



ENGINEERING, PHYSICS, MATH COMPANION TO **KING OF THE TIGHTROPE:** **WHEN THE GREAT BLONDIN RULED NIAGARA** written by Donna Janell Bowman illustrated by Adam Gustavson

Circumference: The distance around an object — $\text{Pi (3.14)} \times \text{diameter of a circle}$

Diameter: Length of a straight line—edge-to-edge—through the center of an object

Radius: Half of diameter. Length of a straight line from the center of an object to one outer edge of the object

Center of gravity/mass: The point where the weight is even on all sides, allowing equilibrium.

Where's the center of gravity of a human? While standing, it is near the top of the hip bone. A human's center of gravity changes with their position.

Equilibrium: The state of balance

Inertia: Inertia is the quality in matter (matter is anything you can touch) that lets it stay still if it is still, or keeps it moving if it is moving. Until an external force intervenes, an object at rest tends to stay at rest, and an object in motion tends to stay in motion.

Why did Blondin use a weighted balance pole? The pole lowered his center of gravity & spread the combined mass (weight of Blondin + pole) away from Blondin's pivot point (feet). Doing so reduced angular acceleration and increased the moment of inertia, allowing Blondin more time to correct wobbling or tipping. Balance poles add stability.

Bonus Challenge Questions for Students:

- Why did Blondin choose a 3.25-inch diameter rope for his Niagara performances?
- How is the tension level of fiber (plant-based) ropes determined?
- What kind of knots would be best for securing a tightrope?
- How would using a fibre rope be different than using today's metal cable?