Physics 1407 Test No. 1 Name_____

I. TRUE – FALSE

1. If an object moves along the x-axis in the negative -x direction (to the left) with decreasing speed, its acceleration is in the negative -x direction.

2. An elevator moves in accordance with the velocity-time graph shown. One concludes that the elevator returns to and passes through its starting point two times.

3. If the net work done on a body is not zero, the body must either gain or lose kinetic energy.

4. If a fireman slides down a rope with increasing speed, the tension in the rope will be less than his weight.

5. If a block of mass M is lifted by means of an attached string with a force F equal to twice its weight, the upward acceleration of the block will have a magnitude equal to the acceleration due to gravity (g).

6. The position of an object oscillates along the x-axis according to $x = A\sin\omega t$, where $A = 3.0$cm and $\omega = \pi\ s^{-1}$. At the time $t = 0.5$s, the acceleration of the object will be zero.

7. A force of 18N is applied to the system of three blocks in contact, as shown. The force which the 3 kg block exerts on the 4 kg block is of magnitude 10N.

8. Consider two blocks of mass M initially at rest and connected by a string which breaks only if the tension is greater than Mg/2. If the string passes over a frictionless pulley, as shown, and the masses are released, the string will break.

9. If the system of blocks shown is initially at rest, they will remain at rest.

10. The width and length of a rectangle are measured to be 9.7 cm and 30.3 cm, respectively. accordingly, one calculates the area of the rectangle to be 0.029 m^2.

11. Suppose that on earth you can throw a ball vertically upward a distance of 15 m. Given that the acceleration due to gravity on planet X is 4.9 m/s^2 one would expect to be able to throw the ball to a height of 60 m on planet X.

12. Shown here are trajectories followed by two baseballs. Assuming air effects are negligible, one concludes that ball b stayed in the air longer than ball a.

13. A track star in the broad jump launches himself with a velocity of 12.2 m/s at 30° above the horizontal. He will then be in the air 2.5 seconds before returning to earth.

14. A small plane is on a compass heading of due east. Its air speed is 200 km/h. A strong wind is blowing from the southeast to the northwest at 80 km/h. The ground speed of the plane is less than 200 km/h.

15. If the resultant force acting on a body differs from zero, the momentum of the body may change, but not necessarily.

16. The system of weights shown suspended by means of a frictionless pulley system is in static equilibrium.

II. MULTIPLE CHOICE

17. Referring to the figure, during the time interval from t = 0 to t = 8.00 s, the average velocity (in m/s) is:

(a) 2.05 (b) 2.25 (c) 2.75 (d) 2.375 (e) 2.50

18. A picture is supported by two strings in various positions as shown below. The tension in each string would be greatest in case

19. A man determine the speed of sound in air by standing a distance of 1600 m from a cliff and calling “Hello”. If echoes return in 10 seconds, he should conclude the speed of sound is, in m/s:

(a) 160 (b) 1600 (c) 240 (d) 3200 (e) 320

20. Ship B, steaming at 12 miles/hour westward, is observed 1 mile due east of ship A, steaming south at 9 miles/hour. Find the velocity of ship A relative to ship B.

(a) 15 mph in the direction 37° north of east (b) 15 mph in the direction 30° south of east
(c) 15 mph in the direction 37° south of east (d) 3 mph 30° north of east

21. A 10-N fish is weighed with two scales of negligible weight, as sketched.

(a) Each scale will read 5 N.
(b) Each scale will read 10 N.
(c) The top scale will read 10 N; the bottom one will read zero.
(d) The top scale will read zero; the bottom one will read 10 N.
(e) Each scale will show a different reading, but the sum of the two values will be 10 N.

22. A projectile is fired from ground level with an initial velocity of 100 m/s which makes an angle of 37° with horizontal. The maximum height to which the projectile rises is:

(a) 184 m (b) 327 m (c) 510 m (d) 490 m (e) 230 m

23. When two vectors of magnitude 3 Glorks and 4 Glorks are added, the resultant will be a vector of magnitude:

(a) 7 Glorks (b) 1 Glork (c) 5 Glorks
(d) between 1 and 7 Glorks, but we cannot deduce the exact value without more information.
(e) which cannot be determined since Glorks are not defined in the SI system of units.

24. A block of mass M slides down a 30.0° inclined plane at constant speed. Evidently the coefficient of kinetic friction is

(a) 0.500 (b) 0.866 (c) 0.577
(d) 1.732 (e) 0.750

25. The speed of a particle in kilometers/hour is given by $v = At^3 + Bt$, with t measured in hours. What are the units of the coefficient A?

(a) dimensionless (b) km/hr^2 (c) km/hr (d) l/hr^3 (e) km/hr^4

26. The vector $\mathbf{v}_3$ in the diagram is equal to:
(a) $\mathbf{v}_1 - \mathbf{v}_2$ (b) $\mathbf{v}_1 \cos\theta$
(c) $\mathbf{v}_2 - \mathbf{v}_1$ (d) $\mathbf{v}_1 + \mathbf{v}_2$
(e) $\mathbf{v}_1/\cos\theta$

27. A 200 m wide river has a uniform flow speed of 3.0 m/s toward the east. A boat with speed of 8.0 m/s relative to the water leaves the south bank and heads in such a way that it crosses to a point directly north of its departure point. How long does it take the boat to cross the river?

(a) 27.0 s (b) 25.0 s (c) 18.2 s
(d) 40.0 s (e) 216 s

28. A body is held in equilibrium by three forces. One force of 18 pounds acts due north, and one of 24 pounds acts due east. Find the magnitude and direction of the third force.

(a) 30 lb, 217° measured ccw from due east (b) 30 lb, 37° measured ccw from due east
(c) 30 lb, 233° measured ccw from due east (d) 10 lb, 217° measured ccw from due east
(f) 10 lb, 37° measured ccw from due east

29. A 100 N weight is suspended by three strings, as shown. Find the tension in string A.

(a) 120 N (b) 200 N (c) 86.6 N
(d) 173 N (e) 50.0 N

30. A person of mass 80 kg rides in an elevator that has a downward acceleration of 1.5 m/s^2. What is the magnitude of the force of the elevator floor on the person?

(a) 664 N (b) 1176 N (c) 120 N (d) 904 N (e) 784 N

31. The block shown is pulled across the horizontal surface at a constant speed by the force shown. If M = 8.0 kg, F = 14 N, and $\theta = 60°$, what is the coefficient of kinetic friction between the block and the horizontal surface?

(a) 0.18 (b) 0.09 (c) 0.17 (d) 0.15 (e) 0.11

32. Referring to the figure, if the frictional force opposing the motion of the blocks is equal to Mg/3, one should find the acceleration to be equal to

(a) g/2 (b) g/3 (c) g/4 (d) 2g/3 (e) g/6