Name: _____ Class: ____ Date: _____

NEWTON'S LAWS TEST REVIEW - Required Assessment

Directions: Use the word bank below to help you with the fill in the blank. Some words may be used more than once, and some words may not be used.

velocity	unbalanced	lesser	accelerate	object
speed	balanced	action-reaction	mass	faster
inertia	force	equal	action	slower
direction	greater	opposite	pairs	reaction
acceleration	rest	kilogram	gram	Newton
tendency	Joule	m/s^2	m/s	motion

I. NEWTON'S FIRST LAW OF MOTION

1. Newton's first law of motion is also known as the LAW OF _____.
2. Newton's first law says that an object that IS NOT MOVING, or is at _____, will stay at _____, **AND** an object that IS MOVING will keep moving with constant _____, which means at the same _____ and in the same _____, **UNLESS** an _____ force acts on that object.
3. Inertia is the _____ of an object to resist a change in _____.
4. The amount of inertia in an object is determined by the object's _____.
5. Circle the object has more inertia:
   a. Bowling ball or Tennis ball
   b. Hammer or Feather

II. NEWTON'S SECOND LAW OF MOTION

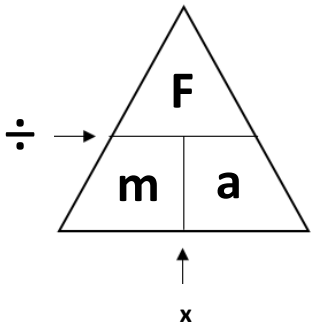
6. Newton's second law of motion is also known as the LAW OF _____, _____ and _____.
7. Newton's second law says that when an _____ force is applied to a _____, it causes it to _____.
8. The greater the force that is applied, the _____ the acceleration.
9. The lesser the force that is applied, the _____ the acceleration.
10. If equal forces are applied to an object with a small mass and an object with a large mass, the object with the large mass will accelerate _____ than the object with the small mass.
11. The equation that is used to solve second law problems is **F = ma**.
    a. What do each of the variables mean?
       F = _____ m = _____ a = _____
    b. What unit of measurement must be used with each variable?
       F = _____ m = _____ a = _____

III. NEWTON'S SECOND LAW OF MOTION PROBLEMS

F = m x a

m = f/a

a = f/m



1. With what force will a car hit a tree if the car has a mass of 3,000 kg and it is accelerating at a rate of 2 m/s^2?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):

2. What is the acceleration of a softball if it has a mass of 0.50 kg and hits the catcher's glove with a force of 25 Newtons?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):

3. What is the mass of a truck if it is accelerating at a rate of 5 m/s^2 and hits a parked car with a force of 14,000 Newtons?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):

4. A 10 kg bowling ball would require what force to accelerate it down an alleyway at a rate of 3 m/s^2?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):

IV. NEWTON'S THIRD LAW OF MOTION

1. Newton's third law of motion is also known as the LAW OF _____.
2. Newton's third law says that every time there is an _____ force, there is also a _____ force that is _____ in size and acts in the _____ direction.
3. Newton's third law states that forces must ALWAYS occur in _____.

V. KEY CONCEPTS: On the line before each description write, *First*, *Second*, or *Third* to identify which of Newton's Laws is being described.

Newton's 1st Law of Motion	Newton's 2nd Law of Motion	Newton's 3rd Law of Motion
An object at rest will remain at rest, and an object in motion will remain in motion, at a constant velocity until acted on by an outside force.	***The acceleration of an object depends on the mass of the object and the force applied to the object.***	***When one force exerts a force on a second object, the second object exerts a force of the same size, but in the opposite direction, on the first object.***

_____ 1. For every action force, there is an equal but opposite reaction force.

_____ 2. When a car stops quickly by applying the brakes, the passengers fly forward until stopped by their seatbelt.

_____ 3. Two cars collide at an intersection. The car with more mass moves a small distance, but the car with less mass skids a great distance across the road.

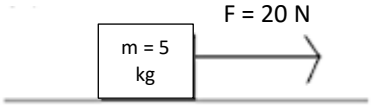
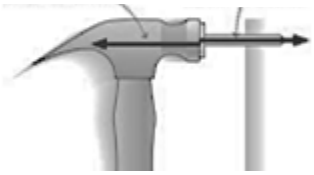
_____ 4. A magician pulls a table cloth out from under dishes and glasses set on top of the table.

_____ 5. The engines fire, and the rocket lifts off the launch pad.

_____ 6. When Mary adds more items to her grocery cart, she notices it becomes harder to push the cart.

VI. UNDERSTANDING

Directions: For each example below, choose which of Newton's Laws is best demonstrated and explain why.

 F = m x a 20 N = (5 kg) x a a = 4 m/s^2	Newton's (1st / 2nd / 3rd) Law Explanation:
The force of the nail on the hammer. The force of the hammer on the nail. 	Newton's (1st / 2nd / 3rd) Law Explanation:
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	Newton's (1st / 2nd / 3rd) Law Explanation:

Name: _____ **Class:** _____ **Date:** _____

NEWTON'S LAWS WORKSHEET

ANSWER KEY

Directions: Use the word bank below to help you with the fill in the blank. Some words may be used more than once, and some words may not be used.

velocity	unbalanced	lesser	accelerate	object
speed	balanced	action-reaction	mass	faster
inertia	force	equal	action	slower
direction	greater	opposite	pairs	reaction
acceleration	rest	kilogram	gram	Newton
tendency	Joule	m/s^2	m/s	motion

I. NEWTON'S FIRST LAW OF MOTION

1. Newton's first law of motion is also known as the LAW OF **INERTIA**

2. Newton's first law says that
   a. an object that IS NOT MOVING, or is at **REST** will stay at **REST** **AND**
   b. an object that IS MOVING will keep moving with constant **VELOCITY,** which means at the same **SPEED** and in the same **DIRECTION,** **UNLESS** an **UNBALANCED** force acts on that object.

3. **Inertia** is the **TENDENCY** of an object to resist a change in **MOTION.**

4. The amount of **inertia** in an object is determined by the object's **MASS**.

5. Which of the following has more inertia?
   a. Bowling ball or Tennis ball
   b. Hammer or Feather

II. NEWTON'S SECOND LAW OF MOTION

6. Newton's second law of motion is also known as the LAW OF **FORCE, MASS AND ACCELERATION**
7. Newton's second law says that when an **UNBALANCED** force is applied to a **OBJECT/MASS** it causes it to **ACCELERATE**.
8. The greater the force that is applied, the **GREATER/FASTER** the acceleration.
9. The lesser the force that is applied, the **LESSER/SLOWER** the acceleration.
10. If equal forces are applied to an object with a small mass and an object with a large mass, the object with the large mass will accelerate **SLOWER** than the object with the small mass.
11. The equation that is used to solve second law problems is **F = ma**.
    a. What do each of the variables mean?

       F = **FORCE** m = **MASS** a = **ACCELERATION**

    b. What unit of measurement must be used with each variable?

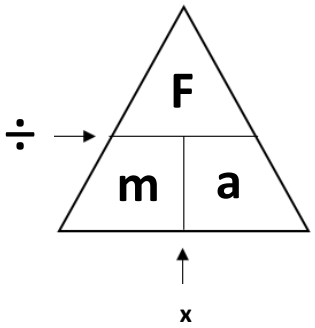
       F = **Newtons (N)** m = **kilograms (kg)** a = **meters per second per second (m/s2)**

III. NEWTON'S SECOND LAW OF MOTION PROBLEMS

F = m x a

m = f/a

a = f/m



5. With what force will a car hit a tree if the car has a mass of 3,000 kg and it is accelerating at a rate of 2 m/s^2?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):
F= ? m = 3,000 kg a = 2 m/s^2	F = m x a	F = (3,000 kg) x (2 m/s^2)	F = 6,000 N

6. What is the acceleration of a softball if it has a mass of 0.50 kg and hits the catcher's glove with a force of 25 Newtons?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):
A= ? F = 25 N m = 0.50 kg	a = F ÷ m	a = (25 N) ÷ (0.50 kg)	a = 50 m/s^2

7. What is the mass of a truck if it is accelerating at a rate of 5 m/s^2 and hits a parked car with a force of 14,000 Newtons?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):
M= ? F = 14,000 N a = 5 m/s^2	m = F ÷ a	m = (14,000 N) ÷ (5 m/s^2)	m = 2,800 kg

8. A 10 kg bowling ball would require what force to accelerate it down an alleyway at a rate of 3 m/s^2?

Given (w/ Units):	Formula:	Substitution	Answer (w/ Units):
F= ? m = 10 kg a = 3 m/s^2	F = m x a	F = (10 kg) x (3 m/s^2)	F = 30 N

III. NEWTON'S THIRD LAW OF MOTION

12. Newton's third law of motion is also known as the LAW OF **ACTION – REACTION.**
13. Newton's third law says that every time there is an **ACTION** force, there is also a **REACTION** force that is **EQUAL** in size and acts in the **OPPOSITE** direction.
14. Newton's third law states that forces must ALWAYS occur in **PAIRS**.

IV: KEY CONCEPTS: On the line before each description write, *First*, *Second*, or *Third* to identify which of Newton's Laws is being described.

Newton's 1st Law of Motion	Newton's 2nd Law of Motion	Newton's 3rd Law of Motion
An object at rest will remain at rest, and an object in motion will remain in motion, at a constant velocity until acted on by an outside force.	***The acceleration of an object is inversely proportional to the mass of the object, and directly proportional to the force applied to the object.***	***When one force exerts a force on a second object, the second object exerts a force of the same size, but in the opposite direction, on the first object.***

__3rd___ 1. For every action force, there is an equal but opposite reaction force.

___1st__ 2. When a car stops quickly by applying the brakes, the passengers fly forward until stopped by their seatbelt.

__2nd___ 3. Two cars collide at an intersection. The car with more mass moves a mall distance, but the car with less mass skids a great distance across the road.

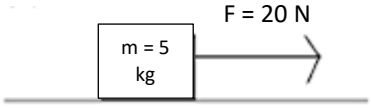
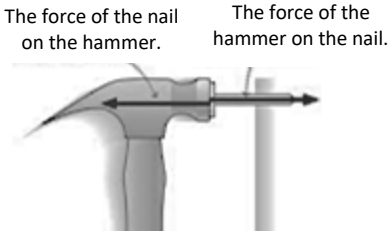
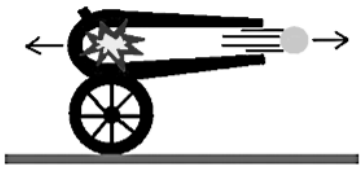
__1st___ 4. A magician pulls a table cloth out from under dishes and glasses set on top of the table.

__3rd___ 5. The engines fire, and the rocket lifts off the launch pad.

__2nd___ 6. When Mary adds more items to her grocery cart, she notices it becomes harder to push the cart.

V. UNDERSTANDING

Directions: For each example below, choose which of Newton's Laws is best demonstrated and explain why.

 F = m x a 20 N = (5 kg) x a a = 4 m/s^2	Newton's (1st / **2nd** / 3rd) Law Explanation: **The force of 20 N moves the mass of 5kg to the right at an acceleration of 4m/s^2**
	Newton's (1st / 2nd / **3rd**) Law Explanation: **Action: the hammer strikes the nail pushing it into the board** **Reaction: the nail strikes the hammer pushing it backwards**
	Newton's (**1st** / 2nd / 3rd) Law Explanation: **Inertia keeps the driver moving forward until the unbalance force, the seatbelt, changes his motion.**
	Newton's (1st / 2nd / **3rd**) Law Explanation: **Action: The explosion shoots the cannon ball out the front** **Reaction: The cannon moves back as it recoils from the explosion**
	Newton's (**1st** / 2nd / 3rd) Law Explanation: **Inertia keeps the coin in place as the unbalance force, your hand, moves the card out of place.**