Question Review

All

If $|x| > 1$, then $(1+x)^{-2}$ =

- 1 - 2x + 3x2-....
- 1 + 2x + 3x2+ ....
- $1 - \frac{2}{x} + \frac{3}{x^2}$-....
- $\frac{1}{x^2} - \frac{2}{x^3} + \frac{3}{x^4}$- ...

EXPLANATIONS Report

19 % were correct!

Given that $|x| > 1$.

So given expression can be written as:

$$x^{-2}\left(1+\frac{1}{x}\right)^{-2} = x^{-2}\left[1-\frac{2}{x}+\frac{3}{x^2}-\frac{4}{x^3}+\ldots.\right]$$

$$= \left[\frac{1}{x^2}-\frac{2}{x^3}+\frac{3}{x^4}-\frac{4}{x^5}+\ldots.\right]$$

If $S_n = \ln x + \ln 2x + \ln 3x + \ldots + \ln nx$ and $m > n$, then, $x\frac{d}{dx}(S_m - S_n) =$

- m - n
- m + n
- mn
- $\frac{m}{n}$

EXPLANATIONS Report

35 % were correct!

Note that $\frac{d}{dx}\ln(nx) = \frac{1}{nx} \times n = \frac{1}{x}$

So,

$$\frac{d}{dx}(S_m - S_n) = \frac{d}{dx}S_m - \frac{d}{dx}S_n$$
$$= \frac{m}{x} - \frac{n}{x}$$
$$= \frac{1}{x}(m-n)$$

Hence, $x\frac{d}{dx}(S_m - S_n) = m - n$

$$\lim_{x\to\pi/4} \frac{\sqrt{2}\cos x - 1}{\cot x - 1} =$$

- ○ $\frac{1}{\sqrt{2}}$
- ◉ $\frac{1}{2}$
- ○ $\frac{1}{2\sqrt{2}}$
- ○ 1

EXPLANATIONS Report

77 % were correct!

$$\lim_{x\to\pi/4} \frac{(\sqrt{2} - \sec x)\cos x(1+\cot x)}{\cot x\,[2 - \sec^2 x]}$$
$$= \lim_{x\to\pi/4} \frac{\sin x(1+\cot x)}{(\sqrt{2}+\sec x)} = \frac{\frac{1}{\sqrt{2}}(2)}{\sqrt{2}+\sqrt{2}} = \frac{1}{2}$$

Or

Using L-Hopital's Rule:

$$\lim_{x\to\pi/4} \frac{\sqrt{2}\cos x - 1}{\cot x - 1} = \lim_{x\to\pi/4} \frac{-\sqrt{2}\sin x}{-\text{cosec}^2 x} = \frac{1}{2}$$

If $y = \cos\theta + i\sin\theta$ then $y + \frac{1}{y}$ is

- ◉ 2 cos θ
- ○ 2 sin θ
- ○ 2cosec θ

- ○ $2\tan\theta$

EXPLANATIONS Report

68 % were correct!

$y = \cos\theta + i\sin\theta = e^{i\theta}$

Then $\frac{1}{y} = e^{-i\theta} = \cos\theta - i\sin\theta$

$\therefore y + \frac{1}{y} = 2\cos\theta$

$\lim_{n\to\infty} \frac{\sqrt{n}}{\sqrt{n}+\sqrt{n+1}} =$

- ○ 1
- ◉ 1/2
- ○ 0
- ○ ∞

EXPLANATIONS Report

67 % were correct!

$\lim_{n\to\infty} \frac{1}{1+\sqrt{1+\frac{1}{n}}} = \frac{1}{2}$ (Dividing numerator and denominator by $\sqrt{n}$)

The line perpendicular to the line $ax + by + c = 0$ which passes through (b, a) is :

- ○ ax + by = $a^2 + b^2$
- ◉ bx− ay = (b - a)(b + a)
- ○ bx - ay = (a - b)(b + a)
- ○ bx + ay = $b^2 + a^2$

EXPLANATIONS Report

64 % were correct!

The line perpendicular to $ax + by + c = 0$ is $bx - ay + k = 0$

Also, since it passes through (b, a), $k = a^2 - b^2$

Hence, $bx - ay = (b - a)(b + a)$

The vertex of the parabola $3x - 2y^2 - 4y + 7 = 0$ is

- (3,1)
- (-3,-1)
- (-3,1)
- none of these

EXPLANATIONS Report

64 % were correct!

Completing square, we can write the equation as $(y+1)^2 = \frac{3}{2}(x+3)$.

So, vertex is $(-3, -1)$.

The focii of the conic $25(x+3)^2 + 16(y-4)^2 = 400$ are:

- (-3,7) and (-3,1)
- (1,-3) and (7,-3)
- (0,4) and (-6,4)
- none of these

EXPLANATIONS Report

55 % were correct!

Given equation can be written as:

$$\frac{(x+3)^2}{4^2} + \frac{(y-4)^2}{5^2} = 1$$

which is an ellipse with center $(-3, 4)$ and major axis parallel to Y axis as, $b = 5 > a = 4$.

eccentricity $(e) = \sqrt{1 - \frac{a^2}{b^2}} = 3/5$

So, the focii are:

$(-3, 4 \pm be) = (-3, 7)$ and $(-3, 1)$

0.32 gm of a metal on treatment with an acid gave 112 mL of hydrogen at STP. Calculate the equivalent weight of the metal

- 58

- [x] 32
- [ ] 11.2
- [ ] 24

EXPLANATIONS Report

76 % were correct!

$Eq.$ wt of metal $= \dfrac{\text{wt of metal } \times 11200}{\text{vol.of } H_2 \text{ in ml displaced at } STP}$

IUPAC name of compound $CH_3 - CH_2 - CH\,(CH_3) - CH_2 - COCl$ is

- [x] 3-methyl pentanoyl chloride
- [ ] 3-methyl butanoyl chloride
- [ ] 1-chloro-3-methyl pentanol
- [ ] None of these

EXPLANATIONS Report

62 % were correct!

$\overset{5}{C}H_3 - \overset{4}{C}H_2 - \overset{3}{C}H\,(CH_3) - \overset{2}{C}H_2 - \overset{1}{C}OCl$

3-methyl pentanoyl chloride

The addition of HCl will not suppress the ionization of

- [ ] Acetic acid
- [ ] Benzoic acid
- [ ] H_2S
- [x] Sulphuric acid

EXPLANATIONS Report

40 % were correct!

Common ion effect is noticed only for weak electrolyte dissociation. H_2SO_4 is strong electrolyte.

A Bessemer converter is used in the manufacture of

- [x] Steel
- [ ] Cast iron
- [ ] Pig iron
- [ ] Silver

EXPLANATIONS Report

61 % were correct!

Bessemer converter is used for the manufacture of steel from pig iron.

What thickness of the copper plating would you expect on a spherical ball of raduis $1cm$ completely dipped in electrolyte on passing $5A$ current for one hour ?
$[\rho_{Cu} = 8.96g/cm^3, Mol.Wt._{Cu} = 63.5]$

- [x] 0.05cm
- [ ] 0.25cm
- [ ] 1.55cm
- [ ] None of these

EXPLANATIONS Report

37 % were correct!

From Faraday's Law of Electrolysis, we have ;

$W = ZIt$

Or, $V \times \rho = Z \times I \times t$

Or, $\text{thickness} \times A \times \rho = \dfrac{E}{F} \times I \times t$

Or, $\text{thickness} = \dfrac{E \times I \times t}{F \times A \times \rho}$

Or, $\text{thickness} = \dfrac{31.75 \times 5 \times 60 \times 60}{96500 \times 4\pi \times (1)^2 \times 8.96}$

$\therefore \text{thickness} = 0.0525cm$

Which of following is obtained when copper it treated with conc. HNO_3?

- [ ] N_2O_5

- [x] NO_2
- [ ] NO
- [ ] N_2O

EXPLANATIONS Report

71 % were correct!

$4HNO_3(l) + Cu(s) \rightarrow Cu(NO_3)_2(s \text{ and } aq) + 2NO_2(g) + 2H_2O(l)$

The solubility of $BaSO_4$ in water $2.42 \times 10^{-3} gL^{-1}$ at $298K$. The value of its solubility product is

(Given molar mass of $BaSO_4 = 233 gmol^{-1}$)

- [ ] $1.08 \times 10^{-14} mol^2 L^{-2}$
- [ ] $1.08 \times 10^{-12} mol^2 L^{-2}$
- [x] $1.08 \times 10^{-10} mol^2 L^{-2}$
- [ ] $1.08 \times 10^{-8} mol^2 L^{-2}$

EXPLANATIONS Report

55 % were correct!

Solubility of $BaSO_4$, $S = \frac{2.42 \times 10^{-3}}{233} \left(molL^{-1}\right) = 1.04 \times 10^{-5} \left(molL^{-1}\right)$

$BaSO_4(s) \rightleftharpoons Ba^{2+}(aq) + SO_4^{2-}(aq)$

$$K_{sp} = \left[Ba^{2+}\right]\left[SO_4^{2-}\right] = S \times S = S^2$$
$$= \left(1.04 \times 10^{-5}\right)^2$$
$$= 1.08 \times 10^{-10} mol^2 L^{-2}$$

When acetylene reacts with *HCl* in the presence of $HgCl_2$, the product is

- [ ] Methyl chloride
- [ ] Dichloroethane
- [x] Vinyl chloride
- [ ] Ethylidine chloride

EXPLANATIONS Report

52 % were correct!

$$CH \equiv CH + HCl \xrightarrow{HgCl_2} CH_2 = CH - Cl$$
$$Ethyne \qquad\qquad Vinyl - Chloride$$

Bhaktapur is famous ___ its JuJu-Dhau.

- in
- about
- to
- for (selected)

EXPLANATIONS Report

93 % were correct!

'for' is used after 'famous'.

If you had been careful,_____.

- you wouldn’t have cut your finger (selected)
- you wouldn't cut your finger
- you will not cut your finger
- you don't cut your finger

EXPLANATIONS Report

87 % were correct!

The possible correct structure with if-clause: 'past perfect' is 'would have + past perfect'.
This structure is used to describe unreal situations in the past.

The prefix non- goes with which word?

- talented
- regular
- injurious (selected)
- belief

Where_____?

- ○ did you cut your hair
- ○ have you cut your hair
- ◉ did you have your hair cut
- ○ did you have cut your hair

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