about 0.00018 g/cm³. Because the helium balloon is less dense than the air, it floats upwards.

Fluid Densities and Their Impact on Buoyancy

Each fluid, be it a liquid or gas, has a specific density. This density decides the strength of the buoyant force it can exert. Essentially, denser fluids can support denser objects.

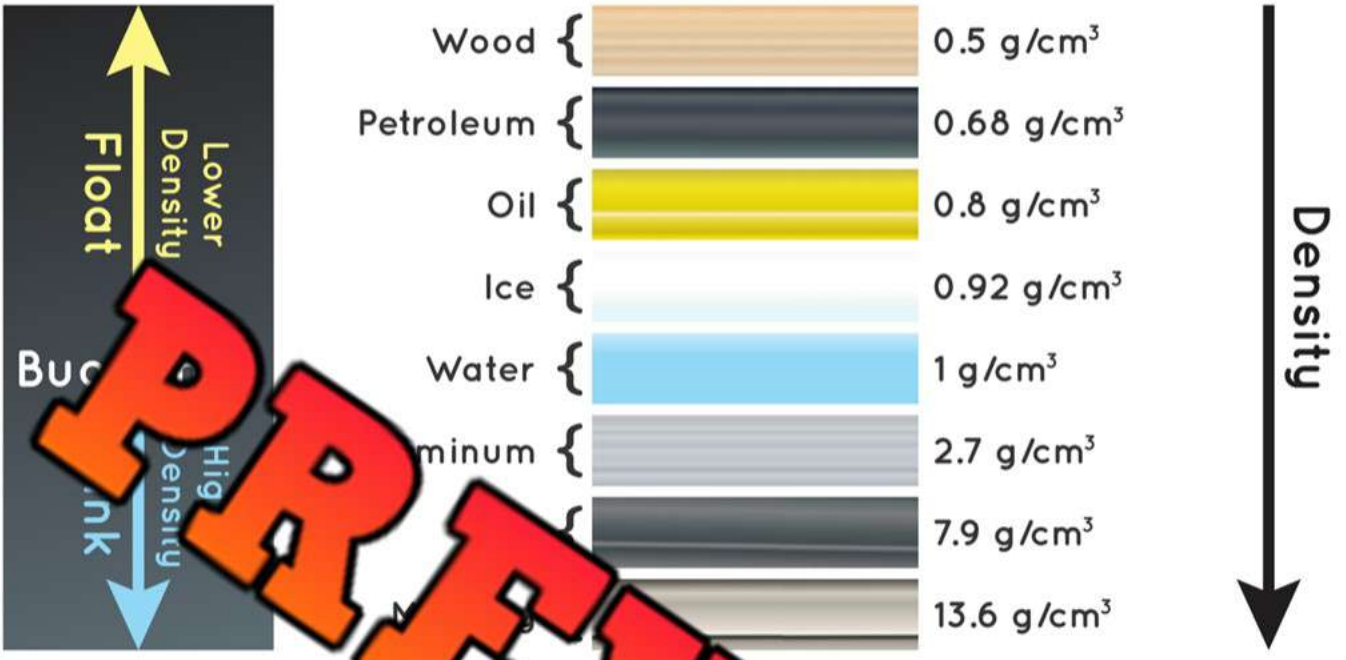
Take water, for example, with a density of about 1 g/cm³. If you drop a metal paperclip (density: 7.8 g/cm³) into it, the paperclip will sink because it's denser than the water.

However, if you put the same paperclip into mercury, a very dense liquid with a density of approximately 13.6 g/cm³, it would float! The mercury's high density provides a strong enough buoyant force to support the paperclip.

Name: _____ 83

Curriculum Connection
E.4

Density and Buoyancy



True Or False Use the t ve to er the questions

1) Wood is very dense	True	False
2) Wood will float in oil	rue	False
3) Ice will sink in water		False
4) Oil will float in mercury		alse
5) If you mixed water, oil, and mercury, the oil will float on top	ue	False
6) Aluminum boats will always sink	True	False
7) Ice will float in mercury	True	False
8) If you dropped ice and iron in oil, the ice would sink faster	True	False
9) Ice will sink in oil	True	False
10) In the winter, ice always sinks to the bottom of lakes and rivers	True	False
11) Iron is over 3 times as dense as aluminum	True	False
12) Water is half as dense as wood	True	False

Name: _____ 84

Curriculum Connection
E.4

Experiment – Buoyancy Of Water Vs Dish Soap

Objective

What are we learning more about?

To observe and compare the buoyancy of different objects in water and dish soap.

Materials

What you will need for the experiment

- ❑ Two cl ainers
- ❑ Wat
- ❑ D ap
- ❑ Small obje
  - ✓ Pape
  - ✓ Rubber b
  - ✓ Plastic ball
  - ✓ Piece of wood
  - ✓ Piece of Styrofoam
  - ✓ Rock

Procedure

How you will complete t erim

1) Fill one container with water and the other with dish soap.

2) Before testing each object, have students predict if the object will sink or float in each liquid.

3) One by one, drop each object into the water and observe what happens. Does it sink or float? Record the results in your notebook.

4) Now, repeat step 3 with the dish soap.

5) Once you have tested all objects in both liquids, compare the results. Were there any differences in the buoyancy of the objects in water versus dish soap? Were the predictions correct?

Observations

Fill in the table below

Object	Predicted Result in Water	Actual Result in Water	Predicted Result in Dish Soap	Actual Result in Dish Soap
Rock				
Rubber				
Pl				
Paperclip				
Piece of Wood				
Piece of Styrofoam				

Results

Answer the questions below

1) Were your predictions about which objects would float or sink in the water accurate? Why or why not?

2) Did the same objects float or sink in both liquids? If not, why do you think this happened?

Name: _____ 91

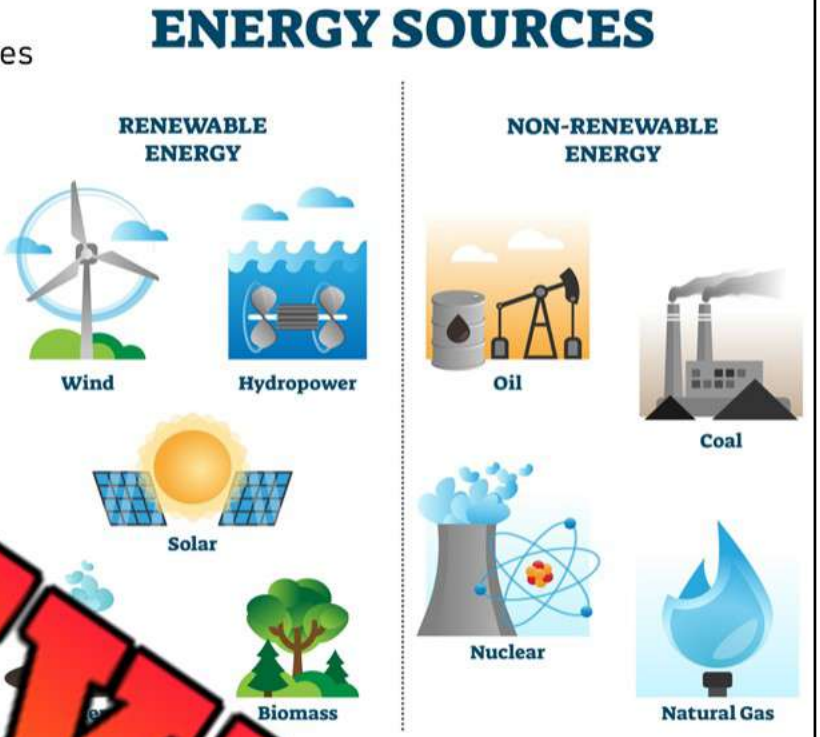
Curriculum Connection
E.5

Renewable Vs Non-Renewable Energy

Non-Renewable Resources

Non-renewable resources are resources that will not replenish themselves in a lifetime. Once we use all of a non-renewable resource, it could take billions of years to form again.

Nuclear power uses uranium that is a n[illegible]ewable resource. **Fossil Fue[illegible]al, oil and natural [illegible]ewable reso[illegible] digging deep in[illegible] gro[illegible]hese materials are [illegible]ey not be used aga[illegible] resou[illegible] are easy to use and [illegible]ide a[illegible] efficient form of energy, h[illegible] they are dangerous to our environment.



Using these non-renewable reso[illegible]volve[illegible]ng up the material which produces a by-product that pollutes o[illegible]vironme[illegible]ci[illegible]ts are searching for more effective ways to use renewable resources. These [illegible]-rene[illegible]nergy sources are expected to run out very soon if we do not cha[illegible]e wa[illegible]

Renewable Resources

A **Renewable resource** can be used over and over again w[illegible]any[illegible] environment. The sun produces enough **solar energy** for the [illegible]tire[illegible] world. If we could setup enough solar panels to collect the energy[illegible]e the non-renewable energy crisis. The problem is that the sun is not always [illegible] where these solar panels are located, which makes it an inefficient means of en[illegible]gy.

Wind energy is also a renewable resource as the wind will always come and go, but that is the problem. The inconsistent flow of the wind makes it another inefficient source of energy.

Water or **hydro energy** uses the flow of water through a dam to generate energy. Water power is efficient but costly to build the dams necessary.

Geothermal energy uses the heat from below the Earth's surface to produce steam that spins turbines and generates power. These setups are efficient but also costly.

The last renewable resource that is commonly used is biomass. **Biomass** energy comes from burning plants, crops, and animal waste to create heat and steam that spins turbines.

Name: _____ 92

Curriculum Connection
E.5

Questions Answer the questions below using evidence from the text

1) Which type of energy do you think is the best?

_____

_____

_____

2) Why ar[illegible]ntists working to find more efficient sources of renewable energy?

_____

_____

_____

True Or False Circle wh[illegible] state[illegible]s true or false

1. Coal and natural gas are examples [illegible]rces.	T	F
2. Biomass is when animal poop is burn[illegible] to crea[illegible]at.	T	F
3. Geothermal energy is efficient but costly.	T	F
4. Wind and solar energy are efficient sources of ene[illegible]	T	F
5. Non-renewable energy sources create harmful by-produc[illegible]hen[illegible]	T	F

Visualizing Draw what you were picturing while you were reading. Ex[illegible]he picture

_____

_____

_____

_____

_____

_____

Curriculum Connection
E.5

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

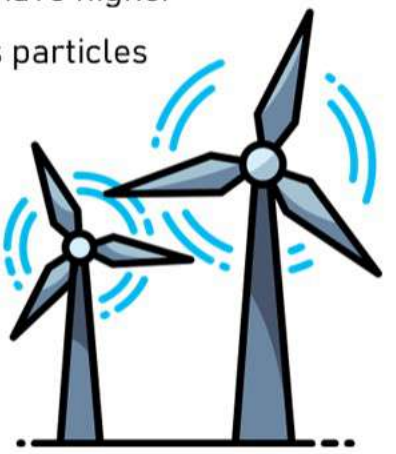
Name: _____ 96

Curriculum Connection
E.6

Wind Energy

What is Wind Energy?

Wind is the movement of air from areas of high-pressure to areas of low pressure. When the gases that make up our air are warmed, they spread out and have higher pressure. When the air is cooled, the pressure is lower as the gas particles get closer together.



Wind energy is the energy we harness from the movement of the wind. We can fly a kite, move a sailboat, and spin a windmill. We can use a wind turbine, we can use wind energy to generate electricity.

What is a Wind Turbine?

A wind turbine is like a windmill. When a turbine is spun by wind energy, the turbine connects to a generator that converts the kinetic energy into electrical energy by forcing the electrons through an electrical circuit.

Use of Wind Energy in Canada

Wind energy is the second most used renewable energy source in Canada. It creates 3.5% of Canada's electricity. Moving water is number one, with 59% of Canada's electricity generation.

Benefits and Drawbacks of Wind Energy

Benefits	✓ Clean energy that doesn't produce greenhouse gases and won't run out ✓ Free energy once you have setup the wind turbine ✓ Wind turbines don't take up much space on the ground
Drawbacks	✓ Dangerous to birds and bats who can fly into the blades ✓ They are noisy so they are usually built in rural areas ✓ Are expensive to setup ✓ They only work when the wind is blowing. This causes unpredictable amounts of energy. If it isn't windy for a long period of time, the stored wind energy will run out

Name: _____ 97

Curriculum Connection
E.6

Questions

Answer the questions below using evidence from the text

1) Why does wind happen?

2) How does wind energy work?

Benefits and Drawbacks

the benefits and drawbacks of solar energy

Benefits	
Drawbacks	

Reaction

Do you think we should use more solar energy? Explain.

Name: _____ 98

Curriculum Connection
E.6

Activity – Balloon Car

Research Question

What are we learning about?

We will be creating a car that is able to move without us pushing it. To do this, we will use the force of moving air. Our car's wheels will attach to a rotating axle.

Materials

What you will need for the experiment

- ❑ Plasti
- ❑ Fo s with holes p hrough e that are large enou for a th ugh
- ❑ 2 wooden g en span over th f the
- ❑ Balloon
- ❑ Two straws
- ❑ Tape
- ❑ Scissors

Method

How you will complete the erime

1) Cut one of the straws in half
2) Tape both pieces of the straw to one side of the wa
3) Put the wooden skewers through the straws
4) Press each bottle cap onto the ends of the wooden skewers. Th w wheels and axles
5) Give your car a push to see if it will roll properly. If it gets stuck or if the wheels don't roll, make sure your axles are parallel to each other.
6) Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.
7) Cut a small hole in the top of the water bottle so that it is just big enough to push a straw through. Ask your teacher for help on this step!
8) Push the free end of the straw through the hole and out the mouth of the bottle
9) Tape the straw to the bottle so it is secured to the bottle
10) Blow up the balloon by blowing air into the straw. Keep your finger over the end of the straw until you are ready for the car to move!

Name: _____ 99

Curriculum Connection
E.6

Diagram

Draw a picture of your balloon car. Label the wheels, axles, and power source. Use arrows to show which way the wind is blowing

Results

...ned with your car? Answer the questions below.

1) How did your car ...? E...

2) How could you improve the design of your car so ... ...er? Think about the following in your answer: weight, straw diame... ...ls, si... ...alloon.

3) Newton's third law of motion states that for every action, there is an equal and opposite reaction. Why is this experiment an example of this law?

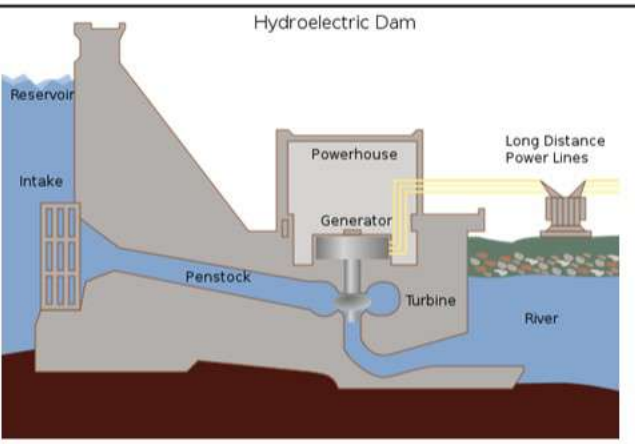
Name: _____ 102

Curriculum Connection
E.6

Hydro Energy

What is Hydro Energy?

Hydro energy is energy harnessed from the flow and movement of falling water. You have likely noticed in a stream or river that a current sends water down hill. This movement of water can be harnessed to create energy for humans to generate [illegible] energy. It is one of the oldest forms of energy. Watermills were first used in the 3rd century by [illegible] movement of water would spin a watermill that would spin a pipe. The pipe connected to a machine that could do work.



How Hydro Energy Works

A hydroelectric dam is built to [illegible] the [illegible]. The water is built up in a reservoir that acts like a lake. The water stored in [illegible] reservoir [illegible] altitudes is potential energy. At the bottom of the concrete wall, there is an intake that allows water to travel down the penstock. The water flow [illegible] consists of spinning the turbine and generating electricity.

Hydroelectric Dams in Canada

The Canadian government is serious about using less fossil fuels for energy and more renewable forms of energy. This is why there are over 15,000 dams in Canada. Hydro creates 59% of all electricity used by Canadians! Canada makes the second most hydroelectricity, behind only China.

Benefits and Drawbacks

Benefits	✓ Renewable source of energy that we won't run out of ✓ The energy is clean because it doesn't emit greenhouse gases ✓ It's the most reliable form of renewable energy as water always flows
Drawbacks	✓ It has an impact on fish because the dam stops the natural flow of water ✓ Can only be built in certain areas where water flows already. It can be difficult to get the electrical energy to big cities from remote locations ✓ High cost to build dams

Name: _____ 103

Curriculum Connection
E.6

Questions

Answer the questions below using evidence from the text

1) What is hydro energy?

2) Does Canada use hydroelectricity? Why do you think they do?

Benefits and Drawbacks

...he benefits and drawbacks of solar energy

Benefits	
Drawbacks	

Reaction

Do you think we should use more solar energy? Explain.

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____ Mark

Circle yes or no for each question.

1) Is hydro energy created by moving water?	Yes / No
2) Do hydroelectric dams store water in a reservoir?	Yes / No
3) Is hydro energy a non-renewable resource?	Yes / No
4) Does Canada have more than 15,000 dams?	Yes / No

Name: _____ Mark

Circle yes or no for each question.

1) Is hydro energy created by moving water?	Yes / No
2) Do hydroelectric dams store water in a reservoir?	Yes / No
3) Is hydro energy a non-renewable resource?	Yes / No
4) Does Canada have more than 15,000 dams?	Yes / No

Name: _____ Mark

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Name: _____ Mark

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2) Do hydroelectric dams store water in a reservoir?	Yes / No
3) Is hydro energy a non-renewable resource?	Yes / No
4) Does Canada have more than 15,000 dams?	Yes / No

Name: _____ 110

Curriculum Connection
E.7

Nuclear Power

Nuclear Power

Nuclear energy is produced by splitting a uranium atom into two smaller atoms. This process releases heat from the nucleus of the atom that is used to create steam.

Nuclear Power in Canada and Worldwide

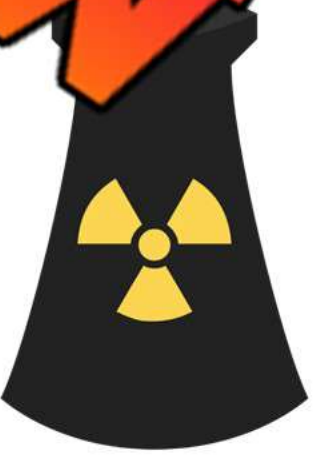
In Canada there are 19 nuclear reactors. Ontario has 18 and there is 1 in New Brunswick. Nuclear energy provides 15% of Canada's energy needs. Nuclear energy creates 10% of the electricity worldwide. Nuclear energy is non-renewable energy because it uses uranium which is a resource we could run out of.

Advantages of Nuclear Energy

- It does not use large amounts of land to generate energy. In fact, it uses 450 times less land than solar energy to generate the same amount of power.
- It is a stable consistent source of energy. It can be produced around the clock while solar and wind only produce energy 10-30 percent of the time depending on weather conditions and whether it is day or night.
- Nuclear energy does not emit greenhouse gases.

Disadvantages of Nuclear Energy

- The same raw materials used to create nuclear power could also be used to create nuclear weapons.
- The risks of an accident at a generating station could cause damage to people and the environment.
- The used uranium is radioactive waste for thousands of years and must be disposed of carefully to avoid contamination.



Name: _____ 111

Curriculum Connection
E.7

True Or False

Circle whether the statement is true or false

1. Nuclear energy is renewable energy.	True	False
2. Nuclear energy uses fission to generate heat.	True	False
3. Nuclear energy generates no greenhouse gases	True	False
4. Fear of nuclear accidents is why people oppose nuclear energy.	True	False
5. Nuclear energy is not used much around the world	True	False

Summarize

Summarize the reading by writing the important information

Questions

Use information from the text to support your answer

1) Do you think we should build more nuclear power generating stations in America? Why or why not?

2) What are the benefits of nuclear power?

Name: _____ 113

Curriculum Connection
E.7

Nuclear Power Accidents

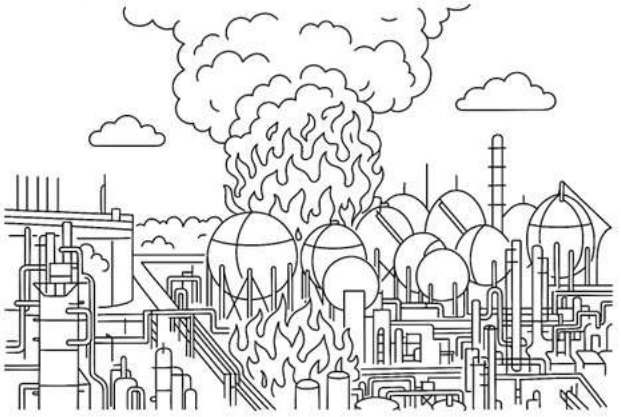
Nuclear Power Accidents - Overview

There have been three major accidents involving nuclear generating stations:

1) In 1979 - Three Mile Island in the United States had an accident with no loss of life or significant health effects however it did cause a slowdown in nuclear power plants being built.

2) In 1986 - Chernobyl in the USSR had an accident resulting in two explosions. 28 people died from radiation poisoning and 15 people died years later from Thyroid cancer. 335,000 people, who lived within a 30 km radius from the accident had to leave their homes.

3) In 2011 - Fukushima Daiichi in Japan had an accident caused by the Tohoku earthquake and tsunami. There were no deaths attributed to the nuclear accident although 18,500 people died as a result of the earthquake and tsunami. One cancer death of a nuclear station employee has since been blamed on the accident. 154,000 people were evacuated from a 20-kilometer radius of the generating station.



Name: _____ 114

Curriculum Connection
E.7

Questions Use information from the text to support your answer

1) Which accident was the worst?

2) Does a nuclear explosion have long lasting effects? Explain.

Visualizing Draw what you were picturing in your head while you were reading

What words from the text made you picture that in your h

Questioning Write two questions you have after reading the text

1)	
2)	

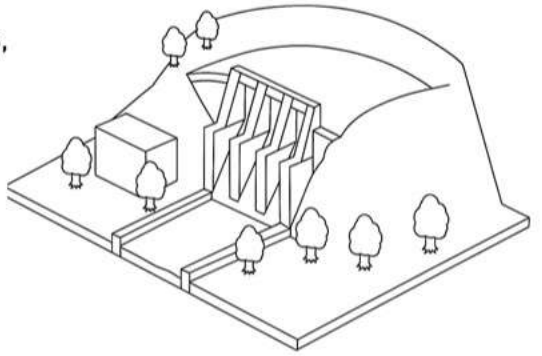
Name: _____ 115

Curriculum Connection
E.8

Alberta's Energy Usage

Fueling Alberta: Fossil Fuels' Major Role

Alberta is rich in fossil fuels, with oil sands, natural gas, and coal deposits driving the province's energy production. These fossil fuels, contributing about 66% of the ene[illegible]pply, power our vehicles, heat our homes, a[illegible]e our industries.



Harnessing the R[illegible]elec[illegible]ic Power in Alberta

Alberta takes ad[illegible]of its [illegible]to generate hydroelectric power. Facilities like the Brazeau Dam on t[illegible]he water's flow into energy, contributing about 2% to Alberta's total p[illegible]nera[illegible]

Utilizing the Wind: Wind Power in Alberta

The vast landscapes of Alberta are ideal for wi[illegible]s. In [illegible]region, farms like the Pincher Creek Wind Farm turn the strong winds [illegible]ity, ma[illegible]around 7% of the province's energy supply.

Type of Energ[illegible]	%[illegible]a
Coal	
Natural Gas	[illegible]%
Oil	14%
Hydro	2%
Wind	7%
Solar	1%
Biomass	5%
Geothermal	5%

From Waste to Energy: Biomass in Alberta

Biomass energy is another renewable resource utilized in Alberta. Facilities like the Whitecourt Power biomass plant convert plant and animal waste materials into electricity or use them as heating fuel. Biomass contributes about 5% to Alberta's energy generation, helping to reduce waste and promote sustainability.

Name: _____ 116

Curriculum Connection
E.8

Questions

Use information from the text to support your answer

1) What are fossil fuels? Name the 3 types and how they are used.

_____

_____

_____

2) Does Al[illegible] use enough renewable energy? Explain your thoughts.

_____

_____

_____

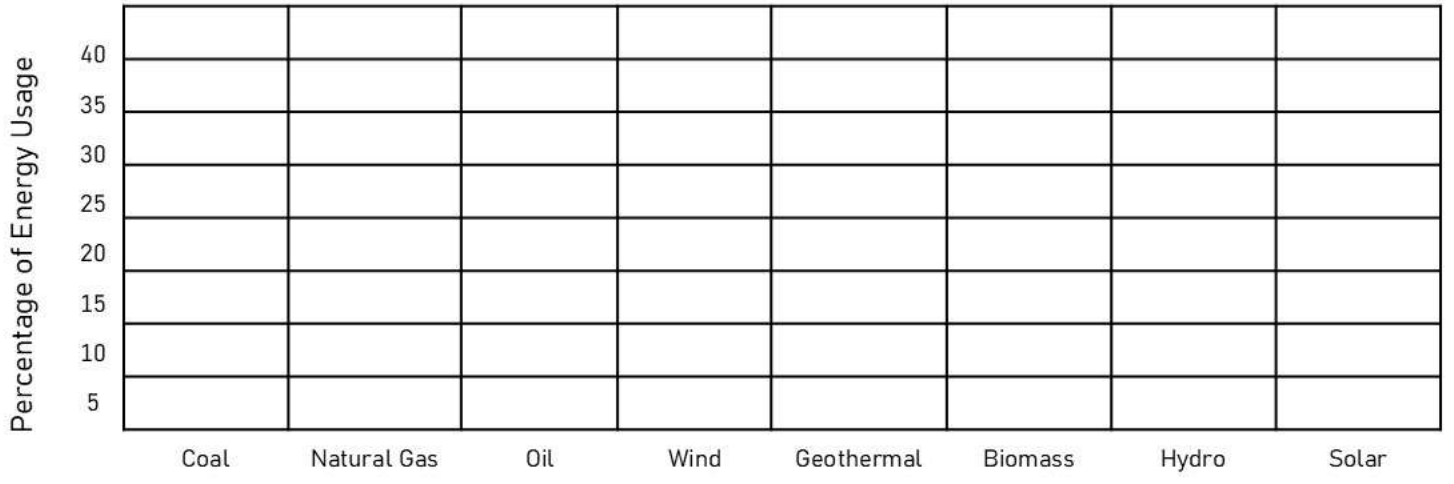
Multiple Choice

[illegible] answer

1) What is the major source of e[illegible]gy in	Fossil Fuels	Wind
2) Which river hosts the Brazeau Dam?	Athabasca	Peace
3) What source of energy contributes 2% to Alb[illegible]otal power?	H[illegible]ectric	Oil
4) How much energy does wind power contribute in Alb[illegible]	2[illegible]	7%
5) What is the energy contribution of biomass in Alberta?	[illegible]	[illegible]%

Graph

Draw a bar graph of the energy sources in Alber[illegible]



Name: _____ 121

Curriculum Connection
E.8

Consequences Of Energy Use

Pollution

When we use non-renewable energy, often the by-product pollutes our environment. **Pollution** is a harmful addition to the natural environment. So when someone throws a snack wrapper on the ground, they are polluting as they are adding a harmful addition to the enviro nt.

Pollutio

Fossil

The most popu ner use is the burning of fos s. The fossil fuels (oil, natural gas, coal) creates pollution that has seve l our ment. First, the carbon dioxide emissions are thickening the carbon bla our os which makes it difficult for heat to escape our planet. This is leading to glo ing. d, the released gases are causing acid rain. Third, smog in our citie s harmf our

Hydroelectric Power

In order for water to provide us with energy, a dam is m ow t er to generate kinetic/mechanical energy. The falling water spins turbines an gene he problem is that we need to build huge structures for the dam to work. The structures are a form of pollution that alters the flow of rivers, flood habitats, and interferes with natural cycles.

Nuclear Power

When uranium is used to split atoms and create heat, there is a by-product that is called radioactive waste. This waste is difficult to dispose of as it is very harmful to the environment. The hot water that is released into rivers can also kill wildlife and destroy habitats.

Name: _____ 122

Curriculum Connection
E.8

Questions

Use information from the text to support your answer

1) What is pollution? Can you think of ways that you have polluted or seen others pollute?

2) Which f[illegible]f pollution do you think is the worst? Why?

Visualizing

Draw what y[illegible]e picturi[illegible] you were reading. Explain the picture

True Or False

Is the statement true or false?

1. The burning of fossil fuels is causing global warming.	True	False
2. Pollution is any addition to our environment.	True	False
3. Using water (hydro) energy is good for the environment.	True	False
4. Nuclear power causes acid rain and smog in our cities.	True	False
5. The hot water released into our rivers and streams is a form of pollution.	True	False

Name: _____ 124

Curriculum Connection
E.8

Energy Efficiency

Insulation

Insulation is used to prevent the flow of heat energy into or out of a certain area. Your lunchbox is likely insulated so that heat outside of your lunchbox cannot easily pass through the insulated materials. This keeps the cold items in your lunch cold.

You have probably seen pink insulation before in your house between the walls. It is used to keep the heat inside your house in the winter, and the heat outside of your house in the summer.

Insulation is important in conserving energy because if we didn't have insulation, we would require more energy to heat and cool our homes among many other things.

Lightbulbs

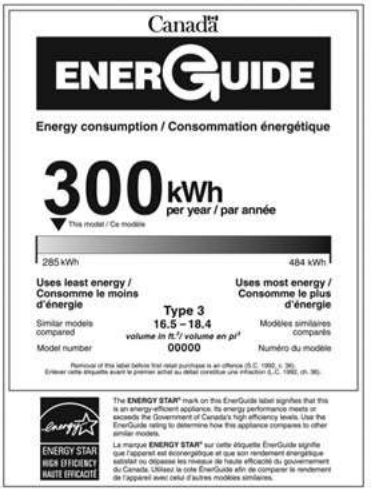
Lights use a lot of electricity. When choosing a new lightbulb, it is important to choose the most efficient ones. This means using bulbs that produce light with less energy.

There are 4 types of lightbulbs you can choose from. The most basic and older style is an incandescent light bulb. These lights give off a lot of heat when they're turned on. Since a light is not meant for heating purposes, that energy is wasted, meaning its not energy efficient.

A compact fluorescent bulb is very efficient but they are bad for the environment. They do not get hot, but they contain mercury in them, which is a dangerous element that needs to be disposed of properly.

Halogen lights are another type, but these work the same as incandescent lights. They produce a lot of heat, which is wasted energy. They last a long time but are not efficient.

Light emitting diodes (LED) bulbs are very energy efficient and last even longer than compact fluorescent bulbs and they do not contain mercury. The only problem is that they are more expensive.



Household appliances

Some appliances in our homes are energy hogs. They require a lot of electricity to operate. Older appliances were made with poor technology that need a lot of energy to run. Replacing old refrigerators or furnaces with newer high efficiency appliances can save a lot of money on energy bills in the long run.

In Canada, the government requires companies to put an EnerGuide label on appliances that displays how much energy the appliance uses. The label even shows how efficient the appliance is compared with other similar appliances. Choosing an energy efficient appliance is important for conservation!

Name: _____ 125

Curriculum Connection
E.8

Questions

Use information from the text to support your answer

1) What is insulation and how does it help conserve energy?

2) What is EnerGuide and how does it help people choose the right appliance?

Inferencing

Use information from the text to support your inference

Who do you think uses more energy, we [illegible]tries or developing countries?
Why do you think that is and is it fair to [illegible]?

Definitions

Explain what the following terms mean

LED Lightbulb	
Incandescent Lightbulb	
Energy Efficient	

Name: _____ 128

Curriculum Connection
CS.1

Coding – Thermostat

A **thermostat** is a computer that uses code to turn our heating and air conditioning on and off. Thermostats help us save energy! When a thermostat heats our house up to the right temperature, it turns off to save energy. When the house gets cold again, it turns back on.

An **HVAC technician** is an expert in the heating and cooling of buildings. They install thermostats, air conditioners, furnaces, and the ductwork that air travels through.

You can program your thermostat to different temperatures depending on when you are home. In the winter, you don't want to let your heat turn off completely because your pipes will freeze. Instead, you would turn the temperature down to above freezing, but not to [illegible] you'll be wasting heat (around 16°C).

[illegible] program uses coding to work. First, you need to define the time. Then [illegible] temperature for that time. The backend of the code will look [illegible] like this:

Directions Help program Kyle's thermostat [illegible] as you think are best for the winter

Cold - 18° C	Warm - 22°	Hot - 25° C

define time1 as 00:00 – 07:00
set time 1 to

define time2 as 07:01 – 08:30
set time 2 to

define time3 as 08:31 – 16:00
set time 3 to

define time4 as 16:01 – 22:00
set time 4 to

define time5 as 22:01 – 23:59
set time 5 to

Name: _____ 129

Curriculum Connection
CS.1

Reading Code – Hailey's Thermostat

Directions Read Hailey's thermostat program and write what temperature it is based on the time

	Time	Temperature
1)	30 am	
2)		
3)	5:00 a	
4)	10:0	
5)	1:00 am	
6)	6:00 pm	
7)	2:30 pm	
8)	4:00 am	
9)	12:00 pm	
10)	8:31 am	

Hailey's Thermostat- Winter

```
define time1 as 00:00 – 07:00
set time1 to 19°C

define time2 as 07:01 – 08:30
set time2 to 23°C

define time3 as 08:31 – 16:00
t time3 to 16°C

defin 4 as 16:01 – 22:00
se 23°C

def e5 3:59
set time5
```


Results What do you think of Hailey's thermostat program? What would you change?

Name: _____ 130

Curriculum Connection
CS.1

Writing Code – My Thermostat

Directions Write your own thermostat program below to save energy

define time1 as

set time1 to

define time2 as

set time2 to

define time3 as

set time3 to

define time4 as

set time4 to

define time5 as

set time5 to

define time6 as

set time6 to

Name: _____ 131

Curriculum Connection
CS.1

Results | Answer the questions below

1) Explain why you programmed the times and temperatures you chose.

2) How would p[illegible]ng a t[illegible]t help save energy?

3) Explain how your thermostat would be different in the summer? W[illegible]e different?

Name: _____ 135

Curriculum Connection
E.1 - E.8

Memory Game: Forces, Flight, And Energy

Objective What are we learning about?

The goal of this activity is to help students review key science concepts related to forces, flight, and energy through a fun and interactive memory matching game.

Materials What you will need for the activity.

- M y game h terms on one set (e.g., lift, drag, l , wi nergy) and matching de or e another.
- A flat surface like a ta flo t the cards.

Instructions How you will complete the acti

1. Divide the class into groups of 3 or 4. Give each a set of M y Game cards. (Provided)
2. Have each group lay all the cards face down in a grid on a ta
3. Each group takes turns flipping over two cards at a time, aiming t a matching term and definition/example.
4. If a student finds a match, they remove those cards from the grid and keep them.
5. If the cards do not match, they are turned back over, and the next student takes a turn.
6. The game continues until all the cards have been matched.
7. After the game, review each term and its meaning with the group.
8. Discuss how these concepts apply to real-life flight, energy use, or environmental choices.

Name: _____ 136

Curriculum Connection
E.1 - E.8

Cards | Memory Game Cards

Term	Definition
Solar Energy	Energy that comes from sunlight.
	A force that slows things down when they move through air or water.
Biomass Energy	E[illegible]y m[illegible] burning plants [illegible]ste.
Lift	A force that pushes an airplane up into the air.
Energy Efficiency	Using less energy to do the same job.

Name: _____ 138

Curriculum Connection
E.1 - E.8

Cards | Memory Game Cards

Term	Definition
Bernoulli's Principle	Fast-moving air has less pressure, which helps airplanes lift off.
[illegible]ty	A force that pulls everything down to the ground.
Wind Energy	[illegible]gy m[illegible]y using moving air [illegible]hines.
Propeller	A spinning blade t[illegible] moves air to help something go forward.
Density	How heavy something is for its size.

Name: _____ 139

Curriculum Connection
E.1 - E.8

Cards | Memory Game Cards

Term	Definition
Air Resistance	A force that pushes against things moving through air.
[illegible]nt	The force of gravity pulling something down.
Renewable Energy	En[illegible]mes from things [illegible]of, like wind [illegible]
Nuclear Energy	Energy made by sp[illegible]tting tiny parts of atoms.
Insulation	Material that helps keep heat in or out of a space.

Name: _____ Date: _____

Unit Test – Energy

Multiple Choice /10

1. Which of the four forces of flight opposes weight a) Propulsion/Thrust b) Drag c) Lift d) All of the	2. Which of the four forces of flight opposes drag a) Propulsion/Thrust b) Weight c) Lift d) All of the above
3. When … parachute, they are using … a) Propu…n/Thru… b) Weight c) Lift d) Drag	4. Aerodynamics improves which of the four forces of flight? a) Lift b) Weight c) Lift d) …opulsion/Thrust
5. Aerodynamic vehicles prevent… a) Thrust b) Lift c) Drag d) Weight	…of energy is coal? a) Re…ble b) …ear c) No… d) Solar
7. The burning of wood for energy is… a) Tidal b) Geothermal c) Hydroelectric d) Biomass	8. Which is a type of re… a) Oil b) Gas c) Wind d) Coal
9. Energy that cannot be replenished in a lifetime is considered… a) Non-Renewable Energy b) Renewable Energy c) Inefficient Energy d) All of the above	10. Wind, solar, and hydro (water) energy are examples of… a) Non-Renewable Energy b) Renewable Energy c) Chemical Energy d) None of the above

Define What does the term mean (1 mark each) /3

Thrust	
Renewable Energy	
B[illegible]y	

Short Answer An[illegible] the [illegible] – Each question is worth 2 marks.

1) How does the density of a [illegible]ect [illegible]id will float or sink in a liquid?

2) What is the difference between renewable and non-renewa[illegible] so[illegible]

3) How does a hot air balloon achieve lift?