Question Review

All

The greatest coefficient in the expansion of $(1+x)^{2n+2}$ is

- $\frac{(2n)!}{(n!)^2}$
- $\frac{(2n+2)!}{\{(n+1)!\}^2}$
- $\frac{(2n+2)!}{n!(n+1)!}$
- $\frac{(2n)!}{n!(n+1)!}$

EXPLANATIONS Report

57 % were correct!

Since greatest coefficient occurs in middle term, it occurs in $\frac{2(n+1)}{2}+1=n+2$ th term.

Hence the coefficient is $C(2n+2,n+1)=\frac{(2n+2)!}{(n+1)!^2}$

If $x=3+i$ then $x^3-3x^2-8x+15=$

- 6
- 10
- -18
- -15

EXPLANATIONS Report

64 % were correct!

$x=3+i \Rightarrow x^2=8+6i=18+6i-10=6(3+i)$
$-10=6x-10$

So, $x^2-6x+10=0$

$$\begin{aligned} x^3-3x^2-8x+15 &= x^3-6x^2+10x+3x^2-18x+30-15 \\ &= x(x^2-6x+10)+3(x^2-6x+10)-15 \\ &= -15 \end{aligned}$$

If $\mathbf{a} \cdot \mathbf{i} = \mathbf{a} \cdot (\mathrm{i} + \mathrm{j}) = \mathrm{a} \cdot (\mathrm{i} + \mathrm{j} + \mathrm{k})$, then a =

- i
- k
- j
- i + j + k

EXPLANATIONS Report

45 % were correct!

Let $a = xi + yj + zk$.

Then $a \cdot i = (xi + yj + zk) \cdot i = x$ and $a \cdot (i + j) = x + y$ and $a \cdot (i + j + k) = x + y + z$

By given, $x = x + y = x + y + z$

Now $x = x + y \Rightarrow y = 0$ and $x + y = x + y + z \Rightarrow z = 0$

So, $a \neq j, a \neq k$ and $a \neq i + j + k$

$\therefore a = i.$

The equation of the line passing through (1, 2, 3) and parallel to the planes $x - y + 2z = 5$ and $3x + y + z = 6$, is

- $\frac{x-1}{-3} = \frac{y-2}{5} = \frac{z-3}{4}$
- $\frac{x-1}{-3} = \frac{y-2}{-5} = \frac{z-1}{4}$
- $\frac{x-1}{-3} = \frac{y-2}{-5} = \frac{z-1}{-4}$
- None of these

EXPLANATIONS Report

61 % were correct!

$$\frac{x-1}{l} = \frac{y-2}{m} = \frac{z-3}{n}$$

Since the line is perpendicular to given planes,

$l - m + 2n = 0$ and

$3l + m + n = 0$

Solving yields;

$$\frac{l}{-1-2}=\frac{m}{6-1}=\frac{n}{1+3}$$

$$\frac{l}{-3}=\frac{m}{5}=\frac{n}{4}$$

$$\therefore\ \frac{x-1}{-3}=\frac{y-2}{5}=\frac{z-3}{4}.$$

Which number should be added to the numbers 13, 15, 19 so that the resulting numbers be the consecutive terms of a H.P. ?

- 7
- 6
- -6
- -7

EXPLANATIONS Report

34 % were correct!

Suppose that x to be added then numbers 13, 15, 19 so that new numbers $x+13,\ 15+x,\ 19+x$ will be in H.P.

$$\Rightarrow (15+x)=\frac{2(x+13)(19+x)}{x+13+x+19}$$

$$\Rightarrow x^2+31x+240=x^2+32x+247\Rightarrow x=-7$$

[Checking options is quicker solution]

$$\lim_{x\to 0}\left(\frac{x^3\cot x}{1-\cos x}\right)=$$

- 0
- 1
- 2
- -2

EXPLANATIONS Report

54 % were correct!

$$\lim_{x\to 0}\frac{x^3\cot x}{1-\cos x}=\lim_{x\to 0}\left(\frac{x^3\cot x}{1-\cos x}\times\frac{1+\cos x}{1+\cos x}\right)$$

$$=\lim_{x\to 0}\left(\frac{x}{\sin^2 x}\times\cot x(1+\cos x)\right)$$

$$= \lim_{x\to 0}\left(\frac{x}{\sin x}\right)^3 \times \lim_{x\to 0}\cos x \times \lim_{x\to 0}(1+\cos x) = 2$$

[USE CALCULATOR: Type the given function, press CALC, then set $x = 0.0001$.]

The area bounded by $y = x^3 - x^2 - x$, the ordinates of extrema, and the X axis is:

- $\frac{44}{81}$ sq. units
- $\frac{7}{12}$ sq. units
- $\frac{101}{162}$ sq. units
- none of these

EXPLANATIONS Report

27 % were correct!

We have $f(x) = y = x^3 - x^2 - x$

It is obvious that the $f(x)$ passes through $(0, 0)$.

For extrema, $f'(x) = 0 \Rightarrow 3x^2 - 2x - 1 = 0 \Rightarrow (3x+1)(x-1) = 0$

So, the extrema are at $x = -1/3$ and $x = 1$.

We have $f(-1/3) = 5/27 > 0$, $f(0) = 0$ and $f(1) = -1 < 0$

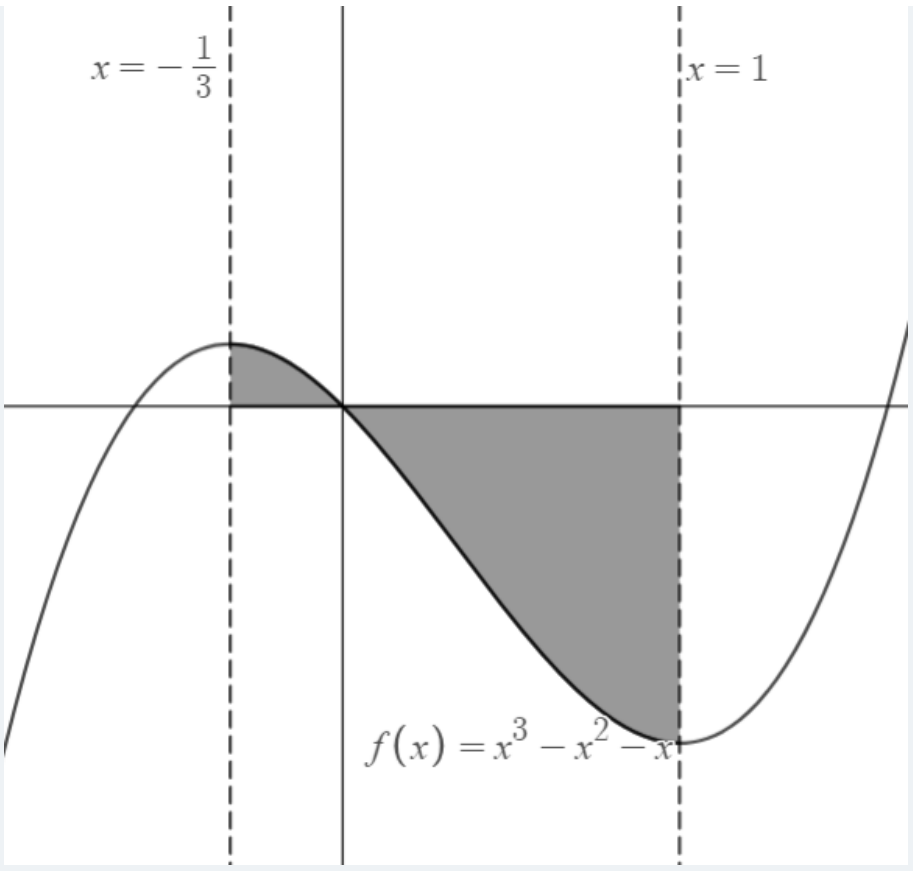
So, the function is positive in $[-1/3, 0)$ and negative in $(0, 1]$. Hence, to calculate the area, we sum two different areas:

$$A = \left|\int_{-1/3}^{0} f(x)dx\right| + \left|\int_{0}^{1} f(x)dx\right|$$

$$A = \left|\int_{-1/3}^{0} (x^3 - x^2 - x)dx\right| + \left|\int_{0}^{1} (x^3 - x^2 - x)dx\right|$$

$$A = \left|\frac{x^4}{4} - \frac{x^3}{3} - \frac{x^2}{2}\right|_{-1/3}^{0} + \left|\frac{x^4}{4} - \frac{x^3}{3} - \frac{x^2}{2}\right|_{0}^{1}$$

On simplification, $A = \frac{101}{162}$



If $\tan\theta - \sqrt{2}\sec\theta = \sqrt{3}$, then the general value of θ is

- $n\pi + (-1)^n\frac{\pi}{4} - \frac{\pi}{3}$
- $n\pi + (-1)^n\frac{\pi}{3} - \frac{\pi}{4}$
- $n\pi + (-1)^n\frac{\pi}{3} + \frac{\pi}{4}$
- $n\pi + (-1)^n\frac{\pi}{4} + \frac{\pi}{3}$

EXPLANATIONS Report

43 % were correct!

$\tan\theta - \sqrt{2}\sec\theta = \sqrt{3}$

$$\Rightarrow \sin\theta - \sqrt{3}\cos\theta = \sqrt{2}$$

$$\Rightarrow \sin\left(\theta - \frac{\pi}{3}\right) = \sin\frac{\pi}{4}$$

$$\Rightarrow \theta = n\pi + (-1)^n\frac{\pi}{4} + \frac{\pi}{3}.$$

Fluorine reacts with water to give

- HF and O_2
- HF and OF_2

- HF and O_3
- HF, O_2 and O_3

EXPLANATIONS Report

23 % were correct!

$2F_2 + 2H_2O \rightarrow 4HF + O_2$

$3F_2 + 3H_2O \rightarrow 6HF + O_3$

The molecular weight of water is 18. What is the unit of molecular weight ?

- g
- mol
- $g\,mol^{-1}$
- $mol\,g^{-1}$

EXPLANATIONS Report

51 % were correct!

The molecular weight is the mass of one mole of a substance.

Which is not basic flux ?

- $CaCO_3$
- Lime
- SiO_2
- CaO

EXPLANATIONS Report

55 % were correct!

$\underset{\text{Acidic flux}}{SiO_2}$ $\underset{\text{Basic flux}}{CaCO_3}$, lime, CaO

What is the % of H_2O in $Fe(CNS)_3.3H_2O$?

- 45

30

19

25

EXPLANATIONS Report

59 % were correct!

In $Fe(CNS)_3.\ 3H_2O$

$\%$ of $H_2O = \dfrac{3 \times 18}{284} \times 100 = 19\%$.

The vapour density of a volatile chloride of a metal M is 76.2 . If the specific heat of the metal is 0.64, the molecular formula of the chloride is

MCl

MCl_2

MCl_3

MCl_4

EXPLANATIONS Report

33 % were correct!

Vapour density = 74.6
Specific heat = $0.55 cal/g^oC$
According to Dulong-Petit's law,

Approx At. Wt. = $\dfrac{6.4}{0.64} = 10$

Molecular mass = 2× Vapour density
= 2 ×76.2
= 152.4
So, weight of chlorine = 152.4 - 10 = 142.4

No of chlorine atoms = $\dfrac{142.4}{35.5} = 4.01 \approx 4$

The formula of metal chloride is MCL_4

How much of *NaOH* is required to neutralise 1500cm^3 of 0.1N HCl (*Na* = 23) ?

40g

4g

6g

60g

EXPLANATIONS Report

66 % were correct!

$N = \frac{\mathrm{W}(gm)\times 1000}{V\times \mathrm{Eq.wt.}}$

$1500\ \mathrm{ml\ of\ 0.1\ N\ HCl}\ = 150ml(N)$

$1 = \frac{\mathrm{W}(gm)\times 1000}{150\times 40}, W(gm) = \frac{150\times 40}{1000} = 6gm$

The sulphate of a metal M contains 9.87% of M. This sulphate is isomorphous with $ZnSO_4.7H_2O$. The atomic weight of M is

- 40.3
- 36.3
- 24.3
- 11.3

EXPLANATIONS Report

48 % were correct!

As the given sulphate is isomorphous with $ZnSO_4.7H_2O$ its formula would be $MSO_4.7H_2O$.

m is the atomic weight of M, molecular weight of $MSO_4.7H_2O = m + 32 + 64 + 126 = m + 222$

Hence % of M $= \frac{m}{m+222} \times 100 = 9.87$ (given)

or $100m = 9.87m + 222 \times 9.87$

or $90.13m = 222 \times 9.87$

or $m = \frac{222 \times 9.87}{90.13} = 24.3$.

In the reaction $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$, the equivalent weight of $Na_2S_2O_3$ (mol. wt. = M) is equal to

- M
- M/2
- M/3
- M/4

EXPLANATIONS Report

38 % were correct!

$\overset{+2}{Na_2}\overset{+2.5}{S_2}O_3 + I_2 \rightarrow \overset{+2.5}{Na_2}\overset{+2.5}{S_4}O_6 + NaI$

$$n = 2 \times 0.5 = 1$$

$$E = \frac{M}{n - \text{factor}} = \frac{M}{1} = M$$

Stop _____ this terrible noise at once!

- make
- to make
- making
- to making

EXPLANATIONS Report

88 % were correct!

A pair of slippers_____ missing.

- are
- has
- were
- is

EXPLANATIONS Report

73 % were correct!

'A pair' means one pair, so singular verb.

The suffix –ism can be used as a/an____

- verb
- noun
- adjective
- adverb

'sink' is transcribed as:

- ○ /ˈsɪnk/
- /ˈsɪŋk/
- ○ /ˈsɪŋ : k/
- ○ /ˈsɪn : k/

EXPLANATIONS

Report

46 % were correct!

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