

Solutions

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

2.1

- $f_k = \mu_k N = 0.2 \times 50 = 10 \text{ N}$

2.2

- Opposite to the motion

2.3

- 25 N (static friction matches the applied force)

2.4

- $N = mg = 40 \text{ N}$; $f_k = 0.25 \times 40 = 10 \text{ N}$

3.1 A

- $f_k = \mu_k N$

3.2 B

- static friction adjusts up to a maximum, then slipping begins

3.3

(a)

- $N = 60 \text{ N}$, $f_{s,\max} = 0.5 \times 60 = 30 \text{ N}$

(b)

- $f_k = 0.4 \times 60 = 24 \text{ N}$

3.4

(a)

- $N = 50 \text{ N}$, $f_k = 0.2 \times 50 = 10 \text{ N}$

(b)

- $F_{\text{net}} = 30 - 10 = 20 \text{ N}$; $a = 20/5 = 4 \text{ m s}^{-2}$