



Rocketry Basics Worksheet

This is Rocket Science



School Name: _____

Launch Team Name: _____

Number Correct _____ X 5 = _____ Total Score



After reviewing the educational information provided to your launch team, complete the following worksheet as a group. Each question is worth five points. For those teams that want an extra challenge, there are several extra credit questions at the end of the worksheet.

Some information needed to complete this worksheet is found in the booklet entitled "Rocketry Basics" and the software program entitled "Rocket Motor Tutorial" on the Education CD. Some information may need to be researched.

- 1 **Who was the German rocket scientist who led the American space program to the moon?**
 - A. Werner Dahm
 - B. Konrad Dannenberg
 - C. Werner Von Braun

- 2 **What American rocketry pioneer built and launched the first liquid fueled rocket??**
 - A. Robert Goddard
 - B. John Glenn.
 - C. Burt Rutan

- 3 **The first Earth-orbiting satellite was called....**
 - A. Explorer 1
 - B. Hubble
 - C. Sputnik 1

- 4 **Who was the first man in outer space?**
 - A. John Glenn
 - B. Alan Shepard
 - C. Yuri Gagarin

- 5 **What Apollo 11 Astronaut was the first to walk on the Moon?**
 - A. Neil Armstrong
 - B. Buzz Aldrin
 - C. Alan Shepard

- 6 **Who wrote the book entitled *Philosophiae Naturalis Principia Mathematica* which described three important principles that govern the motion of all objects?**
 - A. Konstantin Tsiokovski
 - B. Sir Isaac Newton
 - C. William Hale

- 7 **How does Newton's Third Law "To every action there is always an equal and opposite reaction" relate to rocketry?**
 - A. That the blast deflector must be strong enough to push the rocket off the launch pad at ignition
 - B. That a rocket flies because the rocket motor "pushes" the rocket in a direction opposite of the exhaust jet
 - C. That the thrust of a rocket motor is proportional to the air density at the launch site

- 8 **What is the purpose of the nozzle on a solid-propellant rocket motor?**
 - A. To increase the acceleration of the exhaust gases
 - B. It holds the propellant in the motor case
 - C. To decrease the acceleration of the exhaust gases

- 9 — **The center of mass (CM) - also called center of gravity (CG) - of a rocket is generally defined as:**
A. The total mass of the rocket divided by 2
B. A distance half way between the fins and nosecone of a rocket
C. The point where all the mass of a rocket is balanced
- 10 — **The center of pressure (CP) of a rocket is generally defined as:**
A. The balance point of the rocket without the motor
B. The total area of the fins, airframe and nose cone divided by two
C. The point on a rocket where the surface area on both sides of the point are equal
- 11 — **For an inherently stable rocket, what is the relationship of center of mass (CM) to the center of pressure (CP)?**
A. The CG must be behind the CP relative to the desired direction of flight
B. The CG must be forward of the CP relative to the desired direction of flight
C. The CG must be in front of the fins of a rocket
- 12 — **What are examples of active rocket controls systems?**
A. Vanes, Movable fins and gimbaled nozzles
B. Fixed fins and spin fins
C. Both A and B
- 13 — **What was the name of the first private space vehicle to take a human into space?**
A. Friendship 7
B. Space Ship One
C. White Knight 1
- 14 — **In general terms, the total impulse of a rocket motor can be described as:**
A. A measure of the total energy of a motor
B. The product of the propellant weight and its burn time
C. The product of the propellant weight and the motor thrust
- 15 — **The average thrust of a rocket motor is:**
A. A motors propellant weight divided by its peak thrust
B. A motor's total impulse divided by its burn time
C. A motors propellant weight divided by its total impulse
- 16 — **The maximum total impulse of a "I" class motor is:**
A. 480 Newton-Seconds
B. 640 Newton-Seconds
C. 900 Newton-Seconds
- 17 — **What does the motor designation I220-8 mean?**
A. The motor is in the "I" impulse range with an total impulse of 220 Newtons and an 8 second ejection delay
B. The motor is in the I impulse range, having an average thrust of 220 Newtons and an 8 second burn time
C. The motor is in the "I" impulse range with an average thrust of 220 Newtons and an 8 second ejection delay
- 18 — **What was the name of the first Space Station?**
A. Skylab
B. International Space Station
C. Salyut 1

- 19 — **What is the Mass Fraction (MF) of a rocket?**
A. The mass of the propellants divided by the mass of the payload
B. The mass of the propellants divided by the rocket's total mass
C. The total mass of the rocket divided by 0.91
- 20 — **To overcome the weight problem of large rockets, today's launch vehicles....**
A. Carry more propellant
B. Use liquid fuels
C. Use staging to drop of exhausted rocket sections

Extra Credit Questions

- 21 — **What happens to the center of gravity (CG) of a rocket during a solid rocket motor's thrusting phase?**
A. The center of gravity stays the same
B. The center of gravity shifts forward
C. The center of gravity shifts aft

Explain Your Answer: _____

- 22 — **What three methods can be used to shift the center of mass (CM) of a rocket forward?**
A. Add weight to the nose, make the rocket longer, install larger fins
B. Add weight to the nose, make the rocket longer, use a smaller (or lighter) motor
C. Add weight to the nose, make the rocket shorter, use a smaller motor

Explain Your Answer: _____

- 23 — **What three methods can be used to shift the center of pressure (CP) aft?**
A. Make the rocket shorter, use larger fins, increase the number of fins
B. Make the rocket shorter, use smaller fins, add weight to the nose
C. Make the rocket shorter, change the number of fins, use a longer launch rod

Explain Your Answer: _____

