Q. The displacement of a particle moving under the action of a force $\vec{F} = 2\hat{\imath} + b\hat{\jmath} + \hat{k}$ is $\vec{d} = \hat{\imath} + \hat{\jmath} + \hat{k}$. Find the value of b if the work done by the force is zero.

1. 0
2. +3
3. −3
4. −1

$W = (2\hat{i} + b\hat{j} + \hat{k}) \cdot (\hat{i} + \hat{j} + \hat{k}) = 0$

$2 + b + 1 = 0$

$b = -3$

Q. If the sum $\sum_{r=0}^{30} \frac{r^2 \left({}^{30}C_r\right)^2}{{}^{30}C_{r-1}} = \alpha . 2^{29}$, then α is equal to

1. 225
2. 465
3. 345
4. 425

$r^2 \frac{30!}{r!(30-r)!}$

$= 30 \sum_{r=0}^{30} (3$

Q. Compare dipole moment of

(I) NF_3

(II) $CHCl_3$

(III) H_2S

(IV) HBr

F

1. I > II > III > IV
2. II > III > I > IV
3. II > III > IV > I
4. III > I > IV > II

Q. A proton is moving with uniform velocity of 2×10^8 m/s in uniform magnetic and electric fields which are perpendicular to each other. If electric field is switched off then proton moves in circular path of radius 1.6×10^{-5} m. Then magnetic field is B

Ans

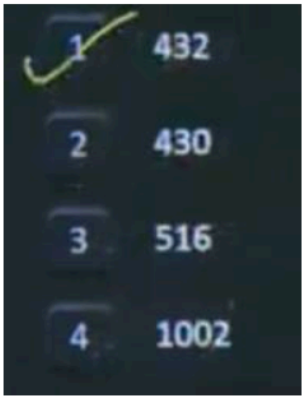
1. 5×10^{-5} T
2. 1.2×10^5 T
3. 2.5×10^4 T
4. 2.5×10^2 T

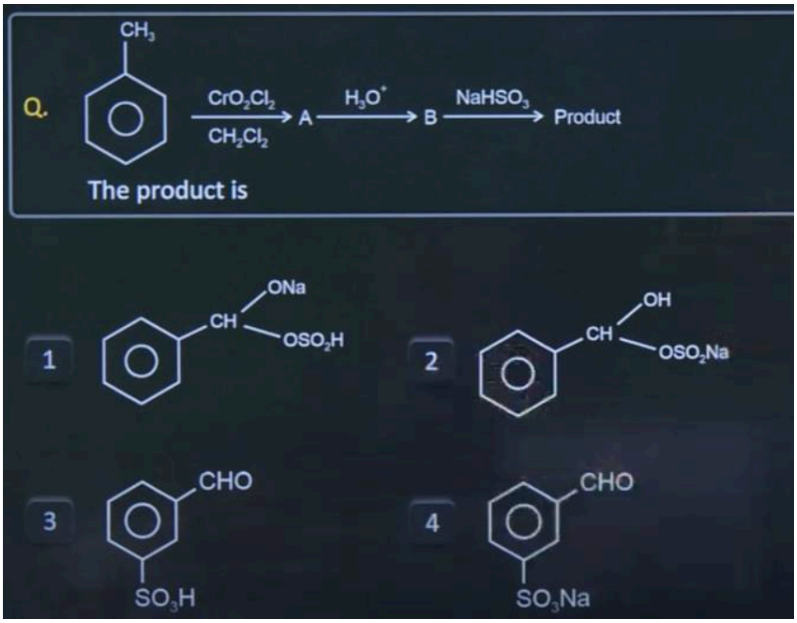
$\Rightarrow r = \frac{mv}{qB}$

$\Rightarrow B = \frac{mv}{qr} = \frac{1.6 \times 10^{-27} \times 2 \times 10^8}{1.6 \times 10^{-19} \times 1.6 \times 10^{-5}}$

Q. 4 boys and 3 girls are to be seated in a row such that all girls seat together and two particular B_1 and B_2 are not adjacent to each other. Then the number of ways in which this arrangemen be done.

Ans





Ans: 2

Q. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 4, 9, 16\}$.

If $f : A \to B$, then number of many-one functions from A to B are

1. 24
2. 232
3. 256
4. 252

$n(A) = 4$

$n(B) = 4$

Q. The dimensional formula of capacitance is

Q. The dimensional form

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

Q. Arrange according to CFSE.

(i) $[Co(NH_3)_4]^{2+}$

(ii) $[Co(NH_3)_6]^{3+}$

(iii) $[Co(NH_3)_6]^{2+}$

(iv) $[Co(en)_3]^{3+}$

1. (iv) > (ii) > (iii) > (i)
2. (iv) > (iii) > (ii) > (i)
3. (i) > (iii) > (ii) > (iv)
4. (i) > (ii) > (iii) > (iv)

Q. If $\theta \in [0, 2\pi]$ satisfying the system of equations $2\sin^2\theta = \cos 2\theta$ and $2\cos^2\theta = 3\sin\theta$. Then the sum of all real values of θ is

Ans

1. $\frac{3\pi}{2}$
2. π
3. $\frac{\pi}{2}$
4. $\frac{5\pi}{6}$