Question Review

All

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} =$$

- $a^2+b^2+c^2$
- (a + b)(b + c)(c + a)
- (a - b)(b - c)(c - a)
- none of these

EXPLANATIONS Report

76 % were correct!

Try putting $a = 1, b = 2$ and $c = 3$

The determinant becomes:

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 4 \\ 1 & 3 & 9 \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ 0 & 1 & 3 \\ 0 & 2 & 8 \end{vmatrix}$$

$[R_2 \to R_2 - R_1, R_3 \to R_3 - R_1]$
$8 - 6 = 2$

Checking options, only (c) satisfies.

$$\frac{d}{dx}\tan^{-1}\frac{x}{\sqrt{a^2-x^2}} =$$

- $\frac{a}{a^2+x^2}$
- $\frac{-a}{a^2+x^2}$
- $\frac{1}{a\sqrt{a^2-x^2}}$
- $\frac{1}{\sqrt{a^2-x^2}}$

EXPLANATIONS Report

38 % were correct!

$\frac{d}{dx}\tan^{-1}\frac{x}{\sqrt{a^2-x^2}}$

Putting $x = a\sin\theta$, we get

$= \frac{d}{dx}\left[\tan^{-1}\frac{a\sin\theta}{a\cos\theta}\right] = \frac{d}{dx}\left[\tan^{-1}\tan\theta\right] = \frac{d}{dx}[\theta]$

Substituting value of θ, so $\frac{d}{dx}\left[\sin^{-1}\left(\frac{x}{a}\right)\right] = \frac{1}{\sqrt{a^2-x^2}}$

In the expansion of $(x^2-2x)^{10}$, the coefficient of x^{16} is

- -1680
- 1680
- 3360 ✓
- 6720

EXPLANATIONS Report

67 % were correct!

The coefficient of x^{16} in the expansion of $(x^2-2x)^{10}$ = The coefficient of x^{16} in $x^{10}(x-2)^{10}$ = The coefficient of x^6 in $(x-2)^{10}$

$$= {}^{10}C_4.2^4, \quad (\because T_{r+1} = {}^nC_r x^{n-r}a^r)$$

$$= 210 \times 16 = 3360.$$

If the 4^{th}, 7^{th} and 10^{th} terms of a G.P. be a, b, c respectively, then the relation between a, b, c is:

- $b = \frac{a+c}{2}$
- $a^2 = bc$
- $b^2 = ac$ ✓
- $c^2 = ab$

EXPLANATIONS Report

78 % were correct!

Let first term of G.P. $= A$ and common ratio $= r$

We know that n^{th} term of G.P. = Ar^{n-1}

Now $t_4 = a = Ar^3$, $t_7 = b = Ar^6$ and $t_{10} = c = Ar^9$

Relation $b^2 = ac$ is true because $b^2 = (Ar^6)^2 = A^2r^{12}$ and $ac = (Ar^3)(Ar^9) = A^2r^{12}$

[NOTE: if a, b, c are in AP, then x^a, x^b, x^c are in GP]

Domain of definition of the function $y = \frac{\sqrt{x^2 - x + 2}}{\sqrt{x^2 - x - 2}}$ is:

- (-1, 2)
- R - [-1, 2]
- R - (-1, 2)
- none of these

EXPLANATIONS Report

68 % were correct!

Given function is:

$$f(x) = \sqrt{\frac{x^2 - x + 2}{x^2 - x - 2}}$$

The quadratic of numerator is $x^2 - x + 2$ whose discriminant is $1 - 8 = -7$. So, it is always positive. (the constant 1 is positive)

The quadratic in denominator is $x^2 - x - 2$ whose discriminant is $1 + 8 = 9$.

The roots are $\frac{1}{2} \pm \frac{3}{2} = 2, -1$

Since the constant is negative and $0 \in (-1, 2)$, the quadratic is negative in the interval $(-1, 2)$.

So, the domain is $R - [-1, 2]$.

[The quadratic in denominator can't be zero]

The middle term of $\left(x - \frac{1}{x}\right)^5$ is:

- 0
- 10x
- -10/x
- none of these

EXPLANATIONS Report

26 % were correct!

The general term is:

$$t_n = (-1)^n \ {}^5C_n \ x^n \ (1/x)^{5-n}$$

For middle term, $n = 3$,

$$t_3 = -10x$$

So, the answer is (d).

The area between the curves $y = x^2$ and $y = 2 - x^2$ is:

- 4/3
- 8/3
- 4
- none of these

EXPLANATIONS

Report

60 % were correct!

The intersection of the curves is found as $x^2 = 2 - x^2 \Rightarrow x^2 = 1 \Rightarrow x = \pm 1$

Also, for $-1 \leq x \leq 1$, both x^2 and $2 - x^2$ are positive.

Thus, the area is:

$$A = \int_{-1}^{1} (2 - x^2 - x^2) dx$$
$$= 2\int_{-1}^{1} (1 - x^2) dx$$
$$= 2 \times \left[x - \frac{x^3}{3} \right]_{-1}^{1} = 8/3$$

If $y = e^{x+e^{x+e^{x+\cdots\infty}}}$, then $\frac{dy}{dx} =$

- $\frac{y}{1-y}$
- $\frac{1}{1-y}$
- $\frac{y}{1+y}$
- $\frac{y}{y-1}$

EXPLANATIONS

Report

60 % were correct!

$y = e^{x+y} \Rightarrow \log y = (x + y) \log e$

$\Rightarrow \frac{1}{y}\frac{dy}{dx} = 1 + \frac{dy}{dx} \Rightarrow \frac{dy}{dx} = \frac{y}{1-y}$

$Na_2S_2O_3 + Cl_2 + H_2O \rightarrow ??$

- S + HCl + Na_2S
- S + HCl + Na_2SO_3
- S + HCl + Na_2SO_4
- S + $NaClO_3$ + H_2O

EXPLANATIONS Report

35 % were correct!

$Na_2S_2O_3 + Cl_2 + H_2O \rightarrow Na_2SO_4 + 2HCl + S$

$CH_3 - C \equiv CH \xrightarrow[Zn/H_2O_2]{O_3}$

$> Product$

Product formed in above reaction is

- CH_3COOH
- HCOOH
- Both (a) and (b)
- CH_3CHO + HCHO

EXPLANATIONS Report

35 % were correct!

Carboxylic acids are formed from ozonolysis of Alkynes

Automobile engine blocks are made of

- stainless steel
- cast iron
- nickel-chromium steel
- wrought iron

EXPLANATIONS Report

Automobile engine blocks are made of cast iron.

IUPAC name of $CHO-(CH_2)_4-COOH$ is

- Heaxan-1-al-6-oic acid
- Formyl-hexanoic acid
- Hexanal-1-carboxylic acid
- Hexanoic acid 5-al-1

EXPLANATIONS Report

44 % were correct!

$\overset{6}{C}HO-\overset{5}{C}H_2-\overset{4}{C}H_2-\overset{3}{C}H_2-\overset{2}{C}H_2-\overset{1}{C}OOH$

Carboxy group has higher order of preference than formyl group. Since there is only one -CHO group it gets the smallest possible number (length of parent chain). So it is not necessary to indicate its position.

So Formyl-hexanoic acid

0.16 gm of a dibasic acid required 25 ml of decinormal $NaOH$ solution for complete neutralization. The molecular weight of the acid is

- 32
- 64
- 128
- 256

EXPLANATIONS Report

65 % were correct!

Strength of acid = $\frac{0.16}{0.025} = 6.4g/l = \frac{6.4}{E}N$

$N_1 \times V_1 = N_2 \times V_2$

$\frac{6.4}{E} \times 25 = 0.1 \times 25$

$E = 64$

Since the acid is dibasic , Mol Wt. = 64 * 2 = 128

If 30 ml of H_2 and 20 ml of O_2 reacts to form water, what is left at the end of the reaction

- 10 ml of H_2
- 5 ml of H_2
- 10 ml of O_2
- **5 ml of O_2**

EXPLANATIONS Report

53 % were correct!

$$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$$

1 mole $\frac{1}{2}$ mole 1 mole

1 volume $\frac{1}{2}$ volume 1 volume

H_2 reacts with $\frac{1}{2}\ ml\ O_2$

30 ml of H_2 reacts with $= \frac{1}{2} \times 30 = 15ml\ O_2$

(20-15) = 5 ml of O_2 will left at the end of the reaction.

In the reaction: $H_2S \rightleftarrows 2H^+ + S^-$, when NH_4OH is added, then

- S^- is precipitate
- No action takes places
- Concentration of S^- decreases
- **Concentration of S^- increases**

EXPLANATIONS Report

30 % were correct!

In IV th group the S^{2-} concentration increase when added the NH_4OH because

$NH_4OH \rightleftharpoons NH_4^+ + OH^-$

$H_2S \rightleftharpoons 2H^+ + S^{2-}$

$OH^- + H^+ \rightleftharpoons H_2O$.

So that dissociation of H_2S is favoured, thus S^{2-} is increased.

Which of the following compound is formed when a gas obtained by reacting H_2SO_4 with excess of P_4O_{10} is treated with anhydrous HCl ?

- [x] Chlorosulphonic acid
- [ ] Hypochlorous acid
- [ ] Sulphur
- [ ] Phosphine

EXPLANATIONS Report

28 % were correct!

H_2SO_4 reacts with the P_4O_{10} to give phosphoric acid and sulphur trioxide gas. The reaction occurs as :

$$6H_2SO_4 + P_4H_10 \longrightarrow \underset{\text{Phosphoric Acid}}{4H_3PO_4} + 6SO_3$$

The SO_3 formed is a gas and can react with HCl.

$$HCl + SO_3 \rightarrow \underset{\text{Chlorosulphonic Acid}}{ClSO_2OH}$$

Chlorosulphonic acid is used for many purposes including the synthesis of detergents, pharmaceuticals, dyes, ion exchange resins, etc.

Shankaran Pillai was born ___ a Saturday.

- [ ] in
- [ ] at
- [x] on
- [ ] All of above

EXPLANATIONS Report

79 % were correct!

'on' is used before days of week.

Yesterday was not a nice day. It ___ since morning.

- [ ] was raining
- [ ] has been raining
- [x] had been raining
- [ ] rained

EXPLANATIONS Report

38 % were correct!

Because of the time adverb 'yesterday', the act of raining was in the past, and it continued over a period of time.

For an ongoing action that occured in the past and continued for a period of time, we use past perfect continuous tense.

Choose the correct sentence:

- [x] My favorite musician, who is also my sister, plays a mean fuzz bass.
- [ ] My favorite musician who is also my sister plays a mean fuzz bass.
- [ ] My favorite musician who is also my sister, plays a mean fuzz bass.
- [ ] My favorite musician, who is also my sister plays a mean fuzz bass.

EXPLANATIONS Report

45 % were correct!

The non-essential clause 'who is also my sister' should be surrounded by commas.

I have _____ hour and ____ half to do this job.

- [ ] an, the
- [ ] a, an
- [ ] the, the
- [x] an, a

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