Question Review

All

If $(1+i\sqrt{3})^9 = a+ib$ then b is equal to

- 1
- 256
- 0
- 9^3

EXPLANATIONS

Report

42 % were correct!

$$1+i\sqrt{3} = 2\left(\frac{1}{2}+i\frac{\sqrt{3}}{2}\right) = 2\left[\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right] = 2e^{i\pi/3}$$

$$\therefore (1+i\sqrt{3})^9 = \left(2e^{i\pi/3}\right)^9 = 2^9\cdot e^{i(3\pi)} = 2^9(\cos 3\pi + i\sin 3\pi) = -2^9$$

$$\therefore a+ib = (1+i\sqrt{3})^9 = -2^9; \therefore b = 0$$

$$\lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sin^{-1}x} =$$

- 2
- 1
- -1
- -2

EXPLANATIONS

Report

76 % were correct!

Using L-Hopital's Rule:

$$L = \lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sin^{-1}x} = \lim_{x\to 0}\sqrt{1-x}.\sqrt{1+x}\left(\frac{1}{2\sqrt{1+x}}+\frac{1}{2\sqrt{1-x}}\right)$$

On simplification,

$$L = \frac{1}{2}\lim_{x\to 0}(\sqrt{1+x}+\sqrt{1-x}) = 1$$

A parabola passing through the point $(-4, -2)$ has its vertex at the origin and y-axis as its axis. The latus rectum of the parabola is :

- 6
- 8 ✓
- 10
- 12

EXPLANATIONS Report

77 % were correct!

Let the equation of parabola is $x^2 = 4ay$, but $a = \dfrac{16}{-2 \times 4} = -2$. Then equation is $x^2 = -8y$ and latus rectum $= 4a = 8$.

The curve $f(x) = \dfrac{1}{x\sqrt{1-x^2}}$ has:

- a local maxima at x = 1/√ 2 and a local minima at x = -1/√ 2 ✓
- a local maxima at x = -1/√ 2 and a local minima at x = 1/√ 2
- neither maxima nor minina because of discontinuity
- f(x) is not a function

EXPLANATIONS Report

23 % were correct!

$$f(x) = \frac{1}{x\sqrt{1-x^2}}$$

$$f'(x) = \frac{1}{x} \times -\frac{1}{2}(1-x^2)^{-3/2} \times (-2x) + \frac{1}{sqrt1-x^2} \times -\frac{1}{x^2}$$

$$\therefore \quad f'(x) = \frac{1}{(\sqrt{1-x^2})^3} - \frac{1}{x^2\sqrt{1-x^2}}$$

For extreme values, $f'(x) = 0$

$$\Rightarrow \frac{1}{\sqrt{1-x^2}(1-x^2)} = \frac{1}{x^2\sqrt{1-x^2}}$$
$$\Rightarrow x^2 = 1 - x^2$$
$$\Rightarrow x^2 = 1/2$$
$$\Rightarrow x = \pm 1/\sqrt{2}$$

Also, evaluating $f(x)$ at these values of x give, $f(-1/\sqrt{2}) = -2 \quad f(1/\sqrt{2}) = 2.$

If $f(x) = 3x - 5$, then $f^{-1}(x)$

- is $\frac{1}{3x - 5}$
- **is $\frac{x + 5}{3}$**
- Does not exist because *f* is not one-one
- Does not exist because *f* is not onto

EXPLANATIONS Report

86 % were correct!

Let $f(x) = y \Rightarrow x = f^{-1}(y)$

Hence $f(x) = y = 3x - 5 \Rightarrow x = \frac{y + 5}{3} \Rightarrow f^{-1}(y) = x = \frac{y + 5}{3}$

$\therefore f^{-1}(x) = \frac{x + 5}{3}$

Also *f* is one-one and onto, so f^{-1} exists and is given by $f^{-1}(x) = \frac{x + 5}{3}$

Consider an infinite G.P. with first term a and common ratio r, its sum is 4 and the second term is 3/4, then :

- a = $\frac{7}{4}$, r = $\frac{3}{7}$
- a = $\frac{3}{2}$, r = $\frac{1}{2}$
- a = 2, r = $\frac{3}{8}$
- **a = 3, r = $\frac{1}{4}$**

EXPLANATIONS Report

50 % were correct!

Here $\frac{a}{1 - r} = 4$ and $ar = \frac{3}{4}$.

Dividing these,

$r(1 - r) = \frac{3}{16}$

Or, $16r^2 - 16r + 3 = 0$

Or, $(4r-3)(4r-1)=0$

$r=\frac{1}{4},\frac{3}{4}$ and $a=3,\ 1$

so $(a,r)=\left(3,\frac{1}{4}\right)\ ,\ \left(1,\frac{3}{4}\right).$

The length of common chord of the circles $x^2+y^2=12$ and $x^2+y^2-4x+3y-2=0$, is

- $4\sqrt{2}$
- $5\sqrt{2}$
- $2\sqrt{2}$
- $6\sqrt{2}$

EXPLANATIONS Report

41 % were correct!

The equation of common chord $\equiv S_1-S_2=0$ or $4x-3y-10=0$ and centre of first circle is (0, 0). Therefore perpendicular from it on line is $p_1=\frac{10}{5}=2$ and $R_1=\sqrt{12}$

Hence, $L=2\sqrt{\left(R_1^2-p_1^2\right)}=2\sqrt{(12-4)}=4\sqrt{2}$

If $\vec{a}=\vec{u}+\vec{v}$ and $\vec{b}=\vec{u}-\vec{v}$ and $\vec{u}$ and $\vec{v}$ are unit vectors, then $|\vec{a}\times\vec{b}|$ is:

- $2\sqrt{1+(\vec{u}.\vec{v})^2}$
- $\sqrt{1+(\vec{u}.\vec{v})^2}$
- $2\sqrt{1-(\vec{u}.\vec{v})^2}$
- $\sqrt{1-(\vec{u}.\vec{v})^2}$

EXPLANATIONS Report

55 % were correct!

$$|\vec{a}\times\vec{b}|=|(\vec{u}+\vec{v})\times(\vec{u}-\vec{v})|$$
$$=2|\vec{u}\times\vec{v}|$$

(Because the cross product of a vector with itself is a null vector and $|\vec{u}\times\vec{v}|=|\vec{v}\times\vec{u}|$)

$$|\vec{a}\times\vec{b}|=2|\vec{u}||\vec{v}|\sin\theta$$
So, $$=2\sqrt{1-\cos^2\theta}$$
$$=2\sqrt{1-(\vec{u}.\vec{v})^2}$$

(Because $\vec{u}.\vec{v}=|\vec{u}||\vec{v}|\cos\theta$)

Which of the following is a conjugated acid-base pair ?

- HCl, NaOH
- NH_4Cl, NH_4OH
- $H_2SO_4 HSO_4^-$
- KCN, HCN

EXPLANATIONS Report

$H_2SO_4 \rightleftharpoons H^+ + HSO_4^-$

Note:

A **conjugate acid** contains one more H atom and one more + charge than the base that formed it.

A **conjugate base** contains one less H atom and one more - charge than the acid that formed it.

Which of the following pairs are not isomeric compounds ?

- Ethyl ethanoate and methyl propanoate
- Butanone and butanal
- Ethoxy propane and propoxy ethane
- Methoxy methane and ethanol

EXPLANATIONS Report

41 % were correct!

Both are same compounds

Oxidation state of oxygen in F_2O is

- + 1
- + 2
- -1
- -2

EXPLANATIONS Report

58 % were correct!

Oxygen shows + 2 oxidation state in F_2O .

As F is most electronegative element, it always has an O. No. =-1

Cassiterite is concentrated by

- Levigation
- Electromagnetic separation
- Floatation
- Liquifaction

EXPLANATIONS Report

48 % were correct!

Cassiterite SnO_2 or tinstone - an ore of tin being non-magnetic can be separated from magnetic impurities like Fe and Mn from this method.

0.2 molar solution of formic acid is ionized 3.2%. Its ionization constant is

- $9.6*10^{-3}$
- $2.1*10^{-4}$
- $1.25*10^{-6}$
- $4.8*10^{-5}$

EXPLANATIONS Report

61 % were correct!

$$K_a = C\alpha^2 = 0.2 \times \left(\frac{32}{100}\right)^2 = 2.048 \times 10^{-4}$$

The volume of 0.6 $M\ NaOH$ required to neutralise 30 cm^3 of 0.4 $M\ HCl$ is

- 40 cm^3
- 30 cm^3
- 20 cm^3

○ 10 cm^3

EXPLANATIONS Report

81 % were correct!

Normality = molarity × basicity or acidity (for HCl)

$N_2 = 0.4 \times 1 = 0.4N$ basicity =1 (for $NaOH$ acidity =1)

$$N_1 = 0.6 \times 1 = 0.6N$$

$$V_1 = ?$$

$$V_2 = 30\ cm^3$$

From the equation,

$N_1V_1 = N_2V_2$

$$0.6 \times V_1 = 0.4 \times 30$$

$$V_1 = \frac{0.4 \times 30}{0.6} = 20\ cm^3$$

IUPAC name of $CH_2 = CH - CH(CH_3)_2$ is

○ 1, 1-dimethyl-2-propene

● 3-methyl-1-butene

○ 2-vinyl propane

○ 1-isopropyl ethylene

EXPLANATIONS Report

73 % were correct!

$$\overset{1}{C}H_2 = \overset{2}{C}H - \overset{3}{C}H - \overset{4}{C}H_3$$
$$|$$
$$CH_3$$

3-methylbut-1-ene

Fluorine with dilute *NaOH* gives

● OF_2

○ O_3

○ O_2

○ HF and O_2

EXPLANATIONS Report

47 % were correct!

$F_2 + (dil.)2NaOH \rightarrow 2NaF + OF_2 + H_2O$

Don't push!

- a simple sentence
- a compound sentence
- a complex sentence
- a compound-complex sentence

EXPLANATIONS Report

78 % were correct!

Don't push! (independent clause)

A sentence having a single independent clause is a simple sentence.

The word “pleased” takes the prefix

- un-
- down-
- over-
- dis-

They saw the accident −−−−−−−− before them.

- happen
- happening
- happens
- to happen

The opposite of 'silly' is:

- ○ generous
- ○ lazy
- ○ nervous
- ◉ sensible

EXPLANATIONS

Report

65 % were correct!

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