



ROCKETRY BASICS WORK SHEET 2023

School Name			
Launch Team Name			
Number Correct		Total Score (Number Correct x 5 Points Each) =	

After reviewing the educational information provided to your launch team, complete the following worksheet as a group. Each question is worth 5 points.

Information needed to complete this worksheet is found in the booklet entitled "Rocketry Basics" and the "Motor Tutorial" on our website. There are also basic history questions that should be researched.

- For a rocket to leave Earth's gravitational pull and travel out into deep space it must reach its:
 A) Terminal velocity
 B) Maximum velocity
 C) Accelerated velocity
 D) Escape velocity
- To shift the center of mass (CM) of a rocket forward, you can do any one of the three following steps: 1) Add weight to the nose, 2) Install lighter fins, and 3) Make the rocket shorter.
 A) True
 B) False
- Movement in which axis will not affect its flight path during a rocket flight?
 A) Pitch
 B) Roll
 C) Center of Mass
 D) Yaw
- Who was first human to orbit the Earth?
 A) John Glenn
 B) Neil Armstrong
 C) Yuri Gidzenko
 D) Yuri Gagarin
- Who was the first American to command the International Space Station?
 A) Alan Shepard
 B) Neil Armstrong
 C) William Shepherd
 D) Chris Hadfield
- Which of his developments did Goddard's interest in rockets reaching higher altitudes become the forerunner of a whole new era in rocket flight?
 A) Solid-propellant rocket
 B) Multi-Stage rocket
 C) Liquid propelled rockets using gasoline and liquid oxygen
 D) Oxygen tanks
- The first United States' satellite made what major scientific discovery?
 A) Discovery of the Van Allen Radiation Belts
 B) First successful entry of a satellite into Earth orbit
 C) Discovery of Pluto

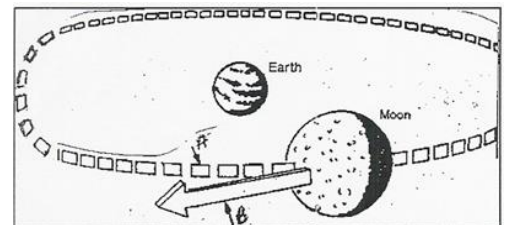
- 8 Which Russian spacecraft was the first to fly past the moon?
- A) Lunar 1
 - B) Explorer 1
 - C) Apollo 11
 - D) Luna Orbiter
- 9 To improve rocket accuracy or power, the technique of 'gyroscopic stabilization' was developed by:
- A) Wan-Her
 - B) Colonel William Congrave
 - C) Kai-Kang
 - D) Robert Goddard
- 10 Why should the center of pressure be towards the rocket's tail for the rocket to fly straight?
- A) The payloads always need to be near the top portion of the rocket.
 - B) During flight, airflow over the larger surface area at the tail will impact a greater force on the tail than the head keeping the nose cone pointed up.
 - C) The payload mass at the upper end will help balance the rocket and then the rocket will fly straight up.
 - D) So the mass of the rocket is evenly distributed from bottom to top of the rocket
- 11 A satellite experiences changes in the gravitational force with distance above a planet. To maintain its orbit around the planet, what must the satellite control?
- A) Velocity
 - B) Forward motion
 - C) Planet's gravity
 - D) Unbalanced gravitational force
- 12 An unstable rocket will tumble around what 'point'?
- A) Yaw
 - B) Center of Pressure
 - C) Pitch
 - D) Center of Mass
- 13 Goddard completed many experiments over his years, he developed:
- A) Smoother air travel
 - B) Payload compartment for scientific instruments
 - C) Gyroscope system for flight control
 - D) Both B and C
- 14 The nozzle on a rocket motor serves what purpose?
- A) To hold the solid – propellant
 - B) To increase the acceleration of the gases that leave the rocket and maximize the thrust
 - C) Reduce the amount of fuel lost at take-off
- 15 What Law(s) control the flight path of a rocket when the rocket leaves the Earth and travels into deep space?
- A) Newton's 3rd Law
 - B) Newton's 1st Law
 - C) Newton's 2nd Law
 - D) All of the above
- 16 All rockets that reach outer space are based on which invention?
- A) Jean Froissart Launching rockets through tubes
 - B) Mongol's fire-arrows
 - C) Schmidlap's multi-stage vehicle for lifting fireworks to higher altitudes
 - D) Hero of Alexandria of his invention of the Hero engine
- 17 What was the name of the first space station?
- A) Skylab
 - B) Mir
 - C) International Space Station
 - D) Salyut

- 18 Three separate projects were launched by the United States to gather information about the moon. Which project would take the first moon color photographs?
- A) Surveyor 2
 - B) Lunar Orbiter
 - C) Surveyor
 - D) Apollo 11
- 19 Which motor has a lower total impulse for an "J" class motor?
- A) 1,280 Newton-seconds
 - B) 700 Newton-seconds
 - C) 640 Newton-seconds
- 20 A "Gimbaled Nozzle" has what effect on the flight of the rocket?
- A) Rocket has no response to the positioning of the Gimbaled Nozzle
 - B) Changes the exhaust direction, thus correcting the direction of flight
 - C) Spins the rocket to maintain stability.

EXTRA CREDIT QUESTIONS

These may require additional Internet investigation.

- 21 Referring to the diagram at the right, an object in space that is near another object is influenced by the gravitational field of that object. Which path in the diagram represents Moon's actual motion when influenced by Earth's gravity?
- A) Path "B"
 - B) Neither path.
 - C) Path "A"



- 22 Which American astronaut is a self-described "rock nerd" and the first black woman to join a space station expedition?
- A) Mae C. Jemison
 - B) Jeanette Epps
 - C) Joan Higginbotham
 - D) Jessica Watkins



- 23 The Solar Orbiter's heat shield reached about _____ degrees Fahrenheit when it completed its flight past the Sun?
- A) 923 Fahrenheit
 - B) -32 Fahrenheit
 - C) 932 Fahrenheit
 - D) Earth has a Sun?



- 24 Which "Hidden Figures" movie subject did NASA change the name of a facility in Fairmont, West Virginia to honor the retired NASA mathematician?
- A) Mary Jackson
 - B) Dorothy Vaughan
 - C) Katherine Johnson



- 25 Using Newton's Second Law of Motion, what is the resulting force applied to an object with a mass of 2 pounds accelerated at 3.25 m/s²:
- A) 6.5 kg(m/s²)
 - B) 6500 g(m/s²)
 - C) 2.95 N
 - D) 0.6 N