Solutions

2.1

- $mg(h + x) = \tfrac{1}{2}kx^2$ - gravity keeps working through the deflection x.
- $1800x^2 = 29.43(1.20 + x)$ gives $x = 0.1485$ m.

2.2

- $F = kx = 3600 \times 0.1485 = 534.5$ N.
- $534.5/(3.0 \times 9.81) = 18.16$ g.

2.3

- Released: $mgs\sin 20° = 3.0 \times 9.81 \times 2.00 \times 0.342 = 20.13$ J.
- Friction: $0.25 \times 29.43 \times \cos 20° \times 2.00 = 13.84$ J.
- $KE = 20.13 - 13.84 = 6.30$ J, so $v = \sqrt{2 \times 6.30/3.0} = 2.049$ m/s.

2.4

- Gravity supplies $mg(h+x)$: halving h halves only part of the payment, and x shrinks less than proportionally.

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