

## PART IA. VOCABULARY REVIEWS

On the line at the left, write the term that correctly completes each statement. Use each term once.

1.

average velocity	speed	clock reading	time interval
rise ( $\Delta x$ )	constant velocity	vector	displacement
run ( $\Delta y$ )	initial velocity	acceleration	final velocity
average speed	scalar	slope	acceleration due to gravity ( <b>g</b> )

1. \_\_\_\_\_ rise ( $\Delta y$ ) \_\_\_\_\_ The vertical separation of any two points on a curve is the \_\_\_\_\_
2. \_\_\_\_\_ time interval \_\_\_\_\_ The difference between two clock readings is the \_\_\_\_\_
3. \_\_\_\_\_ clock reading \_\_\_\_\_ A measurement of time is a \_\_\_\_\_
4. \_\_\_\_\_ displacement \_\_\_\_\_ The change in position of an object is the \_\_\_\_\_
5. \_\_\_\_\_ run ( $\Delta x$ ) \_\_\_\_\_ The horizontal separation of any two points on a curve is the \_\_\_\_\_
6. \_\_\_\_\_ constant velocity \_\_\_\_\_ An object that has the same average velocity for all time intervals is moving at \_\_\_\_\_
7. \_\_\_\_\_ scalar \_\_\_\_\_ A quantity that has only magnitude is a \_\_\_\_\_ quantity.
8. \_\_\_\_\_ speed \_\_\_\_\_ The magnitude of velocity is the \_\_\_\_\_
9. \_\_\_\_\_ slope \_\_\_\_\_ The ratio of rise to run is the \_\_\_\_\_ of a line of a graph.
10. \_\_\_\_\_ vector \_\_\_\_\_ A quantity that has both magnitude and direction is a \_\_\_\_\_ quantity.
11. \_\_\_\_\_ average velocity \_\_\_\_\_ The change of position divided by the time interval over which the change occurred is the \_\_\_\_\_
12. \_\_\_\_\_ acceleration \_\_\_\_\_ The change of velocity divided by the time interval over which the change occurred is the \_\_\_\_\_
13. \_\_\_\_\_ average speed \_\_\_\_\_ The total distance divided by the total time.
14. \_\_\_\_\_ initial velocity \_\_\_\_\_ The velocity when the clock reading is zero is the \_\_\_\_\_
15. \_\_\_\_\_ final velocity \_\_\_\_\_ The velocity after acceleration has occurred is the \_\_\_\_\_
16. \_\_\_\_\_ (**g**) acceleration due to gravity \_\_\_\_\_ The constant acceleration that acts on falling bodies is \_\_\_\_\_

2.

kg velocity	Newton s	meter m/s	acceleration $m/s^2$
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1. velocity The slope of a position-time graph gives the \_
2. acceleration The slope of a velocity-time graph gives the \_\_\_\_
3. kg The units of mass
4. N The units of weight
5. s The units of time
6. m The units of distance
7. m/s The units of velocity
8.  $m/s^2$  The units of acceleration

3.

acceleration components <b>Pythagorean theorem</b>	equilibrium resultant	zero head-to-tail	range magnitude
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1. acceleration Along the path of a projectile the \_\_\_\_\_ is constant.
2. magnitude The size of a quantity is the \_\_\_\_\_
3. resultant A vector that represents the sum of two other vectors is the \_\_\_\_\_
4. Pythagorean Theorem The \_\_\_\_\_ is a mathematical method to find the resultant.
5. head-to-tail The \_\_\_\_\_ is a graphical method to find the resultant.
6. equilibrium When the net sum of all forces acting on an object is zero, the object is said to be in \_\_\_\_\_
7. zero The vertical velocity at the top of a projectile's path is \_\_\_\_\_
8. components When a projectile is thrown at an angle, its initial velocity has two \_\_\_\_\_
9. range Another name given to the horizontal distance achieved by a projectile is the \_\_\_\_\_

4.

action-reaction	<b>kinematics</b>	friction	net force
static friction	gravitational force	drag force	inertia
coefficient of friction	Newton	normal force	mass
Newton's first law	terminal velocity	dynamics	
Newton's second law	applied force	magnetic force	
Newton's third law	weight		

1. applied force A push or a pull is a(n) \_\_\_\_\_
2. Newton's 3<sup>rd</sup> law When one object exerts a force on a second object, the second object exerts a force on the first that is equal in magnitude but opposite in direction, this is a statement of \_\_\_\_\_
3. net force The vector sum of all forces on an object is the \_\_\_\_\_
4. gravitational force The agent of the \_\_\_\_\_ is the mass of the Earth
5. magnetic force The \_\_\_\_\_ is an example of a field force
6. normal force Is a perpendicular contact force that is exerted by a surface
7. Newton's 1st law An object with no net force acting on it remains at rest or moves with constant velocity in a straight line; this is a statement of \_\_\_\_\_
8. terminal velocity The constant velocity reached by a falling object is the \_\_\_\_\_
9. inertia The tendency of an object to remain either at rest or in constant motion is \_\_\_\_\_
10. mass The \_\_\_\_\_ is the amount of matter of an object.
11. weight Is another name given to the gravitational force
12. coefficient of friction In determining the force of friction, the constant that depends on the nature of the two surfaces in contact is the \_\_\_\_\_
13. friction The force that opposes motion between two surfaces that are in contact is \_\_\_\_\_
14. Newton's 2nd law The acceleration of a body is directly proportional to the net force on it and inversely proportional to its mass; this is a statement of \_\_\_\_\_
15. drag force The friction-like force caused by air resistance is the \_\_\_\_\_
16. kinematics The study of how objects move is \_\_\_\_\_

17. static friction The force between surfaces that opposes the start of motion is \_\_\_\_\_
18. Newton One \_\_\_\_\_, a unit of force, is equal to the amount of force that causes a mass of one kilogram to accelerate at a rate of one meter per second squared.
19. action-reaction The pair of opposite but equal forces that two objects exert on each other are the \_\_\_\_\_
20. dynamics The study of why objects move as they do is \_\_\_\_\_

## PART IB. MULTIPLE CHOICE

1. Speed is
- A) a measure of how fast something is moving.
  - B) the distance covered per unit time.
  - C) always measured in terms of a unit of distance divided by a unit of time.
  - D) all of the above**
2. One possible unit of speed is
- A) miles per hour.
  - B) kilometers per hour.
  - C) meters per second.
  - D) all of the above**
3. When you look at the speedometer in a moving car, you can see the car's
- A) instantaneous speed.**
  - B) average speed.
  - C) instantaneous acceleration.
  - D) average acceleration.
4. Suppose you take a trip that covers 240 km and takes 4 hours. Your average speed is
- A) 480 km/h.
  - B) 240 km/h.
  - C) 120km/h.
  - D) 60 km/h.**
5. Acceleration is defined as the change in
- A) position divided by the time interval.
  - B) velocity divided by the time interval.**
  - C) time it takes to move from one speed to another speed.
  - D) time it takes to move from one place to another place.

6. Suppose you are in a car that is going around a curve. The speedometer reads a constant 30 miles per hour. Which of the following is NOT true?

- A) You and the car are accelerating.
- B) Your speed is constant.
- C) Your velocity is constant.**
- D) Your acceleration is constant.

7. A ball is thrown straight up. At the top of its path its acceleration is

- A)  $0 \text{ m/s}^2$
- B) about  $5 \text{ m/s}^2$
- C) about  $10 \text{ m/s}^2$**
- D) about  $20 \text{ m/s}^2$

8. A vector is a quantity that has

- A) magnitude and time.
- B) magnitude and direction.**
- C) time and direction.

9. When velocity is represented as a vector

- A) the length of the arrow represents the speed.
- B) the length of the arrow is drawn to a suitable scale.
- C) the direction of the arrow shows the direction of motion.
- D) all of the above**

10. Which of the following would NOT be considered a projectile?

- A) A cannonball thrown through the air
- B) A cannonball rolling down a slope**
- C) A cannonball thrown straight up
- D) A cannonball rolling off the edge of a table

11. The horizontal component of a projectile's velocity is independent of

- A) the vertical component of its velocity**
- B) the range of the projectile.
- C) time.

12. A ball is thrown into the air at some angle between 10 degrees and 90 degrees. At the very top of the ball's path, its velocity is

- A) entirely vertical.
- B) entirely horizontal.**
- C) both vertical and horizontal.
- D) There's not enough information given to determine.

13. Whirl a rock at the end of a string and it follows a circular path. If the string breaks, the tendency of the rock is to
- A) follow a spiral path.
  - B) continue to follow a circular path.
  - C**) follow a straight-line path.
14. The law of inertia states that an object
- A) at rest will remain at rest unless acted on by an outside force.
  - B) will continue moving at the same velocity unless an outside force acts on it.
  - C) will continue moving in a straight line unless an outside force acts on it.
  - D**) all of the above
15. The law of inertia applies to
- A) moving objects.
  - B) objects at rest.
  - C**) both moving and non-moving objects.
16. After a cannon ball is fired into frictionless space, the amount of force needed to keep it going equals
- A) twice the force with which it was fired.
  - B) the same amount of force with which it was fired.
  - C) one half the force with which it was fired.
  - D**) zero, since no force is necessary to keep it moving.
17. Which has more mass, a kilogram of feathers or a kilogram of iron?
- A) The feathers
  - B) The iron
  - C**) Neither. The masses are equal.
18. A 10-N force and a 30-N force act on an object in opposite directions. What is the net force on the object?
- A) 40N
  - B) 30 N
  - C**) 20 N
  - D) 10 N
19. A tennis ball and a solid steel ball the same size are dropped at the same time. Which ball has the greater force acting on it?
- A) The tennis ball
  - B**) The steel ball
  - C) They both have the same force acting on them.

20. A tennis ball and a solid steel ball the same size are dropped at the same time. In the absence of air resistance, which ball has the greater acceleration?

- A) The tennis ball
- B) The steel ball
- C) They both have the same acceleration.**

21. As he falls from a high-flying stationary helicopter, Jim's velocity increases and his acceleration

- A) decreases.**
- B) remains the same.
- C) increases.

22. When Jim is flying at terminal velocity

- A) his velocity is constant.
- B) his net force is zero.
- C) both of the above are true.**
- D) none of the above are true.

23. A high school student hits a nail with a hammer. During the encounter, there is a force

- A) on the hammer but not on the nail.
- B) on the nail but not on the hammer.
- C) on the nail and also on the hammer.**

24. Whenever an object exerts a force on another object, the second object exerts a force of the same magnitude, but in the opposite direction to that of the first object.

- A) Always true**
- B) Sometimes true
- C) Always false

25. A woman weighing 500 N sits on the floor. She exerts a force on the floor of

- A) 1000 N.
- B) 500 N.**
- C) 250 N.
- D) 50N.

26. As a 500 N woman sits on the floor, the floor exerts a force on her of

- A) 1000 N.
- B) 500 N.**
- C) 250 N.
- D) 50N.

27. Forces always occur

- A) when velocities are constant.
- B) as single quantities.
- C) in pairs.**
- D) in triplets.

**28.** An unfortunate bug splatters against the windshield of a moving car. Compared to the force of the car on the bug, the amount of force of the bug on the car is

- A) larger.
- B) smaller.
- C) the same.**

**29.** An unfortunate bug splatters against the windshield of a moving car. Compared to the deceleration of the car, the deceleration of the bug is

- A) larger.**
- B) smaller.
- C) the same.

**30.** If a horse pulls on a wagon at rest, the wagon pulls back equally as much on the horse. Will the wagon be set into motion?

- A) No, because the forces cancel each other.
- B) Yes, because there is a net force acting on the wagon.**
- C) Yes, because there is a time delay between action and reaction.
- D) Yes, because the horse's pull on the wagon is larger than the wagon's pull on the horse.