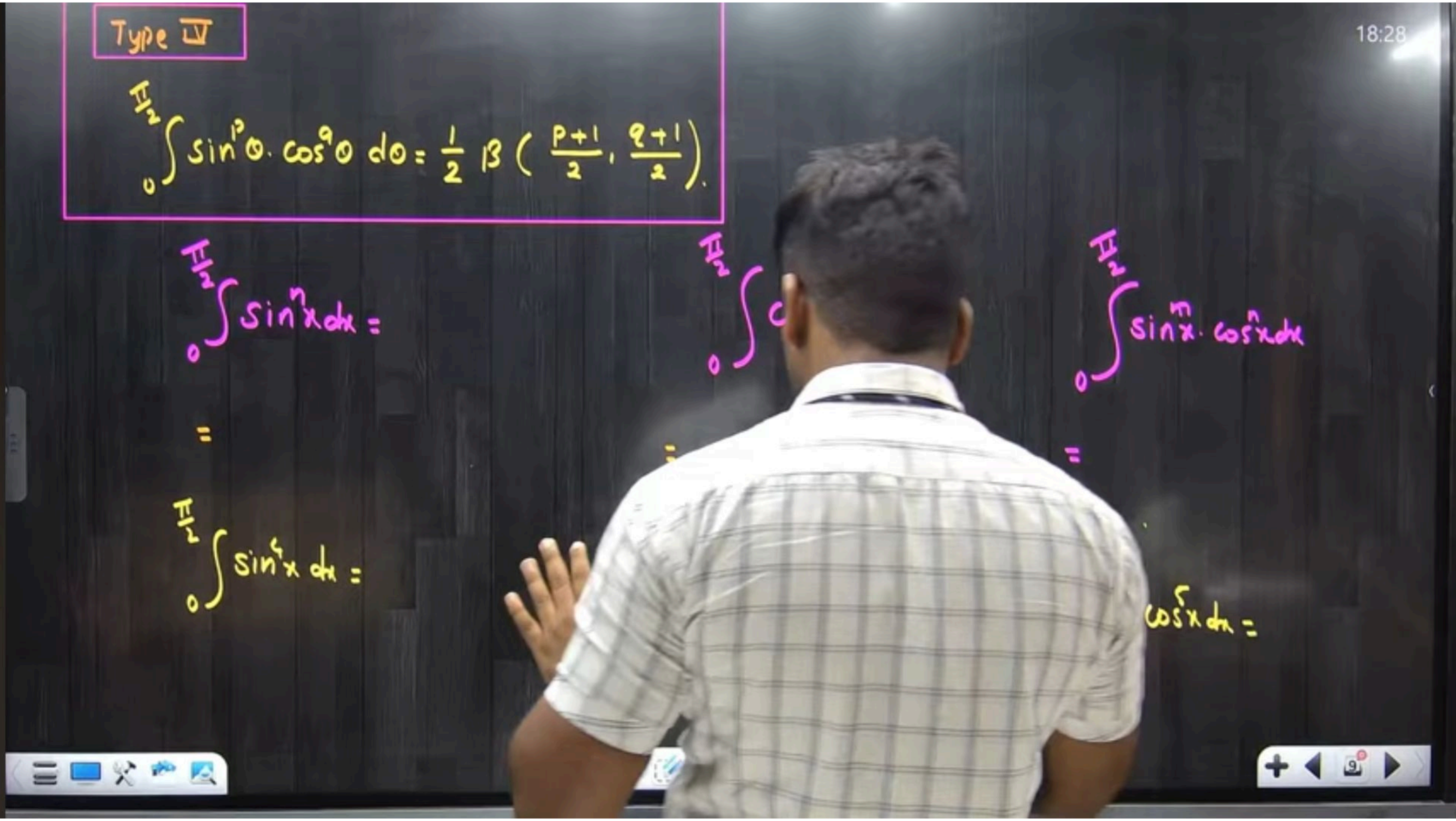
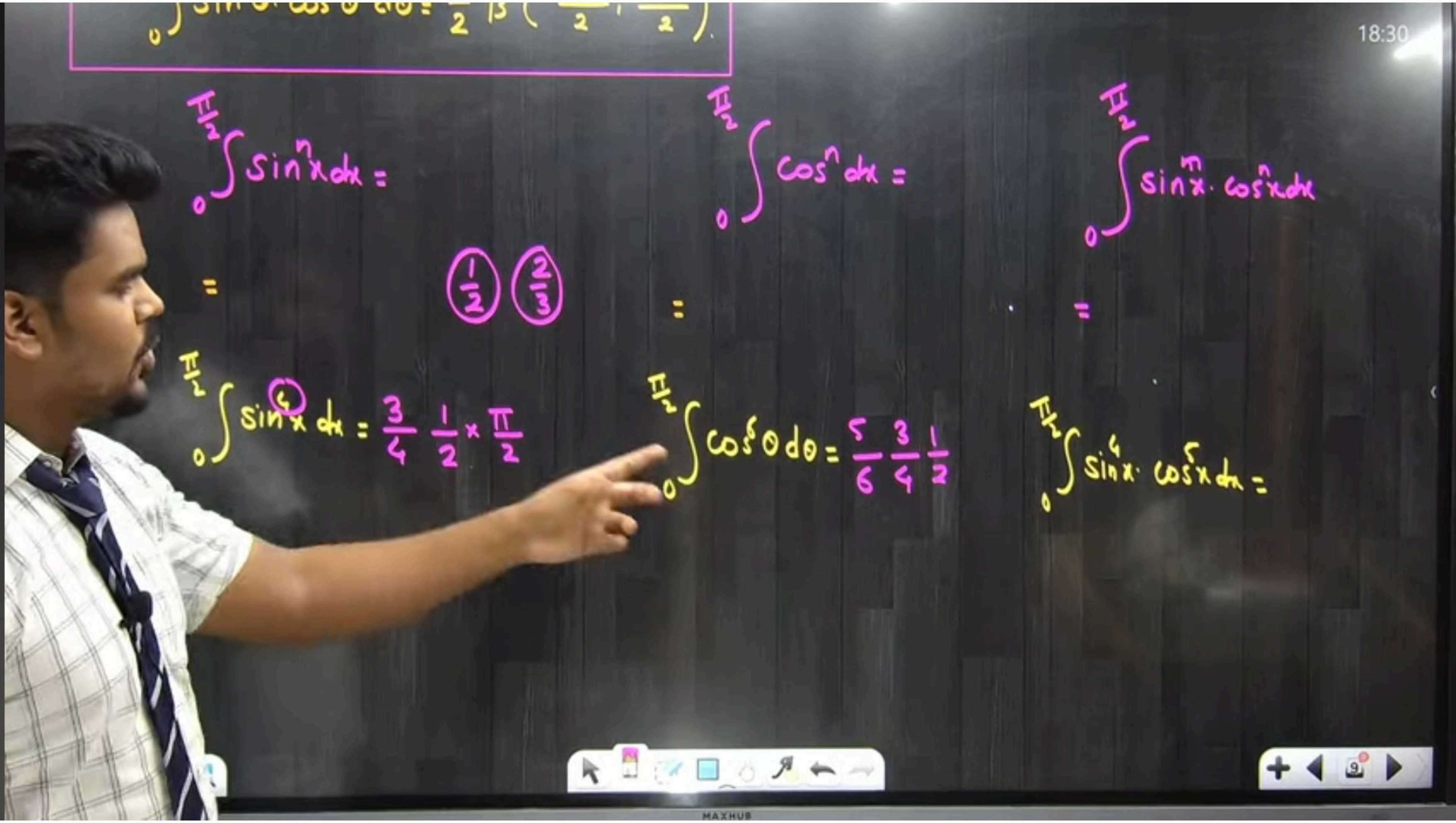

Type IV
$\int_0^{\frac{\pi}{2}} \sin^p\theta \cdot \cos^q\theta \, d\theta = \frac{1}{2} B\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$
$\int_0^{\frac{\pi}{2}} \sin^n x \, dx =$
=
$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx =$
$\int_0^{\frac{\pi}{2}} \sin^m x \cdot \cos^n x \, dx$
=
$\cos^5 x \, dx =$
18:28


18:30
$\int_0^{\pi/2} \sin^n x\,dx =$
$\int_0^{\pi/2} \cos^n dx =$
$\int_0^{\pi/2} \sin^m x \cdot \cos^n x\,dx$
=
$\frac{1}{2}$ $\frac{2}{3}$
=
=
$\int_0^{\pi/2} \sin^4 x\,dx = \frac{3}{4}\,\frac{1}{2} \times \frac{\pi}{2}$
$\int_0^{\pi/2} \cos^6\theta\,d\theta = \frac{5}{6}\,\frac{3}{4}\,\frac{1}{2}$
$\int_0^{\pi/2} \sin^4 x \cdot \cos^5 x\,dx =$
MAXHUB

$$\int_0 \ldots = \frac{\ }{2}\,\beta\left(\frac{\ }{2}, \frac{\ }{2}\right)$$

18:31

$$\int_0^{\pi/2} \sin^n x\,dx =$$

$$=$$

$$\int_0^{\pi/2} \sin^4 x \ldots$$

$$\int_0^{\pi/2} \cos^n dx =$$

$$\int_0^{\pi/2} \cos^5\theta\,d\theta = \frac{4}{5}\,\frac{2}{3}$$

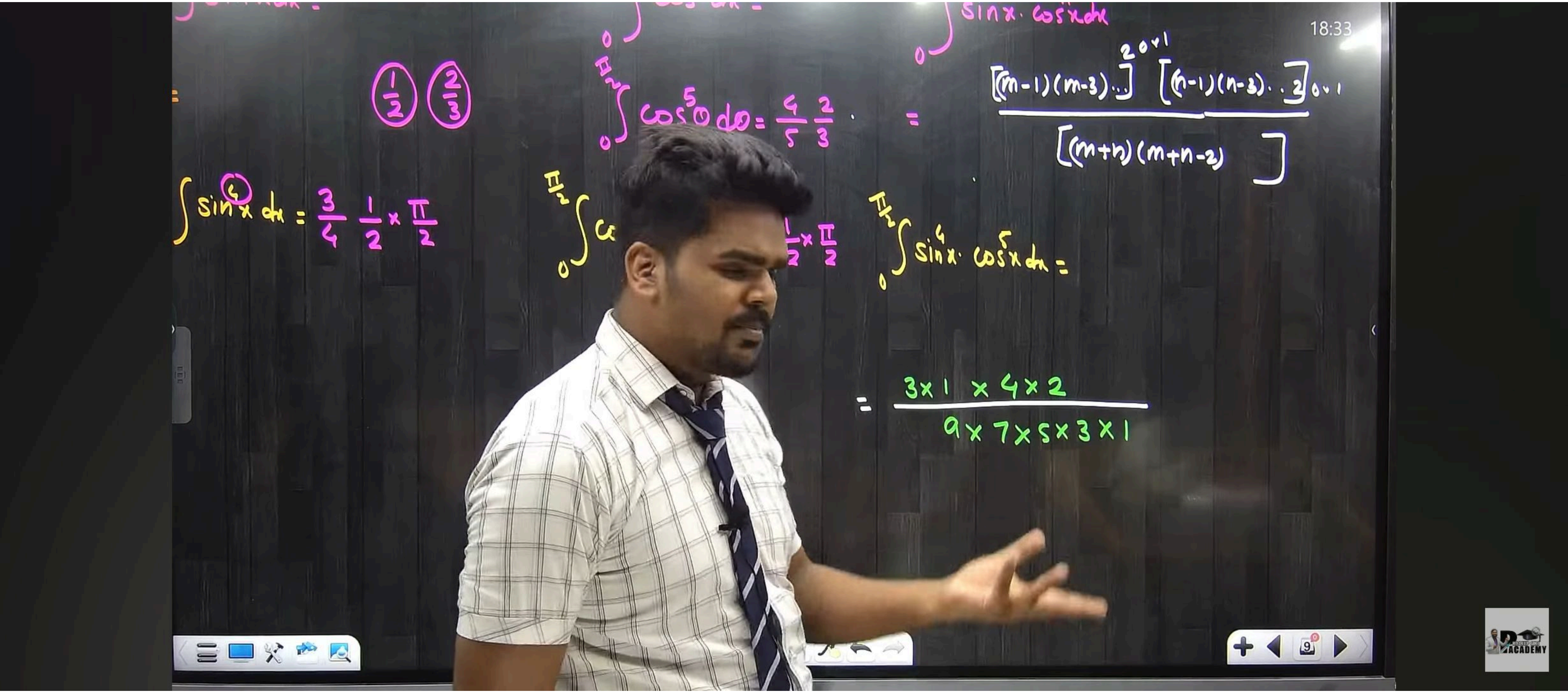
$$\int_0^{\pi/2} \cos^6\theta\,d\theta = \frac{5}{6}\,\frac{3}{4}\,\frac{1}{2}\times\frac{\pi}{2}$$

$$\int_0^{\pi/2} \sin^m x \cdot \cos^n x\,dx$$

$$=$$

$$\int_0^{\pi/2} \sin^4 x \cdot \cos^5 x\,dx =$$

ACADEMY


18:33
[(m-1)(m-3)...] [(n-1)(n-3)...2] 0 v 1
[(m+n)(m+n-2)]
∫ sin^4 x dx = 3/4 1/2 × π/2
∫ cos^5 θ dθ = 4/5 2/3
∫ sin^4 x · cos^5 x dx =
= (3×1 × 4×2) / (9×7×5×3×1)
ACADEMY

$$\int_0^a (a^2-x^2)^{5/2}\,dx$$

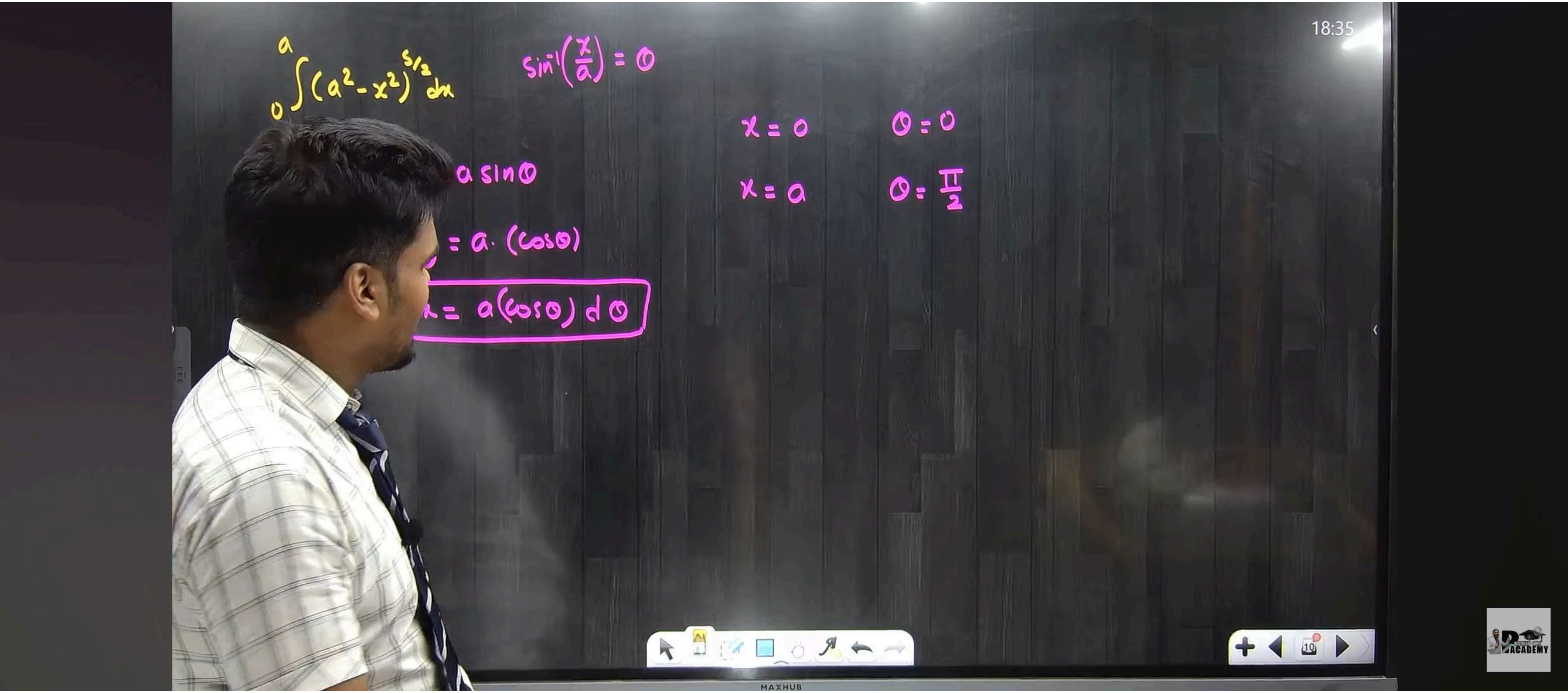
put $x = a\sin\theta$

$$\frac{dx}{d\theta} = a\cdot(\cos\theta)$$

$$\boxed{dx = a(\cos\theta)\,d\theta}$$

$1-x^2$

18:34



$\int_0^a (a^2-x^2)^{5/2} dx$
$\sin^{-1}\left(\frac{x}{a}\right) = \theta$
$x = 0$ $\theta = 0$
$x = a$ $\theta = \frac{\pi}{2}$
$a \sin\theta$
$= a \cdot (\cos\theta)$
$= a(\cos\theta)\, d\theta$
18:35
MAXHUB
ACADEMY

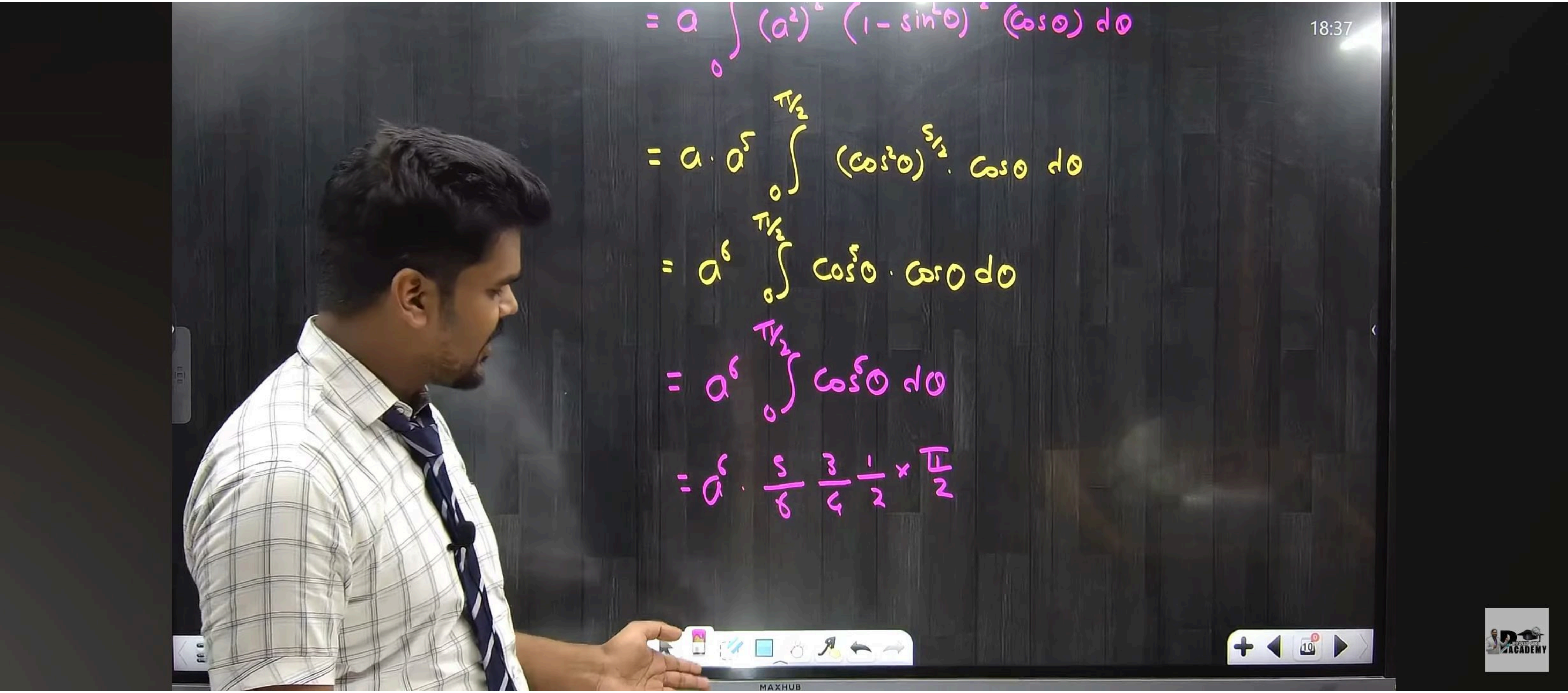
$$\frac{dx}{d\theta} = a\cdot(\cos\theta)$$

$$\boxed{dx = a(\cos\theta)\,d\theta}$$

$$= \int_0^{\frac{\pi}{2}} (a^2 - a^2\sin^2\theta)^{5/2}\, a\cdot(\cos\theta)\, d\theta$$

$$= a\int_0^{\frac{\pi}{2}} (a^2)^{5/2}\,(1-\sin^2\theta)^{5/2}\,(\cos\theta)\, d\theta$$

$$= a\cdot a^5 \int_0^{\pi/2} (\cos^2\theta)^{5/2}\cdot \cos\theta\, d\theta$$



$= a \int_0 (a^2) (1 - \sin^2\theta) (\cos\theta)\, d\theta$
$= a \cdot a^5 \int_0^{\pi/2} (\cos^2\theta)^{5/2} \cdot \cos\theta \, d\theta$
$= a^6 \int_0^{\pi/2} \cos^5\theta \cdot \cos\theta \, d\theta$
$= a^6 \int_0^{\pi/2} \cos^6\theta \, d\theta$
$= a^6 \cdot \frac{5}{6} \frac{3}{4} \frac{1}{2} \times \frac{\pi}{2}$
18:37

Type - V

$$\int_0^\infty \frac{x^m}{(1+x^2)^n}\,dx = \frac{1}{2}\,B\left(\frac{m+1}{2}, \frac{2n-m-1}{2}\right)$$

eg. $\int_0^\infty \frac{dx}{(1+x^2)^{7/2}}$

Type - VI

$$\int_0^\infty \frac{x^m}{(1+x)^n} = B(m+1, n-m-1)$$

eg. $\int_0^\infty \frac{x^5(1+x^4)}{(1+x)^{16}}\,dx$

Type - V

$$\int_0^\infty \frac{x^m}{(1+x^2)^n}\,dx = \frac{1}{2} B\left(\frac{m+1}{2}, \frac{2n-m-1}{2}\right)$$

Type - VI

$$\int_0^\infty \frac{x^m}{(1+x)^n} = B(m+1,\ n-m-1)$$

$$\int_0^\infty \frac{dx}{(1+x^2)^{7/2}}$$

$x = 0 \quad \theta = 0$

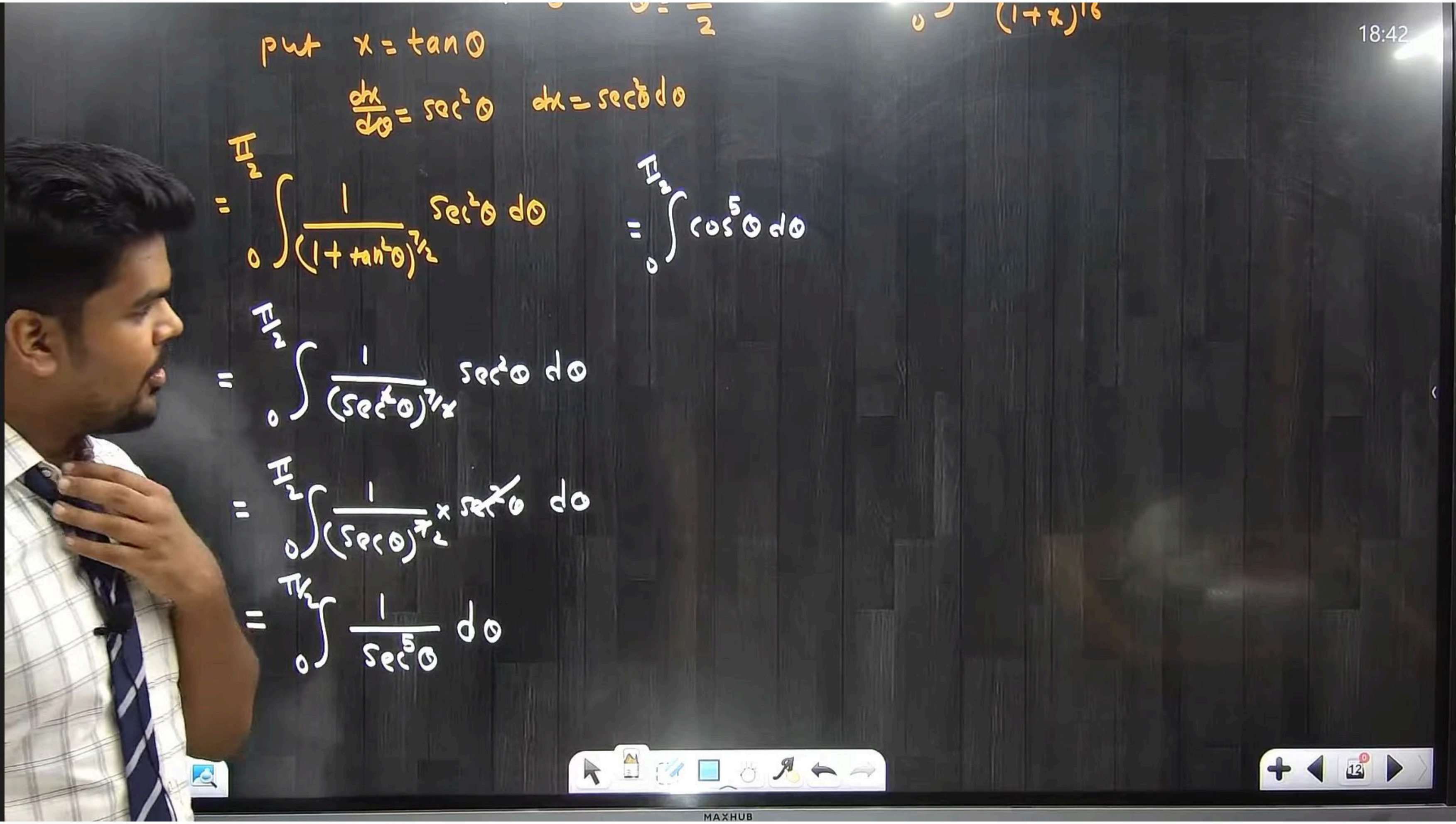
$x = \infty \quad \theta = \frac{\pi}{2}$

put $x = \tan\theta$

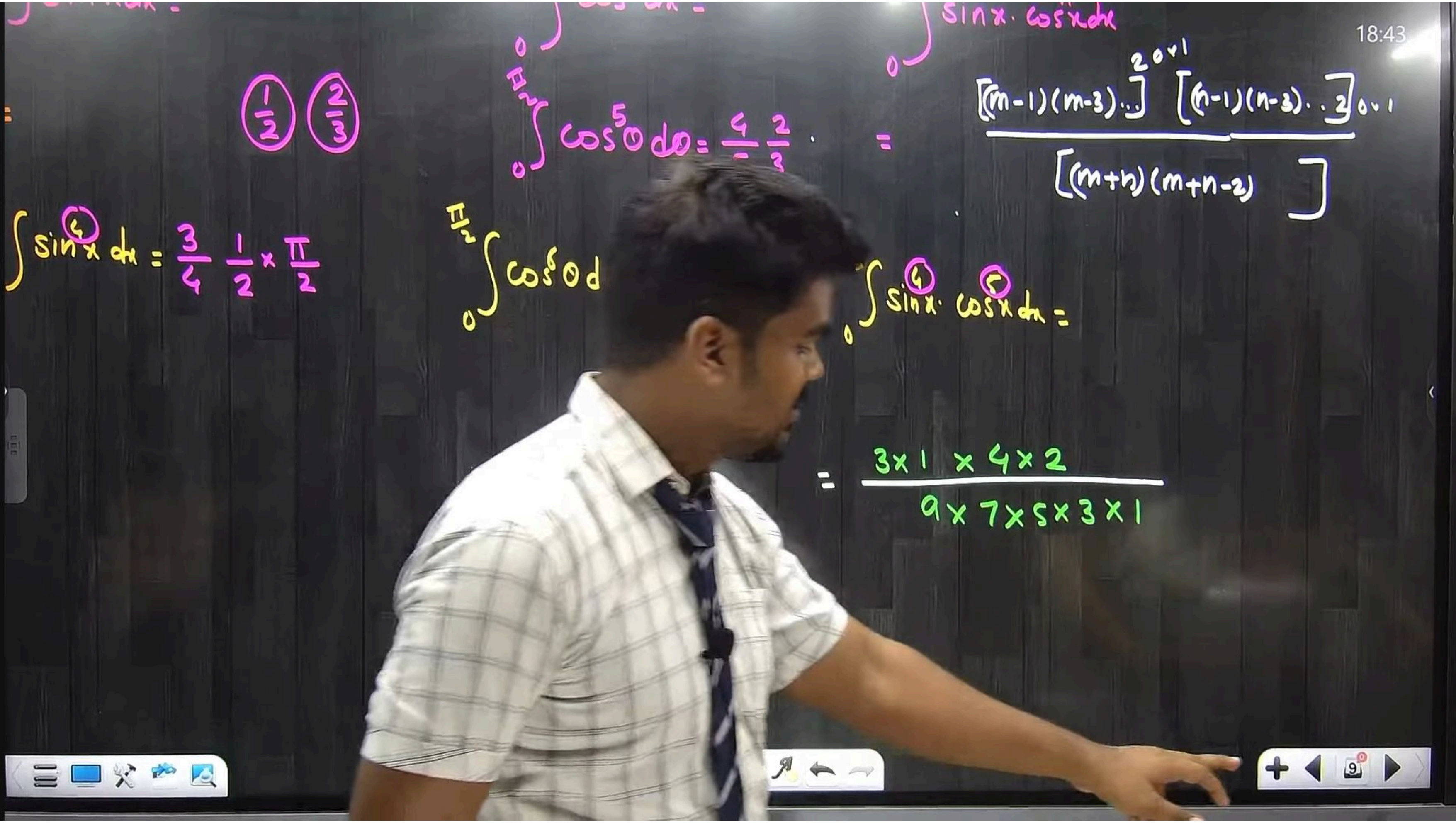
$\frac{dx}{d\theta} = \sec^2\theta \quad dx = \sec^2\theta\, d\theta$

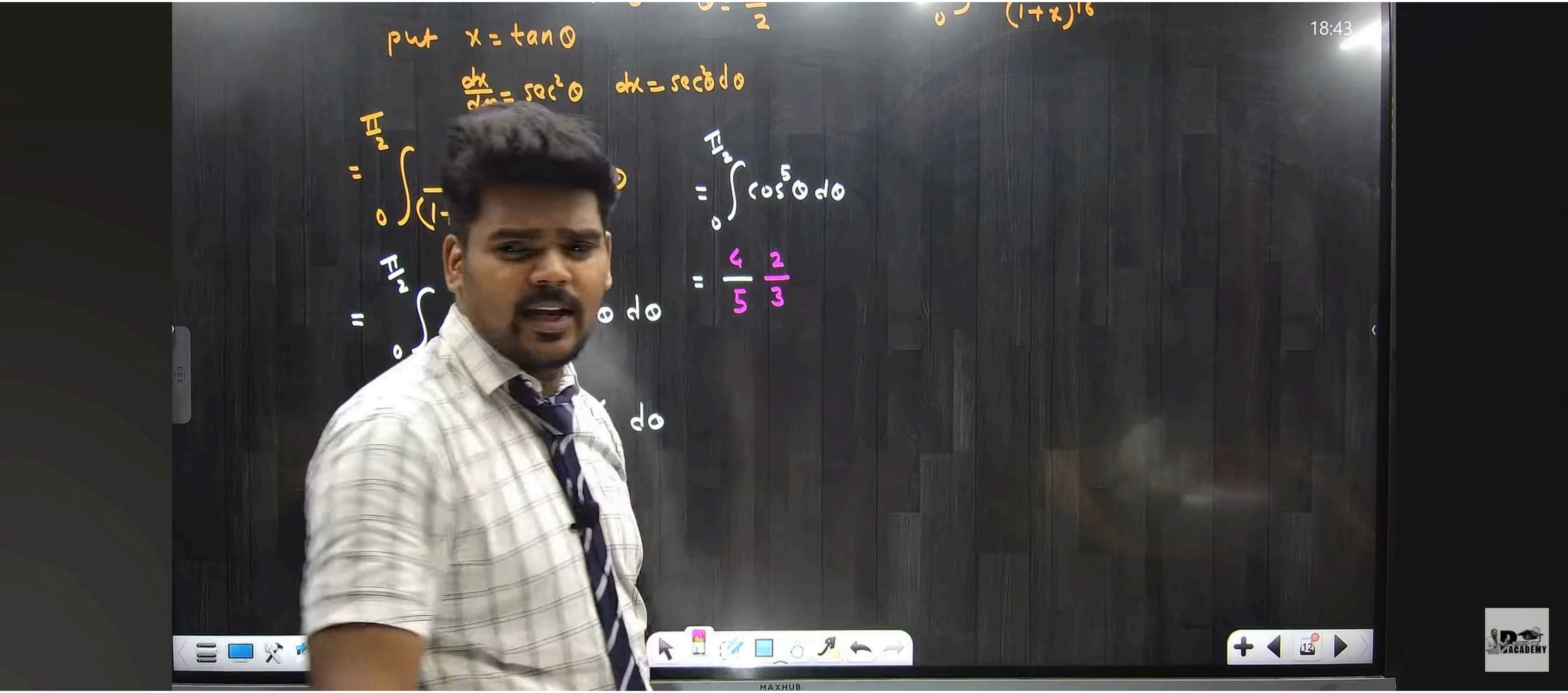
$$= \int_0^{\pi/2} \frac{1}{(1+\tan^2\theta)^{7/2}} \sec^2\theta\, d\theta$$

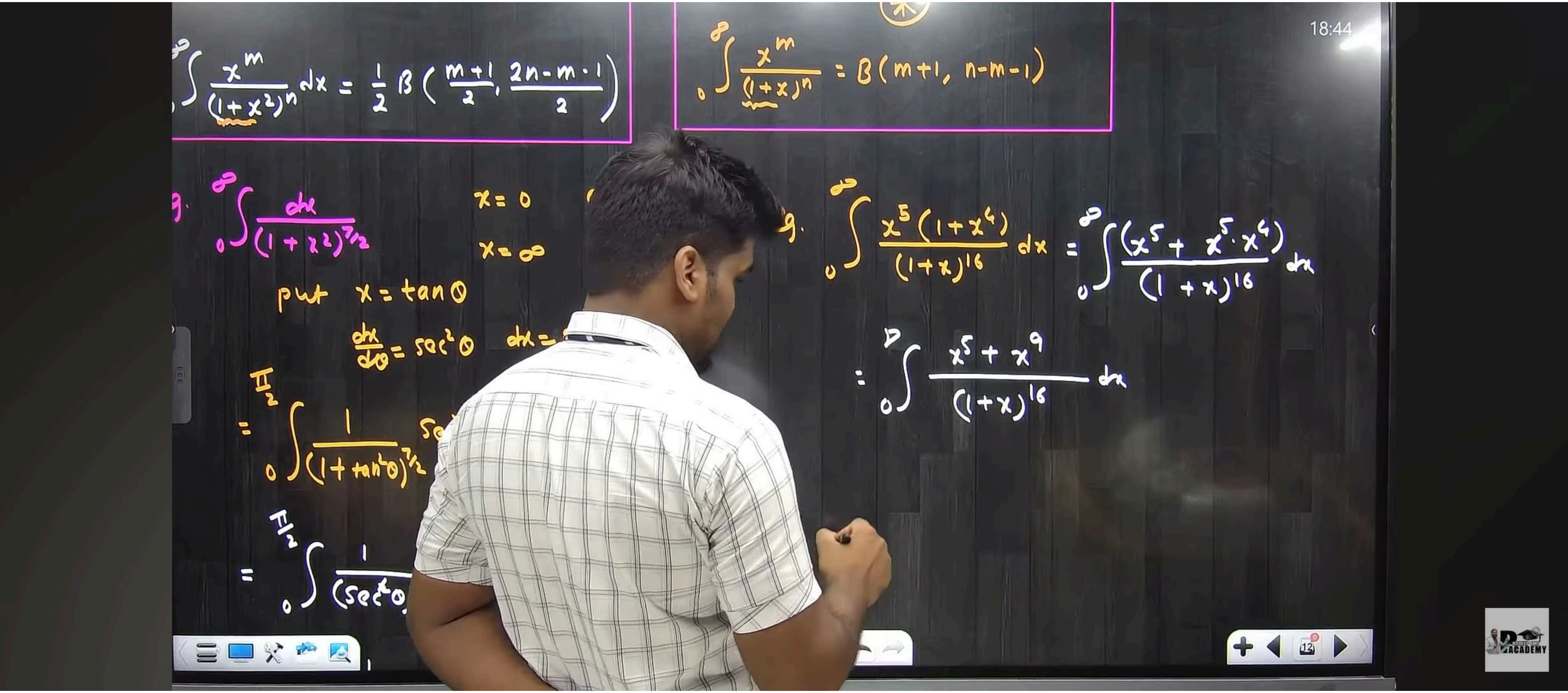
eg. $$\int_0^\infty \frac{x^5(1+x^4)}{(1+x)^{16}}\,dx$$


put $x = \tan\theta$
$\frac{dx}{d\theta} = \sec^2\theta \quad dx = \sec^2\theta\, d\theta$
$= \int_0^{\pi/2} \frac{1}{(1+\tan^2\theta)^{7/2}} \sec^2\theta\, d\theta$
$= \int_0^{\pi/2} \frac{1}{(\sec^2\theta)^{7/2}} \sec^2\theta\, d\theta$
$= \int_0^{\pi/2} \frac{1}{(\sec\theta)^{7}} \times \cancel{\sec^2\theta}\, d\theta$
$= \int_0^{\pi/2} \frac{1}{\sec^5\theta}\, d\theta$
$= \int_0^{\pi/2} \cos^5\theta\, d\theta$
18:42
MAXHUB
ACADEMY

In sum consisting of both sin and cos, if both are even only then multiply pi/2 else no


18:43
1/2 2/3
$\int_0^{\pi/2} \cos^5\theta \, d\theta = \frac{4}{5} \cdot \frac{2}{3}$
$= \frac{[(m-1)(m-3)\ldots]\,[(n-1)(n-3)\ldots 2]}{[(m+n)(m+n-2)\ldots]}$
2 or 1
$\int \sin^4 x \, dx = \frac{3}{4} \cdot \frac{1}{2} \times \frac{\pi}{2}$
$\int_0^{\pi/2} \cos^5\theta \, d$
$\int_0 \sin^4 x \cdot \cos^5 x \, dx =$
$= \frac{3 \times 1 \times 4 \times 2}{9 \times 7 \times 5 \times 3 \times 1}$
ACADEMY


put x = tan θ
dx/dθ = sec²θ   dx = sec²θ dθ
= ∫₀^{π/2} cos⁵θ dθ
= 4/5 · 2/3
18:43
MAXHUB
ACADEMY


18:44
$\int_0^\infty \frac{x^m}{(1+x^2)^n}dx = \frac{1}{2}B\left(\frac{m+1}{2}, \frac{2n-m-1}{2}\right)$
$\int_0^\infty \frac{x^m}{(1+x)^n} = B(m+1, n-m-1)$
g. $\int_0^\infty \frac{dx}{(1+x^2)^{7/2}}$
$x=0$
$x=\infty$
put $x=\tan\theta$
$\frac{dx}{d\theta}=\sec^2\theta$
$= \int_0^{\pi/2} \frac{1}{(1+\tan^2\theta)^{7/2}}$
$= \int_0^{\pi/2} \frac{1}{(\sec^2\theta)}$
g. $\int_0^\infty \frac{x^5(1+x^4)}{(1+x)^{16}}dx = \int_0^\infty \frac{(x^5+x^5\cdot x^4)}{(1+x)^{16}}dx$
$= \int_0^\infty \frac{x^5+x^9}{(1+x)^{16}}dx$
ACADEMY

eg. $\int_0^\infty \frac{dx}{(1+x^2)^{3/2}}$

$x = 0 \quad \theta = 0$

$x = \infty \quad \theta = \frac{\pi}{2}$

put $x = \tan\theta$

$\frac{dx}{d\theta} = \sec^2\theta$

$= \int_0^{\pi/2} \frac{1}{(1+\tan^2\theta)^{3/2}} \sec^2\theta \, d\theta$

$= \int_0^{\pi/2} \frac{1}{(\sec^2\theta)^{3/2}}$

$= \int_0^{\pi/2} \frac{1}{(\sec}$

$= \int_0^{\pi/2} \frac{1}{\sec}$

eg. $\int_0^\infty \frac{x^5(1+x^4)}{(1+x)^{16}}\,dx = \int_0^\infty \frac{(x^5 + x^5 \cdot x^4)}{(1+x)^{16}}\,dx$

$= \int_0^\infty \frac{x^5 + x^9}{(1+x)^{16}}\,dx$

$= \int_0^\infty \frac{x^5}{(1+x)^{16}}\,dx + \int_0^\infty \frac{x^9}{(1+x)^{16}}\,dx$

$= \beta(6, 10) + \beta(10, 6)$

$= 2\beta(6,10)$

18:47

Type - IX

(a) $$\int_a^b (x-a)^m \cdot (b-x)^n \, dx = (b-a)^{m+n+1} \cdot B(m+1, n+1)$$

$(x - LL)$ $(UL - x)$

eg. $$\int_7^{11} \sqrt[4]{(x-7)(11-x)} \, dx.$$

eg. $$\int_3^7 (x-3)^{\frac{1}{4}} \cdot (7-x)^{\frac{1}{4}} \, dx.$$

eg. $\int_7^{11} \sqrt[4]{(x-7)(11-x)}\, dx$.

eg. $\int_3^7 (x-3)^{\frac{1}{4}} \cdot (7-x)^{\frac{1}{4}}\, dx$.

$$\int_7^{11} (x-7)^{\frac{1}{4}} \cdot (11-x)^{\frac{1}{4}}\, dx$$

$\frac{1}{4}+\frac{1}{4}+1$

$\frac{2}{4}+1$

$\frac{1}{2}+1$

$\frac{3}{2}$

$a=7 \quad b=11 \quad m=n=\frac{1}{4}$

$$= 4^{3/2} \cdot \beta\left(\frac{1}{4}+1, \frac{1}{4}+1\right)$$

$$= 2^{2\times\frac{3}{2}}\, \beta\left(\frac{5}{4}, \frac{5}{4}\right)$$

$$= 8\, \beta\left(\frac{5}{4}, \frac{5}{4}\right)$$