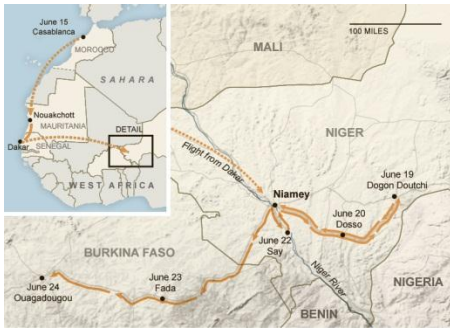


ANGULAR DYNAMICS

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An African Adventure, and a Revelation OUAGADOUGOU, Burkina Faso



INTRODUCTION: This 100 lb hoop shaped wheel (below) of 1 m radius has a huge moment of inertia. Thus, when turning at just 1 rev/3 s (frequency f) has a lot of rotational kinetic energy. The young boy uses his body weight (F) to create a torque through $1/4$ rev. ($\pi/2$ radians) causing the kinetic energy.

QUESTIONS: (a) Convert 100 lb to kg? (b) Find moment of inertia (in kg m^2) of hoop shaped wheel? (c) Find rotational kinetic energy (in J) of wheel? (d) How much work does the boy do to cause this KE? (e) Find the approximate weight (lb) of boy ($\sim F$ boy exerts) knowing W (work) = Torque X (angular displacement in radians). (f) **HINT:** 2.2 lb/kg , $I_{\text{hoop}} = m R^2$, $KE = 1/2 I_{\text{hoop}} (\text{angular velocity})^2$, Torque = $F \times (\text{lever arm})$, angular velocity = $2(\pi) f$, 0.2248 lb/N , **ANSWERS:** (a) $\sim 45.45 \text{ kg}$, (b) $\sim 45.45 \text{ kg m}^2$ (c) $\sim 99.58 \text{ J}$ (d) $\sim 99.58 \text{ J}$ (e) $\sim 211 \text{ lb}$

TAKE an American student and an American teacher who have never been near Africa before, lead them on a crazed “win a trip” journey through five particularly wretched countries, and what do you get?

Well, a few mishaps. There was that angry mob in Mauritania — who would have thought our cameras would upset people that much? And that bull elephant in Niger was equally inhospitable, although the giraffes seemed amiable as they approached to gawk at the strange white humans. We encountered plenty of heartbreak, like the baby we met in Niger who was going blind from lack of vitamin A. In some places, we felt the gnawing disquiet of insecurity. The rise of banditry and a Qaeda network in West Africa forced us to take an armed escort across one particularly lawless stretch of “highway.” Yet my travel buddies and I also found something far more significant on our journey: **hope. One of the best-kept secrets in the world today can be found in thatched-roof villages like the ones we passed through: Africa appears to be turning around.**

