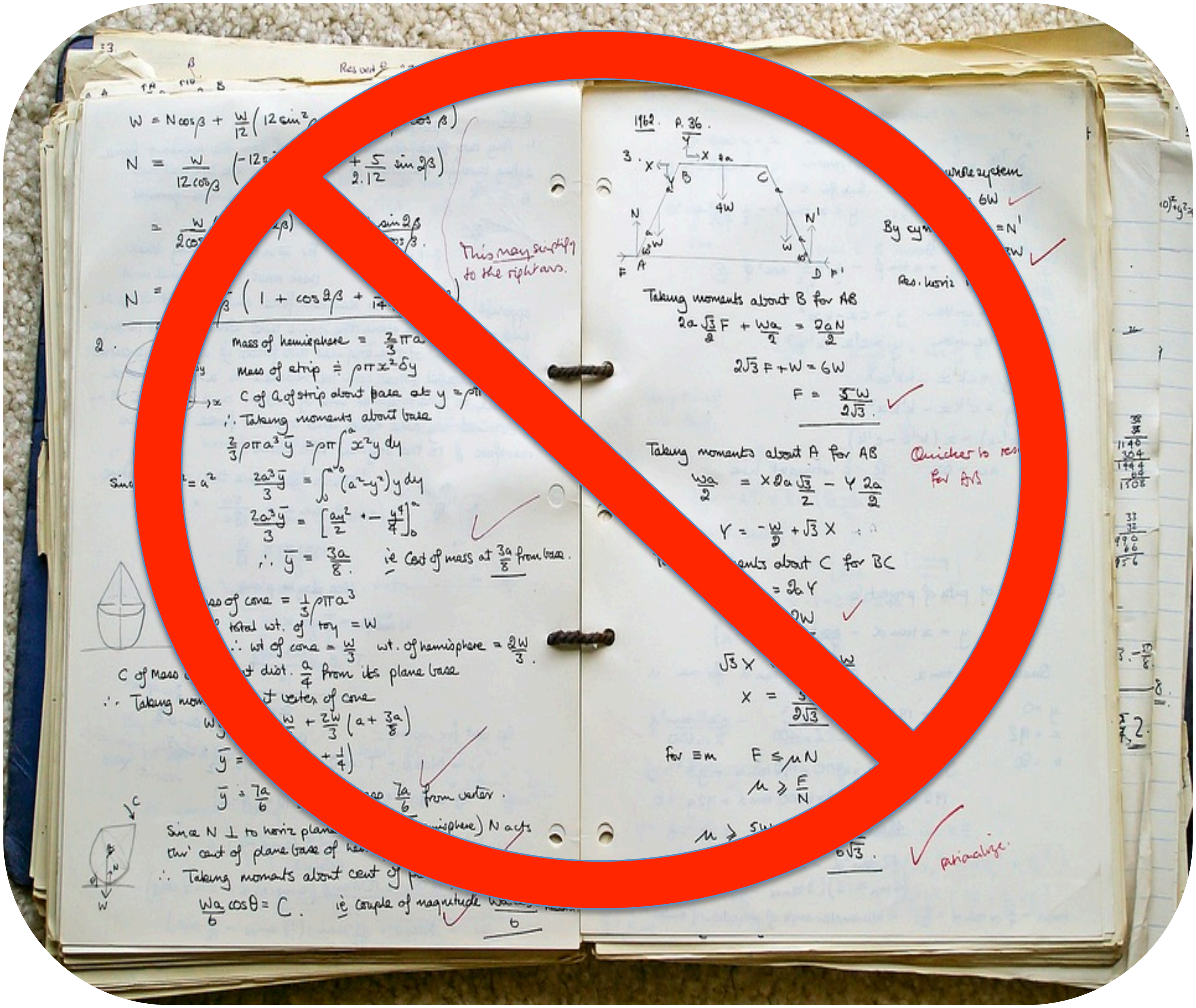

$W = N\cos\beta + \frac{W}{12}(12\sin^2$ … $\cos\beta)$

$N = \frac{W}{12\cos\beta}(-12$ … $+ \frac{5}{2.12}\sin 2\beta)$

$= \frac{W}{2\cos}$ … $2\beta)$ … $\frac{\sin 2\beta}{\cos\beta}$.

$N =$ … $\beta(1 + \cos 2\beta + \frac{}{14}$ …

This may simplify to the right ans.

2. Mass of hemisphere $= \frac{2}{3}\pi a$

Mass of strip $\doteqdot \rho\pi x^2\delta y$

C of G of strip about base at $y = \rho\pi$

∴ Taking moments about base

$\frac{2}{3}\rho\pi a^3\bar{y} = \rho\pi\int_0^a x^2 y\,dy$

Since … $= a^2$ $\quad \frac{2a^3\bar{y}}{3} = \int_0^a (a^2-y^2)y\,dy$

$\frac{2a^3\bar{y}}{3} = \left[\frac{ay^2}{2} + - \frac{y^4}{4}\right]_0^a$

$\therefore \bar{y} = \frac{3a}{8}$. ie Cent of mass at $\frac{3a}{8}$ from base.

…ass of cone $= \frac{1}{3}\rho\pi a^3$

… total wt. of toy $= W$

∴ wt of cone $= \frac{W}{3}$ wt. of hemisphere $= \frac{2W}{3}$.

C of Mass … at dist. $\frac{a}{4}$ from its plane base

∴ Taking mom… vertex of cone

W … $\frac{W}{}$ … $+ \frac{2W}{3}(a + \frac{3a}{8})$

$\bar{y} =$ … $+ \frac{1}{4})$

$\bar{y} = \frac{7a}{6}$ … $\frac{7a}{6}$ from vertex.

Since N ⊥ to horiz plan… …misphere) N acts thr' cent of plane base of he…

∴ Taking moments about cent of p…

$\frac{Wa}{6}\cos\theta = C$. ie couple of magnitude $\frac{Wa}{6}$

1962. P. 36.

3.

Taking moments about B for AB

$2a\frac{\sqrt{3}}{2}F + \frac{Wa}{2} = \frac{2aN}{2}$

$2\sqrt{3}F + W = 6W$

$F = \frac{5W}{2\sqrt{3}}$.

Taking moments about A for AB

Quicker to res… for AB

$\frac{Wa}{2} = X\,2a\frac{\sqrt{3}}{2} - Y\frac{2a}{2}$

$Y = -\frac{W}{2} + \sqrt{3}X$

…ents about C for BC

$= 2aY$

$2W$

$\sqrt{3}X$ … W

$X = \frac{5}{2\sqrt{3}}$

for Em $\quad F \leq \mu N$

$\mu \geqslant \frac{F}{N}$

$\mu \geqslant 5W$ … $6\sqrt{3}$.

rationalize.

…whole system … $= 6W$

By sym… $= N'$

… $2W$

Res. horiz