

Solutions

2.1 D $z \times x = y$; the minus sign in $-2m\Omega \times v'$ reverses it.

Compare the rejected options: $+x$; $-x$; $+y$; $+z$. Use the stated model and conditions.

2.2 C $v' = 0$ removes Coriolis; the real centripetal force is inward even though $a' = 0$.

Compare the rejected options: Its inertial acceleration is zero; Its Coriolis force is nonzero because the platform turns; Centrifugal force is an additional real interaction; Its real force must be outward. Use the stated model and conditions.

2.3 24. $N - 30 = 3(-2)$, so $N = 24$.

2.4 True. The cross product is perpendicular to v' , so $F_C \cdot v' = 0$.

3.1 With $v' = a' = 0$, the inertial acceleration is $\Omega \times (\Omega \times r) + \dot{\Omega} \times r = -\Omega^2 r \hat{x} + \alpha r \hat{y}$. Real force is $m(-\Omega^2 r \hat{x} + \alpha r \hat{y})$. Coriolis vanishes, while the Euler apparent force points $-y$ and centrifugal points $+x$. Award centripetal term, tangential term, real force and apparent-force distinction.