銘傳大學九十二學年度管理研究所碩士班招生考試

(甲組) 第一節

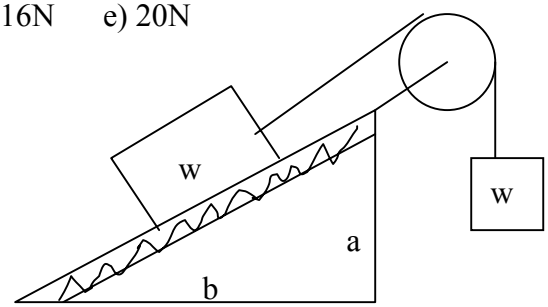
普通物理學 試題

單選題 100% (每題 2 分)可使用計算機

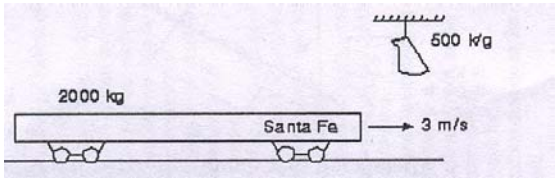
1. A nanosecond is
   a) 10^9s b) 10^3s c)10^6s d)10^{-9}s e)10^{-6}s
2. A ball rolls up a slope. At the end of three seconds its velocity is 20 cm/s; at the end of eight seconds its velocity is 0 cm/s. What is the acerage acceleration (in cm/s2) from the third to the eighth second?
   a) 2.5 b) 4.0 c) 5.0 d) 6.0 e) 7.0
3. As a rocket is accelerating vertically upward at 9.8 m/s^2 near the Earth's surface, it releases a projectile. Immediately after release the acceleration (in m/s2) of the projectile is: a) 9.8 down b) 0 c) 9.8up d) 19.6 up e) none of the above
4. The velocity of a projectile equals its initial velocity added to: a) a constant horizontal velocity b) a constant vertical velocity c) a constantly increasing horizontal velocity d) a constantly increasing downward velocity e) a constant velocity directed at the target.
5. In principle, a force is measured by measuring the _____, when the force is applied to it. a) velocity of the standard kilogram b) speed of the standard kilogram c) velocity of any object d) acceleration of the standard kilogram e)acceleration of any object.
6. A Newton is the force: a) of gravity on a 1kg body b) of gravity on a 1g body c) that gives a 1g body an acceleration of 1 cm/s^2 d) that gives a 1kg body an acceleration of 1 m/s^2 e) that gives a 1g body an acceleration of 9.8 m/s^2
7. A32-N force, parallel to the incline, is required to push a certain crate at constant velocity up a frictionless incline that is 30?above the horizontal. The mass of the crate is: a) 3.3kg b) 3.5kg c) 5.7kg d) 6.5kg e) 160kg
8. A horizontal force of 12 N pushes a 0.5-kg block against a vertical wall. The block is initially at rest. If m/s=0.6 and m/k=0.8 which of the following is true? a) The frictional force is 4.9N b) The frictional force is 7.2 N c) The normal force is 4.9 N d) The block will start moving and accelerate e) If started moving downward, the block will decelerate

9. The system shown remains at rest. The force of friction on the upper block is: a) 4N b) 8N c) 12N d) 16N e) 20N

w=20N
a=3 m
b=4 m



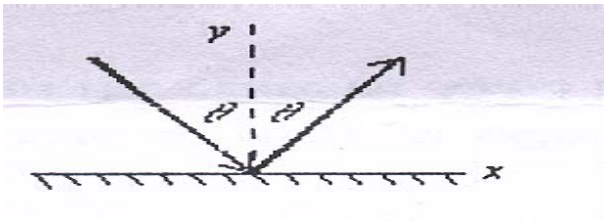
10. Which of the following is NOT a correct unit for work ? a)erg b)ft • lb c)watt d)newton • meter e)joule
11. A 2-kg particle on the end of an ideal spring is pulled out 0.5m and released from rest. The spring constant is 200 N/m. When the particle passes the point where the spring force is zero its speed is a) 0 b) 0.05m/s c) 5 m/s d) 10m/s e) 100m/s
12. A kilowatt hour is a unit of : a) power b)energy/time c) work d) power/time e) force/distance
13. A nonconservative force: a) violates Newton's second law b) violates Newton's third law c)cannot do any work d) must be perpendicular to the velocity of the particle on which it acts e) none of the above
14. A force of 10N holds an ideal spring with a 20-N/m spring constant in compression. The potential energy stored in the spring is: a)0.5J b)2.5J c)5J d)10J e)200J
15. A 25-g ball is released from rest 80 m above the surface of the Earth. Just before it his the surface its speed is 20 m/s. During the fall the internal energy of the ball and air changed by : a)+15J b)-5J c)+5J d)-15J e)0J
16. A 1.0 kg-ball moving at 2.0 m/s perpendicular to a wall rebounds from the wall at 1.5m/s. The change in the momentum of the ball is: a)zero b)0.5 N • s away from wall c)0.5 N • s toward wall d) 3.5 N • s away from wall e) 3.5 N • s toward wall
17. A 500-kg sack of coal is dropped on a 2000-kg railroad flatcar which was initially moving at 3 m/s as shown. After the sack rests on the flatcar, the speed of the flatcar is: a) 0.6m/s b)1.2m/s c)1.8m/s d)2.4m/s e)3.6m/s



18. The physical quantity “impulse” has the same dimensions as that of : a) force b) power c)energy d)momentum e)work

19. A ball hits a wall and rebounds with the same speed, as diagrammed below. The changes in the components of the momentum of the ball are:

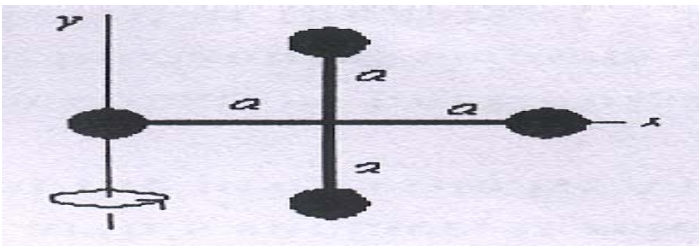
a) $\triangle Px > 0,\ \triangle Py > 0$
b) $\triangle Px < 0,\ \triangle Py > 0$
c) $\triangle Px = 0,\ \triangle Py > 0$
d) $\triangle Px = 0,\ \triangle Py < 0$
e) $\triangle Px > 0,\ \triangle Py < 0$



20. An elastic collision is one in which: a) momentum is not conserved but kinetic energy is conserved b) total mass is not conserved but momentum is conserved c) kinetic energy and momentum are both conserved d)momentum is conserved but kinetic energy is not conserved e)the total impulse is equal to the change in kinetic energy.

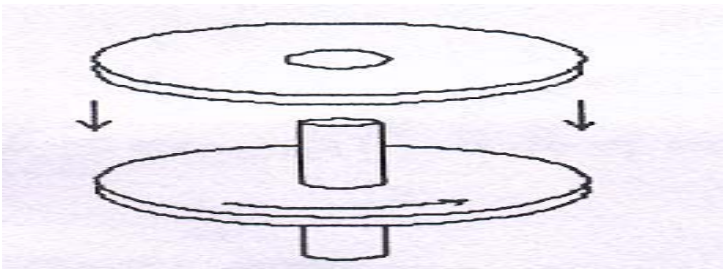
21. Four identical particles, each with mass m, are arranged in the x, y plane as shown. They are connected by light sticks to from a rigid body. If m = 2.0 kg and a = 1.0 m, the rotational inertia of this array about the y-axis is:

甲、4.0 kg · m^2
乙、12kg · m^2
丙、9.6kg · m^2
丁、4.8kg · m^2
戊、none of these



22. The coefficient of static friction between a certain cylinder and a horizontal floor is 0.40. If the rotational inertia of the cylinder about its symmetry axis is given by I = (1/2)MR2, then the maximum acceleration the cylinder can have without slipping is:

a) 0.1g
b)0.2g
c)0.4g
d)0.8g
e)g



23. A wheel, mounted on a vertical shaft of negligible rotational inertia, is rotating at 500 rpm. Another identical (but not rotating) wheel is suddenly dropped onto the same shaft as shown. The resultant combination of the two wheels and shaft will rotate at: a) 250 rpm b)354 rpm c)500 rpm d)707 rpm e)1000 rpm

24. Possible units of angular momentum are: a) kg · m/s b)kg · m^2/s^2 c) kg · m/s^2 d) kg · m^2/s e)none of these.

25. A Carnot engine that operates between the temperatures TH = 850K and TL =

300K, The engine performs 1200 J of work each cycle, which takes 0.25s. What is the efficiency of this engine? a)50% b)35% c)70% d)55% e)45%

26. As same as question 25. What is the average power of this engine? a) 4.8kW b)5.8kW c)6.8kW d)3.8kW e)2.8kW.

27. As same as question 25. What is the average $|QH|$ is extracted as heat from the high-temperature reservoir every cycle? a)1805J b)1955J c)1855J d)1755J e) 1655J

28. As same as question 25. What is the entropy change of the working substance for the energy transfer to it from the high-temperature reservoir? a) 355J b)755J c)855J d)955J e)455J

29. As same as question 25. What is the entropy change of the working substance for the energy transfer to it from the high-temperature reservoir? a)2.18J/K b)1.18J/K c)0.18J/K d)6.55J/K e)3.55J/K

30. Electric field lines: a)are trajectories of a test charge b)are vectors in the direction of the electric field c)form closed loops d)cross each other in the region between two point charges e)are none of the above

31. An electric field exerts a torque on a dipole only if: a)the field is parallel to the dipole moment b)the field is not parallel to the dipole moment c)the field is perpendicular to the dipole moment d)the field is not perpendicular to the dipole moment e)the field is uniform

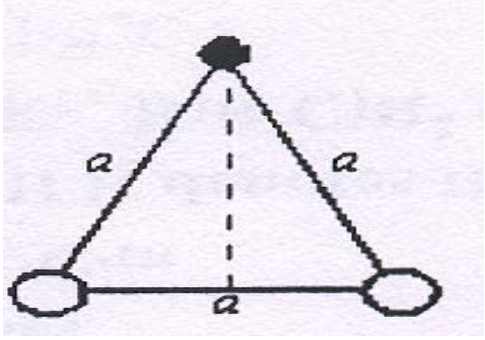
32. Two identical charges q are placed on the x axis, one at the origin and the other at x = 5 cm. A third charge –q is placed on the x axis so the potential energy of the three-charge system is the same as the potential energy at infinite separation. Its x coordinate is: a)13cm b)2.5cm c)7.5cm d)10cm e)15cm

33. Charge Q is distributed uniformly throughout an insulating sphere of radius R. The magnitude of the electric field at a point R/2 from the center is:

a) $Q/4\pi\varepsilon_0 R^2$ b) $Q/\pi\varepsilon_0 R^2$ c) $3Q/4\pi\varepsilon_0 R^2$ d) $Q/8\pi\varepsilon_0 R^2$ e) none of these

34. The two charges Q are fixed at the vertices of an equilateral triangle with sides of length a. If k = 1/4p50, the work required to move q from the other vertex to the center of the line joining the fixed charged is:

a) 0
b) kQq/a
c) kQq/a^2
d) $2kQq/a$
e) $\sqrt{2}kQq/a$



35. The units of capacitance are equivalent to: a) J/C b) V/C c) J^2/C d) C/J e) C^2/J

36. Capacitors C_1 and C_2 are connected in series. The equivalent capacitance is given by: a)$C_1C_2/ (C_1+ C_2)$ b) $(C_1+ C_2)/ C_1C_2$ c) $1/(C_1+ C_2)$ d)C_1/C_2 e) C_1+C_2

37. A certain wire has resistance R. Another wire, of the same material, has half the length and half the diameter of the first wire. The resistance of the second wire is: a) R/4 b) R/2 c)R d)2R e)4R

38. Conductivity is: a) the same as resistivity, it is just more convenient to use for good conductors b) expressed in Ω c) equal to 1/resistance d)expressed in(Ω · m) (e) not a meaningful quantity for an insulator.

39. A total resistance of 3.0Ω is to be produced by combining an unknown resistor R with a 12Ω resistor. What is the value of R and how is it to be connected to the 12Ω resistor? A) 4.0Ω parallel b)4.0Ω, series c)2.4Ω, parallel d)2.4Ω, series e)9.0Ω, series

40. Units of a magnetic field might be : a)C · m/s b)C · s/m c)C/kg d)kg/C · m e)N/C · m

41. A cyclotron operates with a given magnetic field and at a given frequency. If R denotes the radius of the final orbit, the final particle energy is proportional to: a) I/R b) R c) R2 d)R^3 e)R^4

42. The magnitude of the magnetic field at point P, at the center of the semicircle s shown, is given by:

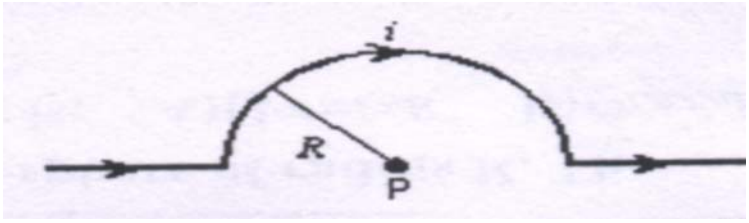
a) μ_0 / R^2

b) $\mu_0 / 2\pi R$

c) $\mu_0 i / 4\pi R$

d) $\mu_0 i / 2R$

e) $\mu_0 i / 4R$



43. We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of : a) 1F b)1mF c)1uF d)100uF e)1pF

44. The order of increasing wavelength for blue (b), green (g), red(r), and yellow (y) light is: a) r,y,g,b b)r,g,y,b c)g,y,b,r d)b,g,r,y c)b,y,g,r

45. Maxwell's equations predict that the speed of light in free space is : a) an increasing function of frequency b)a decreasing function of frequency c)independent of frequency d)a function of the distance from the source e)a function of the size of the source

46. In a Young's double-slit experiment the center of a bright fringe occurs wherever waves from the slits differ in the distance they travel by a multiple of: a) a fourth of a wavelength b)a half a wavelength c) a wavelength d) three-fourths of a

wavelength e)none of the above.

47. The rainbow seen after a rain shower is caused by: a)diffraction b)interference c)refraction d)polarization e)absorption

48. In order to obtain a good single-slit diffraction pattern, the slit width could be: a) λ b) $\lambda/10$ c) 10λ d) $10^4\lambda$ e) $\lambda/10^4$

49. The units of the Planck constant h are those of: a)energy b)power c)momentum d)angular momentum e)frequency

50. In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional: a) the energy of the least energetic electron before it is ejected b) the energy of the least energetic electron after it is ejected c) the energy of the most energetic electron before it is ejected d)the energy of the most energetic electron after is is ejected e) the electron potential energy at the surface of the sample.

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