15.03.21

15 March 2021 19:19

1) Trignometry → Basic
→ 2) Trig Eqns
→ I.T.F
→ Properties of Δ's
→ Heights & Distances

2) Calculus — 30-35% / 100% in Maths

→ Diff. Calculus
→ (i) Limits
→ (ii) continuity
→ (iii) Diffbility
→ (iv) Methods of diff
→ (v) MVTs
→ (vi) A.O.D

→ Int. Calculus
→ (i) Indef Integ
→ (ii) Def Integ
→ (iii) Areas
→ (iv) Diff Equations

30%

3) Algebra
→ (i) Vectors & 3D
→ (ii) Matrices & Dets
→ (iii) Complex Numbers.
→ (iv) Quad Eqns, Theory of Eqns.
→ (v) Sequences & Series
→ (vi) Binomial theorem
→ (vii) P&C

4) Probability & Probability Distribution.

5) exclusive topics
→ Functions
→ sets, Relations
→ Math. Reasoning.
→ Statistics //

---

(1) $\sin(270-\theta)$ (2) $\sin(720+\theta)$ (3) $\sin(-30)$

(4) $\sin(330+\theta)$ (5) $\sin(-320+\theta)$

(6) $\cos(270+\theta)$ (7) $\tan(360+\theta)$

(8) $\sin(360+\theta)+\cos(360+\theta)$

(9) Max, min values of $\sin x \cdot \cos x$ (10) Max, Min of $\sin x+\cos x$.

1) $y=\sin x$ ($x=90$) 1

2) $y=\cos x$ 1

(3) $y=\sin x\cdot\cos x$ → $x=71.2$

$1\times1=1$

$1\times0=0$

1, $\sin(x)$ — 0, $\frac{1}{2}$

−1

$x=0$

1 / −1

$\sin(21\theta)$ → $x=0$ →

$\sin(2021x)$ → 1, −1

2, −2 ← $y=2\sin x$ $y_{max}=2\times1=2$, $y_{min}=2\times(-1)=-2$

1×1

3) $y=\sin x\cdot\cos x$ →

$y=\frac{\sin 2x}{2}$.

$y=\frac{1}{2}\cdot\sin 2x$ — 1, −1

$y_{max}=\frac{1}{2}\times1=\frac{1}{2}$

$y_{min}=\frac{1}{2}\times-1=-\frac{1}{2}$

$\sin 2x=2\sin x\cdot\cos x$

$\frac{\sin 2x}{2}=\sin x\cdot\cos x$

>170/300

$\sin x$ — $\sin 2\theta=\sin 2(\theta)$, $\sin 3(\theta)$, $\sin 4(\theta)$

1) $\sin 2\theta=2\sin\theta\cos\theta$

2) $\cos 2\theta=\cos^2\theta-\sin^2\theta$

* (i) $\sin^2\theta+\cos^2\theta=1$.

$\sin^2(2\theta)+\cos^2(2\theta)=1$

2) $\cos 2\theta = \cos^2\theta - \sin^2\theta$

$= 2\cos^2\theta - 1$

$= 1 - 2\sin^2\theta$

3) $\boxed{\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}}$

$\sin^2(3\theta) + \cos^2(3\theta) = 1$

(ii) $\sec^2\theta - \tan^2\theta = 1$

$\sec^2\theta = 1 + \tan^2\theta$ //

(iii) $\boxed{\operatorname{cosec}^2\theta - \cot^2\theta = 1}$

---

4) $\sin 2\theta = 2\sin\theta\cos\theta \Rightarrow \sin\theta = 2\sin\theta/2 \cdot \cos\theta/2$.

5) $\cos\theta = 2\cos^2\theta/2 - 1 = 1 - 2\sin^2\theta/2 = \cos^2\theta/2 - \sin^2\theta/2$.

6) $\tan\theta = \dfrac{2\tan\theta/2}{1-\tan^2\theta/2}$.

---

(7) $1 - \cos 2\theta = 2\sin^2\theta$

(8) $1 - \cos\theta = 2\sin^2\theta/2$.

(9) $1 + \cos 2\theta = 2\cos^2\theta$

(10) $1 + \cos\theta = 2\cos^2\theta/2$.

---

(11) $\sin 2\theta = \dfrac{2\tan\theta}{1+\tan^2\theta}$

(12) $\sin\theta = \dfrac{2\tan\theta/2}{1+\tan^2\theta/2}$

(13) $\cos\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

$\sec^2\theta = 1 + \tan^2\theta$

(13) $\cos 2\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

(14) $\cos\theta = \dfrac{1-\tan^2\theta/2}{1+\tan^2\theta/2}$.

(15) $\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

(16) $\tan\theta = 2\tan\theta/2 \,/\, 1-\tan^2\theta/2$.

---

(17) $\sin(A+B) = \sin A\cos B + \cos A\sin B$.

(18) $\sin(A-B) = \sin A\cos B - \cos A\sin B$.

(19) $\cos(A+B) = \cos A\cos B - \sin A\sin B$.

(20) $\cos(A-B) = \cos A\cos B + \sin A\sin B$

(21) $\tan(A+B) = \dfrac{\tan A+\tan B}{1-\tan A\tan B}$; $\tan(A+A) = \dfrac{\tan A+\tan A}{1-\tan A\tan A}$

$\tan 2A = \dfrac{2\tan A}{1-\tan^2 A}$ ||

---

(22) $\sin C + \sin D = 2\sin\left(\dfrac{C+D}{2}\right).\cos\left(\dfrac{C-D}{2}\right)$.

(23) $\sin C - \sin D = 2\cos\left(\dfrac{C+D}{2}\right).\sin\left(\dfrac{C-D}{2}\right)$.

(24) $\cos C + \cos D = 2\cos\left(\dfrac{C+D}{2}\right).\cos\left(\dfrac{C-D}{2}\right)$

(25) $\cos C - \cos D = -2\sin\left(\dfrac{C+D}{2}\right).\sin\left(\dfrac{C-D}{2}\right)$

$\sin(-C+D)$

$\sin(D-C)$

$\sin(-\theta) = -\sin\theta$

$= 2\sin\left(\dfrac{C+D}{2}\right).\sin\left(\dfrac{D-C}{2}\right)$.

(26) $\sin(-\theta) = -\sin\theta$, $\sin(-3\theta) = -\sin(3\theta)$

$\operatorname{Cosec}(-\theta) = -\operatorname{Cosec}\theta$

(27) $\cos(-\theta) = \cos\theta$

$\sec(-\theta) = \sec\theta$

(28) $\tan(-\theta) = -\tan\theta$

$\cot(-\theta) = -\cot\theta$ $\int \sin 3\theta \cdot d\theta$

---

(29) $\sin 3\theta = 3\sin\theta - 4\sin^3\theta \Rightarrow \boxed{\sin^3\theta = \dfrac{3\sin\theta - \sin 3\theta}{4}}$

(30) $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

(31) $\tan 3\theta = \dfrac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$

---

(32) $2\sin A\cos B = \sin(A+B) + \sin(A-B)$.

(33) $2\cos A\cos B = \cos(A+B) + \cos(A-B)$.

(34) $-2\sin A\sin B = \cos(A+B) - \cos(A-B)$

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

Q)) Max, Min values of $\sin x + \cos x$. //.

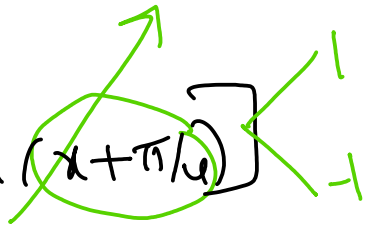
$y = \sin x + \cos x$, y_{max}, y_{min}

$$y = \sqrt{2}\left[\frac{\sin x + \cos x}{\sqrt{2}}\right].$$

$$y = \sqrt{2}\left[\sin x \cdot \frac{1}{\sqrt{2}} + \cos x \cdot \frac{1}{\sqrt{2}}\right] \qquad A = x,\ B = 45^\circ$$

$$y = \sqrt{2}\left[\sin A \cdot \cos B + \cos A \cdot \sin B\right]$$

$$y = \sqrt{2}\left[\sin(A+B)\right] = \sqrt{2}\left[\sin(x + \pi/4)\right]$$



$$y_{max} = \sqrt{2} \times 1 = \sqrt{2}$$

$$y_{min} = \sqrt{2} \times -1 = -\sqrt{2}$$

H.W

(1) Max, Min of $\sin x - \cos x$.

(2) Max, Min of $\sin 3x + \cos 3x$.

(3) Max, Min of $\sin 3x - \cos 3x$.

(4) Max, Min of $y = 3\sin x + 4\cos x$.

(5) Max, Min of $y = 3\sin x - 4\cos x$.