1. Dropped from 1.80 m from rest: landing speed (m/s, three decimals)?

   _____ m/s

2. The 2.5 kg till on a 25 degree ramp: normal force (N, two decimals)?

   _____ N

3. A 2.5 kg till dropped 1.80 m onto k = 4900 N/m: maximum deflection (m, four decimals)?

   _____ m

4. A 2.5 kg till hits at 5.943 m/s with e = 0.35: impulse magnitude (N s, two decimals)?

   _____ N · s

5. A 0.310 m wheel rolling at 2.00 m/s: angular velocity (rad/s, three decimals)?

   _____ rad/s

6. That 5.0 kg disk after 1.50 m of rolling carries 19.04 J total. The split is:

   ☐ 9.52 J carried, 9.52 J spun

   ☐ 12.70 J carried, 6.35 J spun

   ☐ 19.04 J carried, nothing spun

   ☐ 6.35 J carried, 12.70 J spun

7. The horizontal and vertical components of the slide-off:

   ☐ run on independent clocks

   ☐ exchange energy

   ☐ are equal in magnitude at landing

   ☐ share one clock, set by the vertical fall

8. On the 25 degree ramp, the normal force equals:

   ☐ mg sin 25°

   ☐ mu_k mg

   ☐ mg cos 25°

   ☐ mg

9. In mg(h + x) = k $x^2/2$, the +x exists because:

   ☐ x is measured from the table

   ☐ gravity keeps working through the deflection

   ☐ energy is not conserved in impacts

10. The coefficient of restitution is the ratio of:

    ☐ final energy to initial energy

    ☐ impulse to momentum

    ☐ separation speed to approach speed

    ☐ rebound height to drop height

1. **5.943 m/s**

   v = sqrt(2gh) = sqrt(2 × 9.81 × 1.80).

2. **22.23 N**

   N = mg cos 25°.

3. **0.1393 m**

   mg(h+x) = k x^2/2.

4. **20.06 N · s**

   J = m(1+e)v.

5. **6.452 rad/s**

   omega = v/r.

6. **12.70 J carried, 6.35 J spun**

   Two thirds translation, one third rotation - the disk geometry taxes every ramp.

7. **share one clock, set by the vertical fall**

   One t governs both axes; the vertical equation sets it.

8. **mg cos 25°**

   The perpendicular equation owns N.

9. **gravity keeps working through the deflection**

   The weight descends h plus the whole compression.

10. **separation speed to approach speed**

    Speeds at the contact, not energies.