Eighth Grade Science Essential questions

Forces and Motion

1. ______ occurs when there is a change in position of an object with respect to a reference starting point. (motion)

2. _____ can also be described by the relationship between distance an object travels and the period of time it travels. (Motion)

3. The ____ position of an object is determined by measuring the change in position and direction of the segments along a trip. (Final)

4. ______ is the location of an object. (Position)

5. An object changes position if it moves relative to a _______ point. (Reference)

6. _______ (the change in position) is determined by the distance and direction of an object's change in position from the starting point. (Displacement)

7._____ is the line, or path along which something is moving, pointing, or aiming. (Direction)

8. Direction is measured using a _____ point with terms such as up, down, left, right, forward, backward, toward, away from, north, south, east, or west. (Reference)

9. Using the data below determine the change in the object's _____ based On its final position, distance, and direction, from a starting point. (Position)

10. The measurement of motion is a ____. (rate)

11. ______ can also be described by the relationship between distance an object travels and the period of time it travels. (motion)

12. ______ is a measure of how fast something moves a particular distance (for example, meters) over a given amount of time (for example, seconds). (Speed)

13. Therefore, speed is the rate of change of the _____ of an object, or how far something will move in a given period of time. (Position)

14. Speed does not necessarily mean that something is moving _____. (Fast)

15. A graph that can be used to represent how both speed and distance change with time is called a _____________ graph. (Time-distance)

16. For a ________ graph, time (an independent variable) is plotted on the x-axis and the distance (the dependent variable) is plotted on the y-axis. (Time-distance)

17. The <u>slope</u> of the line can tell the relative _____ of the object. (Speed)

18. When the slope of the line is _____, the speed is faster than if the slope were flatter. (Steep)

19. When the slope of the line is flatter, the speed is ____. (Slower)

20. When the slope of the line is ________ to the x-axis, the speed is zero (the object is not moving). (Horizontal)

21. _______ occurs when there is a change in position of an object with respect to a reference starting point. (Motion)

22. The _____ position of an object is determined by measuring the change in position and direction of the segments along a trip. (Final)

23. _______ is the location of an object. (Position)

24. An object changes position if it moves relative to a _____ point. (Reference)

25. The change in position is determined by the distance and direction of an object's change in position from the starting point is called ______. (Displacement).

26. Direction is the ____, or path along which something is moving, pointing, or aiming. (Line)

27. Direction is measured using a ______ ______with terms such as up, down, left, right, forward, backward, toward, away from, north, south, east, or west. (Reference point)

28. Motion can also be described by the relationship between distance an object travels and the period of time it travels. This measurement of motion is a ___. (Rate)

29. ______ speed can be calculated by dividing the total distance the object travels by the total amount of time it takes to travel that distance. (Average)

30. While the speed of the object may vary during the total time it is moving, the ______ speed is the result of the total distance divided by the total time taken. (Average)

31. ______ measurements contain a unit of distance divided by a unit of time. Examples of units of speed might include "meters per second" (m/s), "kilometers per hour" (km/h), or "miles per hour" (mph or mi/hr.). (Speed)

32. Average speed can be calculated using the formula v=d/t. What are the variables?
(A. ***v*** is the average speed of the object)
(B. ***d*** is the total distance or length of the path of the object)
(C. ***t*** is the total time taken to cover the path)

33. _____ (including gravity and friction) can affect the speed and direction of an object. (Forces)

34. _______ is a force that always attracts or pulls objects toward each other without direct contact or impact. (Gravity)

35. Gravitational attraction depends on the _____ of the two objects and the distance they are apart. (Mass)

36. Objects on Earth are pulled toward the _____ of Earth. (Center)

37. The force of gravity, like all other forces, can cause ______ in the speed of objects. (Changes)

38. As an object falls, its speed will continually ______as Earth's gravity continually pulls it downward. When air resistance is ignored, all objects will speed up at the same rate as they fall. (Increase)

39. ________ can also cause an object that is thrown into the air to change its upward motion, slow down, and fall back toward Earth's surface. (Gravity)

40. The _____ of Earth's gravity keeps the Moon in orbit; the moon is constantly changing direction because of gravity. (Pull)

41. ______ is a force that occurs when one object rubs against another object. (Friction)

42. What two factors determine the amount of friction? (The kinds of surfaces, and the force pressing the surfaces together)

43. ______ is the force that acts to resist sliding between two surfaces that are touching. It can slow down or stop the motion of an object. (Friction)

44. The slowing force of friction always acts in the direction _______ to the force causing the motion. (Opposite)

45. _______ slows or stops the motion of moving parts of machines. (Friction)

46. _______ can be the force that makes it difficult to start an object moving. (Friction)

47. Enough force must be applied to a nonmoving object to overcome the between the touching surfaces. (Friction)

48. The ________the two surfaces are, the less friction there is between them; therefore, the moving object will not slow down as quickly. (Smoother)

49. Friction between surfaces can be ______, in order for objects to move more easily, by smoothing the surfaces, using wheels or rollers between the surfaces, or lubricating/oiling the surfaces. (Reduced)

50. If ______ could be removed, an object would continue to move. (Friction)

51. The ______ force pushing the two surfaces together, the stronger friction prevents the surfaces from moving. (Greater)

52. As an object gets heavier, the force of _____ between the surfaces becomes greater. (Friction)

53. To move a heavy object, a greater ______ must be applied to overcome the friction between the surfaces. (Force)

54. Varying the amount of force or mass will affect the ______ of an object. (Motion)

55. If an object is in motion and more force is applied to it, the object will begin moving ______. (Faster)

56. If two objects have the same _____ and a greater force is applied to one of the objects, the object which receives the greater force will change speeds more quickly. For example if a ball is hit harder, it will speed up faster. (Mass)

57.  If an object must be slowed down quickly, the force applied to the object must be ______ than what is needed for a gradual slowing down. For example, the greater the force applied to the brakes of a bicycle, the more quickly it will slow down or stop. (Greater)

58. Varying the amount of _____ applied to a moving object can also change the direction that the object is moving more or less quickly. For example, a baseball pitched toward the batter may quickly change direction and speed if hit very hard, or may change direction and speed more slowly if hit softly as with a bunt.  (Force)

59.  If a heavy (more massive) object is in motion, _____ force must be applied to get the object moving faster. (More)

60.  If the same force is applied to two objects, the object with the _____ mass will change speeds more quickly. For example if a baseball and a bowling ball are thrown with the same force the baseball will speed up faster. (Smaller)

61. In order to slow down or stop a heavier (more massive) object, the force on that object must be _____ than for a less massive object. For example, if the same braking force is applied to a small car and a large truck, the car will slow down more quickly. (Greater)

62. It is more difficult to change the _____ of a heavy moving object, than one that is lighter in mass. (Direction)

63.  Forces have a ______ (strength) and a direction. (Magnitude)

64.  Forces can be represented as arrows with the length of the arrow representing the magnitude of the force and the head of the arrow pointing in the direction of the force. Using such arrows, the resulting force (____ _____) and direction can be determined. (Net force)

65.  Forces acting on an object can be balanced or _______. (Unbalanced)

66.  ______ forces will cause no change in the motion of an object. (Balanced)

67.  ______ forces acting on an object in opposite directions and equal in strength do not cause a change in the speed/magnitude or direction of a moving object. (Balanced)

68.  Objects that are not moving will not start moving if acted on by _____ forces. (Balanced)

69.  For example, in arm wrestling where there is no winner, the force exerted by each person is equal, but they are pushing in opposite directions. The resulting force (___ force) is zero.  (Net)

70. In a tug of war, if there is no movement in the rope, the two teams are exerting equal, but opposite forces that are balanced. Again, the resulting force (___ force) is zero.  (Net)

71. ________forces are not equal, and they always cause the motion of an object to change the speed and/or direction that it is moving. (Unbalanced)

72.  When two unbalanced forces are exerted in opposite directions, their combined force is equal to the _____ between the two forces. (Difference)

73.  The magnitude and direction of the net force affects the resulting ____. (Motion)

74.  This combined force is exerted in the direction of the ____force. For example, if two students push on opposite sides of a box sitting on the floor, the student on the left pushes with less force (small arrow) on the box than the student on the right side of the box (long arrow). The resulting action (net force: smaller arrow to the right of the =) shows that the box will change its motion in the direction of the greater force.
(Larger)

75. Or, if in a tug of war, one team pulls harder than the other, the resulting action (___ force) will be that the rope will change its motion in the direction of the force with the greater strength/magnitude. (Net)

76.  If unbalanced forces are exerted in the same _____, the resulting force (net force) will be the sum of the forces in the direction the forces are applied.  For example, if two people pull on an object at the same time in the same direction, the applied force on the object will be the result of their combined forces.  (Direction)

77.  When forces act in the same direction, their forces are _____. When forces act in opposite directions, their forces are subtracted from each other. (Added)

78.  _______ forces also cause a nonmoving object to change its motion.  If there is no net force acting on the object, the motion does not change. (Unbalanced)

79.  If there is net force acting on an object, the speed of the object will change in the direction of the ___ force. (Net)

80. _____ is the tendency of objects to resist any change in motion.  (Inertia)

81. _____ is a property of the object; it is not a force. (Inertia)

82.  It is the tendency for objects to stay in motion if they are moving or to stay at rest if they are not moving unless acted on by a ___ force. (Outside)

83. The more mass an object has, the harder it is to start it in motion, to slow it down or speed it up, or to turn it.  The more mass an object has, the more ____ it has.  (Inertia)

84. □□□□□□ causes a passenger in a car to continue to move forward even though the car stops.  This is the reason that seat belts are so important for the safety of passengers in vehicles. (Inertia)

85.  ______ is the reason that it is impossible for vehicles to stop instantaneously. (Inertia)

86. _____is the reason that it is harder to start pushing a wheelbarrow full of bricks than to start pushing an empty wheelbarrow. The filled wheelbarrow has more mass and therefore, more inertia. (Inertia)

87.  _____ is also the reason that it is harder to stop a loaded truck going 55 miles per hour than to stop a car going 55 miles per hour. The truck has more mass resisting the change of its motion and therefore, more inertia. (Inertia)