

## Solutions

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

### 2.1

- Weight ( $F_W = mg$ , down) and the normal force ( $F_N$ , up)

### 2.2

- take right as positive; friction acts to the left:

$$F_{\text{net}} = F_{\text{push}} - F_f = 20 \text{ N} - 8 \text{ N}$$

- $F_{\text{net}} = \mathbf{12 \text{ N}}$  to the right

### 2.3

- The forces acting *on* the object

### 2.4

- resolve the weight along the slope:

$$F_{W\parallel} = mg \sin \theta = (2 \text{ kg})(10 \text{ m s}^{-2}) \sin 30^\circ$$

- $F_{W\parallel} = \mathbf{10 \text{ N}}$  down the slope

### 3.1 B

- the net force is the vector sum of all forces on the object

### 3.2 B

- all forces acting on the object

### 3.3

(a)

- take right as positive; friction acts to the left:

$$F_{\text{net}} = F_T - F_f = 30 \text{ N} - 12 \text{ N}$$

- $F_{\text{net}} = \mathbf{18 \text{ N}}$  to the right

(b)

- Newton's second law,  $F_{\text{net}} = ma$ :

$$a = \frac{F_{\text{net}}}{m} = \frac{18 \text{ N}}{5 \text{ kg}}$$

- $a = \mathbf{3.6 \text{ m s}^{-2}}$  to the right

### 3.4

(a)

- resolve the weight along the slope:

$$F_{W\parallel} = mg \sin \theta = (4 \text{ kg})(10 \text{ m s}^{-2}) \sin 37^\circ$$

- $F_{W\parallel} = \mathbf{24 \text{ N}}$  down the slope

(b)

- with no friction this component is the net force, so  $ma = mg \sin \theta$ :

$$a = \frac{F_{W\parallel}}{m} = \frac{24 \text{ N}}{4 \text{ kg}}$$

- $a = \mathbf{6.0 \text{ m s}^{-2}}$  down the slope