JEE Mains

Physics

Low Level

1. What is the unit of power?
    - A) Joule
    - B) Watt
    - C) Newton
    - D) Ampere

    Answer: B) Watt
2. An object is thrown upwards with a velocity of 20 m/s. How high will it rise? (Use g=10 m/s2g = 10 \, \text{m/s}^2g=10m/s2)
    - A) 20 m
    - B) 40 m
    - C) 30 m
    - D) 50 m

    Answer: B) 20 m
3. A body is in uniform circular motion. What remains constant?
    - A) Speed
    - B) Velocity
    - C) Acceleration
    - D) Force

    Answer: A) Speed
4. Which of the following is a scalar quantity?
    - A) Velocity
    - B) Force
    - C) Work
    - D) Displacement

    Answer: C) Work
5. The temperature at which the Kelvin and Celsius scales coincide is:
    - A) 0°C
    - B) -273°C
    - C) -100°C
    - D) 100°C

    Answer: B) -273°C

Medium Level

1. A particle moves in a straight line with an acceleration of 2 m/s22 \, \text{m/s}^22m/s2. If it starts from rest, what is its velocity after 5 seconds?
    - A) 10 m/s
    - B) 5 m/s
    - C) 20 m/s
    - D) 15 m/s

    Answer: C) 10 m/s
2. In a hydraulic lift, if the area of the smaller piston is A1A_1A1 and the area of the larger piston is A2A_2A2, what is the relation between the forces?
    - A) F1=F2F_1 = F_2F1=F2

- B) F1A1=F2A2F_1A_1 = F_2A_2F1A1=F2A2
- C) F1=F2A1A2F_1 = \frac{F_2A_1}{A_2}F1=A2F2A1
- D) F1=F2A2A1F_1 = F_2 \frac{A_2}{A_1}F1=F2A1A2

Answer: B) F1A1=F2A2F_1A_1 = F_2A_2F1A1=F2A2

3. A metal rod expands linearly. If its length increases by ΔL\Delta LΔL, what is the change in volume?
   - A) ΔV=ΔL\Delta V = \Delta LΔV=ΔL
   - B) ΔV=3ΔL\Delta V = 3\Delta LΔV=3ΔL
   - C) ΔV=LΔL\Delta V = L \Delta LΔV=LΔL
   - D) ΔV=L2ΔL2\Delta V = \frac{L^2 \Delta L}{2}ΔV=2L2ΔL

   Answer: B) ΔV=3ΔL\Delta V = 3\Delta LΔV=3ΔL
4. The moment of inertia of a thin rectangular plate about an axis passing through its center and perpendicular to its plane is:
   - A) 112ml2\frac{1}{12} m l^2121ml2
   - B) 13ml2\frac{1}{3} m l^231ml2
   - C) 16ml2\frac{1}{6} m l^261ml2
   - D) 14ml2\frac{1}{4} m l^241ml2

   Answer: A) 112ml2\frac{1}{12} m l^2121ml2
5. A wave travels with a speed of 340 m/s and has a frequency of 1700 Hz. What is its wavelength?
   - A) 0.2 m
   - B) 0.5 m
   - C) 1.0 m
   - D) 2.0 m

   Answer: B) 0.2 m

Higher Level

1. A projectile is launched with an initial velocity uuu at an angle θ\thetaθ. What is the maximum height reached?
   - A) u2sin⁡2θ2g\frac{u^2 \sin^2 \theta}{2g}2gu2sin2θ
   - B) u2g\frac{u^2}{g}gu2
   - C) u2cos⁡2θg\frac{u^2 \cos^2 \theta}{g}gu2cos2θ
   - D) u22g\frac{u^2}{2g}2gu2

   Answer: A) u2sin⁡2θ2g\frac{u^2 \sin^2 \theta}{2g}2gu2sin2θ
2. Two bodies of mass m1m_1m1 and m2m_2m2 collide elastically. If m1m_1m1 is initially at rest, what is the final velocity of m1m_1m1 after the collision?
   - A) 2m2m1+m2v\frac{2m_2}{m_1 + m_2} vm1+m22m2v
   - B) m2−m1m2+m1v\frac{m_2 - m_1}{m_2 + m_1} vm2+m1m2−m1v
   - C) m1−m2m1+m2v\frac{m_1 - m_2}{m_1 + m_2} vm1+m2m1−m2v
   - D) m1+m2m1−m2v\frac{m_1 + m_2}{m_1 - m_2} vm1−m2m1+m2v

   Answer: A) 2m2m1+m2v\frac{2m_2}{m_1 + m_2} vm1+m22m2v
3. A thin circular loop of radius RRR is rotated about its vertical diameter with a constant angular speed ω\omegaω. What is the expression for the apparent weight of a particle at the rim of the loop?
   - A) mgmgmg
   - B) mg+mRω2mg + mR\omega^2mg+mRω2
   - C) mg−mRω2mg - mR\omega^2mg−mRω2
   - D) mRω2mR\omega^2mRω2

   Answer: B) mg+mRω2mg + mR\omega^2mg+mRω2

4. A beam of light passes from air to glass. If the angle of incidence is 30∘30^\\circ30∘ and the refractive index of glass is 1.51.51.5, what is the angle of refraction?
    - A) 20∘20^\\circ20∘
    - B) 30∘30^\\circ30∘
    - C) 15∘15^\\circ15∘
    - D) 22.5∘22.5^\\circ22.5∘

      Answer: D) 22.5∘22.5^\\circ22.5∘
5. In a Carnot engine operating between two temperatures THT_HTH and TCT_CTC, what is the efficiency of the engine?
    - A) 1−THTC1 - \frac{T_H}{T_C}1−TCTH
    - B) TH−TCTH\frac{T_H - T_C}{T_H}THTH−TC
    - C) TCTH\frac{T_C}{T_H}THTC
    - D) THTC\frac{T_H}{T_C}TCTH

      Answer: B) TH−TCTH\frac{T_H - T_C}{T_H}THTH−TC

Chemistry

Low Level

1. What is the molecular formula for water?
    - A) H_2O
    - B) O_2H
    - C) OH
    - D) H_2O_2

      Answer: A) H_2O
2. What is the pH of a neutral solution at 25°C?
    - A) 0
    - B) 7
    - C) 14
    - D) 1

      Answer: B) 7
3. Which of the following is a strong acid?
    - A) Acetic acid
    - B) Hydrochloric acid
    - C) Carbonic acid
    - D) Phosphoric acid

      Answer: B) Hydrochloric acid
4. What is the primary gas produced during photosynthesis?
    - A) Oxygen
    - B) Carbon dioxide
    - C) Nitrogen
    - D) Hydrogen

      Answer: A) Oxygen
5. What is the name of the process in which a solid changes directly into a gas?
    - A) Sublimation
    - B) Deposition
    - C) Evaporation

- D) Condensation
  Answer: A) Sublimation

Medium Level

1. What type of bond is formed when electrons are shared between atoms?
   - A) Ionic bond
   - B) Covalent bond
   - C) Metallic bond
   - D) Hydrogen bond
     Answer: B) Covalent bond
2. In the reaction 2H2+O2→2H2O2H_2 + O_2 \rightarrow 2H_2O2H2+O2→2H2O, what is the mole ratio of hydrogen to water?
   - A) 1:1
   - B) 2:1
   - C) 2:2
   - D) 1:2
     Answer: B) 2:2
3. What is the process of converting a liquid into a gas called?
   - A) Evaporation
   - B) Sublimation
   - C) Condensation
   - D) Freezing
     Answer: A) Evaporation
4. Which type of reaction is represented by A+B→ABA + B \rightarrow ABA+B→AB?
   - A) Decomposition
   - B) Combination
   - C) Displacement
   - D) Redox
     Answer: B) Combination
5. Which of the following is the correct electron configuration for sodium?
   - A) $1s^2\ 2s^2\ 2p^6\ 3s^1$
   - B) $1s^2\ 2s^2\ 2p^6\ 3p^1$
   - C) $1s^2\ 2s^2\ 2p^5\ 3s^2$
   - D) $1s^2\ 2s^2\ 2p^6\ 3s^2$
     Answer: A) $1s^2\ 2s^2\ 2p^6\ 3s^1$

Higher Level

1. What is the enthalpy change when one mole of water vapor condenses to liquid water?
   - A) -40.7 kJ/mol
   - B) -50.1 kJ/mol
   - C) 40.7 kJ/mol
   - D) 0 kJ/mol
     Answer: A) -40.7 kJ/mol
2. For the reaction A⇌B+CA \rightleftharpoons B + CA⇌B+C, if Kc=4K_c = 4Kc=4, what is the value of KpK_pKp at constant temperature?
   - A) 16
   - B) 4

- C) 1
- D) 0.25

  Answer: A) 16

3. In which of the following reactions does oxidation occur?
   - A) H2+Cl2→2HClH_2 + Cl_2 \rightarrow 2HClH2+Cl2→2HCl
   - B) 2Mg+O2→2MgO2Mg + O_2 \rightarrow 2MgO2Mg+O2→2MgO
   - C) 2H2O→2H2+O22H_2O \rightarrow 2H_2 + O_22H2O→2H2+O2
   - D) CH4+2O2→CO2+2H2OCH_4 + 2O_2 \rightarrow CO_2 + 2H_2OCH4 +2O2→CO2+2H2O

     Answer: C) 2H2O→2H2+O22H_2O \rightarrow 2H_2 + O_22H2O→2H2 +O2
4. What is the major product when benzene reacts with chlorobenzene in the presence of a catalyst?
   - A) Biphenyl
   - B) Toluene
   - C) Ethylbenzene
   - D) Chlorobenzene

     Answer: A) Biphenyl
5. Which statement is true about equilibrium?
   - A) The concentrations of reactants and products are equal.
   - B) The rates of forward and reverse reactions are equal.
   - C) The reaction stops.
   - D) The reaction favors reactants only.

     Answer: B) The rates of forward and reverse reactions are equal.

Mathematics

Low Level

1. What is 2+22 + 22+2?
   - A) 3
   - B) 4
   - C) 5
   - D) 6

     Answer: B) 4
2. What is the area of a rectangle with length 5 and width 3?
   - A) 15
   - B) 8
   - C) 12
   - D) 10

     Answer: D) 15
3. What is the value of xxx if 2x=102x = 102x=10?
   - A) 2
   - B) 3
   - C) 5
   - D) 10

     Answer: C) 5
4. The sum of angles in a triangle is:

- A) 90 degrees
- B) 180 degrees
- C) 270 degrees
- D) 360 degrees

Answer: B) 180 degrees

5. What is 525^252?
   - A) 10
   - B) 15
   - C) 25
   - D) 20

   Answer: C) 25

Medium Level

1. Solve for xxx in the equation x2−5x+6=0x^2 - 5x + 6 = 0x2−5x+6=0.
   - A) 2 and 3
   - B) 1 and 6
   - C) 0 and 5
   - D) 3 and 4

   Answer: A) 2 and 3
2. What is the value of the determinant of the matrix (1234)\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}(1324)?
   - A) -2
   - B) 2
   - C) 5
   - D) 1

   Answer: A) -2
3. The value of sin⁡30∘\sin 30^\circsin30∘ is:
   - A) 0
   - B) 0.5
   - C) 1
   - D) 0.75

   Answer: B) 0.5
4. What is the sum of the roots of the quadratic equation ax2+bx+c=0ax^2 + bx + c = 0ax2+bx+c=0?
   - A) −ba-\frac{b}{a}−ab
   - B) ba\frac{b}{a}ab
   - C) cb\frac{c}{b}bc
   - D) −c-c−c

   Answer: A) −ba-\frac{b}{a}−ab
5. If f(x)=x3−3x+2f(x) = x^3 - 3x + 2f(x)=x3−3x+2, what is f(1)f(1)f(1)?
   - A) 0
   - B) 1
   - C) 2
   - D) -1

   Answer: A) 0

Higher Level

1. What is the limit of sin⁡xx\frac{\sin x}{x}xsinx as xxx approaches 0?

- A) 1
- B) 0
- C) Infinity
- D) Undefined

  Answer: A) 1

2. Solve the integral ∫x2 dx\int x^2 \, dx∫x2dx.
   - A) x33+C\frac{x^3}{3} + C3x3+C
   - B) x3+Cx^3 + Cx3+C
   - C) x22+C\frac{x^2}{2} + C2x2+C
   - D) 2x+C2x + C2x+C

     Answer: A) x33+C\frac{x^3}{3} + C3x3+C
3. What is the derivative of f(x)=exf(x) = e^xf(x)=ex?
   - A) exe^xex
   - B) xexxe^xxex
   - C) lnf0x\ln xlnx
   - D) xex^exe

     Answer: A) exe^xex
4. If tanf0θ=1\tan \theta = 1tanθ=1, what is the value of θ\thetaθ?
   - A) 45∘+n×180∘45^\circ + n \times 180^\circ45∘+n×180∘
   - B) 90∘+n×180∘90^\circ + n \times 180^\circ90∘+n×180∘
   - C) 30∘+n×180∘30^\circ + n \times 180^\circ30∘+n×180∘
   - D) 60∘+n×180∘60^\circ + n \times 180^\circ60∘+n×180∘

     Answer: A) 45∘+n×180∘45^\circ + n \times 180^\circ45∘+n×180∘
5. The equation of a circle with center (h,k)(h, k)(h,k) and radius rrr is given by:
   - A) (x−h)2+(y−k)2=r2(x-h)^2 + (y-k)^2 = r^2(x−h)2+(y−k)2=r2
   - B) (x+h)2+(y+k)2=r2(x+h)^2 + (y+k)^2 = r^2(x+h)2+(y+k)2=r2
   - C) (x−h)2+(y+k)2=r(x-h)^2 + (y+k)^2 = r(x−h)2+(y+k)2=r
   - D) (x+h)2+(y−k)2=r2(x+h)^2 + (y-k)^2 = r^2(x+h)2+(y−k)2=r2

     Answer: A) (x−h)2+(y−k)2=r2(x-h)^2 + (y-k)^2 = r^2(x−h)2+(y−k)2=r2

JEE Advanced

Physics

Low Level

1. What is the value of gravitational acceleration on Earth?
   - A) 9.8 m/s29.8 \, \text{m/s}^29.8m/s2
   - B) 10 m/s210 \, \text{m/s}^210m/s2
   - C) 9.0 m/s29.0 \, \text{m/s}^29.0m/s2
   - D) 8.0 m/s28.0 \, \text{m/s}^28.0m/s2

     Answer: A) 9.8 m/s29.8 \, \text{m/s}^29.8m/s2
2. A ray of light strikes a plane mirror at an angle of 30∘30^\circ30∘. What is the angle of reflection?
   - A) 30∘30^\circ30∘
   - B) 60∘60^\circ60∘
   - C) 90∘90^\circ90∘

- D) 15∘15^\circ15∘

  Answer: A) 30∘30^\circ30∘

3. Which of the following is a unit of energy?
   - A) Joule
   - B) Newton
   - C) Watt
   - D) Ampere

     Answer: A) Joule
4. In a vacuum, light travels at:
   - A) 3×108 m/s3 \times 10^8 \, \text{m/s}3×108m/s
   - B) 3×106 m/s3 \times 10^6 \, \text{m/s}3×106m/s
   - C) 3×105 m/s3 \times 10^5 \, \text{m/s}3×105m/s
   - D) 3×104 m/s3 \times 10^4 \, \text{m/s}3×104m/s

     Answer: A) 3×108 m/s3 \times 10^8 \, \text{m/s}3×108m/s
5. Which of the following quantities is conserved in an elastic collision?
   - A) Momentum only
   - B) Kinetic energy only
   - C) Both momentum and kinetic energy
   - D) Neither

     Answer: C) Both momentum and kinetic energy

Medium Level

1. A mass mmm is attached to a spring with spring constant kkk. If the mass is displaced by a distance xxx and released, what is the maximum speed of the mass?
   - A) kmx\sqrt{\frac{k}{m}} xmkx
   - B) kx2m\sqrt{\frac{kx^2}{m}}mkx2
   - C) km\sqrt{\frac{k}{m}}mk
   - D) mkx\sqrt{\frac{m}{k}} xkmx

     Answer: A) kmx\sqrt{\frac{k}{m}} xmkx
2. What is the effective resistance of three resistors, each of resistance RRR, connected in series?
   - A) RRR
   - B) 3R3R3R
   - C) R3\frac{R}{3}3R
   - D) R33R2\frac{R^3}{3R^2}3R2R3

     Answer: B) 3R3R3R
3. In a parallel plate capacitor, if the distance between the plates is doubled, what happens to the capacitance?
   - A) Doubles
   - B) Halves
   - C) Remains the same
   - D) Increases by a factor of four

     Answer: B) Halves
4. A projectile is launched at an angle of 60∘60^\circ60∘ with an initial velocity uuu. What is the time of flight?
   - A) 2usin⁡60∘g\frac{2u \sin 60^\circ}{g}g2usin60∘
   - B) usin⁡60∘g\frac{u \sin 60^\circ}{g}gusin60∘
   - C) u2sin⁡2⋅60∘g\frac{u^2 \sin 2 \cdot 60^\circ}{g}gu2sin2⋅60∘

- D) ucos⁡60∘g\frac{u \cos 60^\circ}{g}gucos60∘
  Answer: A) 2usin⁡60∘g\frac{2u \sin 60^\circ}{g}g2usin60∘

5. The period of a simple pendulum depends on:
   - A) Mass of the bob
   - B) Length of the pendulum
   - C) Amplitude of the swing
   - D) None of the above
     Answer: B) Length of the pendulum

Higher Level

1. The wave function ψ(x)\psi(x)ψ(x) of a particle in a one-dimensional infinite potential well is given by:
   - ψn(x)=2Lsin⁡(nπxL)\psi_n(x) = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right)ψn(x)=L2sin(Lnπx)
   - What is the probability of finding the particle in the first quarter of the well?
   - A) 18\frac{1}{8}81
   - B) 14\frac{1}{4}41
   - C) 12\frac{1}{2}21
   - D) 116\frac{1}{16}161
     Answer: B) 14\frac{1}{4}41
2. What is the condition for constructive interference in a double-slit experiment?
   - A) dsin⁡θ=(m+0.5)λd \sin \theta = (m + 0.5) \lambdadsinθ=(m+0.5)λ
   - B) dsin⁡θ=mλd \sin \theta = m \lambdadsinθ=mλ
   - C) dtan⁡θ=mλd \tan \theta = m \lambdadtanθ=mλ
   - D) d=mλd = m \lambdad=mλ
     Answer: B) dsin⁡θ=mλd \sin \theta = m \lambdadsinθ=mλ
3. A cylindrical conductor of radius RRR carries a current III. What is the magnetic field at the center of the cylinder?
   - A) 000
   - B) μ0I2πR\frac{\mu_0 I}{2\pi R}2πRμ0I
   - C) μ0I4πR\frac{\mu_0 I}{4\pi R}4πRμ0I
   - D) μ0IR\frac{\mu_0 I}{R}Rμ0I
     Answer: A) 000
4. The half-life of a radioactive substance is t1/2t_{1/2}t1/2. What is the decay constant λ\lambdaλ?
   - A) 0.693t1/2\frac{0.693}{t_{1/2}}t1/20.693
   - B) 1t1/2\frac{1}{t_{1/2}}t1/21
   - C) t1/20.693\frac{t_{1/2}}{0.693}0.693t1/2
   - D) t1/22\frac{t_{1/2}}{2}2t1/2
     Answer: A) 0.693t1/2\frac{0.693}{t_{1/2}}t1/20.693
5. A current III flows through a solenoid of length LLL and cross-sectional area AAA. The magnetic field inside the solenoid is given by:
   - A) μ0IA\frac{\mu_0 I}{A}Aμ0I
   - B) μ0IL\frac{\mu_0 I}{L}Lμ0I
   - C) μ0nIL\frac{\mu_0 n I}{L}Lμ0nI
   - D) μ0I\mu_0 Iμ0I
     Answer: C) μ0nIL\frac{\mu_0 n I}{L}Lμ0nI

Chemistry

Low Level

1. What is the chemical formula for sulfuric acid?
    - A) H_2SO_4
    - B) H_2SO_3
    - C) H_2S
    - D) HSO_4

    Answer: A) H_2SO_4
2. What is the primary component of air?
    - A) Oxygen
    - B) Nitrogen
    - C) Carbon Dioxide
    - D) Argon

    Answer: B) Nitrogen
3. Which of the following is a noble gas?
    - A) Oxygen
    - B) Helium
    - C) Hydrogen
    - D) Nitrogen

    Answer: B) Helium
4. The reaction 2H2+O2→2H2O2H_2 + O_2 \rightarrow 2H_2O2H2+O2→2H2O is an example of:
    - A) Synthesis
    - B) Decomposition
    - C) Single replacement
    - D) Double replacement

    Answer: A) Synthesis
5. What is the oxidation state of sulfur in H2SO4H_2SO_4H2SO4?
    - A) +2
    - B) +4
    - C) +6
    - D) -2

    Answer: C) +6

Medium Level

1. In an exothermic reaction, the enthalpy change ΔH\Delta HΔH is:
    - A) Positive
    - B) Negative
    - C) Zero
    - D) Cannot be determined

    Answer: B) Negative
2. Which of the following elements has the highest ionization energy?
    - A) Sodium
    - B) Magnesium
    - C) Chlorine
    - D) Argon

    Answer: D) Argon

3. What is the molarity of a solution containing 2 moles of solute in 1 liter of solution?
    - A) 2 M
    - B) 1 M
    - C) 0.5 M
    - D) 4 M

    Answer: A) 2 M
4. The pH of a neutral solution at 25°C is:
    - A) 7
    - B) 0
    - C) 14
    - D) 1

    Answer: A) 7
5. Which of the following compounds is a strong acid?
    - A) Acetic acid
    - B) Hydrochloric acid
    - C) Citric acid
    - D) Carbonic acid

    Answer: B) Hydrochloric acid

Higher Level

1. What is the equilibrium constant KcK_cKc for the reaction A+B⇌C+DA + B \rightleftharpoons C + DA+B⇌C+D if at equilibrium, [A]=1 M[A] = 1 \, M[A]=1M, [B]=2 M[B] = 2 \, M[B]=2M, [C]=3 M[C] = 3 \, M[C]=3M, and [D]=4 M[D] = 4 \, M[D]=4M?
    - A) 122\frac{12}{2}212
    - B) 121\frac{12}{1}112
    - C) 3×41×2\frac{3 \times 4}{1 \times 2}1×23×4
    - D) (3)(4)(1)(2)\frac{(3)(4)}{(1)(2)}(1)(2)(3)(4)

    Answer: D) (3)(4)(1)(2)\frac{(3)(4)}{(1)(2)}(1)(2)(3)(4)
2. The half-life of a first-order reaction is:
    - A) Independent of concentration
    - B) Dependent on concentration
    - C) Zero
    - D) Negative

    Answer: A) Independent of concentration
3. What is the main product of the reaction between ethene and bromine?
    - A) Ethane
    - B) Bromoethane
    - C) 1,2-Dibromoethane
    - D) None of the above

    Answer: C) 1,2-Dibromoethane
4. If the KpK_pKp of a reaction is 444, what is the relationship between KcK_cKc and KpK_pKp?
    - A) Kc=KpK_c = K_pKc=Kp
    - B) Kc<KpK_c < K_pKc<Kp
    - C) Kc>KpK_c > K_pKc>Kp
    - D) Kc=KpK_c = K_pKc=Kp at all temperatures

    Answer: B) Kc<KpK_c < K_pKc<Kp
5. Which of the following reactions is not an example of a redox reaction?

- A) Fe2++2Ag+→Fe3++2AgFe^{2+} + 2Ag^{+} \rightarrow Fe^{3+} + 2AgFe2++2Ag+→Fe3++2Ag
- B) H2+Cl2→2HClH_2 + Cl_2 \rightarrow 2HClH2+Cl2→2HCl
- C) 2Na+Cl2→2NaCl2Na + Cl_2 \rightarrow 2NaCl2Na+Cl2→2NaCl
- D) NaOH+HCl→NaCl+H2ONaOH + HCl \rightarrow NaCl + H_2ONaOH+HCl→NaCl+H2O
  Answer: D) NaOH+HCl→NaCl+H2ONaOH + HCl \rightarrow NaCl + H_2ONaOH+HCl→NaCl+H2O

Mathematics

Low Level

1. What is the sum of the angles in a triangle?
   - A) 180 degrees
   - B) 360 degrees
   - C) 90 degrees
   - D) 270 degrees
     Answer: A) 180 degrees
2. What is 2+32 + 32+3?
   - A) 4
   - B) 5
   - C) 6
   - D) 7
     Answer: B) 5
3. What is the value of 505^050?
   - A) 0
   - B) 1
   - C) 5
   - D) Undefined
     Answer: B) 1
4. What is the area of a circle with radius rrr?
   - A) πr2\pi r^2πr2
   - B) 2πr2\pi r2πr
   - C) 12πr2\frac{1}{2} \pi r^221πr2
   - D) 4πr24\pi r^24πr2
     Answer: A) πr2\pi r^2πr2
5. The equation of a line in slope-intercept form is:
   - A) y=mx+by = mx + by=mx+b
   - B) Ax+By=CAx + By = CAx+By=C
   - C) y2=4axy^2 = 4axy2=4ax
   - D) x2+y2=r2x^2 + y^2 = r^2x2+y2=r2
     Answer: A) y=mx+by = mx + by=mx+b

Medium Level

1. What is the solution to the equation x2−4=0x^2 - 4 = 0x2−4=0?
   - A) x=2x = 2x=2

- B) x=−2x = -2x=−2
- C) x=2,−2x = 2, -2x=2,−2
- D) No solution

  Answer: C) x=2,−2x = 2, -2x=2,−2

2. What is the value of the determinant of the matrix (1234)\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}(1324)?
   - A) -2
   - B) 2
   - C) 5
   - D) 1

     Answer: A) -2
3. Solve for xxx: log⁡2(x)=5\log_2(x) = 5log2(x)=5.
   - A) 32
   - B) 16
   - C) 10
   - D) 8

     Answer: A) 32
4. The area of a triangle with base bbb and height hhh is:
   - A) bhbhbh
   - B) 12bh\frac{1}{2}bh21bh
   - C) 2bh2bh2bh
   - D) b+h2\frac{b+h}{2}2b+h

     Answer: B) 12bh\frac{1}{2}bh21bh
5. If f(x)=x2+2x+1f(x) = x^2 + 2x + 1f(x)=x2+2x+1, what is f(−1)f(-1)f(−1)?
   - A) 0
   - B) 1
   - C) -1
   - D) 2

     Answer: B) 1

Higher Level

1. What is the limit of sin⁡xx\frac{\sin x}{x}xsinx as x→0x \to 0x→0?
   - A) 0
   - B) 1
   - C) Infinity
   - D) Undefined

     Answer: B) 1
2. What is the integral of ∫x2 dx\int x^2 \, dx∫x2dx?
   - A) x33+C\frac{x^3}{3} + C3x3+C
   - B) x3+Cx^3 + Cx3+C
   - C) x22+C\frac{x^2}{2} + C2x2+C
   - D) 2x+C2x + C2x+C

     Answer: A) x33+C\frac{x^3}{3} + C3x3+C
3. If f(x)=exf(x) = e^xf(x)=ex, what is f′(x)f'(x)f′(x)?
   - A) exe^xex
   - B) xexx e^xxex
   - C) ln⁡(x)\ln(x)ln(x)
   - D) xex^exe

     Answer: A) exe^xex

4. The derivative of sin⁡(x)\sin(x)sin(x) is:
    - A) cos⁡(x)\cos(x)cos(x)
    - B) −sin⁡(x)-\sin(x)−sin(x)
    - C) tan⁡(x)\tan(x)tan(x)
    - D) sec⁡2(x)\sec^2(x)sec2(x)

    Answer: A) cos⁡(x)\cos(x)cos(x)
5. Solve for xxx in the equation ex=5e^x = 5ex=5:
    - A) x=ln⁡(5)x = \ln(5)x=ln(5)
    - B) x=5x = 5x=5
    - C) x=e5x = e^5x=e5
    - D) x=log⁡(5)x = \log(5)x=log(5)

    Answer: A) x=ln⁡(5)x = \ln(5)x=ln(5)