

Multibody systems answers

1. You feel a force pulling you back because the box exerts an equal and opposite tension force on you through the rope, in accordance with Newton's third law of motion.

2.

- **b)** $a=10\text{m/s}^2$
- **c)** $FT=30\text{N}$

3.

- **a)** $FA=122.5\text{N}$
- **b)** $FT=35\text{N}$

4.

- **b)** $a\approx 6.58\text{m/s}^2$
- **c)** $FT\approx 13.16\text{N}$

5. (Assuming a coefficient of friction $\mu=0.2$)

- **2b (with friction):** $a=8.04\text{m/s}^2$
- **2c (with friction):** $FT=30\text{N}$
- **Bonus 3a (with friction):** $FA=191.1\text{N}$
- **Bonus 3b (with friction):** $FT=54.6\text{N}$

6.

- **a)** $a=3.92\text{m/s}^2$
- **b)** $FT=47.04\text{N}$

7. $m=8.94\text{kg}$

8.

- **a)** $a=0.89\text{m/s}^2$
- **b)** $FT=106.91\text{N}$

9. $m=39.13\text{kg}$