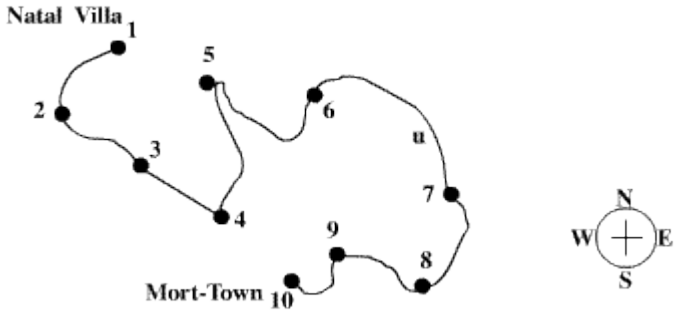
Name _____

PHYSICS TEST

The following picture is an **overhead** shot of a curvy mountain road. Look at the picture and answer the following questions:



1. Suppose you were driving on this road. Which line represents distance?

- A. A straight line from 1 to 10
- B. A straight line from 1 to 4, then 4 to 10
- C. The complete curve from 1 to 10
- D. The line from 1 to 9
- E. None of the above answers

2. Which line represents displacement?

- A. A straight line from 1 to 10
- B. A straight line from 1 to 4, then 4 to 10
- C. The complete curve from 1 to 10
- D. The line from 1 to 9
- E. None of the above answers

3. Suppose the trip is 500 miles long and took you 10 hours. What is your rate, or average speed?

- A. 5000 miles per hour
- B. 500 miles per hour
- C. 50 miles per hour
- D. 5 miles per hour
- E. None of these

4. If an airplane flew a straight line between these two cities and it traveled at 90 miles per hour and it was a three-hour flight, what is the distance the airplane traveled?

- A. 30 miles
- B. 3 miles
- C. 270 miles
- D. 300 miles
- E. None of these

5. True (A) or False (B) Distance = Rate times Acceleration

Now let's look at the slopes of these mountains. Here are what the symbols mean :

u = uphill d = downhill

* = summit

6. At which point do you have the greatest potential energy?

A. 1 F. 6

B. 2 G. 7

C. 3 H. 8

D. 4 I. 9

E. 5 J. 10

7. Remember E_P=w x h where w=weight and h=height. If the weight of the car is 1000 Newtons, at the highest point see problem #6) what is the potential energy of the car?

- A. 5 Joules
- B. 50 Joules
- C. 5,000 Joules
- D. 50,000 Joules
- E. None of the above

8. At which point do you have the greatest kinetic energy?

A. 1 F. 6

B. 2 G. 7

C. 3 H. 8

D. 4 I. 9

E. 5 J. 10

9. At which point is there a mix of kinetic and potential energy?

A. 1 F. 6

B. 2 G. 7

C. 3 H. 8

D. 4 I. 9

E. 5 J. 10

10. At which point is centripetal force greatest?

A. 1 F. 6

B. 2 G. 7

C. 3 H. 8

D. 4 I. 9

E. 5 J. 10

11. Suppose your breaks went out at point 6. Why wouldn't you make the next turn?

- A. Centripetal force pushes you outside
- B. A car in motion stays in motion
- C. Brakes have no effect on this problem
- D. Because the brakes stopped, the car will stop before you get there
- E. Steering wheels don't work if brakes don't work

12. At point 4 you run into some ice. Why is it dangerous to drive on ice?

- A. Ice has too much mass
- B. Ice has too much friction
- C. Ice has too little mass
- D. Ice has too little friction
- E. The ice puts force on your car that makes it go off the road.

13. The stretch of road from 3 to 4 is perfectly flat. There are no turns at all, and you don't need to brake, turn, or change your velocity. Are you accelerating between 3 and 4?

- A. Yes, because you are still moving.
- B. Yes because you have to keep your foot on the pedal
- C. No because you can't accelerate on flat roads
- D. No because you aren't changing velocity
- E. None of the above

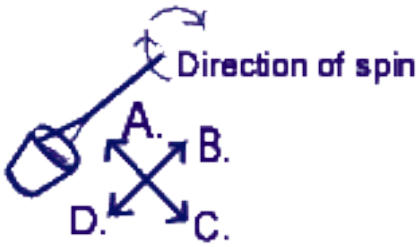
OK, enough with that car thing. Match the following words with their definitions.

14. Potential Energy	A. F x D. To do this, you must move something.
15. Newton	B. Stored energy - a rock on a cliff
16. Joule	C. Energy of motion - a rock rolling down a cliff
17. Work	D. Unit of energy, abbr. J, equal to 1 Newton Meter
18. Kinetic Energy	E. Standard unit of force, abbr. N, equal to 1kg/ms2

Five more:

19. Inertia (Momentum)	A. A push or a pull, equal to MxA
20. Force	B. Amount of matter, or material in an object
21. Mass	C. Tendency of an object to resist change in motion
22. Weight	D. A change in velocity or speed
23. Acceleration	E. The effect of gravity on mass

24. In linear acceleration when you move forward, you feel like you're being pushed back. The feeling is **opposite** to the direction of acceleration. In the following diagram, which arrow correctly shows the direction of acceleration in centripetal force?



Fill in the blanks for Newton's laws:

Newton's 1st: An object in ___25___ tends to stay in ___25___ and an object at ___26___ tends to stay at ___26___ unless acted upon by an ___27___ ___28___.

Newton's 2nd. Force = ___29___ times ___30 ___

Newton's 3rd. For every ___31___ there is an ___32___ and ___33___ ___34___.

ANSWERS for 25-34

A. Acceleration B. Action C. Displacement D. Equal E. Force F. Gravity	G. Inertia H. Mass I. Momentum J. Motion K. Opposite	L. Outside M. Reaction N. Rest O. Time P. Vector

Match the example with Newton's laws

35. A large dog runs across a slippery floor. It tries to stop, but runs into a table.

- A. Newton's 1st.
- B. Newton's 2nd.
- C. Newton's 3rd.

36. A girl on a boat tries to jump out onto the shore, but it pushes the boat backward.

- A. Newton's 1st.
- B. Newton's 2nd.
- C. Newton's 3rd.

37. A half-pound ball and 10 pound ball are dropped from a tall tower. They hit the ground at the same time, but the heavier one leaves a crater.

- A. Newton's 1st.
- B. Newton's 2nd.
- C. Newton's 3rd.

38. You're in space aiming a squirt gun at your friend. You pull the trigger and find yourself moving backward.

- A. Newton's 1st.
- B. Newton's 2nd.
- C. Newtons 3rd.

39. Your friend is balancing on a pop-can. You kick the can and it goes flying, but your friend falls straight down.

- A. Newton's 1st.
- B. Newton's 2nd.
- C. Newton's 3rd.

40. True (A) or False (B) These laws were created by a man at a Fig Newton factory.

For all of the following, tell whether the forces are balanced (A) or unbalanced (B)

41. An athlete is standing atop a hill
42. A seventh grader trips and falls
43. You are walking to class
44. You are seated in your seat
45. A ping pong ball rolls around
46. Broken glass sits on the floor

47. Which of the following is a vector?

- A. Five feet high and six feet wide
- B. Six feet underground
- C. Down and out
- D. Four-score and seven years

48. If gravity is an acceleration, which of the following has the same meaning as W=MG (Weight = Mass times Gravity)

- A. Work = Force x Distance
- B. Distance = Rate x Time
- C. Force = Mass x Acceleration
- D. Potential Energy = Weight x Height

49. Where would a downhill skier have the most potential energy?

- A. Half-way up on the chair-lift
- B. At the top of the hill
- C. When going through the first curve
- D. When moving the fastest
- E. At the finish line

50. (I'll be nice) True (A) or False (B) Roller coasters involve a lot of physics.

END OF MULTIPLE CHOICE. NOW, DO THE WRITTEN PORTION

Remember the Pythagorean theorem, a2+b2=c2. Solve the following equations.

1. A man walks 3 blocks north and 4 blocks east. What how far is he from home?

2. A = 12 and C = 13. What is B?

3. D=RT If the distance is 50 miles and the rate is 50 miles per hour, how long does the journey take?

4. If the distance is 100 miles and the trip takes 4 hours, how fast are you going?

5. $E_k=1/2mv^2$. If the mass is 40 kilograms and the velocity is 4 meters per second, what is the Energy?

6. E_P=wxh (weight times height) If an object weighs 1000 Newtons and is 70 meters in the air, what is the potential energy?

7. Force is Mass times Acceleration F=MA. If the mass of an object is 1000 kilograms, and the acceleration is 2 meters per second squared, what is the force?

On this page, think about the childhood game "ring around the rosies," or a similar game. Describe how the following forces apply to it. If you were deprived of this as a child, see me. Two points per term

Work Velocity Friction	Centripetal Force Gravity Acceleration	Kinetic Energy Potential Energy Momentum (Inertia)