Name _____

Force & Motion (p. 87 – 95)

I. Force & Motion

1. **Define the term force.**

   Force – push or pull exerted on an object

2. **What are three results of an applied force?** (chair pushing demo.)

   1. Speed Up 2. Slow down 3. Change direction

3. **Why is motion determined by force and direction?**

   1. Force = magnitude (distance)

   2. Direction = displacement (position)

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4. **For a boat floating in the sea, identify the following :**

   1. System = Floating Boat (Object)

   2. External World = Buoyant Force (↑), Gravity (↓) (Forces on object)

II. Contact Forces & Field Forces

1. **Match the terms with the correct definitions.**

1. A.	- Contact Force	A. External world object touches & applies force on system.
2. C.	- Field Force	B. Specific and identifiable cause of a force. (Hand pushing books)
3. B.	- Agent	C. Force exerted on a system without contact occurring. (Gravity, Magnetism)

Relate to Earthquakes

2. **Give examples of each of the following terms.**

   Contact Force = Finger on pop top ; Foot on soccer ball

   Field Force = Gravity ; Magnetism ; Electricity

   Agent = Wind = blown over tree ; Hammer = nail head

3. **Define the term free-body diagram.**

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Free-Body Diagram – physical model which represents the forces acting on a system

4. **Each force in a free-body diagram is labeled with the symbol** F.

III. Force & Acceleration

Experiment p. 90

1. **The greater an applied force, the greater the acceleration.**

   Circle One : (True) False

   ↑ $F = m^{\text{constant}} a$ (increase)

2. **Increasing the mass of an object requires ~~less~~ more force to maintain initial acceleration of the object with less mass.**

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   Circle One : True (False)

Farm-N-Fleet
- Pushing in shopping carts (plus snow)

Name _____

3. **Write out the formula for determining force of an object.**

$F = ma$ Force = (mass)(acceleration) (N) (kg) (m/s^2)

4. **Doubling the force on an object, quadruples the acceleration.**

Circle One : True **False** $2F = ma$ ← doubled, constant

5. **To measure force, what units are used?** kg · m/s^2 or Newton (N)

IV. Combining Forces

1. **How are vectors added when force vectors are in (the) :**

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Same Direction = Replace with one vector with length equal to combined length

Opposite Directions = Vector is length of the difference between two vectors.

2. **Define the term net force.**

Net Force – vector sum of all the forces of an object

V. Newton's Second Law

1. **A net force of 100 N on an object by two people equals 100 N by one person.**

It can if the other person is negative.

Circle One : True False

Which weighs more, 100 kg of feather or 100 kg of lead?

2. **Define Newton's Second Law.**

Newton's Second Law - acceleration of an object is proportional to the net force and inversely proportional to the mass of the object being accelerated.

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3. **Write out the formula to determine Newton's Second Law.**

$a = \frac{F_{net}}{m}$ acceleration = $\frac{F_{net}}{mass}$ (N) (m/s^2) (kg)

VI. Newton's First Law

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1. **Define Newton's First Law.**

Newton's First Law – an object at rest will remain at rest, and an object that is moving will continue to move in a straight line with constant speed, if and only if the net force acting on the object is zero

Friction = F_f

Normal = F_N

Spring = F_{sp}

Tension = F_T

Thrust = F_{thrust}

Weight = F_g

2. **Define the term inertia.**

Ex. - Air Hockey

Inertia – tendency of an object to resist change

Ex. Seat Belts / Space / Flowers On A Table

3. **Why is inertia not considered a force?**

Velocity = force = requires speed + direction change

Rest = no velocity

Constant velocity = no change

4. **Define the term equilibrium.**

(Leaning Demo) ← Two people face to face

Equilibrium – net force on an object is zero

v = 0

5. **An object is in equilibrium if it is moving at a constant velocity or at rest.**

Circle One : True False