PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 97

Physics

1. Assuming f to be the frequency of the electromagnetic wave corresponding to the first

line in Balmer series, the frequency of the immediate next line is

A. 0.50 f

B. 1.35 f

C. 2.05 f

D. 2.70 f

Answer: B

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2. Ionization energy of He^+ ion at minimum energy position is

A. 13.6 eV

B. 27.2 eV

C. 54.4 eV

D. 68.0 eV

Answer: C

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3. Two billiard balls undergo a head-on collision. Ball 1 is twice as heavy as ball 2. Initially, ball 1 moves with a speed v towards ball 2 which is at rest. Immediately after the collision, ball 1 travels at a speed of $v/3$ in the same direction. What type of collision has occured?

A. Inelastic

B. Elastic

C. Completely inelastic

D. Cannot be determined from the information given

Answer: B

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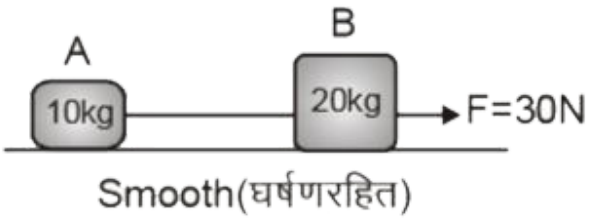
4. Two blocks A and B are connected by a massless string (shown in figure) A force of 30 N is applied on block B. The distance travelled by centre of mass in 2s starting from rest is :



A. 1 m

B. 2 m

C. 3 m

D. 4 m

Answer: B

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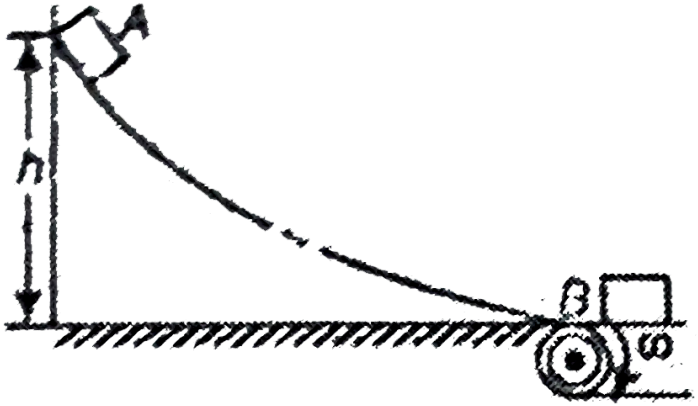
5. Particles are released from rest A and side down the smooth surface of hight h to a conveyor B. The correct angular veleocity ω of the coneyor pulley of readius r to prevent any

siding on the beit as the particles transfer to the conveyou is



A. $\sqrt{2gh}$

B. $\frac{2gh}{r}$

C. $\frac{\sqrt{2gh}}{r}$

D. $\frac{2gh^2}{r^2}$

Answer: C

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6. A circular loop with N turns has radius r . It lies in the x-y plane carrying current I in the anti-clockwise direction . If the magnetic field in the region is $\vec{B} = B_0\hat{i}$, then find the torque $\left(\vec{r}\right)$ acting on the loop .

A. $B_0NI\pi r^2\hat{j}$

B. $B_0I\pi r^2\hat{j}$

C. $B_0NI\pi r^2\hat{k}$

D. $B_0\pi r^2atk$

Answer: A

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7. If the ratio of the concentration of electron to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of current is $\frac{7}{4}$ then what is the ratio of their drift velocities ?

A. $\frac{4}{7}$

B. $\frac{4}{5}$

C. $\frac{5}{8}$

D. $\frac{5}{4}$

Answer: D

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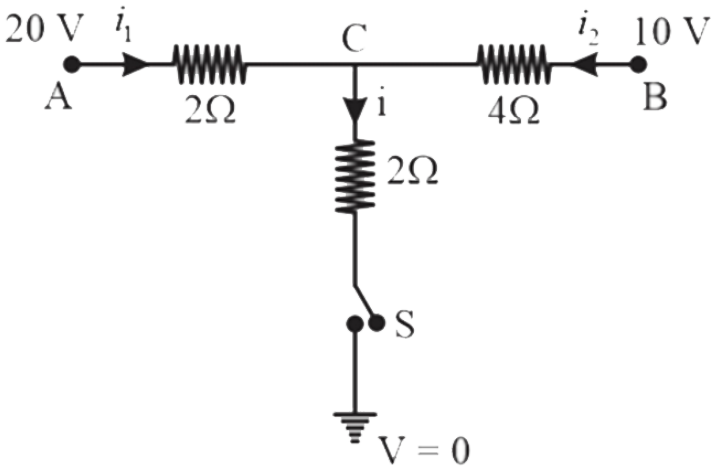
8. When the switch S, in the circuit shown , is closed , then the Value of current i will be :



A. $2A$

B. $5A$

C. $3A$

D. $4A$

Answer: B

9. Two capacitors of capacitance of $6\mu F$ and $12\mu F$ are connected in series with a

battery. The voltage across the $6\mu F$ capacitor is 2V. Compute the total battery voltage.

A. 25 V

B. 50 V

C. 100 V

D. 150 V

Answer: B

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10. Two identical metal plates are given poistive charges Q_1 and Q_2 $(< Q_1)$ respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C, the potencial difference between them is

A. $\frac{Q_1 + Q_2}{2C}$

B. $\frac{Q_1 + Q_2}{C}$

C. $\frac{Q_1 - Q_2}{C}$

D. $\frac{Q_1 - Q_2}{2C}$

Answer: D

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11. A conducting rod of length l is moving in a transverse magnetic field of strength B with veocity v. The resistance of the rod is R. The current in the rod is

A. $\frac{Blv}{R}$

B. Blv

C. Zero

D. $\frac{B^2v^2l^2}{R}$

Answer: C

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12. In a series LCR circuit with an AC source, $R = 300\Omega, C = 20\mu F, L = 1.0henry, \varepsilon_{rms} = 50V$ and $v = \frac{50}{\pi} Hz$. Find (a) the rms current in the circuit and (b) the rms potential differences across the capacitor, the resistor and the inductor. Note that the sum of the rms potential differences across the three elements is greater than the rms voltage of the source.

A. 50 V

B. $\frac{50}{\sqrt{2}}V$

C. 40 V

D. $\frac{40}{\sqrt{2}}V$

Answer: A

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13. Acceleration due to gravity is ' g ' on the surface of the earth. The value of acceleration

due to gravity at a height of 32 km above earth's surface is (Radius of the earth = 6400 km)

A. 0.9 g

B. 0.99 g

C. 0.8 g

D. 1.01 g

Answer: B

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14. Find the change in the gravitational potential energy when a body of mass m is raised to a height nR above the surface of the earth. (Here, R is the radius of the earth)

A. $mgR\dfrac{(n-1)}{n}$

B. $nmgR$

C. $mgR\dfrac{n^2}{n^2+1}$

D. $mgR\dfrac{n}{n+1}$

Answer: A

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15. A glass flask of volume one litre at $0^\circ C$ is filled, level full of mercury at this temperature. The flask and mercury are now heated to $100^\circ C$. How much mercury will spill out if coefficient of volume expansion of mercury is $1.82 \times 10^{-4}/^\circ C$ and linear expansion of glass is $0.1 \times 10^{-4}/^\circ C$ respectively?

A. $2.48 \times 10^{-2} L$

B. $1.52 \times 10^{-2} L$

C. $1.53 \times 10^{4} L$

D. $1.52 \times 10^{-4} L$

Answer: B

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16. A carnot engine absorbs $1000J$ of heat energy from a reservoir at $127^{\circ} C$ and rejecs $600J$ of heat energy during each cycle. Calculate (i) efficiency of the engine, (ii) temperature of sink, (iii) amount of useful work done per cycle.

A. $70\,\%$ and $-10^{\circ} C$

B. $50\,\%$ and $-20^{\circ}C$

C. $40\,\%$ and $-33^{\circ}C$

D. $20\,\%$ and $-43^{\circ}C$

Answer: C

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17. When a gas filled in a closed vessel is heated through $1^{\circ}C$, its pressure increases by 0.4%. What is the initial temperature of gas ?

A. 250 K

B. 2500 K

C. $250^\circ C$

D. $25^\circ C$

Answer: A

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18. A solenoid of 2.5 m length and 2.0 cm diameter possesses 10 turns per cm. A current of 0.5 A is flowing through it . The magnetic induction at axis inside the solenoid is

A. $2\pi \times 10^{-4}T$

B. $2\pi \times 10^{-5}T$

C. $2\pi \times 10^{-6}T$

D. $2\pi \times 10^{-7}T$

Answer: A

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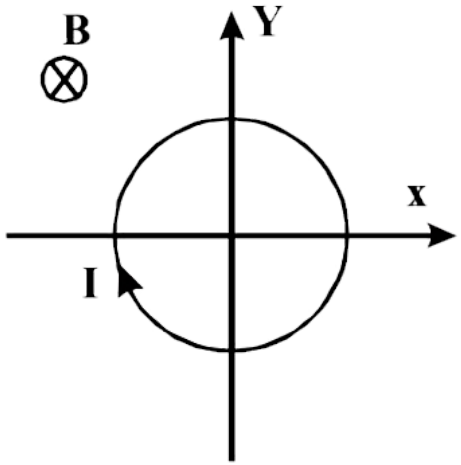
19. A conducting loop carrying a current I is placed in a uniform magnetic field ponting into the plane of the paper as shown. The loop will

have a tendency to



A. Contract

B. Expand

C. Move towards +ve x - axis

D. Move towards -ve x - axis

Answer: B

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20. The length of the bridge, which a grain 130 metres long and travelling at 45 km/hr can cross in n30 second is $200\ m$ b. $225\ m$ c. $245\ m$ d. $250\ m$

A. 200 m

B. 250 m

C. 245 m

D. 250 m

Answer: C

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21. A particle is projected with a velocity v so that its range on a horizontal plane is twice the greatest height attained. If g is acceleration due to gravity, then its range is

A. $\frac{4v^2}{5g}$

B. $\frac{4g}{5v^2}$

C. $\frac{4v^2}{5g^2}$

D. $\frac{4v}{5g^2}$

Answer: A

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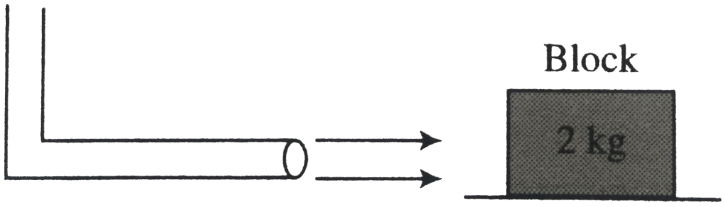
22. A block of metal weighing 2kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of $1kgs^{-1}$ and at a speed of $5ms^{-1}$. The initial acceleration of the block is



A. $2.5ms^{-2}$

B. $5.0ms^{-2}$

C. $10ms^{-2}$

D. None of the above

Answer: A

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23. A bullet fired into a fixed target loses half of its velocity after penetrating 3 cm . How much further it will penetrate before coming to rest

assuming that it faces constant resistance to motion?

A. 1.5 cm

B. 1.0 cm

C. 3.0 cm

D. 2.0 cm

Answer: B

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24. Consider the nuclear reaction $X^{200} \rightarrow A^{110} + B^{80} + 10n^{1}$. If the binding energy per nucleon for X, A and B are 7.4 MeV, 8.2 MeV and 8.1 MeV respectively, then the energy released in the reaction:

A. 70 MeV

B. 200 MeV

C. 190 MeV

D. 10 MeV

Answer: A

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25. Two nuclei have mass numbers in the ratio 27 : 125. What is the ratio of their nuclear radii ?

A. $5:9$

B. $9:5$

C. $5:3$

D. $3:5$

Answer: D

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26. The motion of a particle executing S.H.M. is given by $x = 0.01 \sin 100\pi(t + .05)$, where x is in metres and time is in seconds. The time period is

A. 0.2 s

B. 0.1 s

C. 0.02 s

D. 0.01 s

Answer: C

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27. The dispalcement of an object attached to a spring and excuting simple harmonic motion is given by $x = 2 \times 10^{-2} \cos \pi t$ metres. The time at which at maximum speed first occurs is :

A. 0.5 s

B. 0.75 s

C. 0.125 s

D. 0.25 s

Answer: A

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28. For plane electromagnetic waves propagating in the z-direction , which one of the following combinations gives the correct possible direction for $\vec{E}$ and $\vec{B}$ field respectively ?

A. $\left(-\hat{i}+\widehat{2j}\right)$ and $\left(2\hat{i}-\hat{j}\right)$

B. $\left(-2\hat{i}-3\hat{j}\right)$ and $\left(3\hat{i}-2\hat{j}\right)$

C. $\left(2\hat{i}+3\hat{j}\right)$ and $\left(\hat{i}+2\hat{j}\right)$

D. $\left(3\hat{i}-4\hat{j}\right)$ and $\left(4\hat{i}-3\hat{j}\right)$

Answer: B

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29. Light of wavelength 4000Å is allowed to fall on a metal surface having work function 2 eV. The maximum velocity of the emitted electrons is

$\left(h=6.6\times10^{-34}Js\right)$

A. $1.35 \times 10^5 ms^{-1}$

B. $2.7 \times 10^5 ms^{-1}$

C. $6.2 \times 10^5 ms^{-1}$

D. $8.1 \times 10^5 ms^{-1}$

Answer: C

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30. A horizontal pipeline carries water in a streamline flow. At a point along the pipe, where the cross- sectional area is $10cm^2$, the water

velocity is $1ms^{-1}$ and the pressure is 2000 Pa. The pressure of water at another point where the cross-sectional area is $5cm^2$, is.....Pa. (Density of water $= 10^3 kg.\, m^{-3}$)

A. 200 Pa

B. 400 Pa

C. 500 Pa

D. 800 Pa

Answer: C

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31. A coaxial cylinder made of glass is immersed in a-liquid of surface tension S. The radius of the inner and outer surface of the cylinder are R_1 and R_2 respectively . Height till which liquid will rise is (Density of liquid is ρ)

A. $\frac{2S}{R_2\rho g}$

B. $\frac{2S}{R_1\rho g}$

C. $\frac{S}{(R_2 - R_1)\rho g}$

D. $\frac{2S}{(R_2 - R_1)\rho g}$

Answer: D

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32. At what distance from a convex lens of focal length $30cm$ an object should be placed so that the size of image be $\frac{1}{4}$ that of object?

A. 30 cm

B. 60 cm

C. 15 cm

D. 90 cm

Answer: D

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33. A thin prism P_1 with angle $4degree$ and made from glass of refractive index 1.54 is combined with another thin prism P_2 made from glass of refractive index 1.72 to produce dispersion without deviation. The angle of the prism P_2 is

A. 5.33°

B. 4°

C. 3°

D. 2.6°

Answer: C

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34. The moment of inertia of a solid cylinder about its axis is given by $(1/2)MR^2$. If this cylinder rolls without slipping the ratio of its rotational kinetic energy to its translational kinetic energy is -

A. $1:1$

B. $2:2$

C. $1:2$

D. $2:3$

Answer: C

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35. A force $\vec{F} = \alpha\hat{i} + 3\hat{j} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{i} - 6\hat{j} - 12\hat{k}$. The value of α for which angular momentum about origin is conserved is:

A. 0

B. 1

C. -1

D. 2

Answer: C

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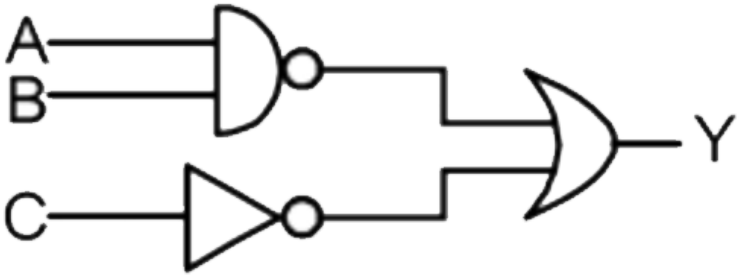
36. The inputs to the digital circuit are shown below. The output Y is



A. $A + B + \overline{C}$

B. $(A + B)\overline{C}$

C. $\overline{A} + \overline{B} + \overline{C}$

D. $\overline{A} + \overline{B} + C$

Answer: C

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37. The part of a transistor which is most heavily doped to produce large number of majority carriers is

A. Emitter

B. Base

C. Collector

D. can be any of the above three

Answer: A

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38. Power radiated by a black body is P_0 and the wavelength corresponding to maximum energy is around λ_0, On changing the temperature of the black body, it was observed that the power radiated becames $\frac{256}{81}P_0$. The shift in wavelength corresponding to the maximum energy will be

A. $+\frac{\lambda_0}{4}$

B. $+\frac{\lambda_0}{2}$

C. $-\frac{\lambda_0}{4}$

D. $-\frac{\lambda_0}{2}$

Answer: C

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39. SI units, the dimensions of $\sqrt{\frac{\varepsilon_0}{\mu_0}}$ is

A. $M^{-1}L^{-4}T^{5}A^{-2}$

B. $M^{-1}L^{-4}T^{5}A^{2}$

C. $M^{-1}L^{-2}T^{3}A^{2}$

D. $M^{-1}L^{-4}T^{4}A^{2}$

Answer: C

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40. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is

A. 1.2 cm

B. 1.2 mm

C. 2.4 cm

D. 2.4 mm

Answer: D

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41. A parallel beam of monochromatic light is incident normally on a slit. The diffraction parttern is observed on a screen placed at the focal plane of convex lens. If the slit width is increased , the central maximum of the diffraction pattern will

A. Become broader and fainter

B. Become broader and bright

C. Become narrower and brighter

D. Become narrower and brighter

Answer: D

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42. A way pulse is travelling on a string of linear mass density $6.4 \times 10^{-3} kgm^{-1}$ under a load of

$80kgf$. Calculate the time taken by the pulse to traverse the string, if its length is $0.7m$.

A. $2 \times 10^{-3}s$

B. $3 \times 10^{-3}s$

C. $4 \times 10^{-2}s$

D. $5 \times 10^{-2}s$

Answer: A

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43. It takes 2.0 seconds for a sound wave to travel between two fixed points when the day temperature is $10^{\circ}C$. If the temperature rise to $30^{\circ}C$ the sound wave travels between the same fixed parts in

A. 1.9 s

B. 2.0 s

C. 2.1 s

D. 2.2 s

Answer: A

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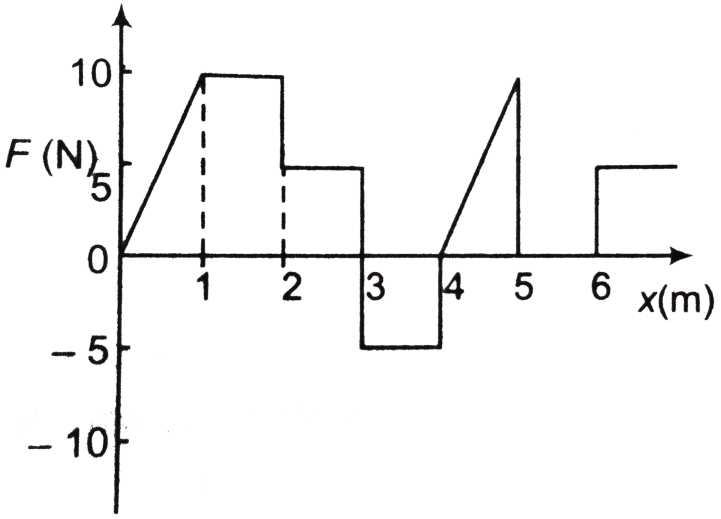
44. The relationship between the force F and position x of body is as shown in figure. The work done in displacing the body in displacing the body from ($x = 1m$ to $x = 5m$) will be



A. 30 J

B. 15 J

C. 25 J

D. 20 J

Answer: B

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45. A particle is projected vertically upwards with a speed of $16ms^{-1}$. After some time, when it again passes through the point of projection,

its speed is found to be $8ms^{-1}$. It is known that the work done by air resistance is same during upward and downward motion. Then the maximum height attained by the particle is (take $g = 10ms^{-2}$)

A. 8 m

B. 4.8m

C. 17.6 m

D. 12.8 m

Answer: A

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