Teacher Answer Key

Case Study

1. The rested brick delivered only its weight — a static load within the platform's rating. The dropped brick converted gravitational potential energy into kinetic energy, arriving with velocity that multiplied the delivered force several-fold, exceeding the rating. Same mass, different physics.
2. Keisha grasped that once the upper block moved, dynamic amplification made floor-by-floor failure inevitable — each floor was hit by a moving mass far exceeding its static design load, then joined the falling mass. That is why modern codes focus on preventing the first failure rather than surviving a collapse in progress.

Multiple Choice

1. B
2. C
3. A

Matching

1-C, 2-D, 3-E, 4-A, 5-B

Fill-in-the-Blank

1) 1,100, 2) columns, 3) seconds

Short Answer (Sample Responses)

Q1: Impact severed columns (loads redistributed through the tube frame), destroyed sprinklers, and stripped fireproofing. Fires then heated bare steel past 1,100°F, halving its strength; sagging trusses pulled perimeter columns inward until they buckled, releasing the upper block — converting potential energy to kinetic and beginning progressive collapse.

Q2: Free fall would mean zero resistance; the measured 11-13 seconds shows each floor briefly resisted, absorbing energy as it failed — consistent with progressive collapse and inconsistent with claims of pre-cleared floors. The resistance shattered concrete, which is why the collapse produced the enormous dust cloud.

Q3: Answers will vary. Strong pairs: impact-resistant fireproofing (keeps steel below its strength-loss range when insulation would otherwise be scoured off) and hardened, wider stairwells or robust cores (preserve egress and prevent local failure from cascading — attacking progressive collapse at its starting point).