Phys 218 – Spring 2018
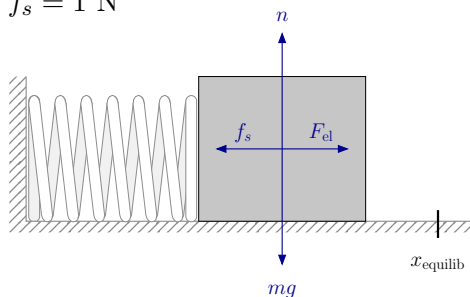## All *University Physics* Sections

Exam II

Short Answers: A) $f_s = 1$ N   [LO 21.1, 25.2, 29.2]

[LO 23.1, 25.1, 26.1, 29.1]

B) a) F_{el} – positive work since $\vec{F}$ and $\vec{s}$ are parallel   [LO 32.1]

F_{grav} – negative work since weight and $\vec{s}$ have vertical components   [LO 32.2]
that are anti-parallel

f_k – negative work since friction is opposite the direction of $\vec{s}$ [LO 32.3]

n – no work since $\vec{n}$ is perpendicular to $\vec{s}$ [LO 32.4]

b) F_{el} – elastic forces are conservative   [LO 36.1]

F_{grav} – gravity is conservative   [LO 36.2]

f_k – friction is non-conservative   [LO 36.3]

c) $K_{max} = \frac{1}{2}k\Delta x^2$ [LO 38.1, 39.1]

C) (a) i. A [LO 44.1]

ii. G [LO 44.2]

iii. A [LO 44.3]

(b) B and E are stable, C is unstable   [LO 42.1, 42.2, 42.3]

(c) i. 5 m $\leq x \leq 7$ m   [LO 43.1]

ii. 4 m $\leq x \leq 8$ m   [LO 43.2]

iii. 0.5 m $\leq x \leq 9.5$ m   [LO 43.3]
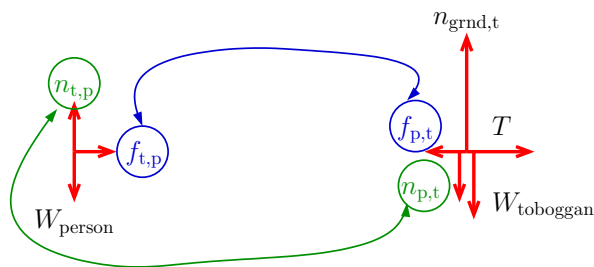
Problem 1: (a)   [LO 22.1, 22.2, 23.2, 23.3, 24.1,
26.2, 26.3, 26.4, 29.3, 29.4]

(b) $f_{t,p} = 150$ N   [LO 21.2, 29.5]

Problem 2: (a) $v = \sqrt{gL}$ [LO 1.1, 3.1, 34.1, 38.2, 40.1]

(b) $T = 2Mg$ [LO 3.2, 18.1, 21.3, 23.4, 24.2]

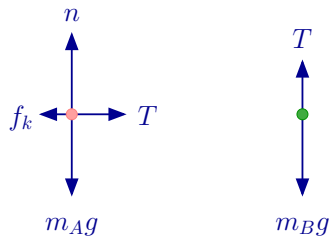(c) $\phi = \cos^{-1}\left(\frac{\frac{1}{2}L - d}{L - d}\right)$ [LO 3.3, 38.3, 40.2]

(d) Since $W = \int \vec{F} \cdot d\vec{s}$, and T is perpendicular to $\vec{s}$, tension does   [LO 24.3, 32.5]
no work

Problem 3: (a) $D = \sqrt{\frac{m}{k} \left[v_0^2 + 2g(L \sin\theta - h) \right]}$ [LO 1.2, 3.4, 34.2, 38.4, 38.5, 40.3]

(b) $a_{\max} = \sqrt{\frac{k}{m} \left[v_0^2 + 2g(L \sin\theta - h) \right]}$ [LO 21.4, 25.3]

(c) $W_{\text{fric}} = -\frac{1}{2}m(v_0^2 gL \sin\theta)$ [LO 28.1, 38.6, 39.2]

Problem 4: (a)   [LO 23.5, 23.6, 24.4, 26.5, 28.2, 28.3, 32.6]

(b) $W_{\text{grav}} = +10$ J   [LO 32.7, 38.7]

(c) $K_f = +9$ J   [LO 39.3]

(d) $v_f = 3$ m/s   [LO 3.5, 34.3]