Question Review

All

In the expansion of $\left(x-\frac{1}{x}\right)^6$, the constant term is

- [x] -20
- [ ] 20
- [ ] 30
- [ ] -30

EXPLANATIONS Report

50 % were correct!

In the expansion of $\left(x-\frac{1}{x}\right)^6$, the general term is

$${}^6C_r x^{6-r}\left(-\frac{1}{x}\right)^r = {}^6C_r(-1)^r x^{6-2r}$$

For term independent of $x, 6-2r=0 \Rightarrow r=3$

Thus the required coefficient $= (-1)^3 \cdot {}^6C_3 = -20.$

The least value of k for which the function x^2+kx+1 is an increasing function in the interval $1<x<2$ is :

- [ ] -4
- [ ] -3
- [ ] -1
- [x] -2

EXPLANATIONS Report

31 % were correct!

To be increasing, $\frac{d}{dx}(x^2+kx+1)>0 \Rightarrow 2x+k>0$

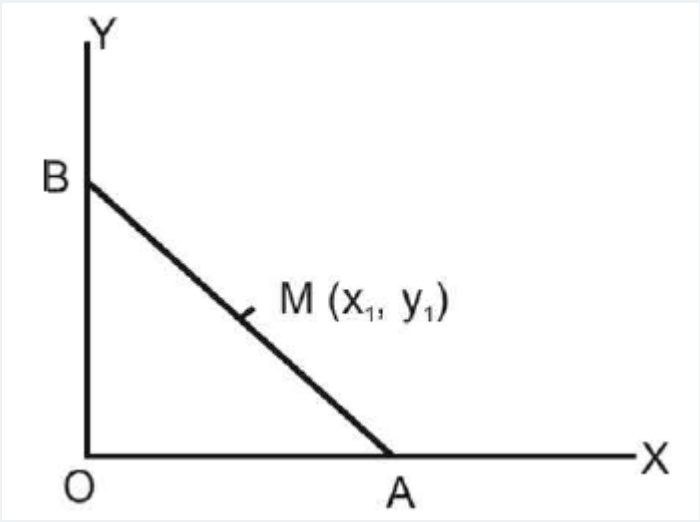
For $x \in (1, 2)$, the least value of k is -2.

Locus of mid point of the portion between the axes of $x\cos\alpha + y\sin\alpha = p$ where p is constant is

- $x^2 + y^2 = \frac{4}{p^2}$
- $x^2 + y^2 = 4p^2$
- $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$
- ✓ $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$

EXPLANATIONS Report

32 % were correct!



Equation of AB is
$x\cos\alpha + y\sin\alpha = p$

$$\Rightarrow \frac{x\cos\alpha}{p} + \frac{y\sin\alpha}{p} = 1$$
$$\Rightarrow \frac{x}{p/\cos\alpha} + \frac{y}{p/\sin\alpha} = 1$$

Co-ordinates of A and B are
$\left(\frac{p}{\cos\alpha}, 0\right)$ and $\left(0, \frac{p}{\sin\alpha}\right)$

So, coordinates of midpoint of AB are
$\left(\frac{p}{2\cos\alpha}, \frac{p}{2\sin\alpha}\right) = (x_1, y_1)$ (say)

$x_1 = \frac{p}{2\cos\alpha}$ & $y_1 = \frac{p}{2\sin\alpha}$
$\Rightarrow \cos\alpha = p/2x_1$ and $\sin\alpha = p/2y_1$

We have,

$$\cos^2\alpha + \sin^2\alpha = 1 \Rightarrow \frac{p^2}{4}\left(\frac{1}{x_1^2} + \frac{1}{y_1^2}\right) = 1$$

Locus of (x_1, y_1) is $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$

The equation of parabola whose vertex and focus are (0, 4) and (0, 2) respectively, is

- $y^2 - 8x = 32$
- $y^2 + 8x = 32$
- ✓ $x^2 + 8y = 32$
- $x^2 - 8y = 32$

EXPLANATIONS Report

54 % were correct!

The parabola has (0,4) as vertex and (0,2) as focus. So, its axis is $x = 0$ i.e, Y-axis. Hence its equation is in the form of $(x-0)^2 = 4a(y-4)$ But a is distance between focus and vertex, i.e, $a = -2$. So, equation is $x^2 = -8y + 32$ or $x^2 + 8y = 32$

The equation of the plane which bisects the line joining the points (-1, 2, 3) and (3, -5, 6) at right angle, is :

- $4x - 7y - 3z = 8$
- $4x + 2y - 3z = 28$
- ✓ $4x - 7y + 3z = 28$
- $4x - 7y - 3z = 28$

EXPLANATIONS Report

65 % were correct!

The dr's of given line are $4, -7, 3$.

Since this line is perpendicular to the plane, the equation of the plane is:

$4x - 7y + 3z = k$.

Only option (c) satisfies.

Further, the plane satisfies midpoint of the line, i.e, $(1, -1.5, 4.5)$

So, $4 + 21/2 + 27/2 = 28 = k$

The value of $\frac{i^{592} + i^{590} + i^{588} + i^{586} + i^{584}}{i^{582} + i^{580} + i^{578} + i^{576} + i^{574}} - 1 =$

- -1
- ✓ -2
- -3
- -4

EXPLANATIONS Report

64 % were correct!

$$\frac{i^{584}\left(i^8+i^6+i^4+i^2+1\right)}{i^{574}\left(i^8+i^6+i^4+i^2+1\right)}-1=\frac{i^{584}}{i^{574}}-1$$
$$=i^{10}-1=-1-1=-2$$

Domain of $f(x)=\dfrac{x^2-3x+2}{x^2+x-6}$ is

- {x : x ∈ R, x ≠ 3}
- {x : x ∈ R, x ≠ 2}
- {x : x ∈ R}
- {x : x ∈ R, x ≠ 2, x ≠ -3}

EXPLANATIONS Report

73 % were correct!

Upon factorization,

$$f(x)=\frac{(x-2)(x-1)}{(x-2)(x+3)}$$

Since denominator should be non-zero, $x \neq 2$ and $x \neq -3$.

So, domain is $\{x : x \in R, \quad x \neq 2, x \neq -3\}$

If α, β, γ are angles of a triangle, then $\sin^2\alpha+\sin^2\beta+\sin^2\gamma-2\cos\alpha\cos\beta\cos\gamma$ is

- 2
- -1
- -2
- 0

EXPLANATIONS Report

54 % were correct!

For $A+B+C=\pi$

$$\sin^2 A+\sin^2 B+\sin^2 C=2+2\cos A\cos B\cos C$$

Proof:

$$A+B+C=\pi$$
$$\sin(A+B)=-\sin C$$
$$(\sin A\cos B+\cos A+\sin B)^2=\sin^2 C$$

Upon simplification,

$\sin^2 A + \sin^2 B - \sin^2 C = 2 \sin A \sin B \cos C$

Adding $2 \sin^2 C$ on both sides,

$\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2 \cos C(\sin A \sin B - \cos C)$

Or, $\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2 \cos C(\sin A \sin B + \cos(A + B))$

As, $\cos(A + B) = \cos A \cos B - \sin A \sin B$,

we get the result

(It is better to check with equilateral triangle than do such proof)

Which of the following is not a chalcogen ?

- O
- S
- Se
- Na

EXPLANATIONS Report

67 % were correct!

16^{th} group called chalcogens (oxygen family) while *Na* is a I^{st} group element which is called alkali metal.

Which of the following behaves as both oxidising and reducing agents?

- H_2SO_4
- SO_2
- H_2S
- HNO_3

EXPLANATIONS Report

53 % were correct!

In SO_2 sulphur is in +4 oxidation state which is intermediate state (between -2 and +6) i.e minimum and maximum ON of S

So it can act as oxidising agent by decreasing its ON or act as reducing agent by increasing is ON.

In other compounds, they are in maiximum of minimum oxidation state.

A molar solution is one that contains one mole of a solute in

- [x] One litre of the solution
- [ ] 1000 *g* of the solvent
- [ ] 22.4 litres of the solution
- [ ] None

EXPLANATIONS Report

58 % were correct!

According to definition of molar solution, a molar solution is one that contains one mole of a solute in one litre of the solution.

What is the oxidation number of sulphur in $Na_2S_4O_6$

- [ ] $\frac{2}{3}$
- [ ] $\frac{3}{2}$
- [ ] $\frac{3}{5}$
- [x] $\frac{5}{2}$

EXPLANATIONS Report

79 % were correct!

$\overset{*}{Na_2}\overset{*}{S_4}O_6$

$$2 + 4x - 12 = 0$$

$$4x = 10$$

$$x = \frac{10}{4}$$

$$x = \frac{5}{2}$$

An alkaline solution has **pH 10**. The number of OH^- ions present in **50 ml** of this solution is

- [ ] N_A
- [ ] $\frac{N_A}{10^4}$

- [x] $\frac{N_A}{20 \times 10^4}$
- [ ] $\frac{N_A}{50 \times 10^4}$

EXPLANATIONS Report

48 % were correct!

Here pH = 10

so pOH = 14-10 = 4

i.e concentration of OH^- ions = 10^{-4} moles in 1 litre

Now

1000ml of the solution $= N_A \times 10^{-4} = \frac{N_A}{10^4} ions$

50ml of the solution $= \frac{N_A}{10^4} \times \frac{50}{1000} = \frac{N_A}{20 \times 10^4} ions$

Which of the following has least mass

- [ ] 2 g atom of nitrogen
- [x] 3×10^{23} atoms of C
- [ ] 1 mole of S
- [ ] 7.0 g of Ag

EXPLANATIONS Report

38 % were correct!

(a) 2 gm atom of nitrogen = 28 gm

(b) 6×10^{23} atoms of C has mass $= 12gm$ 3×10^{23} atoms of C has mass $= \frac{12 \times 3 \times 10^{23}}{6 \times 10^{23}} = 6gm$

(c) 1mole of S has mass = 32 gm

(d) 7.0 gm of Ag So, lowest mass = 6 gm of C.

A current 2.0 A is passed for 5 hours through a molten metal salt deposits 22 g of metal (At. wt. =177). The oxidation state of the metal in the metal salt is

- [ ] + 1
- [ ] + 2
- [x] + 3

+ 4

EXPLANATIONS Report

63 % were correct!

$$E_{\text{metal}} = \frac{\text{Weight of metal} \times 96500}{\text{Number of coulombs}}$$

$$= \frac{22.2 \times 96500}{2 \times 5 \times 60 \times 60} = 59.5$$

Oxidation number of the metal $= \frac{177}{59.5} = +3$

A certain quantity of electricity is passed through an aqueous solution of $AgNO_3$ and cupric salt solution connected in series. The amount of Ag deposited is $1.08\ gm$, the amount of copper deposited is (atomic weight of Cu = 63.5; Ag = 108)

0.6454 g

6.354 g

0.3177 g

3.177 g

EXPLANATIONS Report

54 % were correct!

$$\frac{\text{Wt. of } Cu}{\text{Wt. of } Ag} = \frac{\text{Eq. wt. of } Cu}{\text{Eq. wt. of } Ag}$$

$$\frac{\text{Wt. of } Cu}{1.08} = \frac{63.5/2}{108}$$

Wt. of $Cu = 0.3177\ gm.$

Anu remained at home because she had a sore throat.

a simple sentence

a compound sentence

a complex sentence

a compound-complex sentence

EXPLANATIONS Report

21 % were correct!

Anu remained at home. (independent clause)

because he had a sore throat (dependent clause)

A sentence having an independent clause and a dependent clause is a complex sentence.

It suffers ... pneumonia.

- with
- of
- from
- at

Mr. Oli _____ the project by next month.

- will complete
- will be completing
- will have been completing
- will have completed

EXPLANATIONS Report

52 % were correct!

To indicate an action that will be completed by a particular point in the future, we use future perfect tense.

Well, I'm pretty sure I'll pass the test.

- noun
- pronoun
- adverb
- interjection

EXPLANATIONS Report

57 % were correct!

interjection (exclaimation) means an abrupt remark, especially as an aside or interruption.

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