Question Review

All

$$\int \cos(\ln x)dx =$$

- $\frac{x}{2}(\cos \ln x - \sin \ln x) + c$
- **$\frac{x}{2}(\cos \ln x + \sin \ln x) + c$** ✓
- $\frac{x}{2}(\sin \ln x - \cos \ln x) + c$
- none of these

EXPLANATIONS Report

57 % were correct!

Using integration by parts,

$$I = \int \cos(\ln x)dx = x\cos \ln x + \int \sin \ln x dx$$
$$= x\cos \ln x + x\sin \ln x - \int \cos \ln x dx$$
$$= x[\cos \ln x + \sin \ln x] - I$$

So,

$$I = \frac{x}{2}(\cos \ln x + \sin \ln x) + c$$

If a unit vector lies in yz-plane and makes angles of 30^o and 60^o with the positive y-axis and z-axis respectively, then its components along the co-ordinate axes will be

- $\frac{\sqrt{3}}{2}, \frac{1}{2}, 0$
- **$0, \frac{\sqrt{3}}{2}, \frac{1}{2}$** ✓
- $\frac{\sqrt{3}}{2}, 0, \frac{1}{2}$
- $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$

EXPLANATIONS Report

65 % were correct!

Let the unit vector be:

$\hat{u} = mj + nk$ such that $m^2 + n^2 = 1$

[Since the vector makes 90° with X-axis, $l = \cos(\pi/2) = 0$]

But by given:

$$m = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$n = \cos 60^\circ = \frac{1}{2}$$

[Since the vector lies in $yz-$plane, so it will be either $0i + \frac{\sqrt{3}}{2}j + \frac{1}{2}k$ or $0i + \frac{1}{2}j + \frac{\sqrt{3}}{2}k$. But the vector $\frac{\sqrt{3}}{2}j + \frac{1}{2}k$ makes angle 30° with $y-$axis and that of 60° with z-axis.]

If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$ then:

- (●) x + y + xy = 1
- ( ) x + y - xy = 1
- ( ) x + y + xy + 1 = 0
- ( ) x + y - xy + 1 = 0

EXPLANATIONS Report

65 % were correct!

$$\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$$

$$\Rightarrow \tan^{-1}\left(\frac{x+y}{1-xy}\right) = \tan^{-1} 1$$

$$\Rightarrow \frac{x+y}{1-xy} = 1$$

$$\Rightarrow x + y + xy = 1$$

$$\int_0^{\pi/2} \sqrt{\cos\theta}\sin^3\theta\, d\theta =$$

- ( ) $\frac{20}{21}$
- (●) $\frac{8}{21}$
-

- $-\frac{20}{21}$
- $-\frac{8}{21}$

EXPLANATIONS Report

67 % were correct!

Let $I = \int_0^{\pi/2} \sqrt{\cos\theta}\sin^3\theta\ d\theta$

Put $t = \cos\theta \Rightarrow dt = -\sin\theta\ d\theta$, then

$$I = -\int_1^0 t^{1/2}(1-t^2)dt = \int_0^1 (t^{1/2} - t^{5/2})dt$$

$$I = \left[\frac{2}{3}t^{3/2} - \frac{2}{7}t^{7/2}\right]_0^1 = \frac{8}{21}$$

16^{th} term in the expansion of $(\sqrt{x} - \sqrt{y})^{17}$ is

- 136xy^7
- 136xy
- -136xy$^{15/2}$
- -136xy^2

EXPLANATIONS Report

78 % were correct!

$$T_{16} = {}^{17}C_{15}(\sqrt{x})^2(-\sqrt{y})^{15}$$

$$= -\frac{17\times 16}{2\times 1}\times xy^{15/2} = -136xy^{15/2}$$

The angle between the lines represented by the equation $ax^2 + xy + by^2 = 0$ will be 45°, if

- a = 1, b = 6
- a = 1, b = -6
- a = 6, b = 1
- none of these

EXPLANATIONS Report

63 % were correct!

$$\tan 45^\circ = \frac{2 \times \sqrt{\frac{1}{4} - ab}}{a + b}$$

$\Rightarrow (a+b)^2 = (1-4ab) \Rightarrow a^2 + b^2 + 6ab - 1 = 0$

which is obviously satisfied by $a = 1$ and $b = -6$

The ratio in which the plane $x - 2y + 3z = 17$ divides the line joining the points (-2, 4, 7) and $(3, -5, 8)$ is:

- 10 : 3
- 3 : 1
- 3 : 10
- 10 : 1

EXPLANATIONS Report

49 % were correct!

The ratio in which the plane $Ax + By + Cz + D = 0$ divides the join of points (x_1, y_1, z_1) and (x_2, y_2, z_2) is:

$$r = -\left(\frac{Ax_1 + By_1 + Cz_1 + D}{Ax_2 + By_2 + Cz_2 + D}\right)$$

$$\Rightarrow r = -\left(\frac{-2 - 8 + 21 - 17}{3 + 10 + 24 - 17}\right)$$

$$\Rightarrow r = \frac{6}{20}$$

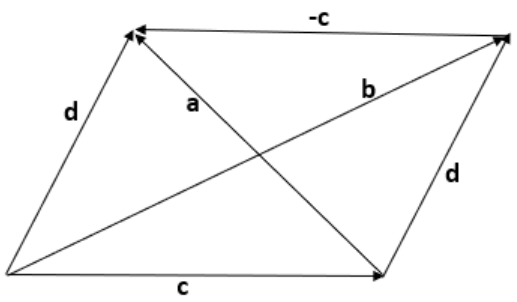
$\Rightarrow r = 3 : 10$

The diagonals of a parallelogram are given by $\vec{a}$ and $\vec{b}$. The area of the parallelogram is:

- $|\vec{a} \times \vec{b}|$
- $2|\vec{a} \times \vec{b}|$
- $\frac{1}{2}|\vec{a} \times \vec{b}|$
- $3|\vec{a} \times \vec{b}|$

EXPLANATIONS Report

67 % were correct!



With reference to the figure, $\vec{b} = \vec{c} + \vec{d}$ and $\vec{a} = \vec{d} - \vec{c}$

So, $|\vec{a} \times \vec{b}| = |(\vec{c} + \vec{d}) \times (\vec{d} - \vec{c})|$

Expanding and making cross product of equal vectors zero,

$|\vec{a} \times \vec{b}| = 2|\vec{c} \times \vec{d}|$

Therefore, the area $= |\vec{c} \times \vec{d}| = \frac{1}{2}|\vec{a} \times \vec{b}|$

Oxidation state of ` S ' in H_2SO_3

- + 3
- + 6
- + 4
- + 2

EXPLANATIONS Report

83 % were correct!

$H_2\overset{*}{S}O_3$

$$+2 + x - 2 \times 3 = 0$$

$$x = 6 - 2 = +4.$$

The shape of $2p$ orbital is

- Spherical
- Ellipsoidal
- Dumb-bell
- Pyramidal

EXPLANATIONS Report

83 % were correct!

The shape of $2p$ orbital is dumb-bell.

Nitrogen atom has an atomic number of 7 and oxygen has an atomic number 8. The total number of electrons in a nitrate ion will be

- 8
- 16
- 32 ✓
- 64

EXPLANATIONS

Report

Number of electrons in nitrogen = 7 and number of electron is oxygen = 8

we know that formula of nitrate ion is NO_3^-

we also know that number of electron = (1 × Number of electrons in nitrogen) + (3 × number of electrons in oxygen) + 1 = (1 × 7) + (3 × 8) + 1 = 32.

Laughing gas is prepared by heating

- NH_4Cl
- $(NH_4)_2SO_4$
- $NH_4Cl + NaNO_3$
- NH_4NO_3 ✓

EXPLANATIONS

Report

47 % were correct!

$$NH_4NO_3 \xrightarrow{\text{heat}} \underset{\text{Laughing Gas}}{N_2O} + 2H_2O$$

The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element *Y* (atomic mass 20) is

- XY
- X_2Y ✓
- XY_3
- X_2Y_3

EXPLANATIONS Report

71 % were correct!

Element	%(a)	At Wt(b)	a/b	Ratio
X	50	10	5	2
Y	50	20	2.5	1

SIMPLEST FORMULA = X_2Y

1.12 *ml* of a gas is produced at STP by the action of 4.12 *mg* of alcohol, with methyl magnesium iodide. The molecular mass of alcohol is

- 16.0
- 41.2
- 82.4
- 156.0

EXPLANATIONS Report

54 % were correct!

$$\underset{1\text{ mol.}}{ROH} + CH_3MgI \rightarrow \underset{1\ \text{mol}=22400\ cc}{CH_4} + \underset{I}{\overset{OR}{Mg}}$$

1.12 mL is obtained from 4.12 mg

$\therefore$ 22400 will be obtained from
$\frac{4.12}{1.12} \times 22400\, mg = 84.2\, g$

At 90^oC pure water has $[H_3O^+] = 10^{-6}\ M$, the value of K_w at this temperature will be

- 10^{-6}
- 10^{-12}
- 10^{-14}
- 10^{-8}

EXPLANATIONS Report

60 % were correct!

For pure water $[H^+] = [OH^-]$

$K_w = [H^+][OH^-]$

$\therefore\ K_w = 10^{-12}$

An electrolytic cell contains a solution of Ag_2SO_4 and have platinum electrodes. A current is passed until 1.6 gm of O_2 has been liberated at anode. The amount of silver deposited at cathode would be

- 107.88 gm
- 1.6 gm
- 0.8 gm
- 21.60 gm

EXPLANATIONS Report

44 % were correct!

At cathode: $Ag^+ + e^- \rightarrow Ag$

At Anode: $2OH^- \rightarrow H_2O + \frac{1}{2}O_2 + 2e^-$

$$E_{Ag} = \frac{108}{1} = 108;\ E_{O_2} = \frac{\frac{1}{2} \times 32}{2} = 8$$

$$\frac{W_{Ag}}{E_{Ag}} = \frac{W_{O_2}}{E_{O_2}}$$

$$W_{Ag} = \frac{1.6 \times 108}{8} = 21.6\ gm.$$

You ..... disqualified from the competition if you don't do better.

- would be
- would have been
- will be
- were

EXPLANATIONS Report

77 % were correct!

Here, the 'if' clause' is in simple present. Then, the pattern is:

if-clause: simple present

result-clause: simple present/ simple future

So, 'are/will be' is the correct answer.

I am sure I_____ him at the party last night.

- [x] saw
- [ ] had seen
- [ ] have seen
- [ ] had been seeing

'She was writing a poem.'

The corresponding passive voice is:

- [ ] A poem was writing by her.
- [ ] A poem was writing by she.
- [x] A poem was being written by her.
- [ ] A poen had been written by her.

EXPLANATIONS

Report

88 % were correct!

The correct pattern is:

Active: *Subject + verb + object.*

Passive: *Object + be-verb + past participle (v_3) + by subject.*

The tense and the aspect should be unchanged. That means the past continuous tense should be maintained.

_____ skin is a sensitive organ.

- [ ] A
- [ ] An
- [x] The
- [ ] None