

‘NOT ALL DRONES ARE CREATED
EQUAL’

DRONE 102

TYPES OF DRONES



Objective

- Compare and contrast the 4 different types of drones as they are broken down into categories, pros, cons, and specific uses.

Materials Needed

- Computer/laptop/internet
- Mobile device

Resources:

- 1: [“Types of Drones”](#) Presentation (Click for Access) (Pages 2-5)
- 2: [Drone Detective](#) (Click for Access) (Page 6)
- 3: [Venn Diagrams](#) (Click for Access) (Pages 7-8)

Lesson Steps:

1. Use Resource 1: “Types of drones” lesson
(Go through this as a class, in groups, or individually)
2. Students complete Resource 2 (Drag & Drop on Canva or you can print and have them fill it in)
3. Student will compare and contrast the different drones presented on a Venn Diagram. Possible mini debate on which drone is best.

45 MIN
LESSON

45 MIN
LESSON

Questions to ask:

- How many different types of drones are available for civilian consumers to purchase?
- What are the different types, pros, cons, and uses?

SINGLE ROTOR PROS AND CONS

PROS

- More fuel-efficient
- Drones fueled by gasoline can fly for even longer distances.
- Single-rotor helicopters have the advantage of having very long blades, which act more like a spinning wing than a propeller.
- Single-rotor helicopters can combine hovering with long endurance or quick forward flight.
- That's because they're constructed to last.



CONS

- Difficult to fly and costly.
- Not as sturdy or forgiving of a landing on an uneven surface, and they shake more.
- Due to their mechanical intricacy, they also need a great deal of care and upkeep.
- A single rotor's large, heavy blades whirling at high speeds can be harmful.



TECHNICAL USES : AERIAL LIDAR LASER SCAN, DRONE SURVEYING, CARRYING HEAVY PAYLOADS

MULTI ROTOR PROS AND CONS

PROS

- More command over the plane in flight.
- More maneuverable than before, so it can go up and down in a straight line, back and forth, side to side, and spin on its own axis.
- Can go significantly closer to buildings and other obstacles while flying.
- Operating efficiency is enhanced, and inspection times are shortened, because it can carry many cargoes in a single trip.



CONS

- Poor endurance and speed make it inadequate for large-scale aerial mapping, long-endurance monitoring, or long-distance inspection
- A great deal of power is needed to counteract gravity and keep them aloft.
- They can only fly for around 20-30 minutes (with light payload) Heavy-lift multi-rotors can carry more weight, but at the expense of significantly reduced flying periods.
- Gas engines are impractical due to throttle change requirements.



TECHNICAL USES: VISUAL INSPECTIONS, THERMAL REPORTS, PHOTOGRAPHY & VIDEOGRAPHY, 3D SCANS

FIXED WING PROS AND CONS

PROS

- Greater range, the ability to map out bigger regions, and the ability to hover over an area of interest for extended periods of time. Many fixed-wing UAVs can remain airborne for 16 hours or longer because of the higher energy density of fuel (gas engine driven).
- When compared to other drone varieties, this one has more range, payload capacity, and stability in the air.



CONS

- They are Expensive
- Fixed-wing drones always fly forward and are faster than multi-rotors. A launcher is typically required to get a fixed-wing drone airborne.
- With a fixed-wing aircraft, taking off is simply the first step. Next is to analyze and stitch together thousands of individual photos to create a single large tiled image, data analysis, tallying stockpile volumes, counting trees, superimposing more data on top of maps, and so on.

TECHNICAL USES : AERIAL MAPPING, DRONE SURVEYING – FORESTRY/ENVIRONMENTAL DRONE SURVEYS, PIPELINE UAV SURVEYS, UAV COASTAL SURVEYS, AGRICULTURE, INSPECTION, CONSTRUCTION, SECURITY



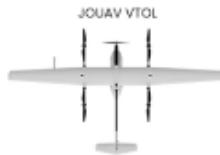
RESOURCE 1 (TYPES OF DRONES)

05

FIXED WING HYBRID VTOL (VERTICAL TAKEOFF & LANDING) PROS AND CONS

PROS

- Take off and land practically anywhere. They do not require a runway for takeoff.
- The drone's autopilot can handle the challenging chore of maintaining flight stability while the pilot concentrates on steering.
- The best of both worlds, hybrid VTOL drones combine the advantages of fixed-wing and rotor-based aircraft.
- They excel at both forward flying and hovering.



CONS

- There are currently only a few number of commercially available fixed-wing hybrid VTOL aircraft.
- The technology utilized by various kind of drones is in its infancy.
- Needs a large area to use this drone

TECHNICAL USES: DRONE DELIVERY, LARGE MULTI-ACRE
PROPERTY SURVEY, AGRICULTURAL ASSESSMENTS



RESOURCE 2 (DRONE DETECTIVE)



- Poor endurance and speed
- Used for Drone Delivery
- More fuel-efficient
- Used for: Photography & Videography
- Only a few number commercially available

- Used for : Carrying heavy payloads
- Can go up and down in a straight line, back and forth, side to side, and spin on its own axis

- Ability to hover over an area of interest for extended periods of time

- Can remain airborne for 16 hours or longer

- Difficult to fly and costly

- They excel at both forward flying and hovering.

- Can go significantly closer to buildings and other obstacles while flying

- They can only fly for around 20-30 minutes

- Need a great deal of care and upkeep

- Used for : Pipeline Surveys, Coastal Surveys, Agriculture, Inspection

- Take off and land practically anywhere

- Can combine hovering with long endurance or quick forward flight

- A launcher is typically required to get airborne

Drone Detective

Instructions: View 'Types of Drones' then Drop the evidence under the correct Perpetrator.



Single Rotor Drone

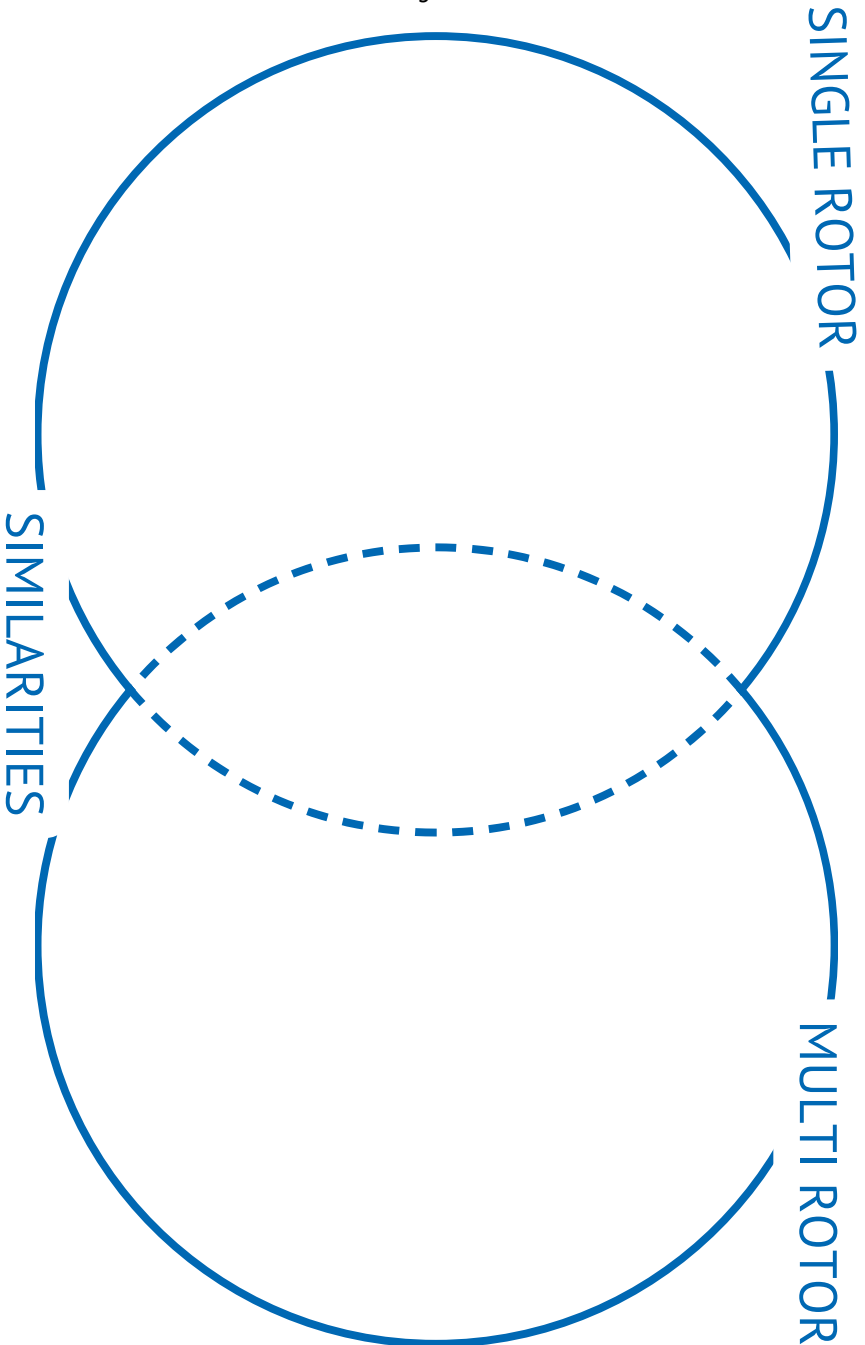
Fixed Wing Drone

Multi Rotor Drone

VTOL

RESOURCE 3 (Venn Diagram)

Write similarities and differences to compare and contrast the Single and Multi Rotor Drones
Which one do you think is best?



RESOURCE 3 (Venn Diagram)

Write similarities and differences to compare and contrast the Fixed Wing and VTOL Drones.
Which one do you think is best?

