PHYSICS

BOOKS - BITSAT GUIDE PHYSICS (HINGLISH)

UNITS, MEASUREMENTS & DIMENSION

Others

1. Which one is not a unit of time?

A. Leap year

B. Year

C. Shake

D. Light yeat

Answer:

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2. The height of the building is $50 ft$. The same in millimetre is

A. $560mm$

B. $285mm$

C. $1786.8mm$

D. $15240mm$

Answer:

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3. Which of the following is the most recise device for measuring length?

A. A vernier calliper with 20 divisioins of the sliding scale

B. An optical insturment that can measure length within wavelength of light

C. A screw gauge of pitch $1mm$ and 100 division on the circular scale

D. None of the above

Answer:

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4. The radius of hydrogen atom is ground state is $5 \times 10^{-11} m$. Find the radius of hydrogen atom is fermimetre.($1 fm = 10^{-15} m$)

A. $5 \times 10^{4} fm$

B. $2 \times 10^{4} m$

C. $5 \times 10^{2} fm$

D. $5 \times 10^{6} fm$

Answer:

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5. One nautical mile is $6080 ft$. The same is kilimetre is

A. $0.9 km$

B. $0.8 km$

C. $1.85 km$

D. None of these

Answer:

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6. The area of a room is $10m^2$. The same in ft^2 is

A. $107.6ft^2$

B. $77ft^2$

C. $77.6ft^2$

D. None of these

Answer:

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7. The density of iron is $7.87 g / cm^3$. If the atoms are spherical and closely packed. The mass of iron atom is $9.27 \times 10^{-26} kg$. What is the volume of an iron atom?

A. $1.18 \times 10^{-26} m^3$

B. $2.63 \times 10^{-29} m^3$

C. $1.73 \times 10^{-28} m^3$

D. $0.53 \times 10^{-29} m^3$

Answer:

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8. The world's largest cut diamond is the first start of Africa (mounted in the British Royal Sceptre and kept in the tower of London). Its voume is 1.84 cubic inch. What is tis volume is cubic metre?

A. $30.2 \times 10^{-6} m^3$

B. $33.28 m^2$

C. $4.8 m^3$

D. None of these

Answer:

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9. Crane is British unit of volume (One crane $= 170.474$ litre). Convert crane into Si unit.

A. $0.170474m^3$

B. $17.0474m^3$

C. $0.0017474m^3$

D. $1704.74m^3$

Answer:

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10. The nearest star to our solar system is 4.29 light year away. How much is this distance in terms of parsecs/?

A. 1.32

B. 3.21

C. 2.31

D. 3.12

Answer:

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11. The concorde is the fastest airlines used for commercial service. It can cruise at 1450 mile per hour (about two times the speed of sound or in other words, mach 2). What is it in m/s?

A. $644.4m/s$

B. $80m/s$

C. $40m/s$

D. none of these

Answer:

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12. The acceleration of a car is 10 mile per hour per second. The same is $(ft)/(s^2)$ is

A. $1.467\frac{ft}{s^2}$

B. $14.67\frac{ft}{s^2}$

C. $40ft/s^2$

D. none of these

Answer:

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13. The speed of light in vacuum is $3 \times 10^8 m/s$. How many nanosecond does it take to travel one metre in a vacuum?

A. $8ns$

B. $\frac{10}{3}ns$

C. $3.34ns$

D. none of these

Answer:

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14. The time taken by an electron to go from ground state to excited state in one shake (one shake $= 10^{-8}s$). Find this tijme is nanosecond.

A. $10ns$

B. $4ns$

C. $2ns$

D. $25ns$

Answer:

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15. The time between human heart beat is $8 \times 10^{-1}s$. How many heart beats are measured in one minute.

A. 75

B. 60

C. 82

D. 64

Answer:

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16. The age of the universe is $5 \times 10^{17} s$. Find the age of universe in year.

A. 158×10^6year

B. 158×10^9 year

C. 158×10^8 year

D. 158×10^{11}year

Answer:

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17. Assuming the length of the day uniformly increases by 0.001 second per century.

Calculate the net effect on the measure of time over 20 centuries.

A. 3.2 hour

B. 2.1 hour

C. 2.4 hour

D. 5 hour

Answer:

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18. Find the number of molecules of H_2O is $90g$ of water.

A. 35.6×10^{23} molecules

B. 41.22×10^{23} molecules

C. 27.2×10^{23} molecules

D. 30.11×10^{23} molecules

Answer:

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19. The mass of Earth is $5.98 \times 10^{24} kg$. The average atomic weight of atoms that make up Earth is $40u$. How many atoms are there is Earth?

A. 9×10^{51}

B. 9×10^{49}

C. 9×10^{46}

D. 9×10^{55}

Answer:

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20. One amu is equivalent of 931meV energy. The rest mass of electron is $9.1 \times 10^{-31} kg$. The mass equivalent energy is (Here $1a\mu = 1.67 \times 10^{-27} kg$)

A. $2.5073 MeV$

B. $0.693 MeV$

C. $4.0093 MeV$

D. None of these

Answer: A

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21. One atomic mass unit is amu $= 166 \times 10^{-27} kg$. The atomic weight of oxcygen is 16. Find the mass of the atom of oxygen.

A. $26.56 \times 10^{-27} kg$

B. $10.53 \times 10^{-27} kg$

C. $74 \times 10^{-27} kg$

D. $2.73 \times 10^{-27} kg$

Answer:

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22. One horse power is equal to

A. $746W$

B. $756W$

C. $736W$

D. $766W$

Answer:

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23. If $E = mc^2$

wher $m =$ mass of the body $c =$ speed of light Guess the name of physical quantity E.

A. Energy

B. Power

C. Momentum

D. None of these

Answer:

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24. One calorie of heat is equivalent to $4.2J$. BTU (British Thermal Unit) is equivalent to $1055J$. The vlaue of on BTU in calorie is

A. $251.2cal$

B. $200cal$

C. $263cal$

D. None of these

Answer:

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25. It is claimed that the two cesium clocks, if allowed t run for 100 yr, free from any disturbance, may differ by only about $0.02s$. Which of the following is the corret fractional error?

A. 10^{-9}

B. 10^{-5}

C. 10^{-13}

D. 10^{-11}

Answer:

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26. Which of the following is the average mass density of sodium atom assuming, its size to be about 2.5Å (use the known values off Avogadro's number and the atomic mass of sodium)

A. $0.64 \times 10^3 kg/m^3$

B. $8.0 \times 10^2 kg/m^3$

C. $8.6 \times 10^3 kg/m^3$

D. $6.4 \times 10^5 kg/m^3$

Answer:

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27. Electorn volt is the unit of energy $\left(1eV = 1.6 \times 10^{-19} J\right)$ in H-atom the binding energy of electron in first orbit is $13.6eV$. The same in joule (J) is

A. $10 \times 10^{-19} J$

B. $21.76 \times 10^{-19} J$

C. $13.6 \times 10^{-19} J$

D. None of these

Answer:

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28. $1 mm Hg$ pressure is equivalent to one torr and one torr is equivalent to $133.3 N/m^2$. The atomospheric presue in mm of Hg pressure is

A. $70mm$

B. $760mm$

C. $3.76mm$

D. none of these

Answer:

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29. One bar is equivalent of $10^5 N/m^2$. The atmosphere pressure is $1.0313 \times 10^5 N/m^2$. The same in bar is

A. 1.88 bar

B. 1.013 bar

C. 2.013 bar

D. none of these

Answer:

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30. 1 revolution is equivalent to 360°. The value of 1 revolution per minute is

A. $2\pi ra/s$

B. $0.104rad/s$

C. $3.14rad/s$

D. None of these

Answer:

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31. The height of a man is $5.87532ft$. But measurement is correct upto three significant figures. The correct height is

A. $5.86ft$

B. $5.87ft$

C. $5.88ft$

D. $5.80ft$

Answer:

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32. $4.32 \times 2.0 =$ .....

A. 8.64

B. 8.6

C. 8.60

D. 8.640

Answer:

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33. $4.338 + 4.835 \times 3.88 + 3.0$ is equal to

A. 10.6

B. 10.59

C. 10.5912

D. 10.591267

Answer:

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34. 10×2.88 is equal to

A. 2.88

B. 2.880

C. 2.9

D. none of these

Answer:

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35. 100×2.88 is equal to

A. 2.88

B. 2.880

C. 2.9

D. none of these

Answer:

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36. If $v =$ velocity of a body $c =$ speed of light

Then, the dimension of $\frac{v}{c}$ is

A. $\left[M^0L^0T^0\right]$

B. $\left[MLT^{-1}\right]$

C. $\left[ML^2T^{-2}\right]$

D. none of these

Answer:

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37. The expression from centripetal force depends upon mass of body, speed of the body and the radius of circular path. Find the expression for centripetal force.

A. $F = \frac{mv^2}{2r^3}$

B. $F = \frac{mv^2}{r}$

C. $F = \frac{mv^2}{r^2}$

D. $F = \frac{m^2 v^2}{2r}$

Answer:

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38. The maximum staic friction on a body is $F = \mu N.$

Here $N =$ normal reaction force on the body.

$\mu =$ coefficient of static friction. The dimension of μ is

A. $\left[MLT^{-2}\right]$

B. $\left[M^0L^0T(0)\theta^{-1}\right]$

C. dimensionless

D. none of these

Answer:

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39. What are dimensions of Young's modulus of elasticity?

A. $\left[ML^{-1}T^{-2}\right]$

B. $\left[MLT^{-2}\right]$

C. $\left[MLT^{-1}\right]$

D. none of these

Answer:

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40. The surface tension is $T = \frac{F}{l}$, then the dimensions of surface tension is

A. $\left[MLT^{-2}\right]$

B. $\left[MT^{-2}\right]$

C. $\left[M^0L^0T^0\right]$

D. none of these

Answer:

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41. The dimension of heat capacity is

A. $\left[L^2T^{-2}\theta^{-1}\right]$

B. $\left[ML^2T^{-2}\theta^{-1}\right]$

C. $\left[M^{-1}L^{2}T^{-2}\theta^{-1}\right]$

D. none of these

Answer:

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42. If $\Delta H = mL$, where m is mass of body.

$\Delta H =$ total thermal energy supplied to the body

$L =$ latent heat of fusion.

Find the dimensions of latent of fusion.

A. $\left[ML^2T^{-2}\right]$

B. $\left[L^2T^{-2}\right]$

C. $\left[M^0L^0T^{-2}\right]$

D. $\left[ML^0T^{-1}\right]$

Answer:

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43. Solar constant is defined as energy received by Earth per cm^2 per minute. Find the dimensions of solar constant.

A. $\left[ML^2T^{-3}\right]$

B. $\left[M^2L^0T^{-1}\right]$

C. $\left[MT^{-3}\right]$

D. $\left[MLT^{-2}\right]$

Answer:

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44. The unit of electric permittivity is $\frac{C^2}{Nm^2}$.

Find the dimesions of electric permittivity

A. $\left[A^2M^{-1}L^{-3}T^4\right]$

B. $\left[AM^{-1}L^{-3}T^4\right]$

C. $\left[A^2M^{-1}L^{-3}T^0\right]$

D. $\left[A^2M^0L^{-3}T^4\right]$

Answer:

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45. A physical relation is $\varepsilon = \varepsilon_0\varepsilon_r$

where $\varepsilon =$ electric permittivity of a medium

$\varepsilon_0 =$ electric permittivity of vacuum

$\varepsilon_r =$ relative permittivity of medium

What are dimensions of relative permittivity?

A. $\left[ML^2T^{-2}\right]$

B. $\left[M^0L^2T^{-3}\right]$

C. $\left[M^0L^0T^0\right]$

D. $\left[M^0L^0T^{-1}\right]$

Answer:

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46. The electric flux is given by scale product of electric field strength and area. What are the dimension of electric flux?

A. $\left[A^{-2}ML^3T^{-2}\right]$

B. $\left[A^{-1}ML^3T^{-2}\right]$

C. $\left[A^{-1}ML^3T^{-3}\right]$

D. $\left[A^0M^2LT^{-1}\right]$

Answer:

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47. Electric displacement is given by $D = \varepsilon E$

Here

$\varepsilon =$ electric permittivity

$E =$ electric field strength,

Find the dimensions of electric displacement.

A. $\left[AML^{-2}T\right]$

B. $\left[AL^{-2}T^{-1}\right]$

C. $\left[AL^{-2}T\right]$

D. None of these

Answer:

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48. The energy stored in an electric device known as capacitor is given by $U = \frac{q^2}{2C}$

where $U =$ energy stored in capacitor

$C =$ capacity of capacitor

$q =$ charge on capacitor

Find the dimensions of capacity of the capacitor

A. $\left[A^2 M^{-1} L^{-3} T^4\right]$

B. $\left[A M^{-1} L^{-2} T^4\right]$

C. $\left[A^2M^{-1}L^{-2}T^4\right]$

D. $\left[A^0M^0L^{-2}T^4\right]$

Answer: C

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49. The work done by a battery is $W = \varepsilon\Delta q$, where $\Delta q =$ charge transferred by battery $\varepsilon =$ emf of the battery. What are dimensions of emf of battery?

A. $\left[A^{-2}M^{0}L^{0}T^{-2}\right]$

B. $\left[A^{-2}ML^{2}T^{-3}\right]$

C. $\left[A^{0}M^{2}T^{-3}\right]$

D. $\left[A^{-1}ML^{2}T^{-3}\right]$

Answer:

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50. The expression for drift speed is $v_d = \frac{J}{\mathrm{ne}}$

Here $J =$ current density,

$n =$ number of electrons per unit volume,

$e = 1.6 \times 10^{-19}$ unit

The unit and dimension of e are

A. coulomb and $[AT]$

B. ampere per second aned $[AT^{-1}]$

C. No sufficient information

D. None of the above

Answer:

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51. The unit of current element is ampere-metre. Find the dimensions of curent element.

A. $[AML]$

B. $[AML^2T]$

C. $[MLT^2]$

D. $[AL]$

Answer:

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52. The magnetic force on a point moving charge is $F = q(v \times B)$.

Here $q =$ electric charge

$v =$ velocity of the point charge

$B =$ magnetic field

The dimensions of B is

A. $\left[AMLT^{-1}\right]$

B. $\left[A^{-1}MLT^{-2}\right]$

C. $\left[A^{-1}MT^{-2}\right]$

D. none of these

Answer:

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53. What are dimensions of $\frac{E}{B}$?

A. $\left[LT^{-1}\right]$

B. $\left[LT^{-2}\right]$

C. $\left[MLT^{-1}\right]$

D. $\left[ML^{2}T^{-1}\right]$

Answer:

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54. What are the dimensions of $\mu_0\varepsilon_0$?

Here $\mu_0 =$ magnetic permeability in vacuum,

$\varepsilon_0 =$ electric permittivity in vacuum

A. $\left[ML^{-2}T^{-2}\right]$

B. $\left[L^{-2}T^{-2}\right]$

C. $\left[L^{-2}T^{2}\right]$

D. None of these

Answer:

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55. In the forumla $a = 3bc^2$ ' a ' and ' c ' have dimensions of electric capacitance and magnetic induction, respectively, what are dimensions of ' b ' in MKS system?

A. $\left[M^{-3}L^{-2}T^4Q^4\right]$

B. $\left[M^{-3}T^4Q^4\right]$

C. $\left[M^{-3}T^3Q\right]$

D. $\left[M^{-3}L^2T^4Q^{-4}\right]$

Answer:

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56. The dimension of $\frac{R}{L}$ are

A. $\left[T^{-2}\right]$

B. $\left[T^{-1}\right]$

C. $\left[ML^{-1}\right]$

D. $[T]$

Answer:

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57. The magnetic energy stored in an inductor is given by $E = \frac{1}{2}L^a l^b$. Find the value of $'a'$ and $'b'$.

Here $L =$ self-inductance $l =$ electric current.

A. $a = 3, b = 0$

B. $a = 2, b = 1$

C. $a = 0, b = 2$

D. $a = 1, b = 2$

Answer:

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58. In $L - R$ circuit $l = l_0\left[1 - e^{-t/\lambda}\right]$

Here $l =$ electric current in the circuit. Then

A. the dimensions of l_0 and λ

B. the dimension of t and λ are same

C. the dimensions o l and l_0 are not same

D. All of the above

Answer:

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59. A physical quantity u is given by the relation $u = \frac{B^2}{2\mu_0}$

Here $B =$ magnetic field strength

$\mu_0 =$ magnetic permeability of vacuum

The name of physical quantity u is

A. energy

B. energy density

C. pressure

D. none of these

Answer:

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60. The energy of a photon depends upon Planck's constant and frequency of light. Find the exprression for photon energy.

A. $E = hv$

B. $E = \frac{h}{v}$

C. $E = \frac{v}{h}$

D. $E = hv^2$

Answer:

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61. If energy of photon is $E \propto h^a c^b \lambda^d$.

Here $h =$ Planck's constant $c =$ speed of light and

$\lambda =$ wavelength of photon

Then, the value of a, b and d are

A. $1, 1, 1$

B. $1, -1, 1$

C. $1, 1, -1$

D. none of these

Answer:

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62. The radius of nucleus is $r = r_0 A^{1/3}$, where A is mass number. The dimensions of r_0 is

A. $[MLT^{-2}]$

B. $[M^0 L^0 T^{-1}]$

C. $[M^0 L T^0]$

D. None of these

Answer:

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63. The power of lens is $P = \frac{1}{f'}$ where f is focal length of the lens. The dimensions of power of lens is

A. $\left[LT^{-2}\right]$

B. $\left[M^0L^{-1}T^0\right]$

C. $\left[M^0L^0T^0\right]$

D. None of these

Answer:

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64. The dimensions of frequency is

A. $\left[T^{-1}\right]$

B. $\left[M^0L^0T\right]$

C. $\left[M^0L^0T^{-2}\right]$

D. none of these

Answer:

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65. The dimensions of wavelength is

A. $\left[M^0L^0T^0\right]$

B. $\left[M^0LT^0\right]$

C. $\left[M^0L^{-1}T^0\right]$

D. none of these

Answer:

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66. The optical path difference is defined as $\Delta x = \frac{2\pi}{\lambda}$.

What are dimensions of optical path difference?

A. $\left[M^0L^{-1}T^0\right]$

B. $\left[M^1L^1T^0\right]$

C. $\left[ML^0T^1\right]$

D. $\left[ML^{-2T}\right.$

Answer:

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67. The unit of intensity of a wave is $\frac{W}{m^2}$?

What are dimensions of intensity of wave?

A. $\left[MT^{-3}\right]$

B. $\left[AML^0T^{-2}\right]$

C. $\left[M^0L^{-1}T^{-2}\right]$

D. None of these

Answer:

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68. If $x = \frac{a \sin \theta + b \cos \theta}{a + b}$, then

A. the dimensions of x and a are same

B. the dimensions of a and b are not same

C. x is dimensions

D. None of the above

Answer:

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69. $\in \frac{g(dv)}{\sqrt{2nv - v^2}} = a^n \sin^{-1}\left[\frac{x}{a} - 1\right]$ on the basis of dimensional analysis, the value of n is

A. 0

B. -2

C. 3

D. none of these

Answer:

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70. Calcualte the fractional error $\left(\frac{\Delta x}{x}\right)$, if $x = a^n$,

A. $\pm\left(\frac{\Delta a}{a}\right)^n$

B. $\pm n\left(\frac{\Delta a}{a}\right)$

C. $\pm n\frac{\log_e(\Delta a)}{a}$

D. $\pm n\frac{\log(\Delta a)}{a}$

Answer:

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71. The relation gives the value of $'x'$

$$x = \frac{a^3 b^3}{c\sqrt{d}}$$

Find the percentage error in $'x'$ if the percentagr error in a, b, c and d are $2\,\%$, $1\,\%$, $3\,\%$ and $4\,\%$ respectively.

A. $\pm 8\,\%$

B. $\pm 10\,\%$

C. $\pm 12\,\%$

D. $\pm 14\,\%$

Answer:

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72. For the equation $F \propto A^a v^b d^{©}$, where F is the force, A is the area V is the velocity and d is the density, the values of a, b and c are, respectively.

A. $1, 2, 1$

B. $2, 1, 1$

C. $1, 1, 2$

D. $0, 1, 1$

Answer:

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73. If edge lengths of a cuboid are measured to be $1.2cm$, $1.5cm$, and $1.8cm$, then volume of the cuboid is

A. $3.240cm^3$

B. $3.24cm^3$

C. $3.2cm^3$

D. $3.0cm^3$

Answer:

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74. If the force is given by $F = at + bt^2$ with t is time. The dimensions of a and b are

A. $\left[MLT^{-4}\right]$ and $\left[MLT^{-2}\right]$

B. $\left[MLT^{-3}\right.$ and $\left[MLT^{-4}\right]$

C. $\left[ML^2T^{-3}\right]$ and $\left[ML^2T^{-2}\right]$

D. $\left[ML^2T^{-3}\right]$ and $\left[ML^3T^{-4}\right]$

Answer:

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75. The dimensional formula for inductance is

A. $\left[ML^2T^{-2}A^{-2}\right]$

B. $\left[ML^2TA^{-2}\right]$

C. $\left[ML^2T^{-1}A^{-2}\right]$

D. $\left[ML^2T^{-2}A^{-1}\right]$

Answer:

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76. A cube has a side of length $1.2 \times 10^{-2} m$.

Calculate its volume

A. $1.7 \times 10^{-6} m^3$

B. $1.73 \times 10^{-6} m^3$

C. $1.70 \times 10^{-6} m^3$

D. $1.732 \times 10^{-6} m^3$

Answer:

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77. The dimensions of the quantity hc (where $h = \frac{h}{2\pi}$) is

A. $\left[ML^2T^{-1}\right]$

B. $\left[MLT^{-1}\right]$

C. $\left[ML^3T^{-2}\right.$

D. $\left[ML^2T^{-1}\right]$

Answer:

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78. A resistor of $10k\Omega$ has a tolerance of 10% and another resistor of $20k\Omega$ has a tolerance of $20\,\%$. The tolerance of the series combination is rearly

A. $10\,\%$

B. $20\,\%$

C. $15\,\%$

D. $17\,\%$

Answer:

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79. The energy (E), angular momentum (L) and universal gravitational constant (G) are chosen as fundamental quantities. The dimensions of universal gravitational constant in the dimensional formula of Planck's constant h is

A. zero

B. -1

C. $5/3$

D. 1

Answer:

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80. In the releation $p = \frac{\alpha}{\beta} e^{-\frac{az}{k\theta}}$, where p is the pressure z is distance k is Boltzmann constant and θ is the temperature the dimensional formula β will be

A. $\left[M^0 L^2 T^0\right]$

B. $\left[ML^2T\right]$

C. $\left[ML^0T^{-1}\right]$

D. $\left[ML^2T^{-1}\right]$

Answer:

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81. A physical quantity is given by $X = \left[M^aL^bT^c\right]$. The percentage error in measurement of M, L and T are α, β, γ

respectively. Then the maximum % error in the quantity X is

A. $a\alpha + b\beta + c\gamma$

B. $a\alpha + b\beta - c\gamma$

C. $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma}$

D. None of the above

Answer:

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82. Which of the following is not a unit of Young's modulus?

A. Nm^{-1}

B. Nm^{-2}

C. $\text{dyne}cm^{-2}$

D. mega pascal

Answer:

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