



# ROCKETRY BASICS WORK SHEET 2018

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.**

- To improve rocket accuracy or power, the technique of 'gyroscopic stabilization' was developed by:  
 A) Colonel William Congrave  
 B) Wan-Her  
 C) Robert Goddard  
 D) Kai-Kang
- 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) Oxygen tanks  
 C) Liquid propelled rockets using gasoline and liquid oxygen  
 D) Multi-Stage rocket
- Which motor has a lower total impulse for an "I" class motor?  
 A) 900 Newton-seconds  
 B) 480 Newton-seconds  
 C) 640 Newton-seconds
- Why should the center of pressure be towards the rocket's tail for the rocket to fly straight?  
 A) The payload mass at the upper end will help balance the rocket and then the rocket will fly straight up.  
 B) So the mass of the rocket is evenly distributed from bottom to top of the rocket  
 C) The payloads always need to be near the top portion of the rocket  
 D) 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.
- 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  
 B) Lunar Orbiter  
 C) Ranger  
 D) Apollo 11
- Movement in which axis will not affect its flight path during a rocket flight?  
 A) Pitch  
 B) Roll  
 C) Center of Mass  
 D) Center of Pressure  
 E) Yaw
- The nozzle on a rocket motor serves what purpose?  
 A) Reduce the amount of fuel lost at take-off  
 B) To increase the acceleration of the gases that leave the rocket and maximize the thrust  
 C) To hold the solid – propellant

- 8 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) Planet's gravity
  - C) Forward motion
  - D) Unbalanced gravitational force
- 9 The first United States' satellite made what major scientific discovery?
- A) Discovery of Pluto
  - B) First successful entry of a satellite into Earth orbit
  - C) Discovery of the Van Allen Radiation Belts
- 10 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.
- 11 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
- 12 What was the name of the first space station?
- A) Skylab
  - B) Mir
  - C) International Space Station
  - D) Salyut
- 13 All rockets that reach outer space are based on which invention?
- A) Schmidlap's multi-stage vehicle for lifting fireworks to higher altitudes
  - B) Hero of Alexandria of his invention of the Hero engine
  - C) Mongol's fire-arrows
  - D) Jean Froissart Launching rockets through tubes
- 14 An unstable rocket will tumble around what 'point'?
- A) Yaw
  - B) Center of Pressure
  - C) Center of Mass
  - D) Pitch
- 15 In order for a rocket to leave Earth's gravitational pull and travel out into deep space it must reach its:
- A) Accelerated velocity
  - B) Escape velocity
  - C) Maximum velocity
  - D) Terminal velocity
- 16 What Law(s) control the flight path of a rocket when the rocket leaves the Earth and travels into deep space?
- A) Newton's 3<sup>rd</sup> Law
  - B) Newton's 1<sup>st</sup> Law
  - C) Newton's 2<sup>nd</sup> Law
  - D) All of the above
- 17 Who was first human to orbit the Earth?
- A) Neil Armstrong
  - B) Yuri Gidzenko
  - C) John Glenn
  - D) Yuri Gagarin
- 18 Which Russian spacecraft was the first to fly past the moon?
- A) Luna 1
  - B) Explorer 1
  - C) Apollo 11
  - D) Lunar orbiter

19 Goddard completed many experiments over he his years, he developed:

- A) Smoother air travel
- B) Payload compartment for scientific instruments
- C) Gyroscope system for fight control
- D) Both C and B

20 Who was the first American to command the International Space Station?

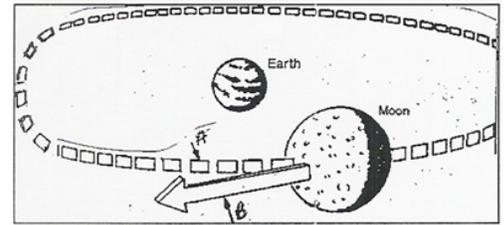
- A) Chris Hadfield
- B) Neil Armstrong
- C) Alan Shepard
- D) William Shepherd

## EXTRA CREDIT QUESTIONS

These will 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) Path "A"
- C) Neither path.



22 Which American Astronaut has the most cumulative days in Space?

- A) Jeffery Williams
- B) Jim Lovell
- C) Peggy Whitson
- D) Gennady Padalka



23 "Miles and miles and miles," he announced in satisfaction as he watched the golf ball fly slow-motion over the moon's dusty craters after this hot shot pilot rigged up a six iron and took a one-handed swing at a golf ball. Who was the sportsman?

- A) John Glenn
- B) Alan Shepard
- C) Gus Grissom



24 Which astronaut spent almost an entire year at the International Space Station?

- A) Jim Kelly
- B) Mark Kelly
- C) Scott Kelly
- D) Kelly Green



25 SpaceX Falcon Heavy first stage is made of 3 Falcon 9 engine cores with 27 Merlin engines together generating more than 5,000,000 pounds-thrust at liftoff. This is approximately equal to:

- A) All the cheddar cheese wheels in Wisconsin
- B) The thrust of eighteen 747 aircraft.
- C) The thrust of a Saturn V moon rocket.
- D) Both B and C

