WALL-E Forces and Energy Final

Name _____ Period_____ Date: _____

Scene 2 – Walk Home

1. To get to the BL Transit Train Station, WALL-E must travel 1 mile past the BnL (Buy-N- Large Superstore). The location of the train station is compared to a:
Position Reference Point Motion Speed

2. WALL-E travels across the city. We can tell that WALL-E is in motion because his motion is measured relative to:
distance velocity our observation speed

3. A person sitting on the flying Axiom ship sees a WALL-E unit that appears to be stopped. The roach outside the Axiom ship sees both the Axiom ship and WALL-E moving. This describes: _____

ene 3 – WALL-E'S Truck

4. WALL-E lowers the ramp to enter his home. The ramp is an example of what type of simple machine? _____

5. The sandstorm that hits WALL-E's truck travels 100 km in half an hour. What is the average speed of the storm in meters per second? _____.

6. The sandstorm changed direction and increased its speed. This is an example of a change in _____.

7. If you wanted to show the relationship between speed, time and distance, which formula would you use?

l Day At Work

8. WALL-E left his truck to go to work. He went from 0 m/s to 30 m/s in 2 seconds. What is his acceleration?
5 m/s^2 10 m/s^2 15 m/s^2 30m/s^2

9. WALL-E makes cubes of garbage and starts to build a wall. As he makes the cubes, he pulls the garbage towards him and then lifts and pushes the finished cube onto the wall. He is using a _____ which is a push or a pull.

10. WALL-E uses his hands to dig up the plant from the dirt. He is using his hands as a: lever wedge wheel & axle pulley screw

estrial Vegetation Evaluator) Arrives

11. WALL-E is chasing the dot of red light. They both move at different speeds while moving in the same direction. The two of them have different

accelerations speeds velocities position

12. WALL-E increases his speed as he approaches the red light. His acceleration is in the same/opposite direction of his motion.

13. The rock on WALL-E's head falls to the ground. This is due to _____.

14. The rock also has energy due to its position or shape. It is _____ energy. When it falls to the ground is becomes _____ energy.

15. Eve's rocket ship lifts off the ground. When the rocket takes off it pushes fuel exhaust downward. The exhaust pushes back on the rocket sending it upward. The exhaust exerts a force that is equal in size and in the opposite direction back on the first object. This is an example of the action and reaction forces related to Newton's _____ law.

16. Newton's second law states that an increased force in the same direction results in an increased/decreased speed/acceleration

_____

17. WALL-E and the grocery carts keep going in a straight line until they hit the windows and sliding glass door. The windows and door apply an unbalanced force that stops the forward motion of the grocery carts. _____ is the reason the carts kept going in a straight line until a force acted upon them.

This is also related to Newton's _____ Law.

18. The metal pipes were at rest until WALL-E hits them. Then they fall on top of him. Name the <u>law</u> and write the <u>definition</u> that relates to this scenario.

_____

_____

_____

_____

19. EVE spins in a circle with an acceleration of 20 m/s^2. If she has a mass of 30 kg, what was the force with which she was spinning?

20 N 30 N 50 N 600 N

20. WALL-E uses a crowbar to open a compartment on Eve's side. This tool is an example of what type of simple machine?

1st class lever 2nd class lever 3rd class lever screw wedge

21. There is a benefit for using this simple machine. The number of times a machine multiplies the input force is called the machine's _____.

22. WALL-E pulls Eve with a string of lights. He is using a _____ to change Eve's motion.

23. When EVE's rocket moves further away from Earth, the gravity

disappears increases decreases is unaffected

24. Which force keeps the moon orbiting around the Earth?

Friction Buoyancy Gravity Hydraulic

25. When WALL-E was on Earth his weight was 490 Newtons and he had a mass of 50 kg. On the Moon, what would happen to his mass and weight?

_____
_____
_____

26. What is the definition of weight?

_____
_____

27. EVE's spaceship moves towards the Axiom at a speed of 28 m/s. As it arrives at the loading dock of the Axiom 15 minutes later, it slows to a speed of 6 m/s. What is the acceleration of EVE's spaceship?

$-5.3\ m/s^2$ $8\ m/s^2$ $-0.024\ km/hr^2$ $-88\ m/s^2$

_____

28. John falls out of his hover chair and is unable to move on his own. This is because the greater his _____ the greater his _____, or resistance to a change in his motion.

_____

29. The Rogue Robots exert a force and break through the glass in the repair station. Which of these is the action force and which is the reaction force?

_____

_____

This is an example of Newton's _____ Law of Motion.

_____

30. Eve picks up WALL-E and moves him into the escape pod. How do we know that WALL-E has moved? (describe his motion using a stationary reference point!)

_____

_____

_____

_____

_____

31. When WALL-E sets off the extinguisher, he accelerates. This is Newton's _____ Law of motion.

32. WALL-E accelerates in the opposite direction to the exhaust. This is Newton's _____ Law. An action force and its reaction force are equal in _____ and opposite in _____.

33. Wall-E's mass is 50 kg and he is accelerating at 4.0 m/s^2. From this data you can tell that WALL-E is applying a force of _____ N.

34. If WALL-E applied a force of 500 N to his 50kg body, the acceleration would be _____m/s^2

35. If WALL-E's mass becomes greater, his acceleration would increase/decrease.

36. As soon as WALL-E shuts the extinguisher off, he continues to move at a constant velocity. This is Newton's _____ Law.

37. Without the extinguisher, WALL-E would move towards the AXIOM ship which is larger than he is. The two factors that affect gravitational attraction between objects are _____ and _____.

_____

38. John and Mary move their feet through the water in the pool. This is an example of _____ friction.

39. They kick water onto the lifeguard robot causing it to short circuit. This is because the robot runs on _____ energy.

40. WALL-E's wheels turn as he moves across the floor to find EVE. This is an example of _____ friction.

41. MO the cleaning robot scrubs the floor removing the foreign contaminant left from WALL-E's wheels. This is an example of _____ friction.

_____

42. When the small Go-4 robot throws the boot, the boot changes position because the Go-4 robot exerts a _____ on the boot.

43. Auto is based on a simple machine. It is a _____. This simple machine makes work easier by changing the _____ or the _____ of a force.

_____

44. EVE and WALL-E get compacted into a large trash cube and are unable to move. This is an example of _____ friction.

_____

45. The vacuum cleaner rouge robot sneezes dust which causes him to move backwards. This is an example of Newton's _____ Law.

_____

46. The Captain pulls on Auto' s wheel with a force of 4 N, and Auto pulls on the wheel from the opposite direction with a force of 3 N. If there is no friction, which direction will the wheel turn? Towards the Captain or Auto? _____

The net force on Auto's wheel is _____.

47. As the Axiom ship tilts, the passengers begin to fall out of their chairs and move across the floor. This is an example of _____ friction.

_____

48. The Axiom ship would have more gravitational pull than WALL-E. This is because the more _____ an object has, the greater the gravitational force.

49. The rogue robots rush out of the Axiom to follow EVE and WALL-E. Some move ahead of the others, therefore they have more kinetic energy due to their _____. The other factor that affects kinetic energy is the _____ of an object.

50. WALL-E uses the sun's energy to charge his battery. He is converting _____ energy into _____ energy.

EXTRA CREDIT: Wall-E needs to clean up the garbage covering a large metropolitan city and place it into (skyscraper-sized) piles. He is able to compact the garbage into **four-foot-square cubes**. It takes him **4 seconds** to collect and compact each cube. Assuming the entire city is **5 feet** deep in garbage and has an area of **10 mi^2**,

1. How long will it take him to stack it into piles?

2. Could this be done in the 700 years before humans return to Earth?

SHOW YOUR WORK!!