

Review Guide

Name _____

Activity review: Describe in the main concepts demonstrated/ learned during each activity.

1. Inertia Lab and demos (coin lab and inertia teacher demos): _____

2. Gravity lab (grape, orange, paper drop, Free Fall Tower gizmo):

3. Fan cart gizmo:

4. Gravity quiz reflection- What did you miss? What corrections did you need to explain and change?

5. Balanced and Unbalanced Forces quiz reflection - What did you miss? What do you need to change to avoid the same mistakes on the test?

Review questions: Answer the following questions.

1. Define force-

2. Describe what a balanced force is. Draw a picture of what a balanced force looks like.

3. Describe what an unbalanced force is. Draw a picture of what an unbalanced force looks like.

4. What is the difference between mass and weight?

5. Does mass or weight depend on gravity?

6. Tell me what gravity is.

7. What can affect the amount of gravity between objects?

8. The force of gravity causes objects to fall towards the center of the Earth with what motion?

9. What is the number we associate with the acceleration of gravity on Earth?

10. What is the difference between mass and weight?

11. What is the difference between balanced and unbalanced forces?

12. Which of the following statements are true of **inertia**? List all that apply.

1. Inertia is a force.
2. Inertia is a force which keeps stationary objects at rest and moving objects in motion at constant velocity.
3. Inertia is a force which brings all objects to a rest position.
4. All objects have inertia.
5. A more massive object has more inertia than a less massive object.
6. Fast-moving objects have more inertia than slow-moving objects.
7. An object would not have any inertia in a gravity-free environment (if there is such a place).
8. Inertia is the tendency of all objects to resist motion and ultimately stop.
9. In a gravity-free environment (should there be one), a person with a lot of inertia would have the same ability to make a turn as a person with a small amount of inertia.

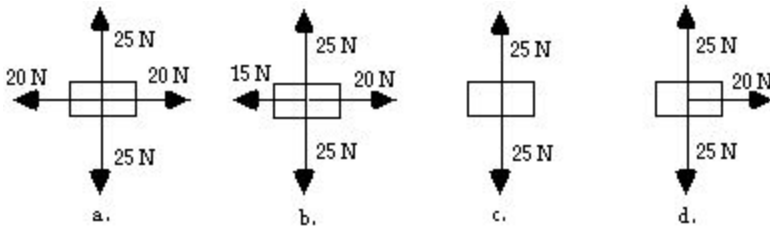
13. Which of the following statements are true of an object that experiences **balanced forces** (or **unbalanced forces**)? List all that apply.

1. If a person is moving to the right, then the forces acting upon it are NOT balanced.
2. A balance of forces is demonstrated by an object which is slowing to a stop.
3. It would take an unbalanced force to keep an object in motion.
4. If an object is moving with a constant speed in a circle, then the forces acting upon the object are balanced.
5. If an object is accelerating at a constant rate of acceleration, then the forces acting upon the object are balanced.
6. It is NOT possible for just three forces to be acting upon an object and they still balance each other.
7. A free-falling object experiences balanced forces only at terminal velocity.
8. Balanced forces cause stationary objects to remain at rest and moving objects to come to rest.
9. Unbalanced forces cause objects to move.

14. The amount of net force required to keep a 5-kg object moving rightward with a constant velocity of 2 m/s is _____.

- a. 0 N b. 0.4 N c. 2 N d. 2.5 N e. 5 N

15. Which one(s) of the following force diagrams depict an object moving to the right with a constant speed? List all that apply.



16. According to Newton's third law, every force is accompanied by an equal and opposite *reaction* force. The reason that these forces do not cancel each other is _____.

- a. the action force acts for a longer time period
b. the two forces are not always in the same direction
c. one of the two forces is greater than the other
d. the two forces act upon different objects; only forces on the same object can balance each other.
e. ... nonsense! They do cancel each other. Objects accelerate because of the presence of a third force.

Each one of Newton's Laws can play a role in any one particular situation. However, one of the laws is often most obviously dominant in governing the motion of a situation. Pick which of Newton's **most** governs the situations described below.

- a. First Law (inertia) b. Second Law ($F = m \cdot a$) c. Third Law (action-reaction)

17. A helicopter must have two sets of blades in order to fly with stability.

18. If you were in an elevator and the cable broke, jumping up just before the elevator hit the ground would not save you. Sorry.

19. You usually jerk a paper towel from a roll in order to tear it instead of pulling it smoothly.
20. A student desk can exert a different amount of normal force on different objects.
21. Heavy objects are not easier to move around in a horizontal fashion on the Moon than on the Earth.
22. Draw a freebody diagram for the following problem-An 8-N force is applied to a 2-kg box to accelerate it to the right across a table. The box encounters a force of friction of 5 N.
23. A 5.20-N force is applied to a 1.05-kg object to accelerate it rightwards across a friction-free surface. Determine the acceleration of the object. (Neglect air resistance.)
24. Define Newton's **law** of **universal gravitation**.

True or false- If the statement is false make it a true statement.

25. All objects accelerate to Earth's surface at the same rate?
26. The rate at which an object falls can be affected by the amount of air resistance acting on the object.
27. Objects with more mass will hit the surface of the MOON before objects with less mass.

28. An object which is moving rightward has a rightward force acting upon it.

29. The more mass an object has the more inertia it has.

30. Newton's 3rd law says, an object in motion will continue in motion an object at rest will stay at rest.

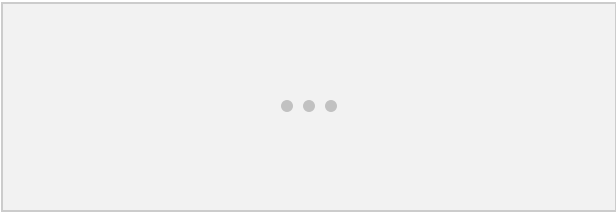
31. Friction always acts in the SAME direction of the applied force.

32. When you increase force on an object you decrease the acceleration.

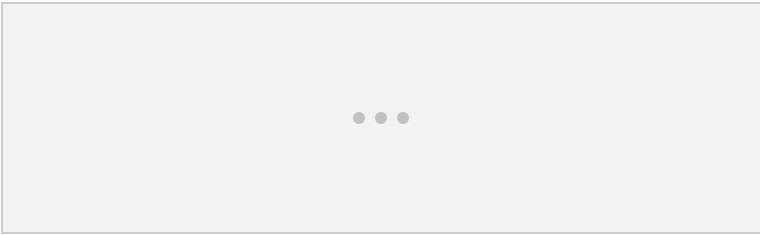
33. Newton's 1st law says, $F=MA$

34. The unit for acceleration is m/s/h

35. The object would move left with a net force of 20 N



36. The object would move right with a net force of 15 N.



37. Mass is measured in meters (T/F) _____

38. The acceleration of gravity on Earth is 1.62 m/s^2 _____

38. Explain why things in orbit are in constant freefall

39. Do you agree more with Galileo or Aristotle and why?

40. An object with 2.5 kg of mass accelerates 6 m/s^2 when an unknown force is exerted on it. Find the force.

Show all work for credit.

41. An object accelerates 5 m/s^2 when a force of 12 N is exerted on it. What is the mass of the object? **Show all work for credit.**

42. An object has a weight of 45 N on Earth. What is the mass of the object? **Show all work for credit.**

Things to know...

Review all notes, labs, gizmos, vocabulary associated with gizmos and labs, openers, quizzes, hw assignments

-Mass and weight are different- Mass is how much matter in an object weight is a measurement of the pull of gravity on an object.

-Gravity is a force- Newton's **law of universal gravitation** states... that any two bodies in the universe attract each other with a force that is dependent on the mass of the objects and the distance between them.

-Unbalanced forces have movement- Friction (air resistance) is one force that acts on falling objects. (works opposite of the applied force)

-The rate that things fall on Earth depends on an object's mass and how they are affected by air resistance. (Grape less affected by air resistance, Orange more mass but also more air resistance. This is why they should hit about the same time)

-On the moon (no air resistance) things fall at the same time.

-**Inertia**- the resistance an object has to a change in its state of motion. More mass more inertia.

-**Earth exerts a gravitational force on objects that is attractive (towards Earth's surface).**

-**Near Earth's surface, this force (gravity) produces a constant acceleration downward.**

-Acceleration= increase in the rate or speed of something, when something goes faster every second

-Speed = how fast something goes or how much distance it travels every second

-What kinds of objects seem to fall more quickly in air? Heavy, small objects

-Slowly? Light objects with a large surface area

-What happens when you drop things in a vacuum? Why do you think that is? The most surprising and misunderstood aspect of free fall is that light objects can fall at the same rate as much heavier objects. In a vacuum, a feather falls as quickly as a hammer!

-Why does it hurt more if you jump from a roof than if you jump from a chair? You speed up as you fall, so you are going faster when you hit the ground.

-what is terminal velocity? The point in an object's fall where the force of air resistance exactly equals the force of gravity and forces are balanced, and no change in motion will occur so the object will continue to fall at the same speed the rest of the way down.

-What two factors affect the terminal velocity of an object? How high you drop the object (how fast it is going) and the mass to surface area ratio of the object. In air, the motion of falling objects is opposed by the frictional force of air resistance. Air resistance depends on the surface area of the falling object. If two objects have the same mass, air resistance will slow the object with larger surface area more. The faster an object is moving, the greater the air resistance. This resistance cancels some of the gravitational force so the object does not speed up quite as much.

Without a parachute, a golf ball falls more quickly than a soccer ball. With a parachute, the soccer ball falls more quickly. Why is this? Massive objects, such as runaway trains, take a lot of force to stop! This explains why the golf ball falls more quickly than the soccer ball without a parachute but more slowly with a parachute. Without a parachute, the soccer ball has much greater air resistance than the golf ball, so it is slowed more than the golf ball. With a parachute, the air resistance of each ball is about the same. The golf ball, which is lighter, is slowed down more.

What would a falling object look like in slow motion? It would start slow then accelerate. See picture

