Forces Lab – 1 Day Version

BALLOON:

1.

2.

3.

WACKY WASHERS:

4.

5.

6.

7.

PENNY AND A BEAKER:

8.

9.

NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10.

11.

SPRING SCALE PULLING A SQUARE MASS:

12.

13.

14.

15.

SPRING SCALE LIFTING A SQUARE MASS:

16.

17.

18.

19.

BALL DROP:

20.

1st law:

3rd law:

BUMPER PENNIES:

21.

22.

CAR AND A RAMP (Car + Zero Masses):

23.

24.

25. Vf = Vi = T =

26.

27.

28.

CAR AND A RAMP (Car + Zero Masses):

29.

30.

31. Vf = Vi = T =

32.

33.

34.

35.

**WEIGHT TRIANGLE**

1. Draw the triangle for W = MG.
2. Indicate which units you use for mass, for weight, and for gravity.
3. If a person weighs 500N, what is her mass?
4. If a truck has a mass of 500kg, what is its weight?
5. A person has a mass of 75kg on Earth. What is its mass on the moon, knowing that the moon has 1/6 the gravity of Earth.
6. What is the value of acceleration due to gravity?
7. What is an object’s speed after 1second of falling? (Use the acceleration triangle that includes time)

**STAR WARS FORCES**

1. Han Solo pilots the Millennium Falcon. (It’s the ship that made the Kessel Run in less than 5 parsecs.) The Falcon is capable of accelerating at 1500 m/s2. If the total mass of the Falcon is 5700 kg, then what is the necessary force required to get to lightspeed?
2. When Luke lands on Dagobah to visit Yoda, he gets his X-wing stuck in the mud. Supposing the X-wing has a mass of 2800 kg, what force was required by Luke to accelerate the fighter at a rate of 2.0 m/s2 out of the mud?
3. The mighty Chewbacca is as strong as he is loyal. The bulking giant is capable of throwing an 81 kg storm trooper with a force of 18 N. What is the acceleration of the stromtrooper?
4. The Death Star has a tractor beam that is capable of capturing enemy ships which allows storm troopers to board the vessel. The beam pulls with a force of 25,000 N. If a rebel cruiser is caught and accelerating towards the Death Star at a rate of 14 m/s2, then what is the mass of the cruiser?

**MULTIPLE CHOICE PART 1:**

1. The firefighter feels the hose pushing backwards. What is the most likely cause of this?
   1. The hose material is very elastic.
   2. Since the hose is at rest, it tends to stay at rest.
   3. The force exerted on the water equals the mass of the water times its acceleration.
   4. The escaping water exerts an equal and opposite force on the hose.
2. If the same force is applied to each of these balls, which one will have the LEAST acceleration?
   1. Baseball mass = 1.0kg
   2. Bowling ball mass = 7.3kg
   3. Golf ball mass = 0.75kg
   4. Tennis ball mass = 0.5kg
3. Which object has the greatest inertia?
   1. A baseball
   2. A bowling ball
   3. A golf ball
   4. A tennis ball
4. If the net force on an object is zero, then the object has:
   1. Reaction forces
   2. Action forces
   3. Balanced forces
   4. Unbalanced forces
5. When an unbalanced force acts on an object;
   1. The objects motion does not change
   2. The object accelerates
   3. The weight of the object decreases
   4. The inertia of the object increases
6. The property of matter that resists changes in motion is called:
   1. Friction
   2. Gravity
   3. Inertia
   4. Weight
7. What is the unbalanced force that slows down a ball rolling across the floor?
   1. Force of friction
   2. Force of gravity
   3. Force of inertia
   4. Force of momentum
8. Which scientific law does the diagram represent?

|  |  |
| --- | --- |
|  |  |
|  |  |
| Start  (10N force applied) | After 3 seconds |

* 1. Law of gravity
  2. Newton’s 1st law of motion
  3. Newton’s 2nd law of motion
  4. Newton’s 3rd law of motion

1. Earth pulls on the moon and holds the moon in its orbit. The moon pulls on Earth with an equal and opposite force. This is an example of:
   1. Newton’s 1st law
   2. Newton’s 2nd law
   3. Newton’s 3rd law
   4. None of the above
2. In the absence of air resistance, how would the acceleration of a 1.5kg book and the acceleration of a 15kg rock differ if the objects were dropped from the same height?
   1. The book would accelerate twice as fast as the rock
   2. The rock would accelerate twice as fast as the book
   3. The book would accelerate ten times as fast as the rock
   4. They would not differ, they would be the same