

The Force Rule

- ◆ Force is affected in 2 ways:
 1. An object of greater mass has a greater force (e.g. An adult baseballer will hit the ball further than a child, _____)
 2. An object with greater acceleration has a greater force (e.g. A faster karate expert can strike with greater force than a slower person, _____)
- ◆ The Force Rule
Force = Mass X Acceleration
F = m X a

The Weight Rule

- ◆ Mass is the amount of _____ in an object. It is measured in _____. The mass of an object remains the _____ anywhere in the universe.
- ◆ Weight is the force of _____ on an object. It is measured in _____. The weight of an object differs depending on its position in the universe (e.g. A person's weight on the moon with less gravity will be _____ than that on earth).
- ◆ Rule for Weight
Weight or Force Of Gravity (in N) = Mass (in kg) X Gravitational Acceleration (9.8m/s²)
 $W = m \times g$



Questions

1. Force depends on 2 factors. What are these?
2. Explain an example where force is affected by: (a) mass (b) acceleration.
3. A bullet fired from a rifle has a greater impact on a target than the same bullet tossed by hand at the target. Why?
4. A car speeding up on a highway has a greater force than the same car slowly driving into a garage. Why?
5. In what units are force, mass and acceleration measured?
6. If the mass of a truck is 3000 kg and it accelerates at 5 m/s/s, what force has it?
7. A car with a mass of 1500 kg travels at a constant speed of 15 m/s along a straight road. What overall force has it? (Careful! There's a trick.)
8. A Japanese Sumo wrestler has a huge mass of 250 kg. What is his weight?
9. A 3 kg ball falls from a tall building. The entire fall takes 4 seconds. (a) With what force does it hit the ground? (b) What speed is it going when it hits?
10. A skydiver falls from an aircraft. What speed will he be travelling after 5 seconds?

Answers

1.mass and acceleration 2.(a)The force when a truck hits a wall is greater than the force when a lighter car hits the wall at the same acceleration. (b) If a bullet is tossed by hand, the force is less than if the same bullet is shot from a rifle with greater acceleration.
3&4.greater acceleration 5.force in Newtons, mass in kilograms, acceleration in m/s/s or m/s^2 6. 15000N 7.The forces on the car (the forward force of the engine, the friction between tyres and the road, the wind resistance) are balanced as it is not accelerating. There is no overall or resulting force. 8.2450N
9.(a)weight=29.4N (b)39.2m/s 10.49m/s