Solutions

Each answer shows the steps, then the **result**.

2.1

- Static friction acts on a surface that is **not sliding** and adjusts up to a maximum; kinetic friction acts on a **sliding** surface and has a fixed value $\mu_k F_N$

2.2

- $F_N = mg = 50$ N; $f_k = 0.40 \times 50 = 20$ N

2.3

- μ_s is larger (more force is needed to start it moving)

2.4

- it is unchanged — friction does not depend on contact area

3.1 A

3.2 B

3.3

(a)

- $F_N = 40$ N, $f_{s,\max} = 0.50 \times 40 = 20$ N

(b)

- $15 < 20$ N, so it does not move; static friction = 15 N, matching the push