PHYSICS

1. PHYSICS

Toss Up: Multiple Choice

A light ray passes through a prism , causing a dispersion of light. Which color will have the greatest angle of deviation?

W) Red

X) Yellow

Y) Green

Z) Blue

Toss Up Answer: Z

Bonus: Short Answer

Put the following electromagnetic waves in order of increasing wavelength: Microwaves, Ultraviolet, Gamma Rays, Radio Waves, Visible Light, Infrared, X-rays.

Bonus Answer: Gamma Rays, X-rays, Ultraviolet, Visible Light, Infrared, Microwaves, Radio Waves

==========

2. PHYSICS

Toss Up: Short Answer

A step-down transformer has a turns ratio less than

Bonus Answer: One

Bonus: Multiple Choice

By design, wires with the highest resistance are built into

W) Clocks

X) Toasters

Y) Telephones

Z) Stereo Speakers

Bonus Answer: X

==========

3. PHYSICS

Toss Up: Multiple Choice

The circuit breaker in a typical household light circuit is rated for how many amps?

W) 2

X) 20

Y) 200

Z) 2000

Toss Up Answer: X

Bonus: Short Answer

Most power lines carry high voltages. Before the electricity is fed into your home, it must be put through what device that lowers the voltage to 110 volts?

Bonus Answer: Transformer

==========

4. PHYSICS

Toss Up: Multiple Choice

Who did not have a unit of electrical measurement named after him?

W) Voltaire

X) Georg Ohm

Y) Andre Ampere

Z) Charles Coulomb

Toss Up Answer: W

Bonus: Short Answer

It converts electrical energy into electromagnetic radiation and vice versa. Name this device designed to transmit and receive radio waves.

Bonus Answer: Antenna

==========

5. PHYSICS

Toss Up: Short Answer

The property of a moving object to continue moving is what Galileo called

Bonus Answer: inertia

Bonus: Multiple Choice

If an object is moving, then the magnitude of its ____ cannot be zero

W) speed

X) velocity

Y) acceleration

Z) W,X

Bonus Answer: Z

==========

6. PHYSICS

Toss Up: Short Answer

The speedometer in your car tells you what

Bonus Answer: instantaneous speed

Bonus: Short Answer

Projectile 'A' is fired at an angle of 50° above the horizontal; projectile 'B' is fired with the same speed at an angle of 40° above the horizontal. Assuming level ground and negligible air resistance, what is true about range and height of both objects?

Bonus Answer: A' will reach a smaller height and have a greater range than 'B'.

==========

7. PHYSICS

Toss Up: Multiple Choice

In the absence of air resistance, the magnitude of the vertical component of a projectile's acceleration

W) is constant until the projectile hits the ground.

X) always decreases with time until the projectile hits the ground.

Y) is equal to the magnitude of the horizontal component of the projectile's acceleration.

Z) increases and/or decreases with time, depending on the projectile's velocity.

Toss Up Answer: W

Bonus: Multiple Choice

n the laboratory, the speed of sound is measured to be 344 meters per second, different from the actual value of 343 meters per second. What is the percent error in the measurement?

W) 1%

X) 1%

Y) 10%

Z) 0.30%

Bonus Answer: Z

==========

8. PHYSICS

Toss Up: Multiple Choice

How long is a meter stick?

W) 36 inches

X) 100 mm

Y) 10 cm

Z) 1 m

Toss Up Answer: Z

Bonus: Multiple Choice

Which combination of the following statements is wrong? I. A body can have a constant speed but a varying velocity. II. A body can have a constant velocity but a varying speed. III. A body can have a zero velocity and finite acceleration.

W) I

X) II

Y) III

Z) NONE

Bonus Answer: Z

==========

9. PHYSICS

Toss Up: Multiple Choice

The graphs of the two equations y = a x 2 + b x + c and y = A x 2 + B x + C, such that a and A have different signs and that the quantities b 2 - 4 a c and B 2 - 4 A C are both negative,

W) 1 intersections

X) 2 intersections

Y) None

Z) I do not know

Toss Up Answer: Z

Bonus: Multiple Choice

For x greater than or equal to zero and less than or equal to 2 pi, sin x and cos x are both decreasing on the intervals

W) (0 , pi/2)

X) (pi/2 , pi)

Y) (pi , 3 pi / 2)

Z) (3 pi / 2 , 2 pi)

Bonus Answer: X

==========

10. PHYSICS

Toss Up: Multiple Choice

Radiocarbon is produced in the atmosphere as a result of?

W) collision between fast neutrons and nitrogen nuclei present in the atmosphere

X) action of ultraviolet light from the sun on atmospheric oxygen
Y) action of solar radiations particularly cosmic rays on carbon dioxide present in the atmosphere
Z) lightning discharge in atmosphere

Toss Up Answer: W

Bonus: Multiple Choice

Nuclear sizes are expressed in a unit named
W) Fermi
X) angstrom
Y) newton
Z) Tesla

Bonus Answer: W

==========

11. PHYSICS

Toss Up: Short Answer

For the hydrogen atom, which series describes electron transitions to the N=1 orbit, the lowest energy electron orbit?

Bonus Answer: Lyman series

Bonus: Short Answer

Electric current may be expressed in which one of the following units?

Bonus Answer: coulombs/second

==========

12. PHYSICS

Toss Up: Short Answer

In the SI system of measure, what is the unit of capacitance?

Bonus Answer: FARAD

Bonus: Short Answer

How much work in joules is done by friction on a sled weighing 100 newtons during a 10 meter displacement? The coefficient of sliding friction is 0.1.

Bonus Answer: 100

==========

13. PHYSICS

Toss Up: Short Answer

An electric vehicle has two stages. If the first stage, the battery, has an efficiency of 90% and the second stage, the inverter, has an efficiency of 80%, calculate the approximate overall efficiency of the vehicle.

Bonus Answer: 72%

Bonus: Multiple Choice

Which of the following is congruent to (n + 1) modulus n?
W) 0
X) 1
Y) n-1
Z) n-2

Bonus Answer: W

==========

14. PHYSICS

Toss Up: Multiple Choice

Aaron, whose mass is 45 kilograms, is riding his 5.0 kilogram skateboard down the sidewalk with a constant speed of 6.0 meters per second when he rolls
across a 10.0 meter long patch of sand on the pavement. The sand provides force of friction of 6.0 newtons. What is Aaron's speed in meters per second as he emerges from the sand?

W) 0
X) 1.8
Y) 3.8
Z) 5.8

Toss Up Answer: Z

Bonus: Short Answer

Which of the following does NOT contain a scalar quantity? Force, energy, or acceleration?

Bonus Answer: Acceleration

==========

15. PHYSICS

Toss Up: Short Answer

In a totally inelastic collision, what happens to the two colliding
objects?

Bonus Answer: They STICK together!

Bonus: Short Answer

r For a uniformly rotating object, what do we call the rate of change
in the angle through which the object turns in one second?

Bonus Answer: ANGULAR VELOCITY

==========

16. PHYSICS

Toss Up: Multiple Choice

A Newton is equal to which of the following?

W) w) kilogram-meter per second
X) x) meter per second squared
Y) y) kilogram-meter per second squared
Z) z) kilogram per meter-second

Toss Up Answer: Y

Bonus: Short Answer

Work is what type of quantity?

Bonus Answer: Scalar quantity.

==========

17. PHYSICS

Toss Up: Short Answer

What is the German term for the energy released when high voltage electrons decelerate at impact with a metal and is also known as "breaking radiation"?

Bonus Answer: Bremsstrahlung

Bonus: Short Answer

Given that Planck's constant is 4*10^(-15) eV*s (READ AS: 4 times 10 to the power of negative 15 electron volt second), what is the maximum kinetic energy, in electron volts, of an electron released from a metal with work function of 1 eV when a photon of frequency of 300 terahertz strikes the metal's surface?

Bonus Answer: 0.2 electron volts

==========

18. PHYSICS

Toss Up: Multiple Choice

Two trucks are 50 kilometers apart and traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40km/h mph. How long will it take for them meet?

W) 15 minutes
X) 20 minutes
Y) 24 minutes
Z) 30 minutes

Toss Up Answer: Z

Bonus: Short Answer

The position of a particle in meters is given by x(t) = 25t − 3t^3 (READ AS: 16 times t minus 3 times t cubed) , where the time t is in seconds. The particle is momentarily at rest at what time t rounded to the nearest hundredth?

Bonus Answer: 1.67 seconds, accept 1.67

==========

19. PHYSICS

Toss Up: Multiple Choice

If on a certain planet, acceleration due to gravity is -5 m/s^2, how long will a ball be in the air if thrown directly upward from the ground with a velocity of 10 m/s?

W) 2 seconds
X) 4 seconds
Y) 8 seconds
Z) 16 seconds

Toss Up Answer: X

Bonus: Multiple Choice

If Jim walks 10 meters north, then 5 meters southeast, then 5 meters northwest, then 5 meters south, what is his displacement?

W) 25 meters north
X) 15 meters north
Y) 5 meters north
Z) 5 meters south

Bonus Answer: Y

==========

20. PHYSICS

Toss Up: Multiple Choice

If an object is located at the focal point of a concave mirror, what type of image will form?

W) real, inverted
X) virtual, inverted
Y) real, upright
Z) Image will not exist

Toss Up Answer: Z

Bonus: Short Answer

Cone cells in the retina allow a human being to perceive color. What are the photoreceptor proteins found in cone cells called?

Bonus Answer: Photopsin

==========

21. PHYSICS

Toss Up: Multiple Choice

Which has the same units as joules?

W) Newton / meter

X) Pascal * meter^2

Y) Coulomb * volt

Z) Kilogram * meter / second^2

Toss Up Answer: Y

Bonus: Short Answer

What is the derived unit for Newton / meter^2?

Bonus Answer: Pascal

==========

22. PHYSICS

Toss Up: Short Answer

What is the third derivative of displacement with respect to time

Bonus Answer: Jerk

Bonus: Short Answer

What is the fourth derivative of displacement with respect to time

Bonus Answer: jounce

==========

23. PHYSICS

Toss Up: Multiple Choice

What is the Zeroth Law of Thermodynamics?

W) Energy cannot be created or destroyed in an isolated system.

X) Absolute Zero is the lowest temperature that is theoretically possible.

Y) If two systems are at the same time in thermal equilibrium with a third system, they are in thermal equilibrium with each other.

Z) The entropy of any isolated system always increases.

Toss Up Answer: Y

Bonus: Short Answer

If the actual vapor density is 5.8 g/m^3 and the saturation vapor density is 10 g/m^3, then what is the relative humidity?

Bonus Answer: 58%

==========

24. PHYSICS

Toss Up: Short Answer

A 12-N horizontal force is applied to a 40-N box resting on a rough horizontal floor. If the static coefficient of friction is 0.5 and the kinetic coefficient of friction is 0.4, the magnitude of the frictional force on the box is:

Bonus Answer: 12

Bonus: Multiple Choice

What is the coefficient of static friction between the ground and the object if it object is moving in a horizontal circle

with a speed of 20 m/s around a radius of 50 m? Assume that g = 10 m/s^2 (READ AS: meters per second squared)?
W) 0.3
X) 0.5
Y) 0.8
Z) 0.9

Bonus Answer: Y

==========

25. PHYSICS

Toss Up: Multiple Choice

A 2-kg object is moving to the right at 3m/s. A 4-N force is applied to the left of the object and then removed after the object has traveled an additional 5m. The work done by this force is:
W) 20 joules
X) 15 joules
Y) 13 joules
Z) -20 joules

Toss Up Answer: Z

Bonus: Short Answer

A 20kg dog initially runs at 10 m/s. What is the dog's final speed if 3000 joules of work is done on it?

Bonus Answer: 20

==========

26. PHYSICS

Toss Up: Multiple Choice

Block A, with a mass of 4 kg, is moving with a speed of 3.0m/s while block B, with a mass of 8 kg, is moving in the opposite direction with a speed of 3.0m/s. The center of mass of the two block-system is moving with a velocity of:
W) 1.0 m/s in the same direction as B
X) 1.3 m/s in the same direction as A
Y) 4.0 m/s in the same direction as B
Z) 6.0 m/s in the same direction as A

Toss Up Answer: W

Bonus: Multiple Choice

A 60kg hunter gets a rope around a 300kg polar bear. They are stationary, 12m apart, on frictionless level ice. When the hunter pulls the polar bear to him, the polar bear will move:
W) 0.5 m
X) 2 m
Y) 4 m
Z) 7m

Bonus Answer: X

==========

27. PHYSICS

Toss Up: Multiple Choice

What is the normal force on an object that is accelerating at 2 m/s^2 upwards if the object is 10 kg? (Use 10 m/s^2 for gravity and neglect other forces)
W) 80
X) 100
Y) 120

Z) 20

Toss Up Answer: Y

Bonus: Short Answer

If a projectile is launched 30 degrees above the horizontal at a velocity of 40 m/s, how long does it take for it to reach the ground? (Use 10 m/s^2 for gravity and neglect other forces)

Bonus Answer: 4 seconds

==========

28. PHYSICS

Toss Up: Multiple Choice

A hose has a diameter of 2 inches and its nozzle is 0.2 inches in radius. If water flows at 4 m/s in the hose, then how fast will it leave the nozzle?

W) 4 m/s

X) 1 m/s

Y) 100 m/s

Z) 200 m/s

Toss Up Answer: Y

Bonus: Short Answer

To measure moderately low pressures, oil with a density of 8.5 × 10^2 kg/m^3 (READ AS: 8.5 times 10 to the -2 kilogram per cubic meter) is used in place of mercury in a barometer. If the height of the oil column changes by 1.0mm, find the change in the pressure, assuming g = 10 m/s.

Bonus Answer: 8.5 Pa

==========

29. PHYSICS

Toss Up: Short Answer

If an object attached to one end of a spring makes 20 complete oscillations in 2*PI s, what is its angular frequency?

Bonus Answer: 20 rad/s

Bonus: Multiple Choice

A 1-kg object attached to a spring whose spring constant is 400N/m executes simple harmonic motion. If its maximum speed is 5.0m/s, find the amplitude of its oscillation.

W) 0.1

X) 0.25 m

Y) 0.45

Z) 0.75

Bonus Answer: X

==========

30. PHYSICS

Toss Up: Multiple Choice

A wave's equation is given as y = 0.1 sin(3x+10t) (READ AS: y equals 0.1 times sine of open parentheses 3x plus 10t close parentheses). What is the angular wave number?

W) 0.3

X) 1

Y) 10

Z) 3

Toss Up Answer: Z

Bonus: Short Answer

An EM wave has a magnetic field with an amplitude of 200 Teslas. What is the amplitude of the wave's electric field in N/c (READ AS: newtons per coulomb)?

Bonus Answer: 6 * 10^10 N/c

==========

31. PHYSICS

Toss Up: Multiple Choice

The sound intensity 3.0m from a point source is 22 W/m^2 (READ AS: 25 watts per meter squared). The power output of the source is:

W) 53

X) 396π

Y) 168

Z) 300π

Toss Up Answer: X

Bonus: Short Answer

A string has length L and mass M. If its fundamental frequency is f, find its tension in terms of L, M and f.

Bonus Answer: 4LMf^2 (READ AS: 4 times L times M times f squared)

==========

32. PHYSICS

Toss Up: Short Answer

The coefficient of linear expansion of a certain steel is 0.000034 per C◦ (READ AS: celsius degree). What is the exact coefficient of volume expansion, in (C◦) ^ (−1) (READ AS: celsius degree to the negative 1)?

Bonus Answer: 0.000102 (DO NOT ACCEPT APPROXIMATIONS)

Bonus: Multiple Choice

The energy given off as heat by 300 g of an alloy as it cools through 50C◦(READ AS: 50 celsius degree) raises the temperature of 300 g of water from 30◦C (READ AS: 30 degrees celsius) to 40◦ C. The specific heat of the alloy (in cal/g · C◦) is:

W) 0.0015

X) 0.1

Y) 0.2

Z) 1

Bonus Answer: Y

==========

33. PHYSICS

Toss Up: Short Answer

An educated guess or explanation for an observation or experimental result. Not yet fully accepted as fact is what?

Bonus Answer: Hypothesis

Bonus: Short Answer

A systematic methodology for gathering, organizing and applying knowledge is?

Bonus Answer: A scientific method

==========

34. PHYSICS

Toss Up: Short Answer

What is energy measured in?

Bonus Answer: Joules

Bonus: Short Answer

What is the unit of charge?

Bonus Answer: Columbus

==========

35. PHYSICS

Toss Up: Multiple Choice

An electron is placed in a horizontally hollow cylindrical solenoid with the current moving clockwise around the solenoid. The electron is released from rest in the middle of the solenoid. What direction will the electron move in?

W) To the left

X) To the right

Y) Stays in the same place

Z) Oscillates between both ends

Toss Up Answer: X

Bonus: Multiple Choice

There are two charges, one with charge +2Q and one with charge -4Q a distance of 2 meters from each other. Assuming the universal charge constant is 1.6*10^-19, which of the following is the force of attraction felt by the two charges, rounded to one decimal place

W) 4.8*10^-19 C

X) 9.6*10^-19 C

Y) 2.4*10^-19 C

Z) 3.2*10^-19 C

Bonus Answer: Z

==========

36. PHYSICS

Toss Up: Multiple Choice

What type of radiation is both the most penetrating and the most effectively stopped if blocked by a hydrogen-rich material?

W) Alpha

X) Beta

Y) Gamma

Z) Neutron

Toss Up Answer: Z

Bonus: Multiple Choice

What type of radiation originates from the electron cloud?

W) Alpha

X) Beta

Y) X-Ray

Z) Gamma

Bonus Answer: Y

==========

37. PHYSICS

Toss Up: Short Answer

What law most directly states that the total of the electric flux out of a closed surface is equal to the charge enclosed divided by the permittivity?

Bonus Answer: Gauss's Law

Bonus: Short Answer

When a magnet is moved into a coil of wire, changing the magnetic field and magnetic flux through the coil, a voltage will be generated in the coil according to which law?

Bonus Answer: Faraday's Law

==========

38. PHYSICS

Toss Up: Multiple Choice

Who first suggested that radiant energy could exist only in discrete quanta which were proportional to the frequency in order to explain the frequency distribution of blackbody radiation?

W) Isaac Newton

X) Max Planck

Y) Ernest Rutherford

Z) Paul Dirac

Toss Up Answer: X

Bonus: Short Answer

Later solved by Planck's quantum radiation formula, what asymptotic result of the classical Rayleigh-Jeans Law was the most troubling?

Bonus Answer: Ultraviolet Catastrophe

==========

39. PHYSICS

Toss Up: Multiple Choice

What is the relativistic mass of a particle with a rest mass of 8g traveling at a speed of .6c?

W) 4g

X) 8g

Y) 10g

Z) 12g

Toss Up Answer: Y

Bonus: Multiple Choice

What is the length of a 1 meter rod traveling on a spaceship going at .8c, as measured by an astronaut on the ship?

W) .8m

X) .6m

Y) 1m

Z) 1.25m

Bonus Answer: Y

==========

40. PHYSICS

Toss Up: Short Answer

If the sound intensity is 10,000 times the threshold of hearing then what is the intensity in decibels?

Bonus Answer: 40dB

Bonus: Short Answer

At what standard frequency would 60 decibels have a loudness of 60 phons?

Bonus Answer: 1000Hz

==========

41. PHYSICS

Toss Up: Multiple Choice

What is the S.I. unit for luminous intensity?

W) Lumen

X) Candela

Y) Newton

Z) Watts

Toss Up Answer: X

Bonus: Multiple Choice

For an isotropic source how many candelas equals 3 lumens?

W) 12π

X) 10π

Y) 4π

Z) 2π

Bonus Answer: W

==========

42. PHYSICS

Toss Up: Short Answer

A military cannon fires a boy into the air at an angle of 45° above the horizontal, reaching a max height y above his original launch height. The cannon is now aimed so that it fires straight up into the air at an angle of 90° to the horizontal. What is the maximum height reached by the same boy now? (let y represent height)

Bonus Answer: 2y

Bonus: Short Answer

a

Bonus Answer: a

==========

43. PHYSICS

Toss Up: Short Answer

If a rocket has a specific impulse of 800 seconds, what is its exhaust velocity, in m/s? Assume standard gravity to be 10 m/s^2.

Bonus Answer: Answer: 8000 m/s (also acceptable: 8 km/s). Exhaust velocity is the product of specific impulse as a unit of time and standard gravity.

Bonus: Short Answer

If an engine has a specific impulse of 500 seconds and a thrust of 10 kN, how long will it take the engine to burn 50 kg of fuel? Assume standard gravity to be 10 m/s^2.

Bonus Answer: Answer: 25 seconds.

Since Fthrust = Gstandard×Isp×R, where

Fthrust = instantaneous thrust of the engine (in newtons)

Gstandard = standard gravity (usually 9.81 m/s^2, but for simplicity we round to 10)

Isp = specific impulse of the engine in seconds

R = mass flow rate in kg/s

10000 = 10×500×R, so R = 2 kg/s

50kg/2kg/s = 25s

==========

44. PHYSICS

Toss Up: Short Answer

A car accelerates from rest at 4 (m/s)^2. What is the distance traveled by the car in 3 seconds?

Bonus Answer: 18 meters (m)

Bonus: Multiple Choice

A motor scooter travels east at a speed of 13 m/s. The driver then reverses direction and heads west at 17 m/s. What was the change in velocity of the scooter?

W) 13 m/s

X) 17 m/s

Y) 30 m/s

Z) 4 m/s

Bonus Answer: Y

==========

45. PHYSICS

Toss Up: Short Answer

A car with a mass of one ton collides with a truck with a mass of ten tons. Which applies the greatest force on the other, in Newtons?

Bonus Answer: They both apply an equal force.

Bonus: Short Answer

Which experiences greater acceleration in the collision from a car with a mass of one ton colliding with a truck with a mass of ten tons, and by how many times greater.

Bonus Answer: The car, it will accelerate ten times as much.

==========

46. PHYSICS

Toss Up: Short Answer

If the acceleration is always perpendicular to an object's velocity, what can be deduced about the object's motion?

Bonus Answer: It is circular motion.

Bonus: Short Answer

If the acceleration of an object is opposite its velocity, what can be said about the object's velocity over time? Assume that the direction of the velocity is positive.

Bonus Answer: It is decreasing.

==========

47. PHYSICS

Toss Up: Multiple Choice

The work done by a friction force is

W) always -

X) always 0

Y) either positive or negative depending upon the situation.

Z) always +

Toss Up Answer: W

Bonus: Multiple Choice

: As defined in physics, work is:

W) scalar quantity

X) always a positive quantity

Y) a vector quantity
Z) always 0

Bonus Answer: W

==========

48. PHYSICS

Toss Up: Multiple Choice

A pendulum which is suspended from the ceiling of a railroad car is observed to hang at an angle of 10 degrees to the right of vertical. Which of the following answers could explain this phenomena?

W) The railroad car is at rest
X) The railroad car is accelerating to the left.
Y) The railroad car is accelerating to the right.
Z) Huh?

Toss Up Answer: X

Bonus: Multiple Choice

Two forces have magnitudes of 11 newtons and 5 newtons. The magnitude of their sum could NOT be equal to which of the following values?

W) 16
X) 5
Y) 9
Z) 7

Bonus Answer: X

==========

49. PHYSICS

Toss Up: Multiple Choice

For an object moving in uniform circular motion, the direction of the instantaneous acceleration vector is:
W) tangent to the path of motion
X) equal to zero
Y) directed radially outward
Z) directed radially inward

Toss Up Answer: Z

Bonus: Multiple Choice

A Newton is equal to which of the following?
W) kilogram-meter per second
X) meter per second squared
Y) kilogram-meter per second
Z)) kilogram per meter-second

Bonus Answer: Y

==========

50. PHYSICS

Toss Up: Short Answer

A ball leaves a girl's hand with an upward velocity of 6 meters per second. What is the maximum height of the ball

above the girl's hand?

Bonus Answer: 1.8 meters

Bonus: Short Answer

A boy throws a ball vertically upward with a velocity of 6 meters per second. How long does it take the ball to return to the boy's hand?

Bonus Answer: 1.22 seconds

==========

51. PHYSICS

Toss Up: Short Answer

A toy train moves in a circle of 8 meters radius with a speed of 4 meters per second. What is the magnitude of the acceleration of the train?

Bonus Answer: 2 meters per second^2

Bonus: Short Answer

A certain machine exerts a force of 200 newtons on a box whose mass is 30 kilograms. The machine moves the box a distance of 20 meters along a horizontal floor. What amount of work does the machine do on the box?

Bonus Answer: 4000 J (joules)

==========

52. PHYSICS

Toss Up: Short Answer

A box is initially at rest on a horizontal, frictionless table. If a force of 10 Newtons acts on the box for 3 seconds, what is the momentum of the box at the end of the 3 second interval?

Bonus Answer: 30 N (newton) seconds

Bonus: Short Answer

A 10 kilogram body initially moving with a velocity of 10 meters per second makes a head-on collision with a 15 kilogram body initially at rest. The two objects stick together. What is the velocity of the combined system just after the collision?

Bonus Answer: 4 meters per seconds

==========

53. PHYSICS

Toss Up: Short Answer

A helicopter is ascending vertically with a constant speed of 6 meters per second relative to the ground. At the instant the helicopter is 60 meters above the ground it releases a package.
What is the magnitude and direction of the velocity of the package, relative to the ground, the instant the package is released by the helicopter?

Bonus Answer: 6 meters/second up

Bonus: Multiple Choice

If the resultant force acting on a body of constant mass is zero, the body's momentum is
W) increasing
X) decreasing
Y) always 0
Z) Constant!

Bonus Answer: Z

==========

54. PHYSICS

Toss Up: Multiple Choice

A certain spring is known to obey Hooke's Law. If a force of 10 newtons stretches the spring 2 meters, how far will a 30 newton force stretch the spring?

W) 1 meter
X) 60 meters
Y) 6 meters
Z) 16 meters

Toss Up Answer: Y

Bonus: Multiple Choice

A block of metal which weighs 60 newtons in air and 40 newtons under water has a density, in kilograms per meter cubed, of:
W) 1000
X) 3000
Y) 5000
Z) 7000

Bonus Answer: X

==========

55. PHYSICS

Toss Up: Multiple Choice

If the distance between two objects, each of mass 'M', is tripled, the force of attraction between the two objects is
W) 1/2 original force
X) 1/3 original force
Y) 1/9 original force
Z) unchanged

Toss Up Answer: Y

Bonus: Multiple Choice

In physics, a radian per second is a unit of:

W) angular displacement
X) angular velocity
Y) angular acceleration
Z) angular momentum

Bonus Answer: X

==========

56. PHYSICS

Toss Up: Short Answer

A 40 kilogram girl climbs a vertical distance of 5 meters in twenty seconds at a constant velocity. How much work has the girl done?

Bonus Answer: 2000 joules / 1960 joules (accept either)

Bonus: Short Answer

A machine performs 8 Joules of work in 2 seconds. How much power is delivered by this machine?

Bonus Answer: 4 Watts

==========

57. PHYSICS

Toss Up: Short Answer

What is the name of the first American physicist to win two Nobel prizes? (very random lol)

Bonus Answer: John Bardeen (can accept just last name?)

Bonus: Multiple Choice

If the resultant force acting on a body of constant mass is zero, the body's momentum is:

W) constant
X) 0
Y) increasing
Z) decreasing

Bonus Answer: W

==========

58. PHYSICS

Toss Up: Short Answer

The constant potential difference across a 2 ohm resistor is 20 volts. How many watts of power are dissipated by this resistor?

Bonus Answer: 200 Watts

Bonus: Multiple Choice

Which of the following scientists is responsible for the exclusion principle which states that two objects may NOT occupy the same space at the same time? Was it:

W) Heisenberg
X) Bohr
Y) Teller
Z) Pauli

Bonus Answer: Z

==========

59. PHYSICS

Toss Up: Multiple Choice

The constant potential difference across a 2 ohm resistor is 20 volts. How many watts of power are dissipated by this resistor?

W) 150 watts
X) 200 watts
Y) 250 watts
Z) 2000 watts

Toss Up Answer: X

Bonus: Short Answer

The potential difference across a 4 ohm resistor is 20 volts. Assuming that all of the energy dissipated by this resistor is in the form of heat, how many joules of heat are radiated in 10 seconds?

Bonus Answer: 1000 J (joules)

==========

60. PHYSICS

Toss Up: Multiple Choice

The force acting between two point charges can be computed using which of the following laws?

W) Ohm's Law

X) Ampere's Law

Y) Coulomb's Law

Z) Newton's Second Law

Toss Up Answer: Y

Bonus: Short Answer

Five volts are applied across the plates of a parallel plate capacitor. The distance of separation of the plates is .02 meters. What is the magnitude of the electric field inside the capacitor?

Bonus Answer: 250 volts per meter

==========

61. PHYSICS

Toss Up: Multiple Choice

NMR spectroscopy is

W) diffraction

X) absorption

Y) radiation

Z) emission

Toss Up Answer: X

Bonus: Multiple Choice

NMR is based on

W) nuclear fission

X) charge of nucleus

Y) magnetically moment of the nucleus

Z) electrical moment of the nucleus

Bonus Answer: Y

==========