Name_____

Welcome to the Supercharged Science

Rocketry and Spaceflight Teleclass Webinar!

You can fill out this worksheet as we go along to get the most out of time together, or you can use it as a review exercise at the end of the class to see where your strengths are.

What we're going to cover today:

- 3 Types of Rockets
- Pressure, Volume, Temperature
- Newton's Laws of Motion
- Satellites in Orbit
- States of Matter
- Chemical Reactions
- Supersonics
- Famous Rocketry Scientists

Do this NOW: Write down two things you want to learn about rockets and spaceflight:

_____

_____

Do this NOW: Write down WHY you want to learn about the things you mentioned above. What will it give you, or provide you with, or make possible for you if you now understand these things that you wanted to learn?

_____

_____

IMPORTANT: During class, you can either fill out the worksheet, OR if that's too stressful or a hassle, just set it aside and fill it out after class is over so you can enjoy watching the class.

Answer key is on the last page, so put it in a place where you won't be tempted to peek at the answers until after you've given it your best shot.

Material List:

- straw
- paperclip
- rubber band
- index card
- popsicle stick
- scissors
- film canister or small container with tight-fitting lid (snap-on lid or a cork will work)
- alka-seltzer tablets (generic brands work fine)
- masking tape
- water
- OPTIONAL: Small toy car (like a “Matchbox” or “Hot Wheels” car)

Can’t Find a Film Canister? Here are a couple of substitutes that can also work…

During the Lesson:

You can look over the worksheet so you know what to listen for as you go through the class with me, or you can go through it along with me during class. OR… flip it over and forget about it and just enjoy the class. When class is over, flip it back over and fill it out and be amazed at how much you've picked up and learned!

1. A rocket is a _____.

2. Rocket engines are _____.

3. Newton's 3rd Law: For every action, there is _____

   _____ reaction.

4. Name three types of rockets:

   1._____

   2._____

   3._____

5. What are four states of matter?

   1._____ 2. _____

   3. _____ 4. _____

6. Fire is made of _____

7. Satellites travel _____ to remain in orbit.

8. The thermite reaction generates its own _____.

9. Name two inventors that did work in the field of rocketry:

   _____

   _____

10. What I didn't know about rocketry until class today was:

    _____

    _____

    _____

Vocabulary Words

Action - A force (push or pull) acting on an object. See Reaction.

Active Controls - Devices on a rocket that move to control the rocket's direction in flight.

Attitude Control Rockets - Small rockets that are used as active controls to change the attitude (direction) a rocket or spacecraft is facing in outer space.

Canards - Small movable fins located towards the nose cone of a rocket.

Case - The body of a solid propellant rocket that holds the propellant.

Center of Mass (CM) - The point in an object about which the object's mass is centered.

Center of Pressure (CP) - The point in an object about which the object's surface area is centered.

Chamber - A cavity inside a rocket where propellants burn.

Drag - Friction forces in the atmosphere that "drag" on a rocket to slow its flight.

Escape Velocity - The velocity an object must reach to escape the pull of Earth's gravity.

Extravehicular Activity (EVA) - Spacewalking.

Fins - Arrow-like wings at the lower end of a rocket that stabilize the rocket in flight.

Fuel - The chemical that combines with an oxidizer to burn and produce thrust.

Gimbaled Nozzles - Tiltable rocket nozzles used for active controls.

Igniter - A device that ignites a rocket's engine(s).

Injectors - Showerhead-like devices that spray fuel and oxidizer into the combustion chamber of a liquid propellant rocket.

Insulation - A coating that protects the case and nozzle of a rocket from intense heat.

Liquid Propellant - Rocket propellants in liquid form.

Mass - The amount of matter contained within an object.

Mass Fraction (MF) - The mass of propellants in a rocket divided by the rocket's total mass.

Microgravity - An environment that imparts to an object a net acceleration that is small compared with that produced by Earth at its surface.

Motion - Movement of an object in relation to its surroundings.

Movable Fins - Rocket fins that can move to stabilize a rocket's flight.

Nose Cone - The cone-shaped front end of a rocket.

Nozzle - A bell-shaped opening at the lower end of a rocket through which a stream of hot gases is directed.

Oxidizer - A chemical containing oxygen compounds that permits rocket fuel to burn both in the atmosphere and in the vacuum of space.

Passive Controls - Stationary devices, such as fixed rocket fins, that stabilize a rocket in flight.

Payload - The cargo (scientific instruments, satellites, spacecraft, etc.) carried by a rocket.

Propellant - A mixture of fuel and oxidizer that burns to produce rocket thrust.

Pumps - Machinery that moves liquid fuel andoxidizer to the combustion chamber of a rocket.

Reaction - A movement in the opposite direction from the imposition of an action. See Action.

Rest - The absence of movement of an object in relation to its surroundings.

Regenerative Cooling - Using the low temperature of a liquid fuel to cool a rocket nozzle.

Solid Propellant - Rocket fuel and oxidizer in solid form.

Stages - Two or more rockets stacked on top of each other in order to reach higher altitudes or have a greater payload capacity.

Throat - The narrow opening of a rocket nozzle.

Unbalanced Force - A force that is not countered by another force in the opposite direction.

Vernier Rockets - Small rockets that use their thrust to help direct a larger rocket in flight.

Vocabulary words source: NASA's Rockets Guide for Educators

Answer Key

1. A rocket is a vehicle that gets its thrust from a rocket engine.
2. Rocket engines are reaction engines.
3. For every action, there is an equal and opposite reaction.
4. Name three types of rockets: solid, liquid, hybrid.
5. What are four states of matter? Solid, liquid, gas, plasma.
6. Fire is made of hot gases and plasma.
7. Satellites travel 5 miles per second to remain in orbit.
8. The thermite reaction generates its own oxygen.
9. Name two inventors that did work in the field of rocketry: Wernher von Braun and Robert Goddard.