

Each question is worth 4 points.

1. Which number has only 2 significant zeroes?  
 A .01490    B .0020400    C 9080    D 20.0    E 1090080
2. The following data was collected when determining the density of a solid substance.  
 mass of empty graduated cylinder ..... 125.48g  
 mass of cylinder and solid ..... 176.95 g  
 mass of cylinder, solid, and water ..... 206.84 g  
 Density of water ..... 1.0 g/ml  
 Determine the density of the solid.  
 A 1.73 g/ml    B .63 g/ml    C 2.72 g/ml    D .249 g/ml    E not enough data.
3. Which conversion is NOT correct?  
 A .023 mm =  $2.3 \times 10^{-5}$  m    B 1.4 cm =  $1.4 \times 10^{-5}$  km  
 C 6.2 pm =  $6.2 \times 10^{-14}$  km    D .028 x  $10^{-4}$  Gm =  $2.8 \times 10^{-5}$  cm.  
 E .091 x  $10^{-5}$  Mg = .91 g.
4. Which of the following is NOT a vector?  
 A. force    B. mass    C. weight    D. velocity    E. displacement
5. A long distance runner is running at the rate of 4.0 miles per hour. He then doubles his speed to 8.0 miles per hour. His kinetic energy  
 A. increased by a factor of 4    B. increased by a factor of 2    C. increased by a factor of .5  
 D. decreased by a factor of .5    E. none of these
6. A baseball batter hits a ball at an angle of  $54^\circ$  with the horizontal and a speed of 28m/s. The center fielder realizes that the ball is over his head and begins to run toward deep center field. He runs at the rate of 4.0 m/s. He just catches the ball at the same level that the batter hit the ball. What was the distance between the batter and the fielder, when the ball was first hit?

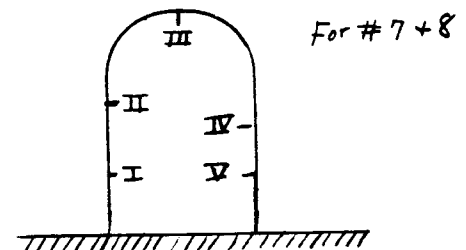
A 76 meters    B 23 meters    C 58 meters    D 95 meters    E 38 meters

7. A projectile is fired straight up. At what place will the projectile have the highest speed?(diagram)

A. I & III    B. II & IV    C. I & V    D. II  
 E. III & V

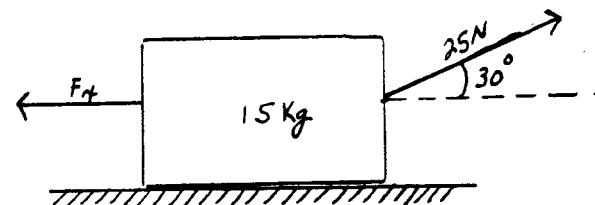
8. The projectile in #8 has zero acceleration at what point?  
 A. I    B. II    C. III  
 D. IV    E. None of these

9. A person weighs 584 Newtons on earth. On the moon his mass would be  
 A 59.6 kg    B 584 kg    C 5720 kg    D 97.3 kg    E. none of these

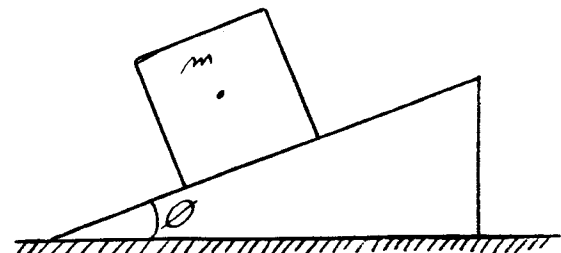


For #7 + 8

10. A box of 15 kg is resting on a smooth flat surface. A force of 25 N is applied to the right at a  $30^\circ$  angle. The acceleration = 0. What is the value of the  $F_x$ ? (diagram)  
 A -21.7N    B -25 N    C -12.5 N  
 D +21.7 N    E +12.5 N



11. A box of mass, m is resting on an incline with an angle of  $\theta$ . Which term represents the force down the plane?  
 A.  $\sin\theta mg$     B.  $\cos\theta mg$   
 C.  $\tan\theta mg$     D.  $\sin\theta F_L$     E. mg

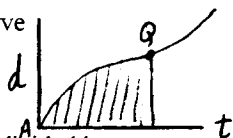


12. A soccer ball of .75 kg mass is kicked across a field with a speed of 22 m/s. It rolls through a rough section of the field where the force of friction is 2N. The rough section is 25 meters long. What is the speed of the ball when it leaves the rough section?

- A. 181.5 m/s    B. 21.9 m/s    C. 22m/s    D. 18.7 m/s    E. 15.4 m/s

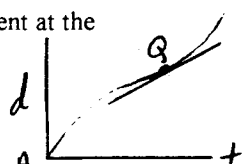
The following graph shows the distance from a starting point, A for a car moving on a straight road. Use the graph and Key to answer questions # 13 and 14.

I. The area under the curve

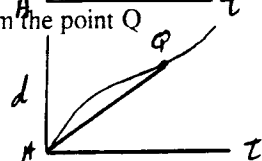


II. Area under the curve divided by the total time

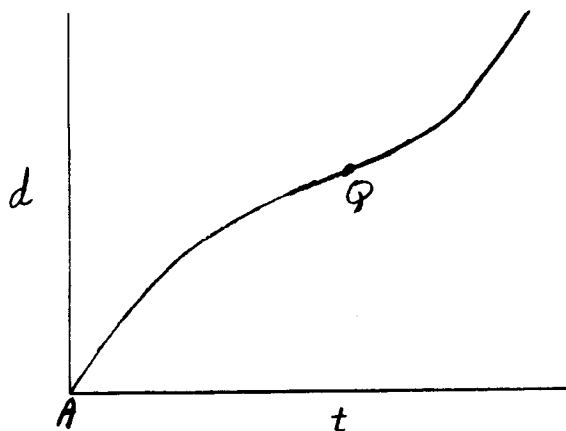
III. The slope of the tangent at the point Q.



IV. The slope of AQ from the point Q to the origin.



V. None of these



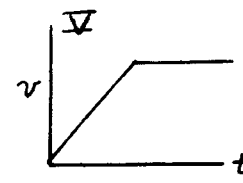
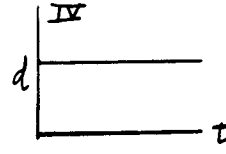
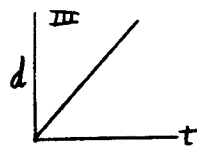
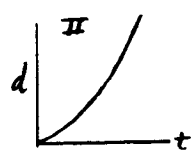
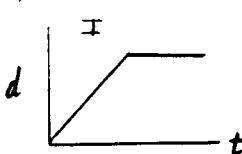
13. From the Key which represents the instantaneous velocity of the car at point Q?

- A. I    B. II    C. III    D. IV    E. V

14. From the key which represents the average velocity of the car between A and Q?

- A. I    B. II    C. III    D. IV    E. V

For Questions 15 + 16



15. Which graph best describes a mass being pulled from rest by a constant force?

- A. graph I    B. graph II    C. graph III    D. graph IV  
E. graph V

16. Which graph best describes the motion of the mass if it is being pulled by a force exactly equal to the force of friction?

- A. graph I    B. graph II    C. graph III    D. graph IV  
E. graph V

17. A person is riding in the back of a truck, which is going at a constant rate of speed. From a bow and arrow he shoots an arrow straight up. Ignoring air resistance, where will the arrow land?

- A. in front of the truck    B. on the shooter    C. behind the truck  
D. it does not come down    E. none of these choices

18. A rubber stopper is attached to a string. It is then swung in a horizontal circle with a radius of 1.1 meter. The stopper makes one revolution in 1.0 second. The stopper has a mass of .014 kg. What is the value of the force the string exerts on the stopper?

- A. 6.9N      B. 43.4 N      C. .16 N      D. .61N      E. .138

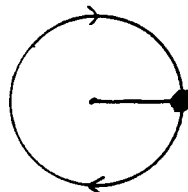
19. Use the same information in problem #18. If the radius in the problem were twice as long, but all other quantities remained the same, then what would happen to the velocity, acceleration, and force?

- A. velocity, acceleration, and force all double the original value.  
 B. velocity is doubled the original value, the acceleration is 4 times the original, and the force is twice the original.  
 C. the velocity is double the original value, the acceleration and force are both 4 times the original.  
 D. the velocity and acceleration are doubled, while the force is 4 times the original.  
 E. none of these.

20. Refer to the adjoining diagram. Which vector represents the direction of the object's velocity at point y?

A rubber stopper is being swung in a circular pathway.

- A. ←      B. ↑      C. →  
 D. ↓      E. ↙



21. One stair in a stairwell has a height of 19 cm. There are 14 steps to the second floor. A person with a mass of 75 kg travels up to the second floor in 8.5 seconds. The power in watts is closest to

- A. 230 watts      B. 2350 watts      C. 1643 watts      D. 16 watts      E. none of these.

22. Two objects starting from rest fall freely. Object A falls for 2.0 seconds, while B falls for freely for 4.0 seconds. Compared with object A, object B falls

- A. one-half as far      B. the same as A      C. twice as far      D. three times as far  
 E. four times as far.

23. The amount of work done in stopping a moving car is proportional to

- A. its kinetic energy squared      B. its velocity      C. its potential energy squared  
 D. its mass times its velocity      E. its kinetic energy.

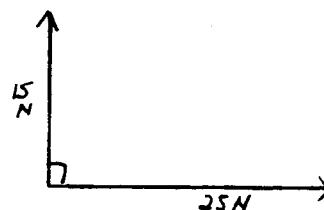
24. Two vectors are pulling on point P at the angles given.

Vector A is 25 N while vector B is 15 N.

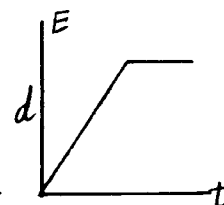
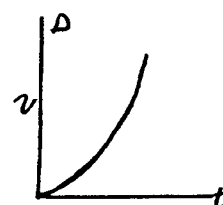
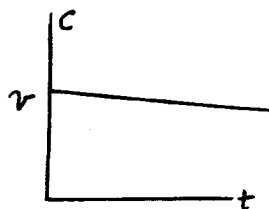
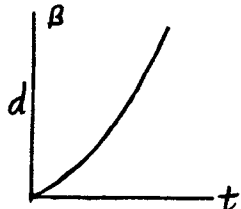
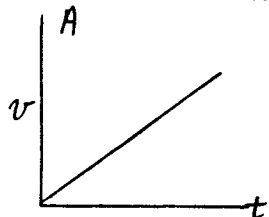
What is the value and direction of the equilibrant vector?

(all angles are measured from the north with north being 0°.)

- A. 29.2N 51°      B. -29.2 N 51°      C. 29.2 N 239°  
 D. -29.2 N 239°      E. -29.2 N 270°



25. A pitcher throws a ball from the pitcher's mound to home base. Which graph best describes the motion of the ball once released by the pitcher while in the air?



**JANUARY 15, 1998 PHYSICS EXAM**  
**ANSWER KEY PHYSICS I JANUARY 15 1998**

1	D	6	C	11	A	16	C	21	A
2	A	7	C	12	D	17	B	22	E
3	C	8	E	13	C	18	D	23	E
4	B	9	A	14	D	19	A	24	D
5	A	10	A	15	B	20	D	25	C